INSTRUCTION MANUAL

Integrating

Sound Level Meter

NL-06

RION CO., LTD.

3-20-41 Higashimotomachi, Kokubunji, Tokyo 185-8533, Japan

Organization of the Documentation

The documentation for the integrating sound level meter NL-06 consists of the three manuals listed below.

- Instruction Manual (this manual)

  Explains operation of the noise level meter NL-06. The manual also explains how to connect and use peripheral equipment such as a level recorder or printer, and how to use the memory card feature.

- Serial Interface Manual

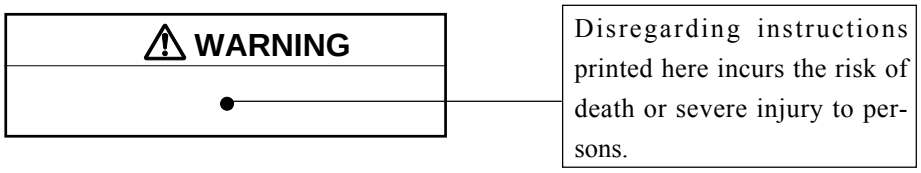
  Describes communication with a personal computer using the integrated RS-232-C interface of the NL-06. Transfer protocols, commands for controlling the sound level meter, format of sound level meter output data etc. are explained.

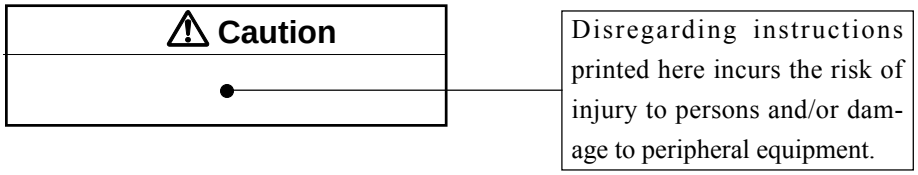
- Technical Notes

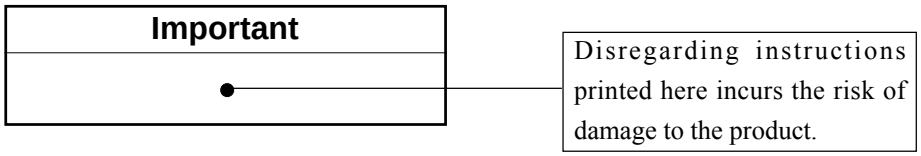
  Gives technical background information about circuit configuration and performance characteristics of the sound level meter, microphone principles and performance, influence of extension cables and windscreen on the measurement and other topics.

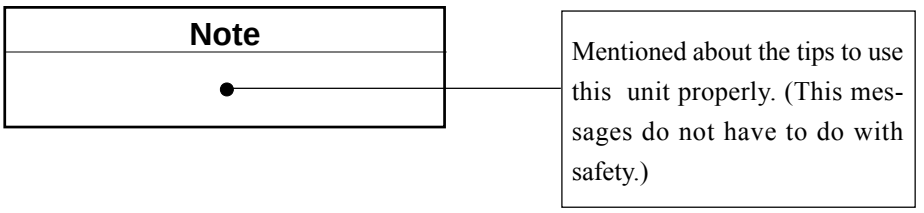
FOR SAFETY

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









Precautions

- Operate the unit only as described in this manual.

- Protect the unit from shocks and vibration. Be especially careful not to touch the delicate microphone diaphragm to avoid damage. The diaphragm is a very thin metal film which can easily be damaged.

- Ambient conditions for operation of the unit are as follows: temperature range -10 to +50ºC, relative humidity 30 to 90%.

  Protect the unit from water or dust, extreme temperatures or humidity, and direct sunlight during storage and use. Also avoid air with high salt or sulphur content, gases, and the vicinity of stored chemicals.

- Always turn the unit off after use. Remove the batteries from the unit if it is not to be used for a long time. When disconnecting cables, always grasp the plug and do not pull the cable.

- Clean the unit only by wiping it with a soft, dry cloth or, when necessary, with a cloth lightly moistened with water. Do not use any solvents, cleaning alcohol or cleaning agents.

- Do not try to disassemble the unit. In case of an apparent malfunction, do not attempt any repairs. Note the condition of the unit clearly and contact the supplier.
- To ensure continued precision, have the unit checked and serviced at rebular intervals. When using the unit for commercial purposes or for calibration, official certification is required every three years. Contact the supplier or an authorized Rion service station.

Contents

Quantifier Notation of NL-06, International Standards and JIS
(Excerpts from ISO 1996, 3891, IEC Pub.804, JIS Z 8202, 8731)

NL-06 notation	Description	Frequency weighting	ISO notation	IEC notation	JIS notation
LP	Sound pressure level	Flat	L_p	—	L_p
LA	A-weighted sound pressure level	A	L_{pA}	—	L_A
LC	C-weighted sound pressure level	C	—	—	—
LPEq	Equivalent continuous sound pressure level	Flat	—	—	—
LAEq	Equivalent continuous A-weighted sound pressure level	A	$L_{Aeq,T}$	$L_{Aeq,T}$	$L_{Aeq,T}$
LCEq	Equivalent continuous C-weighted sound pressure level	C	—	$L_{Ceq,T}$	—
LPE	Sound exposure level	Flat	—	—	—
LAE	A-weighted sound exposure level	A	L_{AE}	$L_{EA,T}$	L_{AE}
LCE	C-weighted sound exposure level	C	—	—	—
L_{AX} LA5	Percentile A-weighted sound pressure level	A	$L_{AN,T}$ $L_{A5,T}$	—	L_X L_5
L_{AX} LA10			$L_{A10,T}$	—	L_{10}
L_{AX} LA50			$L_{A50,T}$	—	L_{50}
L_{AX} LA90			$L_{A90,T}$	—	L_{90}
L_{AX} LA95			$L_{A95,T}$	—	L_{95}
LAmx	Maximum A-weighted sound pressure level	A	—	—	—
LAmn	Minimum A-weighted sound pressure level	A	—	—	—

Outline

The integrating sound level meter NL-06 is designed for sound pressure level measurements complying with IEC and JIS standards. In addition to conventional sound pressure level measurements, the NL-06 can measure the following parameters:

- Equivalent continuous sound pressure level L_{eq}
- Sound exposure level L_E
- Maximum level L_{max}
- Minimum level L_{min}
- Percentile level L_x (five selectable settings)
- Instantaneous Sound Pressure Level L_p

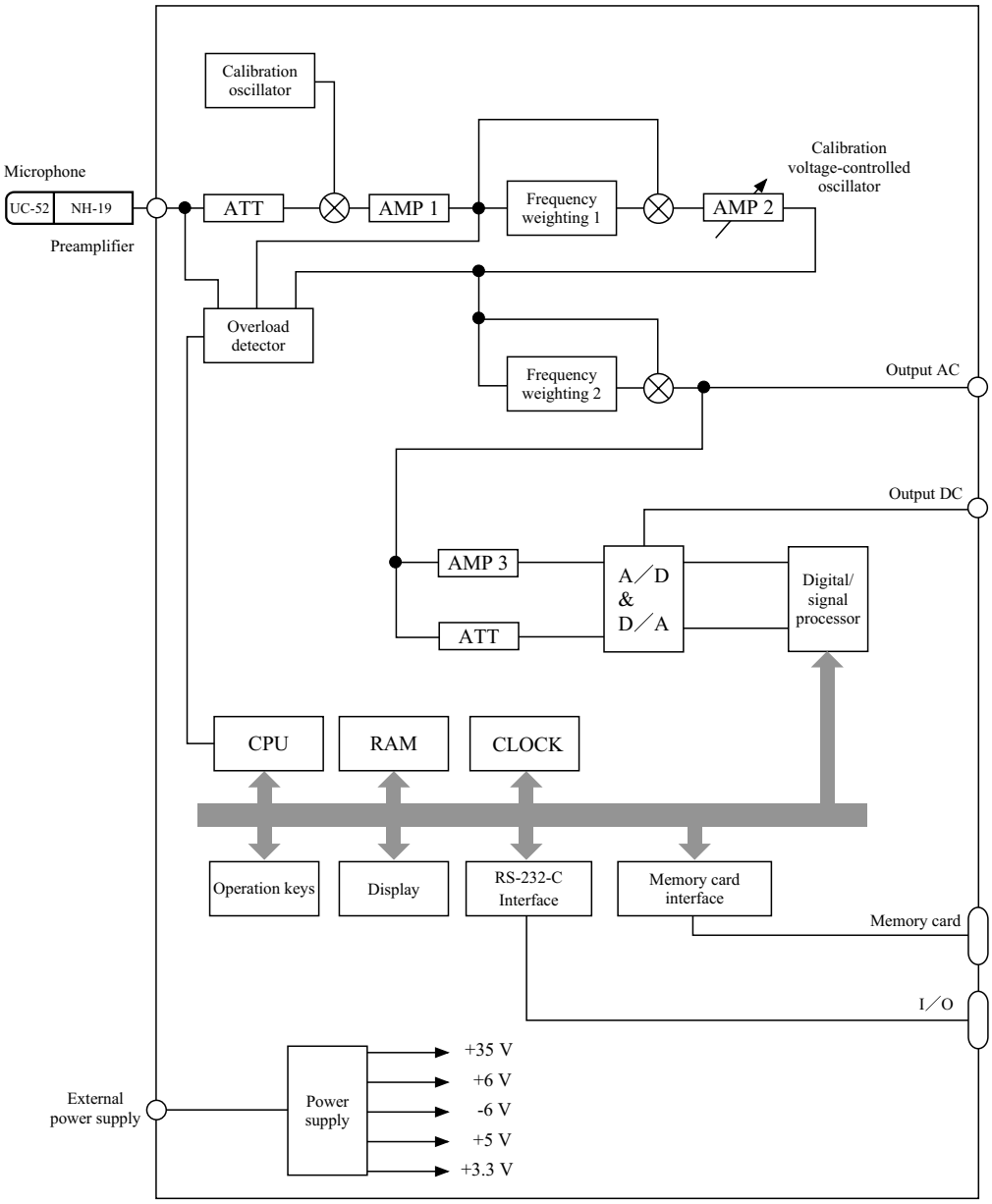
Measurement settings and measurement values (level indication and bar graph) are shown on a backlit LCD panel.

Measurement data (noise level, sound pressure level processed values, measurement settings, etc.) can be stored in the internal memory. The serial interface allows sending measurement data to a printer or computer.
Using optional memory cards, measurement data can be stored for later processing on a computer.

The following options are available:

- Printer CP-11
  For printout of measurement data (including data stored in memory)
- Level recorder LR-06, LR-07
  Allows recording noise level changes over time.

NL-06 Block Diagram

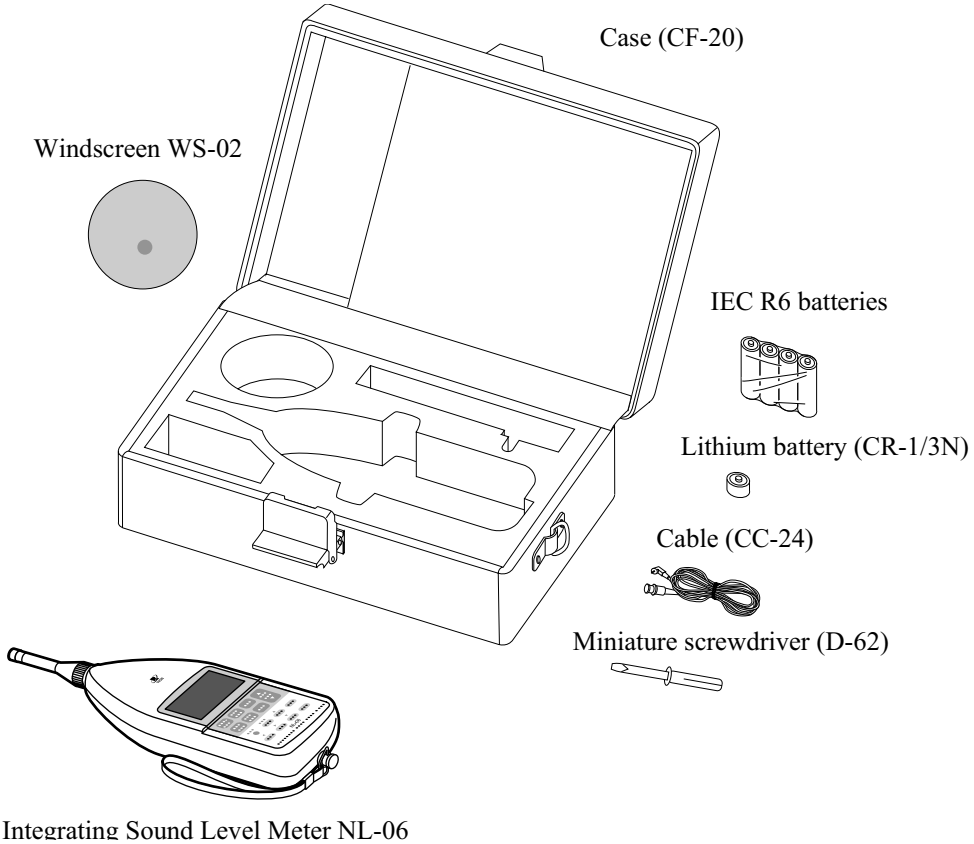


Panel Explanation

Carrying Case and Accessories

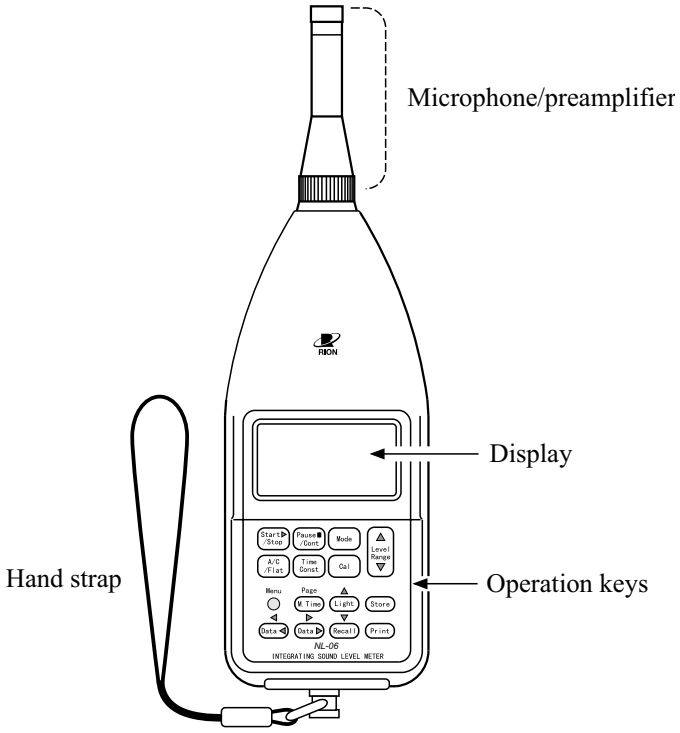
The unit is supplied with the parts listed below. Verify that all parts are complete and that there is no damage. If any parts are missing or damaged, please contact the supplier or an authorized Rion service station.

Name	Model	Q'ty
Windscreen	WS-02	1
Cable	CC-24	1
Miniature screwdriver	D-62	1
IEC R6 batteries		4
Lithium battery	CR-1/3N	1
Case	CF-20	1
Instruction manual		1 set



Integrating Sound Level Meter NL-06

Front Panel



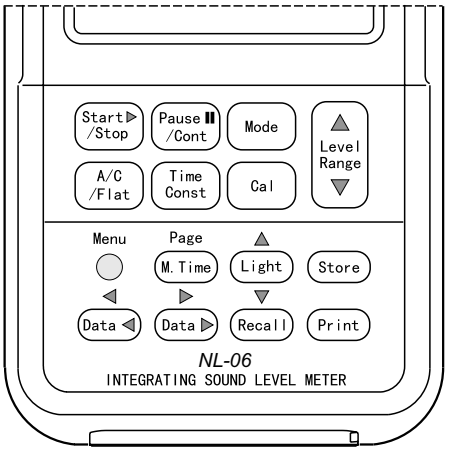
Microphone/preamplifier

The microphone and preamplifier are configured as an integrated assembly. The assembly can be removed from the sound level meter and connected via an optional extension cable, for measurements a distance.

Display

This backlit display shows the sound pressure level as a numeric reading and a bar graph representation. The display also shows the operation mode of the sound level meter, the selected measurement parameters, warning indications etc.

Operation keys



Start/Stop key

Press to start and to terminate the sound pressure level measurement (including the various processing functions). The key is also used to store data in memory (auto 1, auto 2).

Pause/Cont key

During a measurement, this key can be used to exclude unwanted portions from processing. Pressing the key again causes processing to be resumed.
It is also possible to use the key for excluding (back- erasing) a 3-second or 5-second interval before the key was pressed (see page 62).

Mode key

This key is used for reading the measurement results. With each push of the button, the display format is switched according to the processing types selected from the menu.

Level Range keys

Serve to select the level range for the measurement. The following 7 range settings are available.
20-80, 20-90, 20-100, 20-110, 30-120, 40-130, 50-140 dB

A/C/Flat key

Sets frequency weighting to A, C or Flat.

Time Const key

Sets time weighting to Fast, Slow.

Cal key

Pressing this key activates the built-in oscillator for electrical calibration of the NL-06 or for level matching of the NL-06 and connected equipment.

Menu key

When this key is pressed, the menu screen for setup of measurement parameters appears on display. Pressing the key again switches the display back to the original condition.

Keys with the same blue color (Page, ▲, ▼, ◀, ▶) become active when this key is pressed.

Page key

Switches between menu pages.

▲, ▼, ◀, ▶ keys

Serve for changing settings and performing other functions.

M.Time key

Serves to set the measurement time. With each push of the key, the measurement is switched in the sequence shown below.

No indication (arbitrary measurement time) → 1 s (second) → 3 s → 5 s → 10 s → 1 m (minute) → 5 m → 10 m → 15 m → 30 m → 1 h (hour) → 8 h → 24 h → no indication

Light key

Turns on the display backlight for easier viewing in dark locations. Pressing the key again turns the backlight off.

Store key

Serves to store instantaneous data and processing results in the memory.

Data ◀, Data ▶ (Data No) keys

When display shows the measurement screen, these keys select the data number in which data are to be stored next.

When display shows data from memory, the keys select the stored data number to be displayed.

Recall key

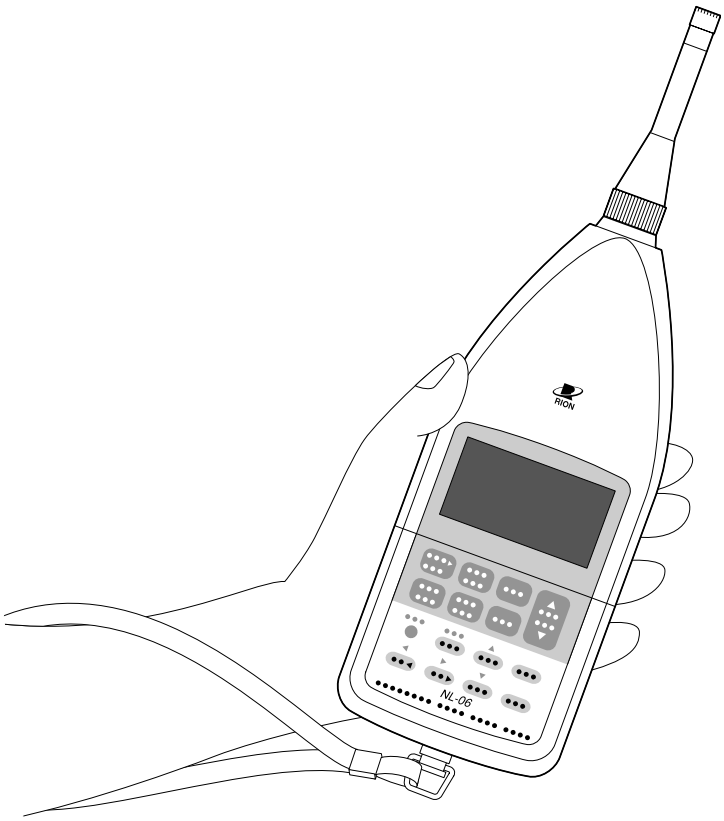
Serves to recall data stored in the memory of the unit.

Print key

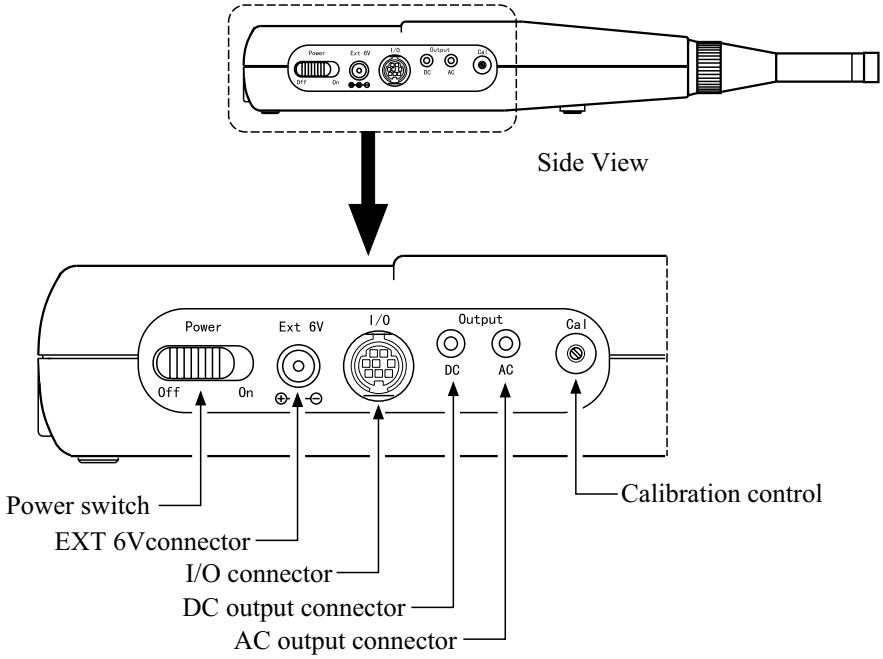
When the optional printer CP-10 or CP-11 is connected, pressing this key initiates a printout.

Hand strap

Makes the unit easy to carry and hold on your palm.



Side Panel



Power switch

This sliding switch serves to turn the unit on and off.

Ext 6V connector

The optional AC adapter NC-34 series can be connected here for powering the unit from an AC outlet.

Important
Use only the specified AC adapter NC-34 series. Using any other adapter can lead to damage.

I/O connector

Serves for input and output of control signals and measurement data. A printer, level recorder, computer or similar equipment can be connected here.

DC output connector

A DC signal corresponding to the sound pressure level is available at this output.

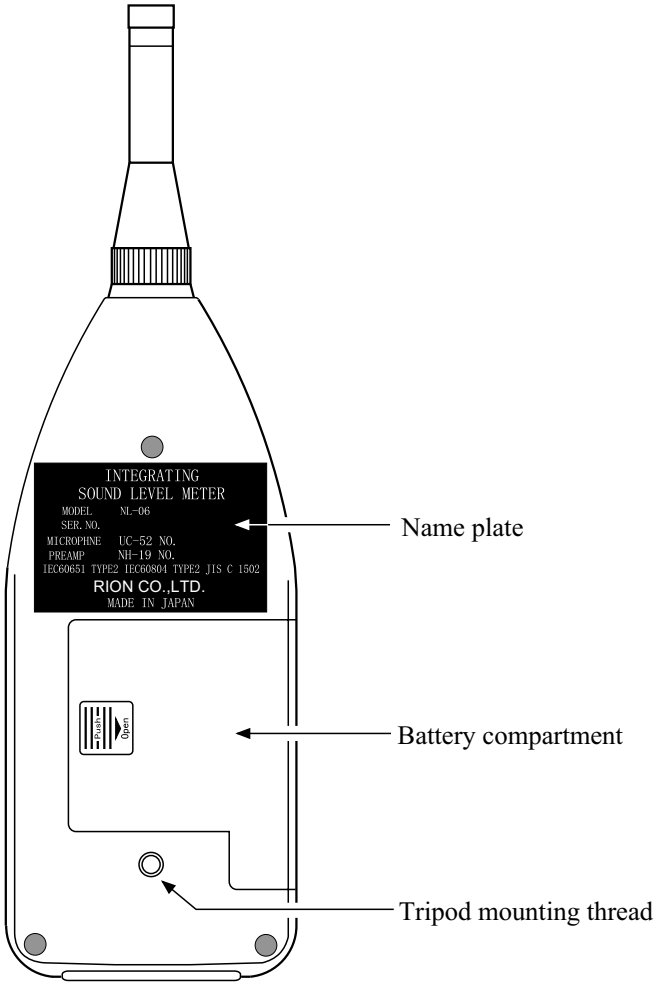
AC output connector

An AC signal (with frequency weighting) corresponding to the sound pressure level is available at this output.

Calibration control

Serves to carry out calibration, using the supplied miniature screwdriver.

Back panel



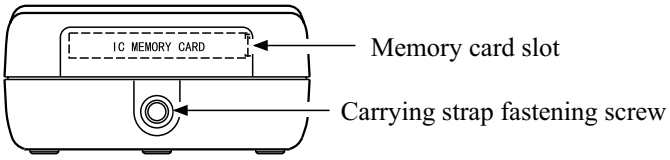
Battery compartment

The supplied backup battery and the four batteries (IEC R6) are inserted here.

Tripod mounting thread

The unit can be mounted on a camera tripod using this thread.

Bottom Side



Memory card slot

Optional memory cards can be inserted here.

Carrying strap fastening screw

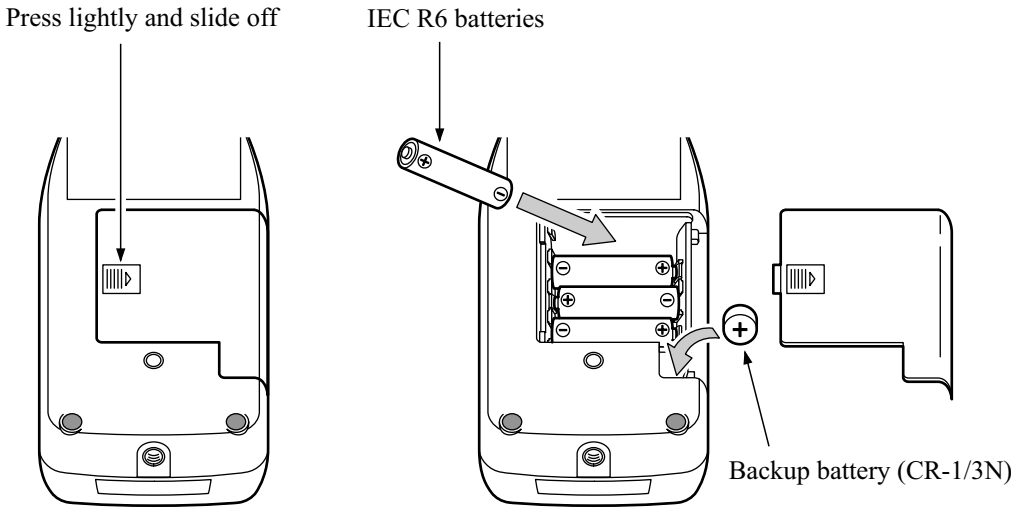
Serves to attach the carrying strap.

Preparations

Backup Battery (Lithium Battery)

After setting the power switch to Off, insert the supplied backup battery (CR-1/3N) into the battery compartment, as described below.

1. Lightly press the cover of the battery compartment and slide it to the right.
2. Insert the backup battery, paying attention to the polarity as indicated in the compartment.
3. Replace the cover.



Important
The life of the backup battery is about two years. To be on the safe side, you should replace the battery every 1 to 1-1/2 years. The backup battery serves to maintain stored data and to power the internal clock. Since this is not mandatory for measurements, the unit can be operated also without the backup battery.

Power Supply

Set the power switch to Off before inserting the batteries or connecting the AC adapter.
The unit can be powered by four IEC R6 (size AA) batteries (alkaline or manganese) or by the optional AC adapter NC- 34 series.
It is possible to use rechargeable batteries, but a separate recharger must be provided for such batteries, since the NL-06 and its AC adapter are not designed to recharge batteries.
Set the power switch to Off before inserting or replacing batteries or connecting the AC adapter.

Note
When the AC adapter is connected, the unit is powered from the adapter, also when batteries are inserted.

Inserting the batteries

1. Lightly press the cover of the battery compartment and slide it to the right.
2. Insert the four IEC R6 batteries, paying attention to the polarity as indicated in the compartment.
3. Replace the cover.

The life of a set of batteries depends on usage conditions and various other factors. Some reference values are shown below.

	Continuous use
Alkaline batteries	approx. 24 hours
Manganese batteries	approx. 11 hours

When display backlighting is used, battery life will be about one-third of the above values.

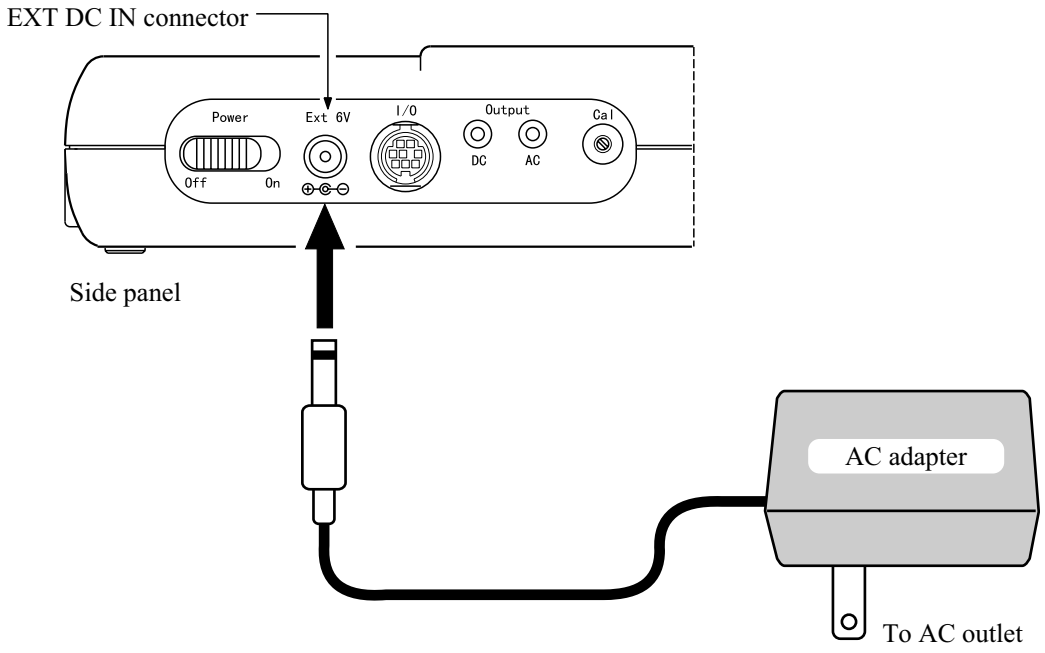
Battery life will be about 10% shorter when the calibration feature and DC output is used.
Battery life will be about 15% shorter when the I/O terminal is connected.

Important
Take care not to reverse the (+) and (-) polarity when inserting the batteries. Always replace all four batteries together. Do not mix old and new batteries or batteries of different type. Remove the batteries from the unit, if the unit is not to be used for a month or longer.

AC adapter

Connect the AC adapter as shown below.

NC-34: for 100 VAC
NC-34A: for 120 VAC
NC-34B: for 220 VAC

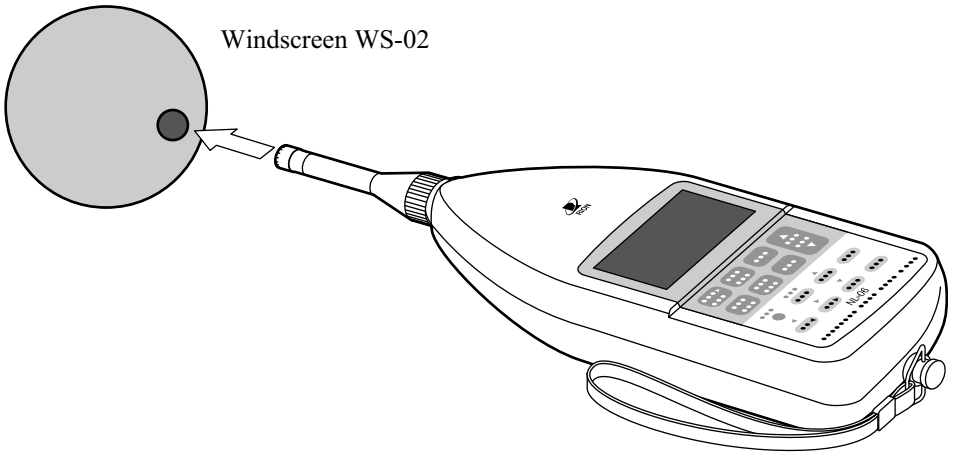


Note
Use only the specified AC adapter NC-34 series. Using any other adapter can lead to damage.

Windscreen (WS-02)

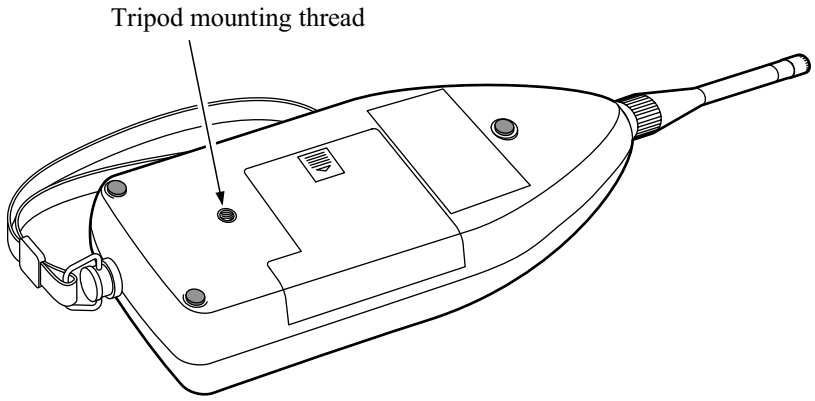
When making outdoor measurements in windy weather or when measuring air conditioning equipment or similar, wind noise at the microphone can cause measurement errors. To prevent this, you should use the supplied windscreen WS-02 in such cases.

For details on the effect of the windscreen upon the measurement, please refer to the Technical Manual.



Tripod Mounting

For long-term measurements, the unit can be mounted on a camera tripod. Proceed carefully, to avoid dropping the unit or tipping over the tripod.



Memory Cards

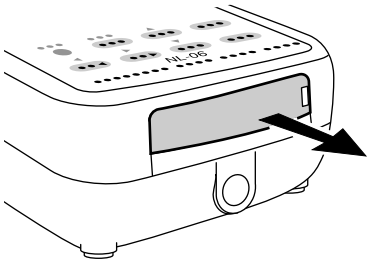
Data stored in the memory of the unit can be copied to a memory card (ADV-CF4M, capacity 4 megabytes), for later data processing on a computer.

Inserting a memory card

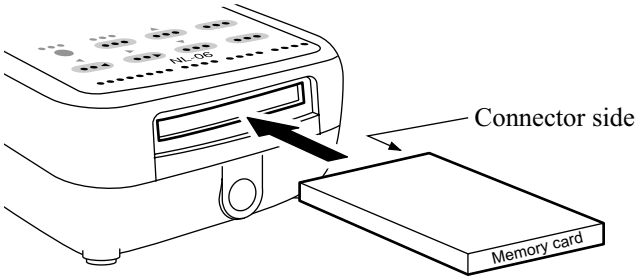
1. Remove the rubber cover from the memory card slot.
2. Insert the memory card.
   Make sure that the card orientation is correct, and push the card in carefully until it stops.

   For details on how to copy measurement data to the memory card, please refer to page 98.

Important
Use only memory cards sold by Rion Corporation. Using other memory cards may cause malfunction or failure.



Remove the card rubber cover.



Microphone Extension Cables (EC-04 series)

Set the power switch to Off before connecting or disconnecting the microphone. To reduce measurement deviations due to refraction effects and the acoustic influence of the operator, the microphone can be detached from the unit and connected via an extension cable. Available cables are listed in the table below. It is also possible to connect several cables in series.

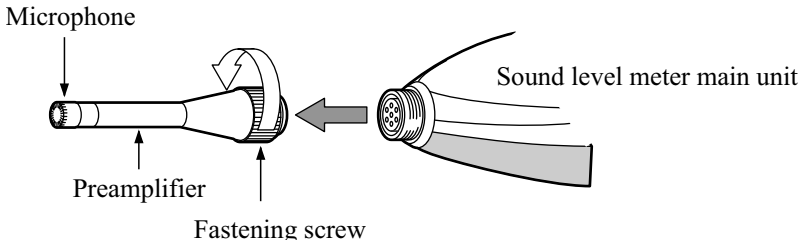
Type	Length	Type	Length
EC-04	2 m	EC-04C	30 m
EC-04A	5 m	EC-04D	50 m
EC-04B	10 m	EC-04E	100 m

Important

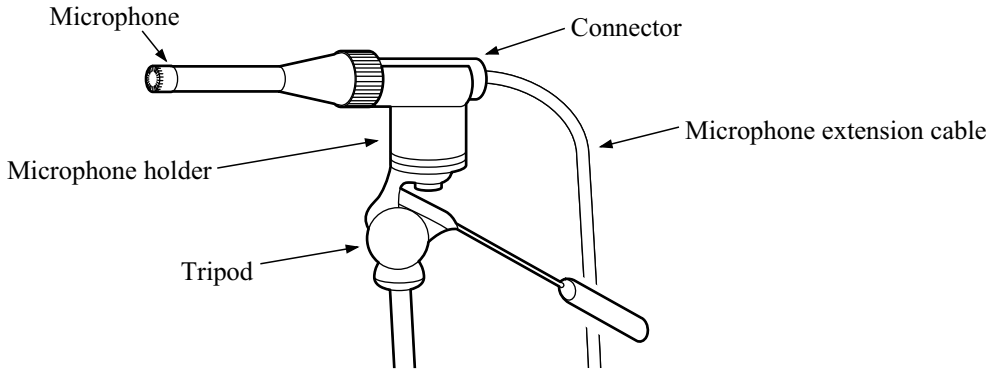
With long extension cables, the cable capacitance restricts the upper measurement frequency and measurement level. For details, please refer to the Technical Manual.

1. Loosen the preamplifier fastening screw and remove the preamplifier from the main unit.

Important
Do not separate the microphone and preamplifier, because this can lead to damage.

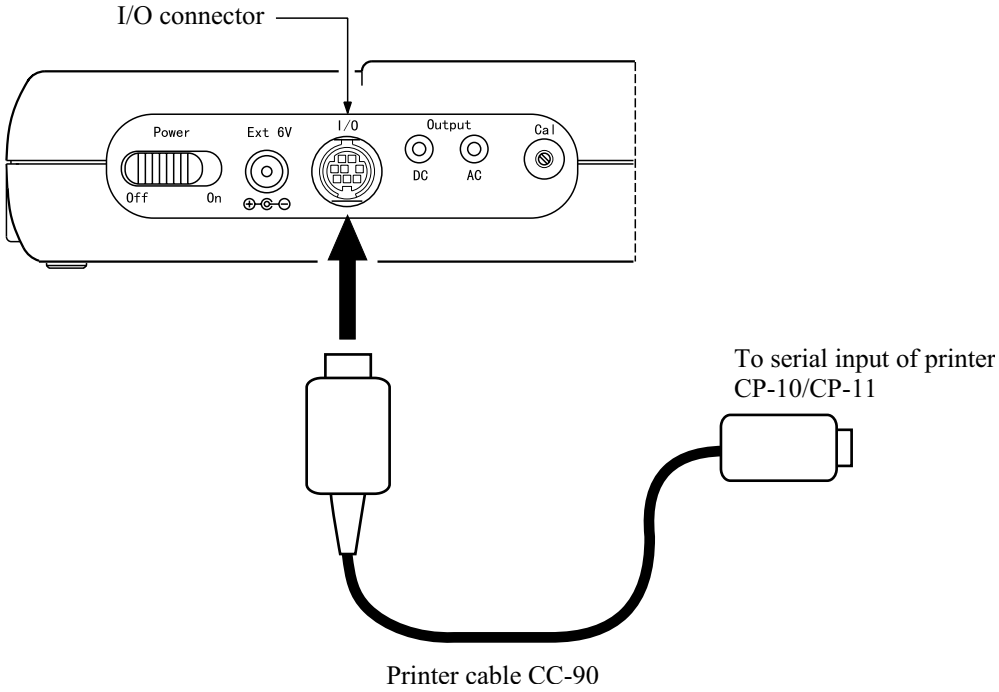


2. Connect the extension cable to the preamplifier and to the main unit and fasten the connectors with the fastening screw.
3. When mounting the microphone on a tripod, first fasten the microphone holder (supplied with the extension cable) to the tripod. Then insert the extension cable connector into the microphone holder.



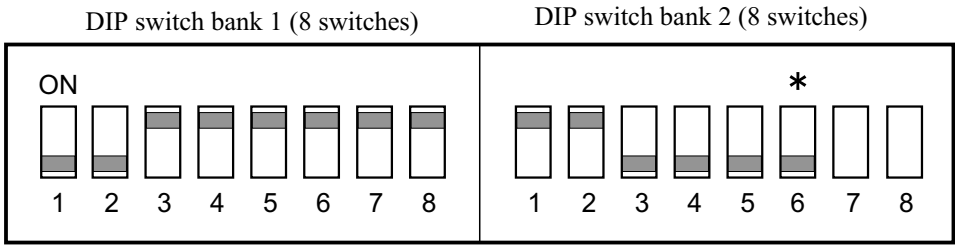
Connection of a Printer (CP-10, CP-11)

The I/O port on the side of the unit can be used for connection of an optional printer (CP-10, CP-11). Use the separately available printer cable CC-90 to connect the I/O port of the NL-06 to the serial input of the printer. Set the power switch to Off before making this connection.

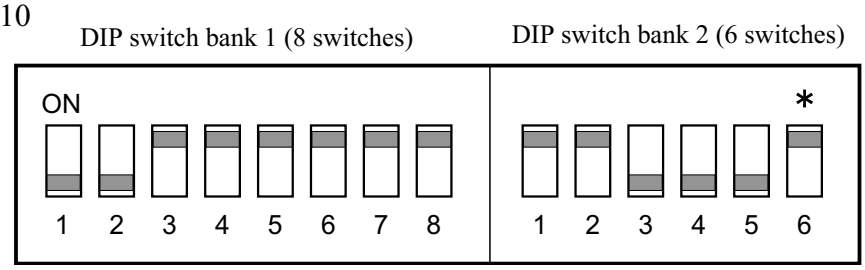


Set the DIP switches of the printer as follows.

CP-11



CP-10

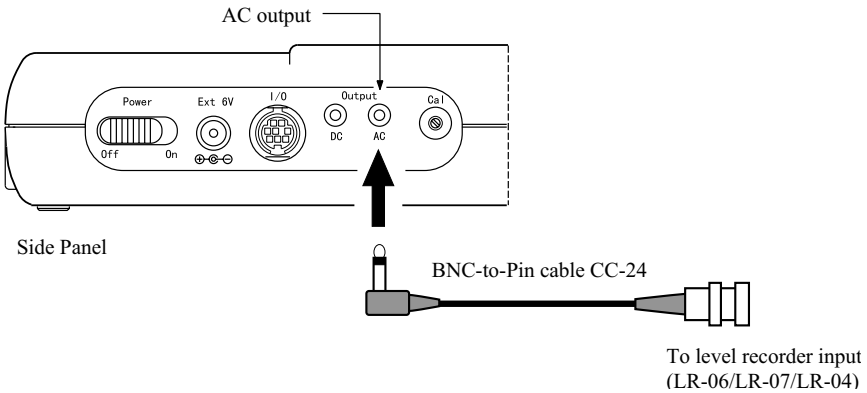


Important
The switch marked with an asterisk (switch 6 of DIP switch bank 2) serves for setting the data transfer speed. The ON position means 4800 bps and the OFF position 9600 bps. This setting must match the setting of the NL-06 (see page 37, I/O port transfer rate). The unit does not support 19200 bps. Switches 7 and 8 of DIP switch bank 2 of printer CP-11 are set at the factory and should not be changed. Otherwise, correct printing may not be possible.

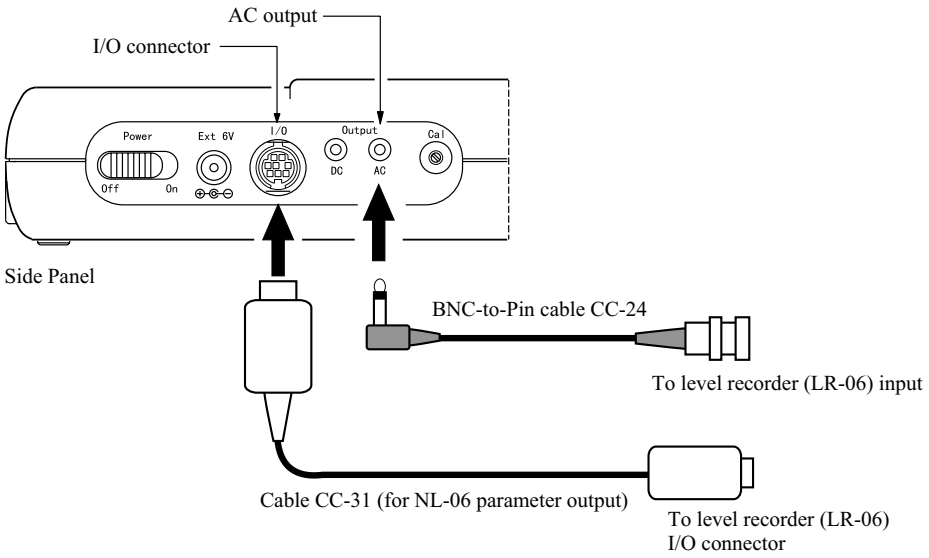
Connection of a Level Recorder (LR-04, LR-06, LR-07)

Sound pressure level recording

Connect the AC output on the side of the NL-06 to the level recorder, as shown below.



When the LR-06 is used, measurement settings of the NL-06 (level range, frequency weighting, filter unit center frequencies) can also be printed out. For this purpose, connect the NL data transmission cable CC-31 as shown below.



Connection to a Computer

Use the optional interface cable to connect the I/O port of the NL-06 to the RS-232-C interface of the computer.

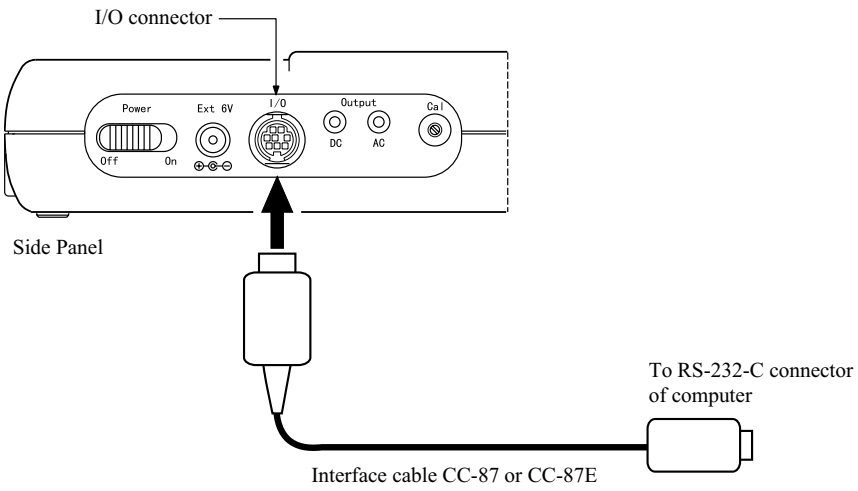
Two types of interface cables are available. Choose the type that matches the connector on the computer.

- 25-pin (male connector) type: CC-87
- 9-pin (female conncetor) type: CC-87E

The computer-side connector on the CC-87 cable is a DB-25PN-N/DB-C2-J9 (Japan Aviation Electronics) and on the CC-87E cable is a HDEB-9S/HDE-CTH (Hirose Electric).

In some cases, a cable adapter is required for connection to a computer.

Set the power switch to Off before making this connection.



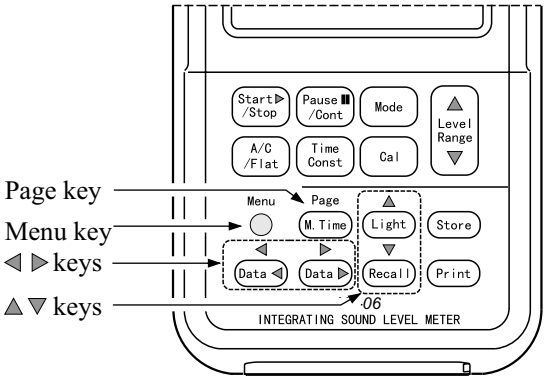
Setting the Date and Time

The NL-06 incorporates a clock which allows recording the date and time along with measurement data.

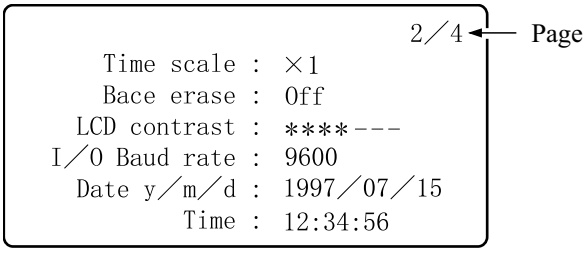
Note
The clock will stop if the power is turned off and no backup battery is inserted.

Set the date and time as described below.

1. Set the power switch on the side of the unit to On.
2. Press the Menu key.



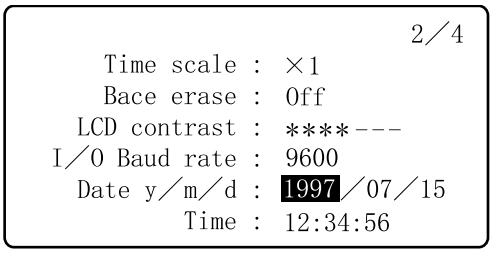
The menu screen appears on display.



Menu screen (2/4)

3. Press the Page key so that the indication 2/4 is shown in the top right corner of the screen.

4. The lower two items are for setting the date and time.
   Use the ▲ and ▼ key to move the highlight (field shown in reverse) to the lower two items, and use the ◀ and ▶ keys to set the current date and time.



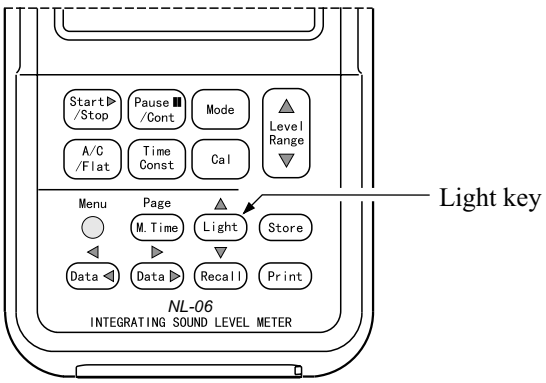
Menu screen (2/4)

5. Press the Menu key to return to the measurement screen.
   The date and time are shown at the top left of display. Verify that the settings are correct.

Using the Display Backlight

Pressing the Light key turns the display backlight on, making the indications easier to read in dark locations. Press the Light key once more to turn the backlight off.

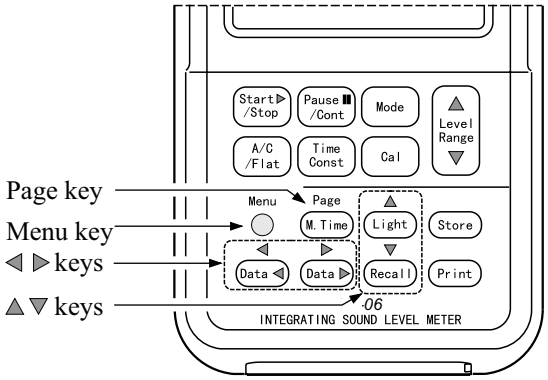
When display backlighting is used, battery life will be reduced to about one-third.

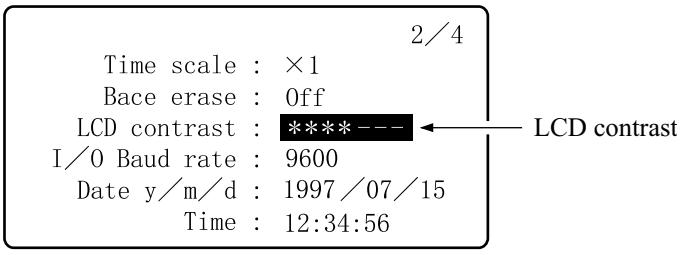


Display Contrast

The contrast of display can be adjusted, as described below.

1. Press the Menu key.
   The menu screen appears on display.





Menu screen (2/4)

2. Press the Page key to call up measurement screen 2/4.

3. Press the ▼ key to highlight the asterisk(*) section of the "LCD contrast" item.
4. Use the ◀ and ▶ keys to adjust the contrast. The number of asterisks increases or decreases accordingly.
5. Press the Menu key to return to the measurement screen.

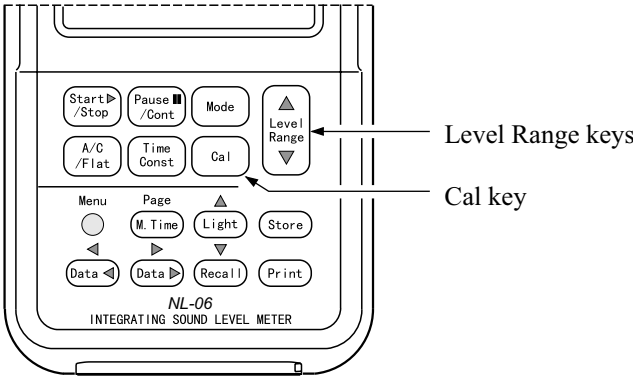
Calibration

Before starting a measurement, the NL-06 must be calibrated. There are two types of calibration, namely electrical calibration and acoustic calibration using a pistonphone. Normally, electrical calibration only is required.

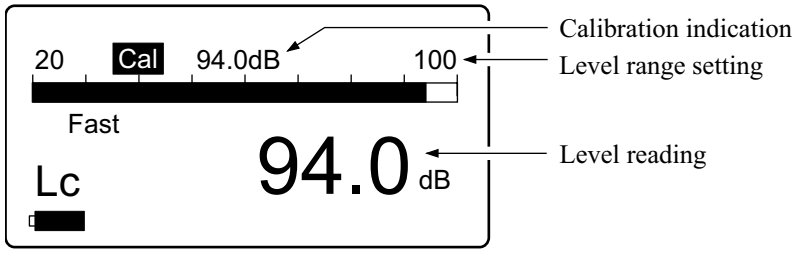
Electrical calibration

This unit has a built-in signal generator (1 kHz, sine wave) that can be used for calibration.

1. Set the power switch on the side of the unit to On.



2. Press the Cal key to activate the calibration screen.
   Set the level range to 20 - 100 dB for calibration.



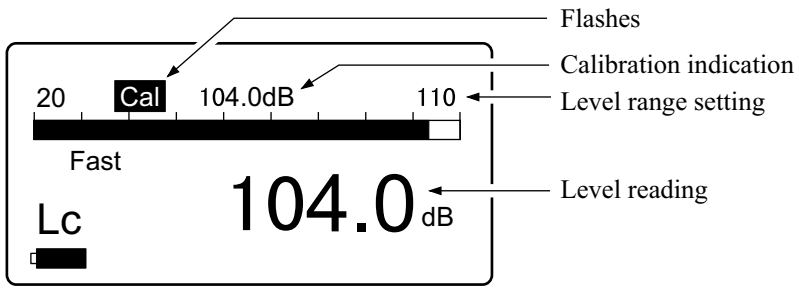
Calibration screen

3. Adjust the calibration control on the side panel with the supplied screwdriver so that the level display shows the calibration value (94 dB).
   Measurement settings automatically become "C" and "Fast" during calibration, but the original settings will be restored when the Cal key is pressed again.

Signal output for external equipment calibration

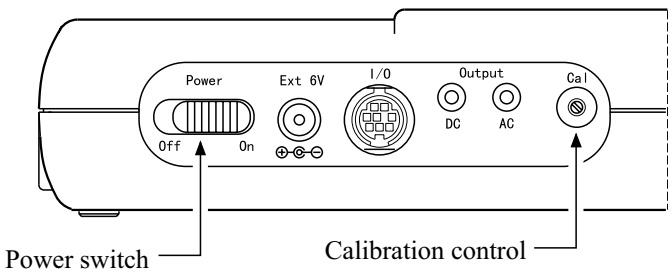
The normal level range setting for calibration is 20 - 100 dB, but for calibration of external equipment, different level range settings can also be selected (using the Level Range keys). In such a case, the "Cal" indication flashes. The calibration value indication always is set to a point 6 dB lower than the maximum value of the level range.

Use the AC output or DC output in this condition to calibrate external equipment.



Calibraiton screen

1. Adjust the calibration control on the side panel with the supplied screwdriver so that the level display shows the calibration value.



2. Press the Cal key again to return to the measurement mode.

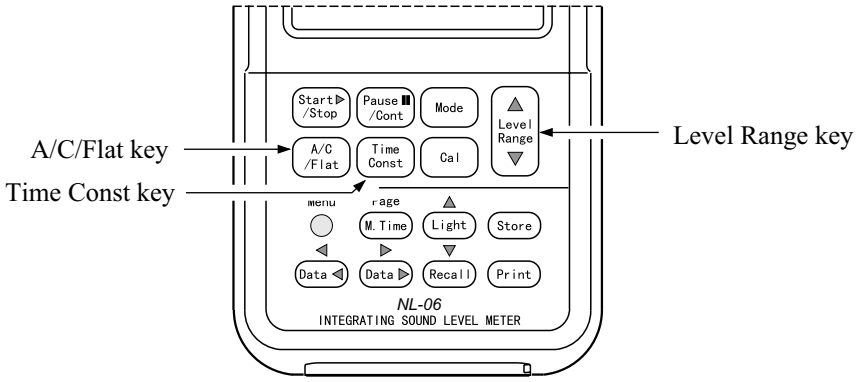
Note
The calibration control is a multi-turn type. The value may not change on one single turn. If a measurement other than instantaneous value is currently in progress (also during pause), as indicated by a flashing triangle in the upper left of the display, calibration cannot be carried out. Wait until the measurement is completed or press the Start/Stop key before initiating calibration.

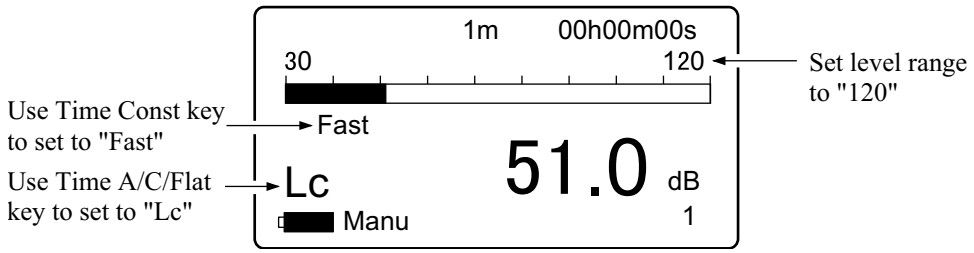
Acoustic calibration with pistonphone

For acoustic calibration, the Rion pistonphone NC-72 is mounted to the microphone of the sound level meter, and adjustment is performed so that the reading of the meter is equal to the sound pressure level inside the coupler.

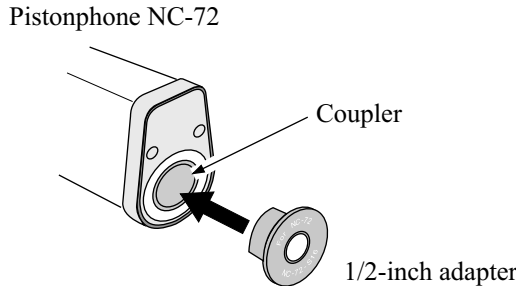
Important
Be very careful when inserting and removing the microphone to and from the coupler, to avoid a sudden pressure buildup which could destroy the diaphragm of the microphone.

1. Turn off the pistonphone.
2. Turn on the NL-06.
3. Use the A/C/Flat key to set frequency weighting to "C" (the display shows "L_C").
4. Use the Time Const key to set the time weighting to "Fast".
5. Use the Level Range keys (▲ or ▼) to set the level range to "120".

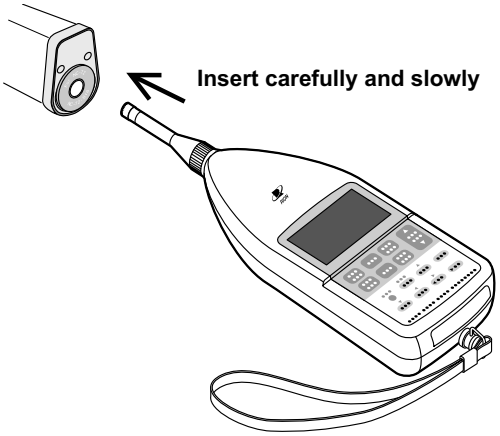




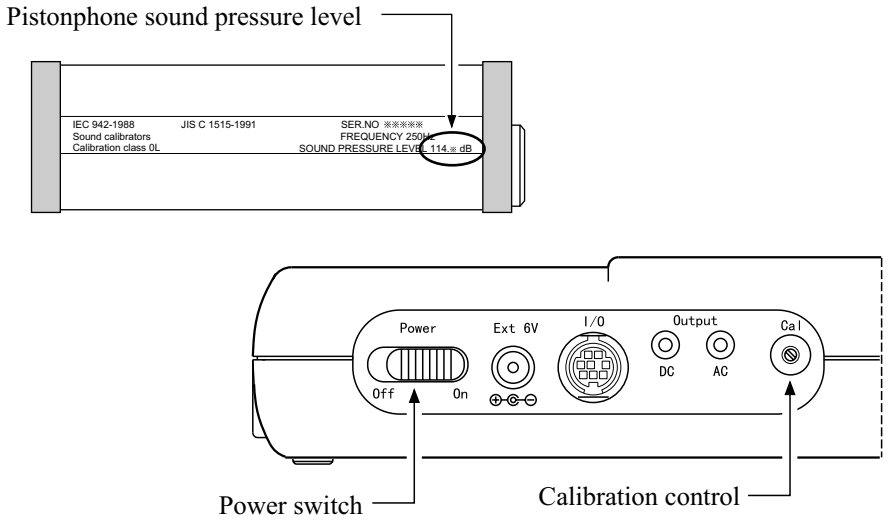
6. Mount a 1/2-inch adapter on the coupler of the pistonphone.

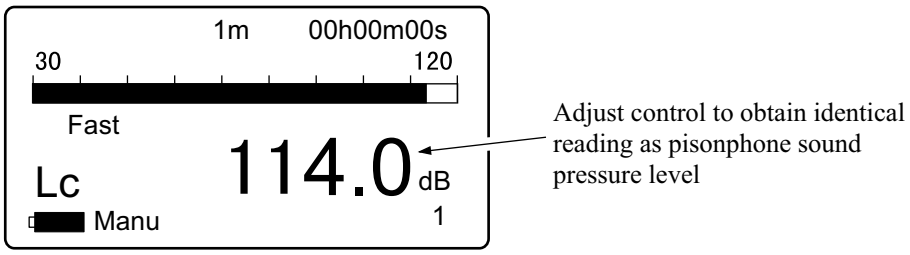


7. Insert the microphone very carefully and slowly all the way into the coupler.



8. Set the power switch of the pistonphone to ON.
9. Adjust the calibration control on the side of the unit with the supplied screwdriver so that the level reading matches the calibration value indicated on the pistonphone.



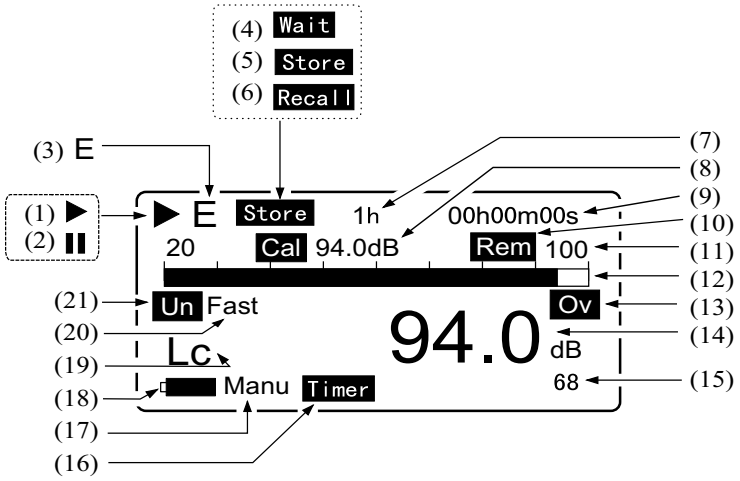


10. Turn off the pistonphone and NL-06.
11. Remove the microphone **very carefully and slowly** from the coupler.

How to Read the Display

Measurement screen

The illustration below shows all possible functions of the display. (In actual operation, not all indicators will light up simultaneously.)
(Character size and display indications may differ on the actual screen.)



Measurement Screen

(1) Measurement symbol (▶)

Flashes (with a 1-second cycle) when a measurement is in progress and when data are stored in memory.

(2) Pause symbol (❚❚)

Appears when a measurement or store operation is being paused. In this condition, the numeric level reading and bar graph indication are not being updated.

(3) Data exclusion indicator

Appears when the data exclusion (back-erase) function (see page 62) is being used.

(4) Wait indicator

When the timer is set, this indication flashes after the Store/Start key is pressed until the actual start of measurement.

(5) Store indicator

Appears when data are being stored in memory. In manual mode, the indicator lights up for about one second. In auto mode, the indicator flashes together with the measurement indicator.

(6) Recall indicator

Appears when data stored in memory are being displayed.

(7) Measurement time indicator

The selected measurement time is shown here. If nothing is shown, the measurement time is arbitrary (controlled by the operator, using the Start/ Stop key).

The following measurement time settings are available:

1 s (second), 3 s, 5 s, 10 s, 1 m (minute), 5 m, 10 m, 15 m, 30 m, 1 h (hour), 8 h, 24 h

(8) CAL indicator

Appears when electrical calibration is being carried out. The displayed value depends on the level range setting.

(9) Elapsed time indicator

Shows the elapsed time of a measurement or store operation. When the time indication exceeds 59 m 59 s (59 minutes 59 seconds), it changes to 01 h 00 m (1 hour 0 minutes).

(10) Remote indicator

Appears when the controls on the unit are inhibited and the unit is being operated under control of a computer.

(11) Level range indicator

Shows the upper and lower limit of the bar graph indication. The level range should be set to a suitable setting for the sound pressure level to be measured.

(12) Bar graph indication

Shows the instantaneous value (updated every 100 ms).

(13) Overload indicator (reverse Ov when instantaneous value is shown)

Appears when overload is detected during instantaneous value display.

(14) Overload indicator (Ov when processed value is shown)

Appears when one or more of the instantaneous value data used for pro-

cessing had overload.

(14) Numeric level reading

Normally, the instantaneous value is shown here. (Updated every 1 second.)

(15) Data number indicator

Shows the data number for the store or recall operation.

(16) Timer indicator

Appears when the timer is On (see description of menu page 1/4).

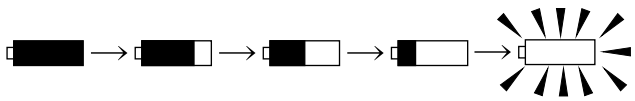
(17) Memory indicators

Show the selected mode for storing data in memory. Three modes are available: Manu (Manual), Auto1, and Auto2.

(18) Battery indicator

When running the unit on battery power, the four segments of this indicator show the remaining battery capacity. The black section becomes smaller as the batteries are used up.

When the entire indicator starts to flash, the batteries are almost exhausted and correct measurement is no longer possible. In this case, immediately replace the batteries with fresh ones.



Flashes

The indicator also is active when the AC adapter is connected.

(19) Frequency weighting indicator

The selected frequency weighting is shown here.

LA: A weighting

LC : C weighting

LP : Flat characteristics

When processing is being used, a third and fourth digit is added to this indication, as follows.

L_{Aeq}, L_{Ceq}, L_{Peq} :	equivalent continuous sound pressure level
L_{AE}, L_{CE}, L_{PE} :	sound exposure level
L_{Amax}, L_{Cmax}, L_{Pmax} :	maximum value

L_{Amin}, L_{Cmin}, L_{Pmin} :	minimum value
L_{A5}, L_{C5}, L_{P5} :	5% percentile sound pressure level
L_{A10}, L_{C10}, L_{P10} :	10% percentile sound pressure level
L_{A50}, L_{C50}, L_{P50} :	50% percentile sound pressure level
L_{A90}, L_{C90}, L_{P90} :	90% percentile sound pressure level
L_{A95}, L_{C95}, L_{P95} :	95% percentile sound pressure level

(20) Time weighting indicator

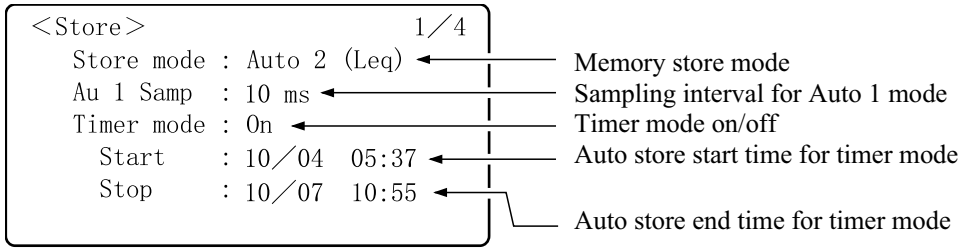
Shows the selected time weighting.

(21) Under-range indicator

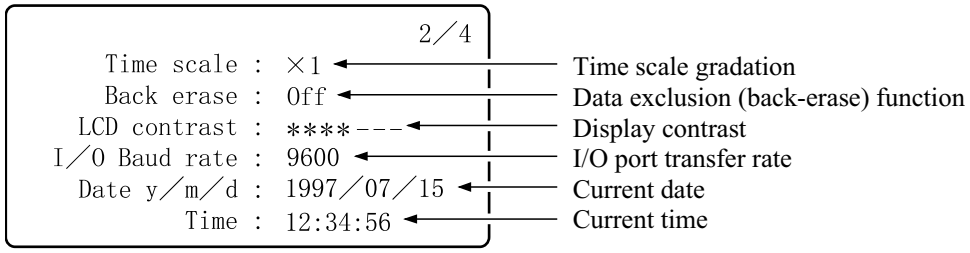
When the instantaneous value level falls to -0.6 dB below the lower limit of the level range, this indicator appears.

Menu Screen

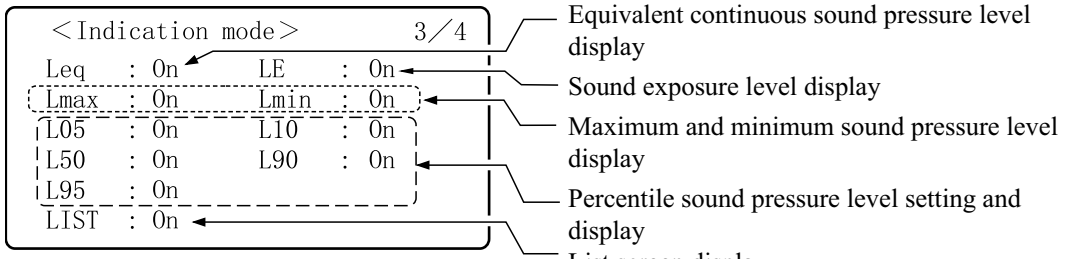
The menu screen has four pages, numbered from 1/4 to 4/4.



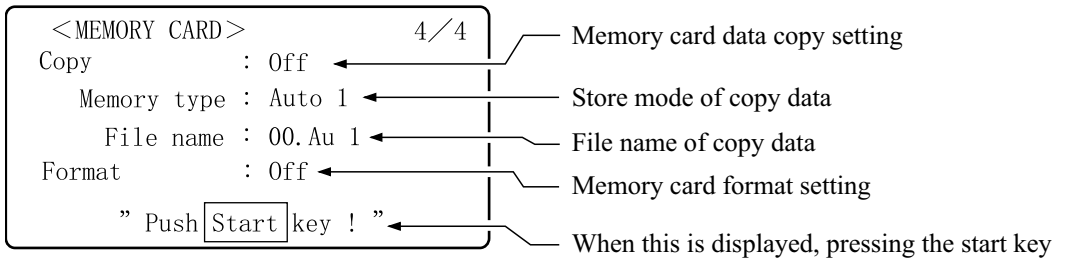
Menu screen (1/4)



Menu screen (2/4)

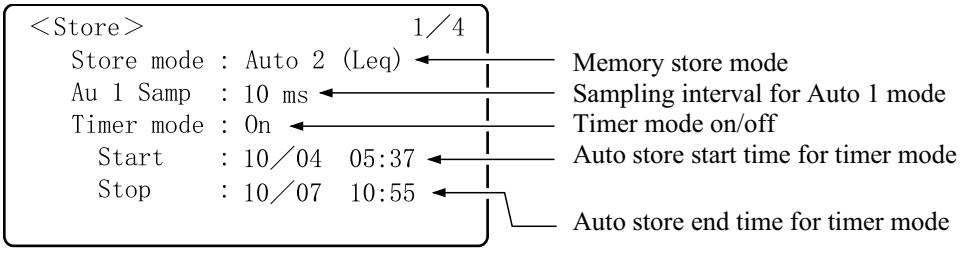


Menu screen (3/4)



Menu screen (4/4)

Menu screen (page 1/4)



Menu screen (1/4)

Memory store mode

Manu: Manual store mode (Max. 100 data)

Auto1: Max. 432000 instantaneous value samples

Auto2 (Leq): Max. 7200 processed value samples

Sampling interval for Auto 1 mode

10 ms (milliseconds), 100 ms, 200 ms, 1 s or 1 s-Leq (s: second)

Timer function (timer mode) on/off

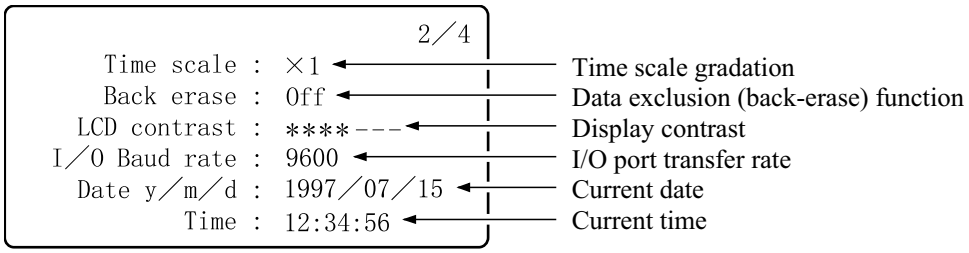
When auto store is used, the timer mode can be set.

Start: Sets the measurement start time.

Stop: Sets the measurement stop time.

For information on measurement procedures using the timer function, please refer to page 79.

Menu screen (page 2/4)



Menu screen (2/4)

Time scale gradation

This axis represents the time, with a selectable scale of 10 or 100 seconds. When displaying instantaneous value data stored with the Auto 1 mode, the time axis scale depends on the sampling interval that was set at the time of storing the data, as shown in the table below.

Auto store sampling interval	Time scale	
	×1	×10
10 ms	1.0 S	10 S
200 ms	20 S	200 S
100 ms	10 S	100 S
1 s	100 S	1000 S
1 s - Leq	100 S	1000 S

Data exclusion (back-erase) function

Data from 3 seconds or 5 seconds before pause button was pressed can be excluded from processing.

Off: Pause button operates normally.

3sec: 3 seconds of data are back-erased.

5sec: 5 seconds of data are back-erased.

Display contrast

Number of asterisks(＊)corresponds to contrast setting.

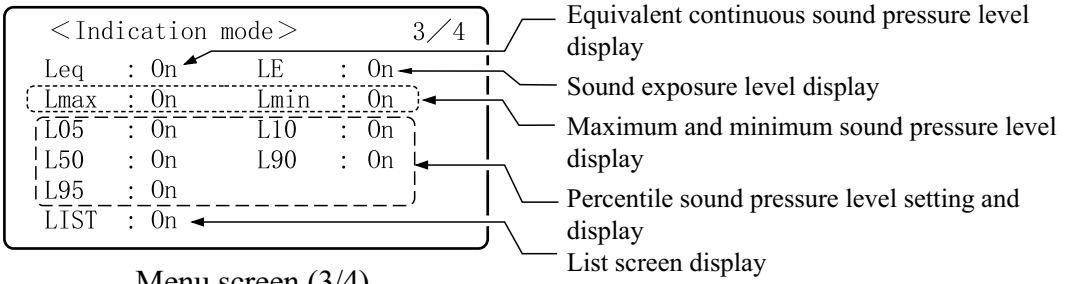
I/O port transfer rate

For connection to printer (CP-10, CP-11) or computer, 19200 bps, 9600 bps or 4800 bps can be selected.

Current date, current time

Shows the selected date and time. In order to maintain the setting also when the unit is switched off, the backup battery must be inserted.

Menu screen (page 3/4)



Menu screen (3/4)

Equivalent continuous sound pressure level display

When the display of equivalent continuous sound pressure level is not desired, this parameter can be set to "Off". The "Off" setting affects only the display, not the actual processing function. When one processing run has been completed and the next processing run has not yet started, the result can be displayed at any time by setting this parameter to "On".

Sound exposure level display

When the display of sound exposure level is not desired, this parameter can be set to "Off". The "Off" setting affects only the display, not the actual processing function. When one processing run has been completed and the next processing run has not yet started, the result can be displayed at any time by setting this parameter to "On".

Maximum and minimum sound pressure level display

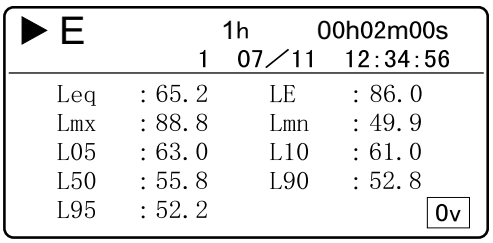
When the display of maximum or minimum sound pressure level is not desired, these parameters can be set to "Off". The "Off" setting affects only the display, not the actual processing function. When one processing run has been completed and the next processing run has not yet started, the result can be displayed at any time by setting these parameters to "On".

Percentile sound pressure level setting and display

When the display of percentile sound pressure level is not desired, these parameters can be set to "Off". The "Off" setting affects only the display, not the actual processing function. When one processing run has been completed and the next processing run has not yet started, the result can be displayed at any time by setting these parameters to "On".

The default settings for the percentile sound pressure level are 5, 10, 50, 90, and 95. These settings can be changed freely, but the setting must be made before starting a measurement. Changing a setting during a measurement is not possible.

Displaying the LIST screen

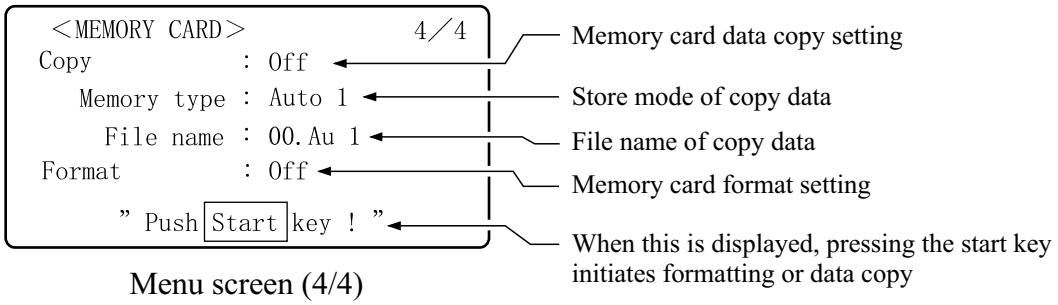


LIST screen display

Using the Mode key, you can call up the LIST screen display of measurement data.

Values for Lxx set to Off on the menu (page 3/4) are not displayed.

Menu screen (page 4/4)



Menu screen (4/4)

Memory card data copy setting

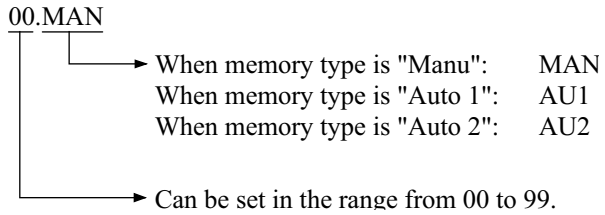
Data collected with auto store are copied up to the data number which contains data. Data collected with manual store are copied in the data number sequence, regardless of whether the data number contains data or not.

Copy data store mode

Select the mode for the data stored in memory. For Auto 1 and Auto 2, the applicable setting is displayed. When there are no stored data, Auto 1 is displayed.

Copy data file name

Assigns a file name to the copied data.



Memory card format setting

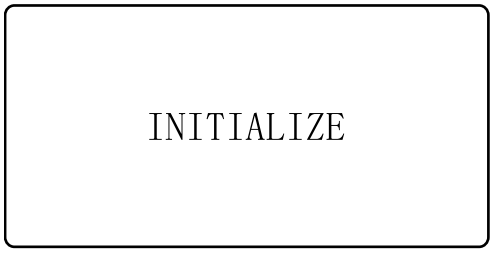
Set this to On when wishing to format the memory card.

"Push Start Key"

Flashes when Copy or Format has been set to On. Not displayed when both items are Off.

Operation at Power-on

- If the power switch is set to On without pressing any other key, the screen below is shown for 3 seconds and instantaneous value display is activated. (The INITIALIZE indication flashes.)



Screen at power-on

- If the Start key is held down while the power switch is set to On, the various settings are returned to the factory default values *.
  Manual and auto store data stored in memory are not cleared, but data collected with an altered percentile sound pressure level L_1 - L_{99} are cleared.

* The factory default settings are as follows.

Time Const	Fast
A/C/Fast	A
Level Range	30 to 120
Mode	Lp
Store Mode	Auto 2 (Leq)
AU1	200 msec
Timer Mode	Off
Time Scale	× 1
Back Erase	Off
LCD Contrast	＊＊＊＊－－－
I/O Baud rate	9600 bps
Leq	On
L50	On
LE, L05, L10, L90, L95	Off
Lmax, Lmin	Off
LIST	Off

Measurement

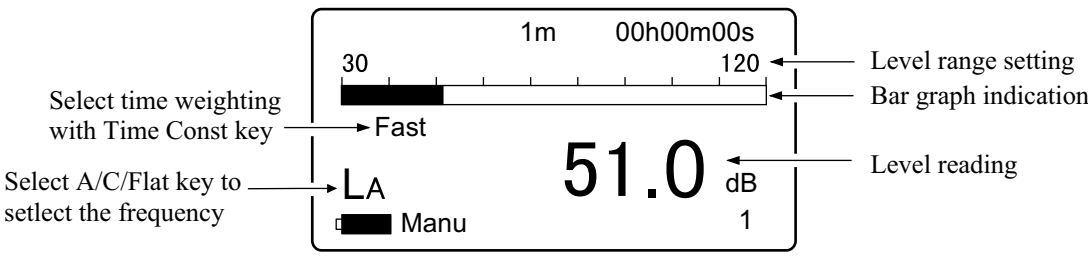
When using this unit in a mode other than instantaneous value measurement, all processing functions provided by the unit are carried out simultaneously. For example, when equivalent noise level measurement is selected, the single-event noise exposure level and time percentile level are also determined. However, the time setting for the time percentile level (5 values) must be selected beforehand. The date and time must also be set as described on page 23.

Instantaneous Sound Pressure Level Measurement

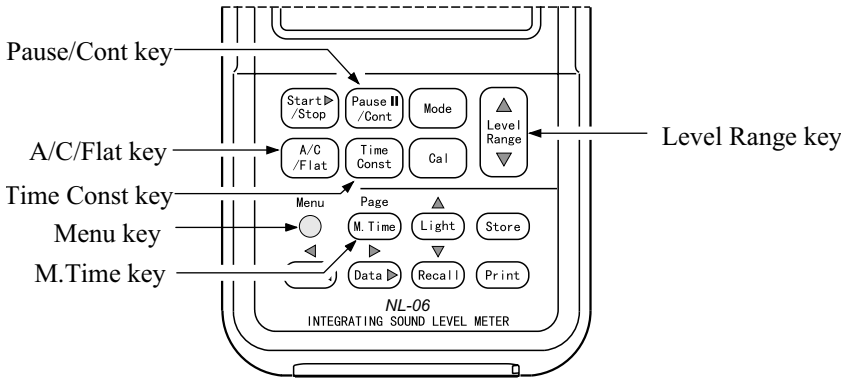
The procedure for instantaneous sound pressure level measurement is described below.
Preparations as described in the previous chapter must be completed first.

Sound pressure level

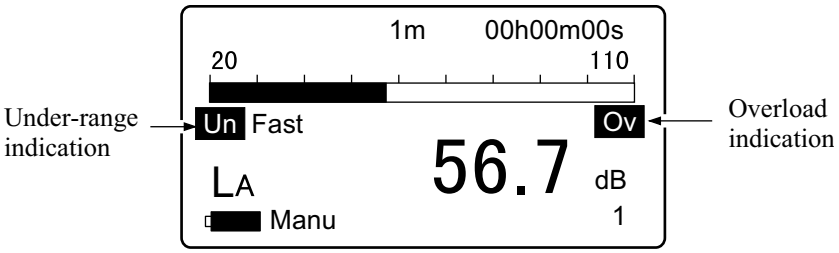
1. Set the power switch on the side of the unit to On.
   After the indication "INITIALIZE" flashes on the screen, the measurement screen appears.
   If the backup battery is inserted, the measurement parameters will be the same as before the unit was turned off the last time.



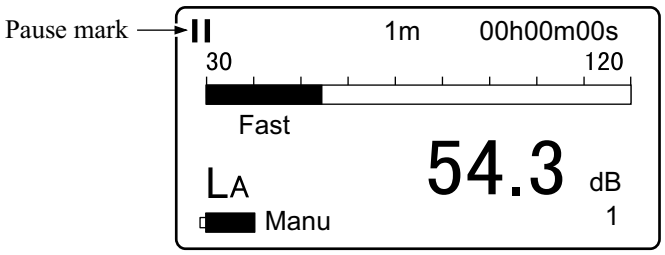
Measurement screen



2. Use the A/C/Flat key to select the frequency weighting characteristic. Normally, the "A" setting is used for noise level measurements. When "Lp" (flat) is shown on the display, sound pressure in the range from 20 to 8000 Hz can be measured.
3. Use the Time Const key to select the time weighting. Normally, the "Fast" setting should be used.
4. When performing measurements according to JIS or other standards, the frequency weighting and time weighting setting required by the standard should be selected.
5. Use the Level Range keys to select the level range. Choose a setting in which the bar graph indication registers to about the middle of the range. If the "Ov" (Over) or "Un" (Under) indication appears frequently, change the level range setting.



6. The numeric level indication shows the currently measured sound pressure level. The reading is updated once every second.
   The Pause/Cont key can be used to pause the measurement, i.e. to prevent the level reading and bar graph indication from being updated. In the pause condition, a ‖ mark appears on the display. Pressing the Pause/Cont key once more resumes the measurement.



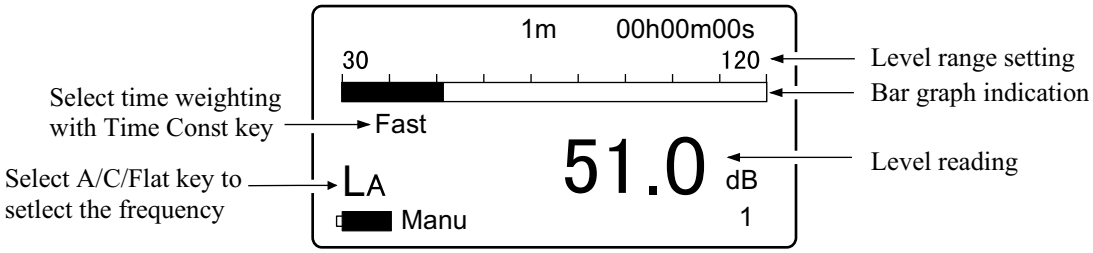
Important
During instantaneous sound level measurement, do not press the Mode key because this causes the processing results to be displayed. As shown in the example, if "L_A" only is displayed, instantaneous measurement is being carried out. L_A Display shows instantaneous sound pressure level. L_{Aeq} Display does not show instantaneous sound pressure level.

Equivalent Continuous A-weighted Sound Pressure Level (L_{Aeq}) Measurement

The procedure for equivalent continuous sound pressure level measurement is described below.

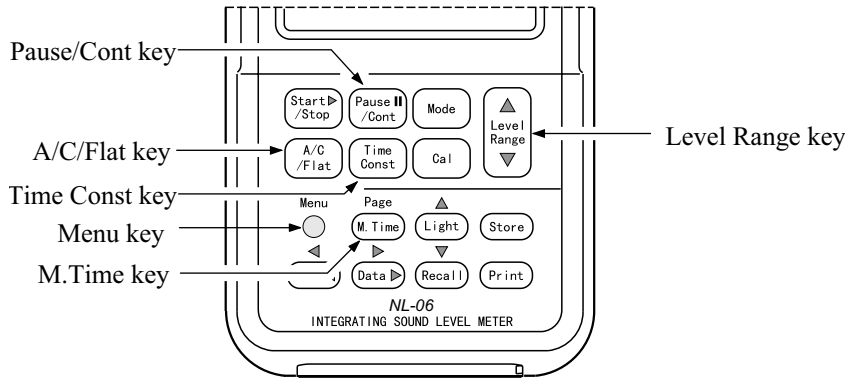
Preparations as described in the previous chapter must be completed first.

1. Set the power switch on the side of the unit to On.



Measurement screen

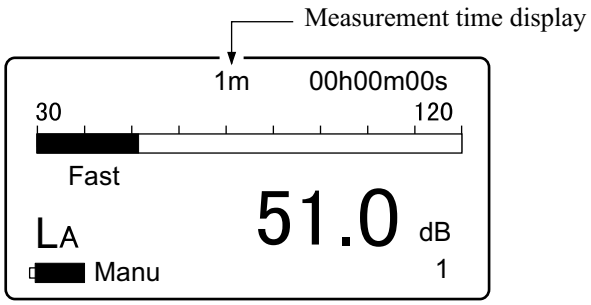
2. Select the frequency weighting with the A/C/Flat key.
   For normal sound pressure level measurements, select the "A" setting. If "C" is selected, the equivalent continuous C-weighted sound pressure level (L_{Ceq})is measured.
3. Use the Time Const key to select the time weighting. Normally, the "Fast" setting should be used.



4. Use the Level Range keys to select the level range. Choose a setting in which the bar graph indication registers to about the middle of the range. If the " Ov " (Over) or " Un " (Under) indication appears frequently, change the level range setting.

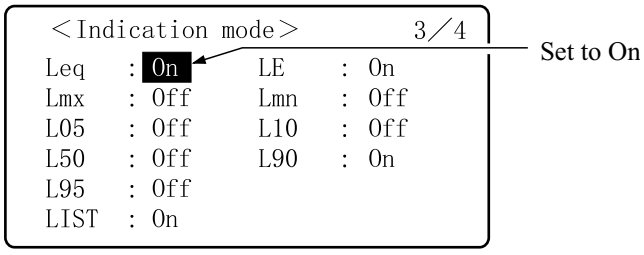
Note
Because this unit performs L_{eq} and L_{AE} processing by sampling the sound pressure waveform at a high sampling rate (20.8 µs), precise results will be obtained regardless of weighting characteristics, also with short measurements.

5. Use the M.Time key to select the measurement time.
   With each push of the M.Time key, the displayed measurement time is switched as listed below.
   No indication (arbitrary measurement time) →1 s (second)→3 s→5 s→10 s→1 m (minute)→5 m→10 m→15 m→30 m→1 h (hour)→8 h→24 h →no indication
   When nothing is displayed, measurement time can be controlled freely by the operator, using the Start/Stop key. The maximum measurement time is 199 hours 59 minutes 59 seconds.



Measurement screen

6. Press the Menu key to call up the menu screen.
7. Use the Page key to set the page to "3/4".

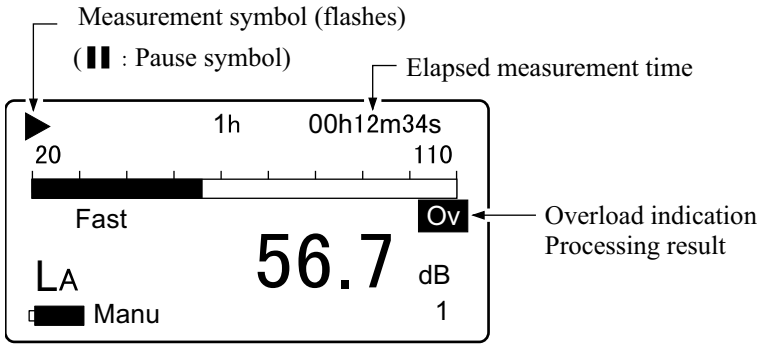


Menu screen (3/4)

8. If "Leq: Off" is displayed, use the ▲ and ▼ keys to highlight the item and use the ▶ key to set it to "On".
9. When wishing to exclude data, proceed as described on page 62.

Note
In addition to the regular pause function it is also possible to exclude (back-erase) data from the immediately preceding 3 seconds or 5 seconds.

10. Press the Menu key to return to the measurement screen.
11. Press the Start/Stop key to start the measurement.



Measurement screen

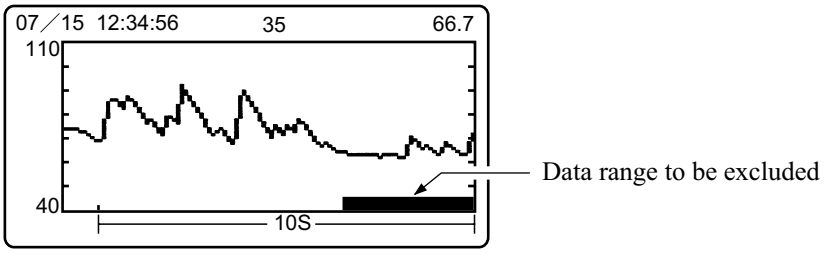
During measurement, the ▶ symbol flashes and the elapsed measurement time is displayed.

When the measurement time set in step 5 has elapsed, the measurement terminates automatically. When wishing to terminate the measurement earlier, press the Start/Stop key. If "no indication" (arbitrary measurement time) was selected, the Start/Stop key must be used to terminate the measurement.

If an overload condition has occurred at least once during the measurement, the " Ov " (Over) indication is shown on the display, to indicate that overload data were included in the instantaneous measurement values used for processing.

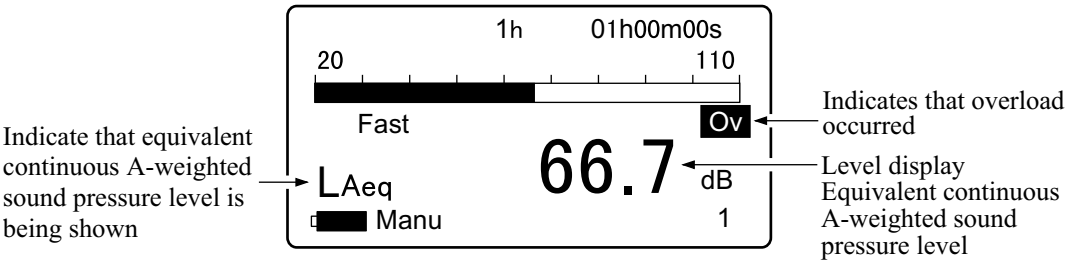
Important
During measurement, most of the keys such as the A/C/Flat key and Level key are inoperative. Only the following four keys can be used: Start/ Stop, Pause/Cont, Mode, Light. All other settings must be made before starting the measurement.

During measurement, the Pause/Cont key can be used to pause and resume the measurement. During pause, the pause symbol (⏸) is shown. Any pause intervals and the time the exclusing data function is activated are not included in the measurement time.
If data were selected for exclusion in step 9, these data are indicated on display, as shown the below.



Measurement screen

12. When the measurement is completed, you can use the Mode key to switch between various ways of displaying the measurement result.
When "L_{Aeq}" is shown, the equivalent continuous A-weighted sound pressure level is being displayed.



Measurement screen

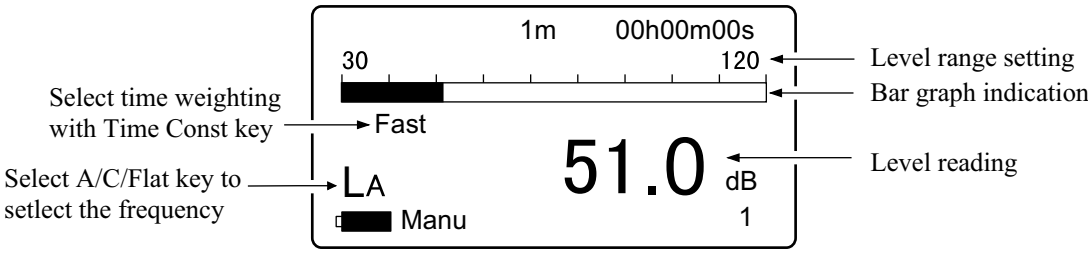
If "L_{Aeq}" is not shown, press the Mode key after performing steps 6-8.
If " Ov " (Over) is shown, overload data were included in the data used to calculate the equivalent noise level.

Note
It is also possible to use the Mode key during measurement to read the equivalent continuous sound pressure level up to that point. (This applies only to the numeric level display. The bar graph indication shows the instantaneous value.)

Sound Exposure Level (L_E) Measurement

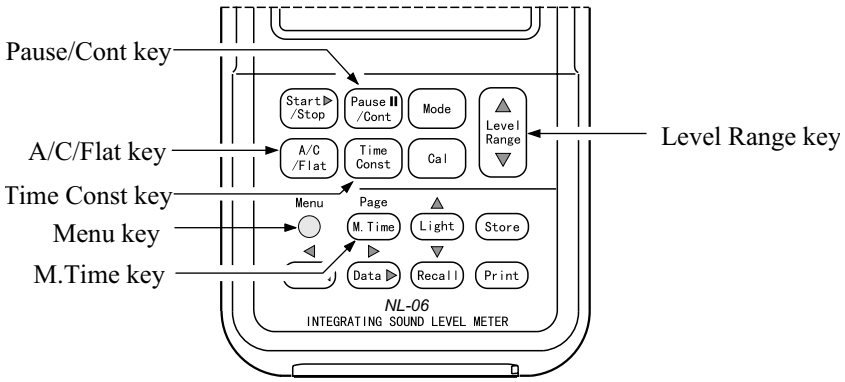
The procedure for sound exposure level measurement is described below. Preparations as described in the previous chapter must be completed first.

1. Set the power switch on the side of the unit to On.



Measurement screen

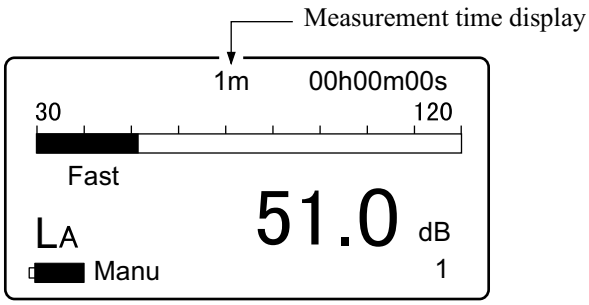
2. Select the frequency weighting with the A/C/Flat key. Normally, the "A" setting should be used.
3. Use the Time Const key to select the time weighting. Normally, the "Fast" setting should be used.



4. Use the Level Range keys to select the level range. Choose a setting in which the bar graph indication registers to about the middle of the range. If the " Ov " (Over) or " Un " (Under) indication appears frequently, change the level range setting.

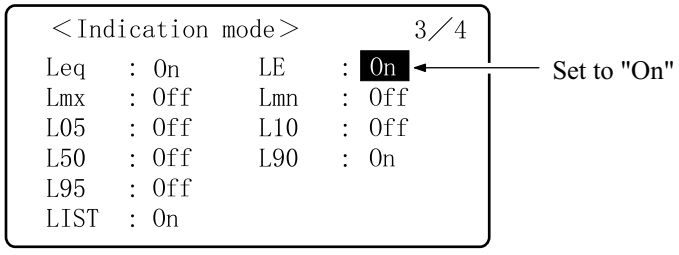
Note
Because this unit performs L_{eq} and L_{AE} processing by sampling the sound pressure waveform at a high sampling rate (20.8 µs), precise results will be obtained regardless of weighting characteristics, also with short measurements.

5. Use the M.Time key to select the measurement time.
   With each push of the M.Time key, the displayed measurement time is switched as listed below.
   No indication (arbitrary measurement time) →1 s (second)→3 s→5 s→10 s→1 m (minute)→5 m→10 m→15 m→30 m→1 h (hour)→8 h→24 h →no indication



Measurement screen

   When nothing is displayed, measurement time can be controlled freely by the operator, using the Start/Stop key. The maximum measurement time is 199 hours 59 minutes 59 seconds.
6. Press the Menu key to call up the menu screen on display.
7. Use the Page key to set the page to "3/4".
8. If "L_E: Off" is displayed, use the ▲ and ▼ keys to highlight the item and use the ▶ key to set it to "On".

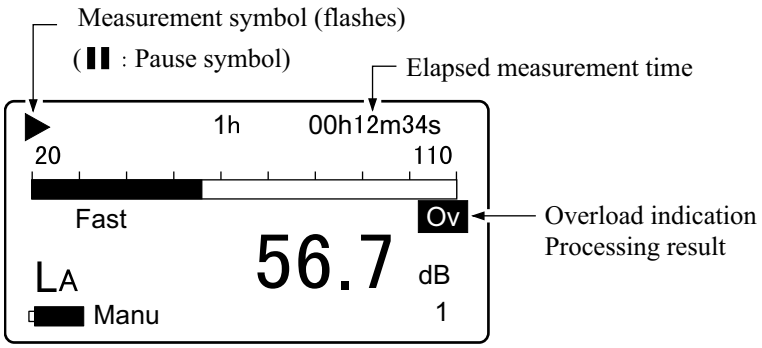


Menu screen (3/4)

9. When wishing to exclude data, proceed as described on page 62.

Note
In addition to the regular pause function it is also possible to exclude (back-erase) data from the immediately preceding 3 seconds or 5 seconds.

10. Press the Menu key to return the menu screen.
11. Press the Start/Stop key to start the measurement.
    During measurement, the ▶ symbol flashes and the elapsed measurement time is displayed.



Measurement screen

When the measurement time set in step 5 has elapsed, the measurement terminates automatically. When wishing to terminate the measurement earlier, press the Start/Stop key. If "no indication" (arbitrary measurement time) was selected, the Start/Stop key must be used to terminate the measurement.

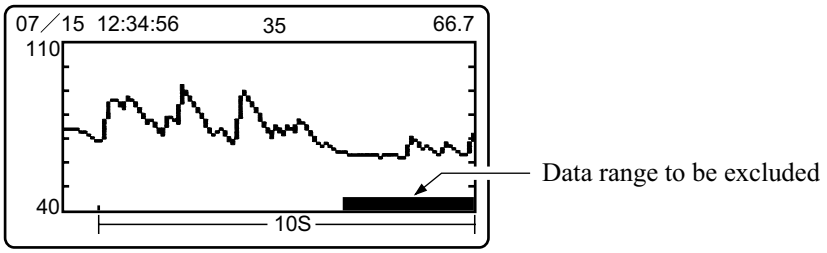
If an overload condition has occurred at least once during the measurement, the " Ov "(Over) indication is shown on the display, to indicate that overload data were included in the instantaneous measurement values used for processing.

Important
During measurement, most of the keys such as the A/C/Flat key and Level key are inoperative. Only the following four keys can be used: Start/Stop, Pause/Cont, Mode, Light. All other settings must be made before starting the measurement.

During measurement, the Pause/Cont key can be used to pause and resume the measurement. During pause, the pause symbol (⏸) is shown. Any pause intervals are not included in the measurement time.

If data were selected for exclusion in step 9, these data are indicated on display, as shown below.

12. When the measurement is completed, you can use the Mode key to switch

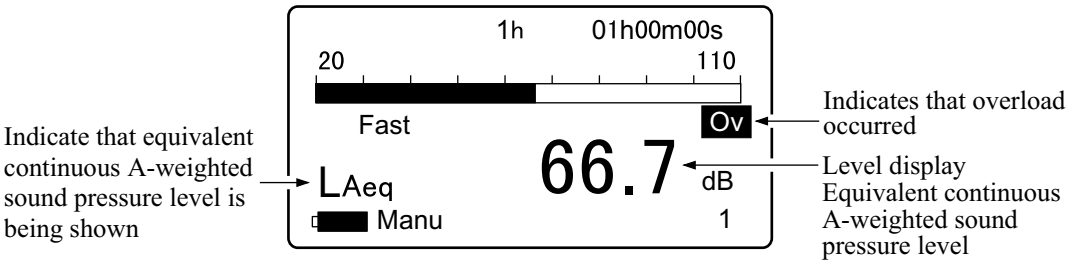


Measurement screen

between various ways of displaying the measurement result.

When "L_{AE}" is shown, the sound exposure level is being displayed.

If "L_{AE}" is not shown, press the Mode key after performing steps 6-8.



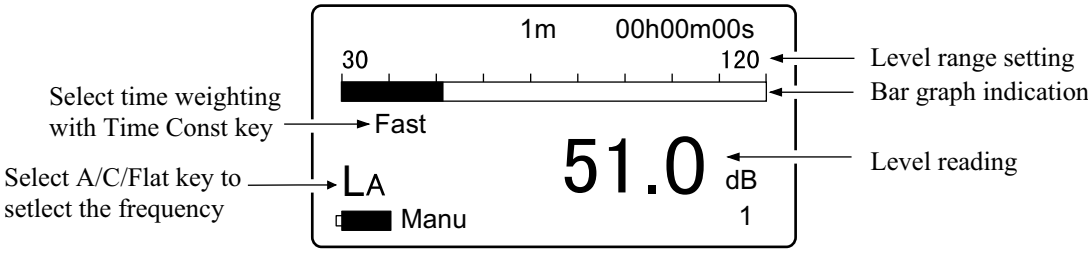
Measurement screen

If " Ov "(Over) is shown, overload data were included in the data used to calculate the sound exposure level.

Maximum Value (L_{max}) and Minimum Value (L_{min}) Measurement

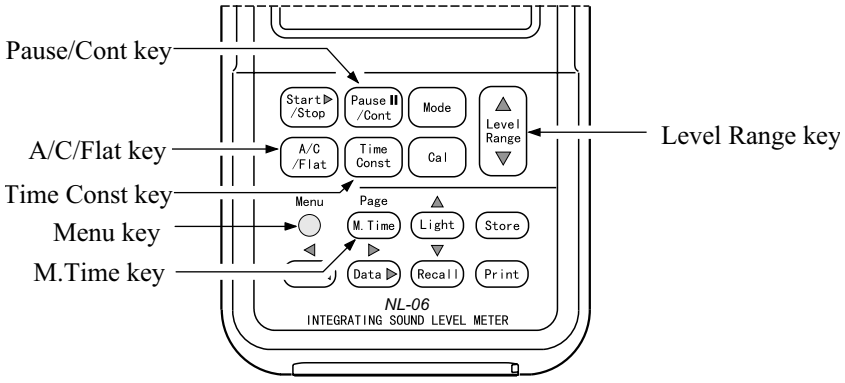
The procedure for maximum value and minimum value measurement is described below.
Preparations as described in the previous chapter must be completed first.

1. Set the power switch on the side of the unit to On.



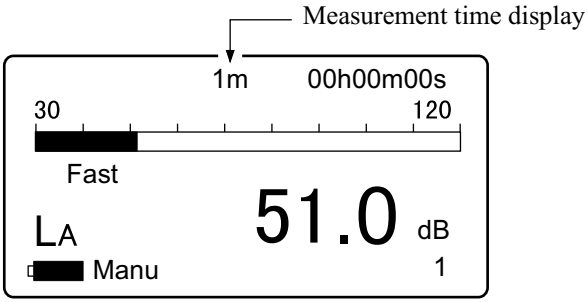
Measurement screen

2. Select the frequency weighting with the A/C/Flat key. Normally, the "A" setting should be used.
3. Use the Time Const key to select the time weighting. Normally, the "Fast" setting should be used.



4. Use the Level Range keys to select the level range. Choose a setting in which the bar graph indication registers to about the middle of the range. If the " Ov "(Over) or " Un "(Under) indication appears frequently, change the level range setting.

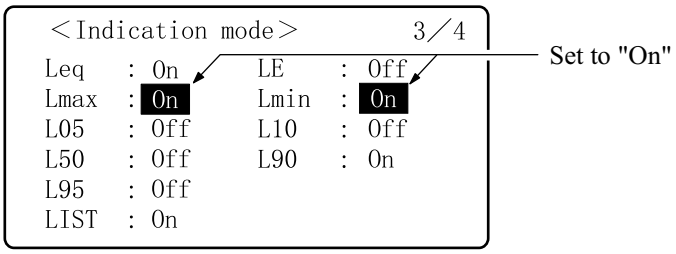
5. Use the M.Time key to select the measurement time.
   With each push of the M.Time key, the displayed measurement time is switched as listed below.
   No indication (arbitrary measurement time) →1 s (second)→3 s→5 s→10 s→1 m (minute)→5 m→10 m→15 m→30 m→1 h (hour)→8 h→24 h →no indication



Measurement screen

When nothing is displayed, measurement time can be controlled freely by the operator, using the Start/Stop key. The maximum measurement time is 199 hours 59 minutes 59 seconds.

6. Press the Menu key to call up the menu screen on display.
7. Use the Page key to set the page to "3/4".
8. If "Lmax: Off, Lmin: Off" is displayed, use the ▲ and ▼ keys to highlight the item and use the ▶ key to set it to "On".

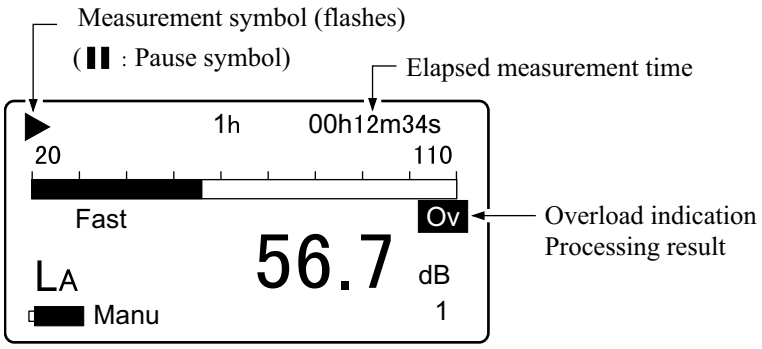


Menu screen (3/4)

9. When wishing to exclude data, proceed as described on page 62.

Note
In addition to the regular pause function it is also possible to exclude (back-erase) data from the immediately preceding 3 or 5 seconds.

10. Press the Menu key to return to the measurement screen.
11. Press the Start/Stop key to start the measurement.
    During measurement, the ▶ symbol flashes and the elapsed measurement time is displayed.



Measurement screen

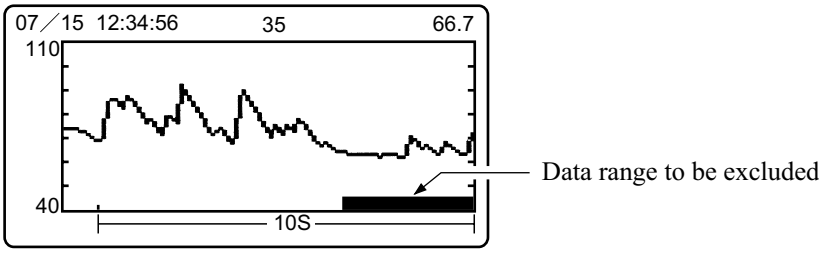
When the measurement time set in step 5 has elapsed, the measurement terminates automatically. When wishing to terminate the measurement earlier, press the Start/Stop key. If "no indication" (arbitrary measurement time) was selected, the Start/Stop key must be used to terminate the measurement.

If an overload condition has occurred at least once during the measurement, the "Ov"(Over) indication is shown on the display, to indicate that overload data were included in the instantaneous measurement values used for processing.

Important
During measurement, most of the keys such as the A/C/Flat key and Level key are inoperative. Only the following four keys can be used: Start/Stop, Pause/Cont, Mode, Light. All other settings must be made before starting the measurement.

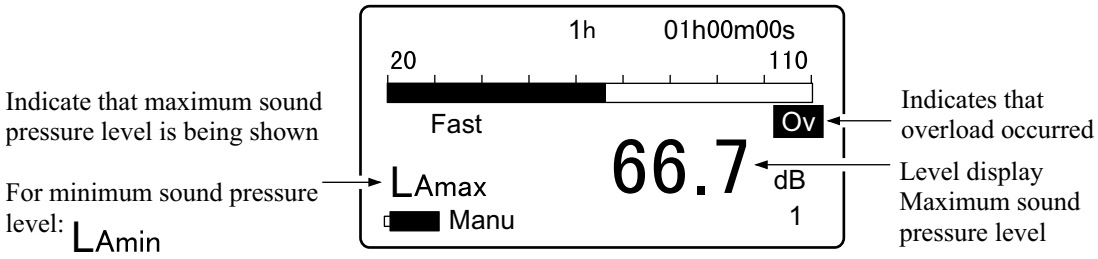
During measurement, the Pause/Cont key can be used to pause and resume the measurement. During pause, the pause symbol (▌▌) is shown. Any pause intervals are not included in the measurement time.

If data were selected for exclusion in step 9, these data are indicated on display, as shown below.



Measurement screen

12. When the measurement is completed, you can use the Mode key to switch between various ways of displaying the measurement result.
When "L_{max}" is shown, the maximum noise level is being displayed, and when "L_{min}" is shown, the minimum noise level is being displayed.



Measurement screen

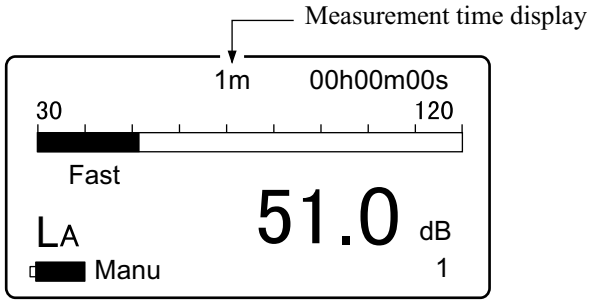
If "L_{Amax}" or "L_{Amin}" is not shown, press the Mode key after performing steps 6-8.
If "Ov"(Over) is shown, overload data were included in the data used to calculate the sound exposure level.

Note
It is also possible to use the Mode key during measurement to read the maximum or minimum noise level up to that point. (This applies only to the numeric level display. The bar graph indication shows the instantaneous value.) Do not use the data exclusion function during L_{min} measurement.

Percentile Sound Pressure Level (L_x) Measurement

The procedure for percentile sound pressure level measurement is described below.
Preparations as described in the previous chapter must be completed first.

1. Set the power switch on the side of the unit to On.
   After about 5 seconds, the measurement screen appears.
   If the backup battery is inserted, the measurement parameters will be the same as before the unit was turned off the last time.
2. Select the frequency weighting with the A/C/Flat key. Normally, the "A" setting should be used.
3. Use the Time Const key to select the time weighting. Normally, the "Fast" setting should be used.
4. Use the Level Range keys to select the level range. Choose a setting in which the bar graph indication registers to about the middle of the range. If the "Ov"(Over) or "Un"(Under) indication appears frequently, change the level range setting.
5. Use the M.Time key to select the measurement time.
   With each push of the M.Time key, the displayed measurement time is switched as listed below.



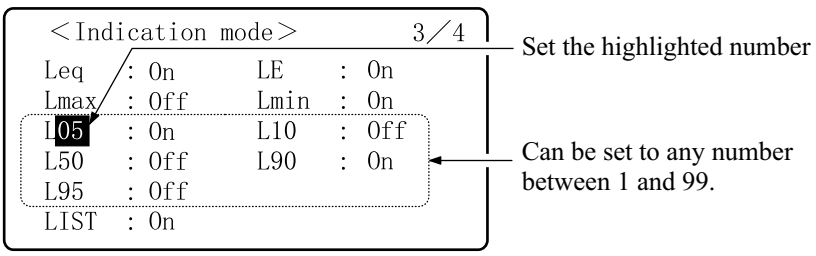
Measurement screen

No indication (arbitrary measurement time) → 1 s (second) → 3 s → 5 s → 10 s → 1 m (minute) → 5 m → 10 m → 15 m → 30 m → 1 h (hour) → 8 h → 24 h → no indication
When nothing is displayed, measurement time can be controlled freely by

the operator, using the Start/Stop key. The maximum measurement time is 199 hours 59 minutes 59 seconds.

Important
Because L_x measurement uses 100-ms sampling intervals, correct values will not be displayed when the measurement time is less than 10 seconds.

6. Press the Menu key to call up the menu screen on display.
7. Use the Page key to set the page to "3/4".
8. In the default condition, the unit is set up to measure the time percentile level L_5, L_{10}, L_{50}, L_{90}, and L_{95}. These settings can be changed to any value between L_1 and L_{99} (up to five settings).
   Use the ▲ and ▼ keys to move the highlight and use the ◀ and ▶ keys to change the time percentile number and to toggle the setting between "On" and "Off".



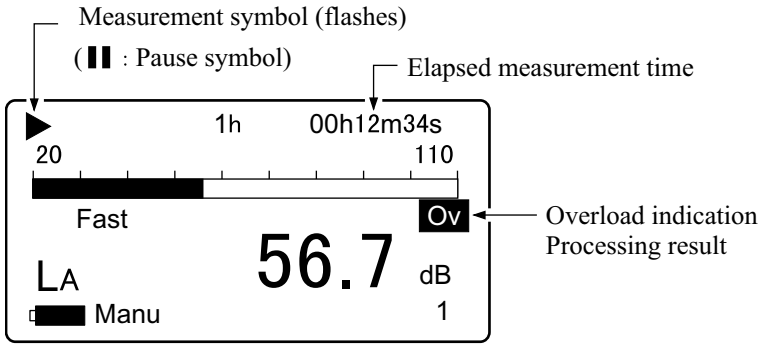
Menu screen (3/4)

Important
Establish these settings before starting the measurement. If a setting is changed later, the measurement will be invalid.

9. When wishing to exclude data, proceed as described on page 62.

Note
In addition to the regular pause function it is also possible to exclude (back-erase) data from the immediately preceding 3 or 5 seconds.

10. Press the Menu key to return to the measurement screen.
11. Press the Start/Stop key to start the measurement.
    During measurement, the ▶ symbol flashes and the elapsed measurement time is displayed.



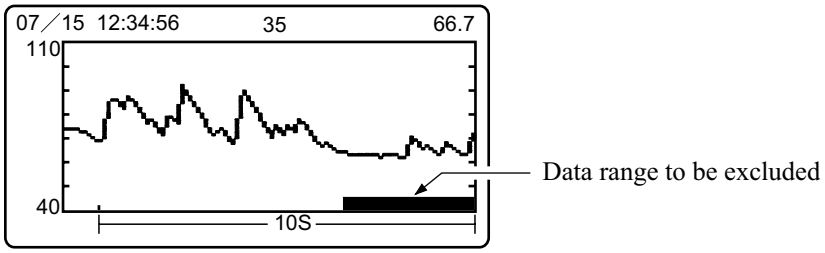
Measurement screen

When the measurement time set in step 5 has elapsed, the measurement terminates automatically. When wishing to terminate the measurement earlier, press the Start/Stop key. If "no indication" (arbitrary measurement time) was selected, the Start/Stop key must be used to terminate the measurement.

If an overload condition has occurred at least once during the measurement, the "Ov"(Over) indication is shown on the display, to indicate that overload data were included in the instantaneous measurement values used for processing.

Important
During measurement, most of the keys such as the A/C/Flat key and Level key are inoperative. Only the following four keys can be used: Start/Stop, Pause/Cont, Mode, Light. All other settings must be made before starting the measurement.

During measurement, the Pause/Cont key can be used to pause and resume the measurement. During pause, the pause symbol (⏸) is shown. Any pause intervals are not included in the measurement time.
If data were selected for exclusion in step 9, these data are indicated on display, as shown below.



Measurement screen

11. When the measurement is completed, you can use the Mode key to switch between various ways of displaying the measurement result.
The time percentile levels as selected in step 8 can be displayed in succession.

Note
It is also possible to use the Mode key during measurement to read the time percentile level to that point. (This applies only to the numeric level display. The bar graph indication shows the instantaneous value.)

If the "Ov"(Over) indication is shown on the display, overload data were included in the instantaneous measurement values used for processing.

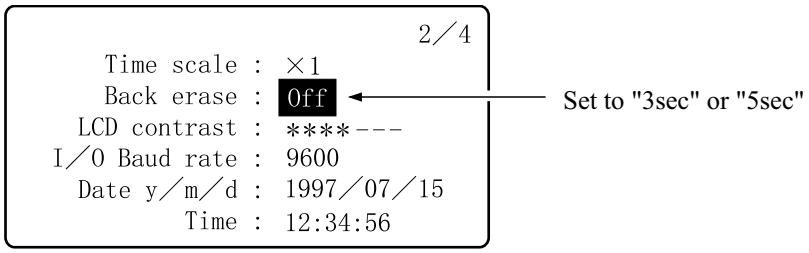
Excluding Data

When a measurement is being carried out and data are being processed, the Pause/Cont key can be used to pause the measurement (i.e. to exclude data from the point at which the key has been pressed), but it is also possible to exclude (back-erase) data from an interval of 3 seconds or 5 seconds before the key has been pressed.

The data that are to be excluded are shown at the bottom of the measurement screen.

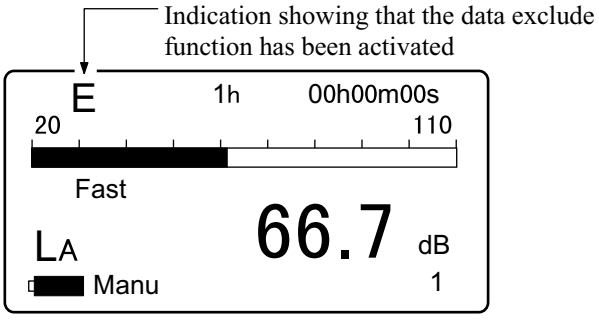
To enable the back-erase function, proceed as follows.

1. Press the Menu key.
2. Press the Page key so that "2/4" is displayed at the top right of the screen.
3. Use the ▲ and ▼ keys until the "Back erase: Off" item is highlighted.
4. Change the setting to "3sec" or "5sec", using the ◀ and ▶ keys.



Menu screen (2/4)

The "E" indication appears on the display, showing that the data exclude function has been activated.



Measurement screen

If "3sec" or "5sec" was selected, data for the respective interval before the Pause/Cont key was pressed are excluded (back-erased).

Memory Functions

The NL-06 incorporates a memory which can be used to store measurement data (instantaneous values, processed values such as Leq etc., measurement parameters such as frequency weighting, time weighting setting etc.)
This chapter describes how to store data in memory and how to recall data from memory. There are four different ways of storing data, as listed below. The manual mode can be used independently, but only one mode among the automatic modes Auto 1 or Auto 2 can be selected.

Manual

In this mode, the operator enters the instantaneous value and processed values into the memory manually. Pressing the Store key causes the current instantaneous value, processed values, and measurement parameters to be stored. Up to 100 sets of data can be stored in this way.

Auto 1

Up to 432000 instantaneous values are stored continuously. The store cycle can be set to 10 ms, 100 ms, 200 ms, 1 second or 1 sec-Leq. When 10 ms is selected, the total length of the sampling period is 1 h 12 m.
With 100 ms the total length is 12 h, with 200 ms the total lenght is 24 h and with 1 s and 1 sec-Leq the total length is 120 h.
It is possible to read out instantaneous values stored in this way and view them as a graph on display.

Auto 2

Up to 7200 data sets containing processed values are stored continuously. This mode is most suitable for long- term measurements. One data set contains all processed values, but not the instantaneous value.

Important
Do not turn the unit off during store. Otherwise stored data may be damaged.

Manual Store

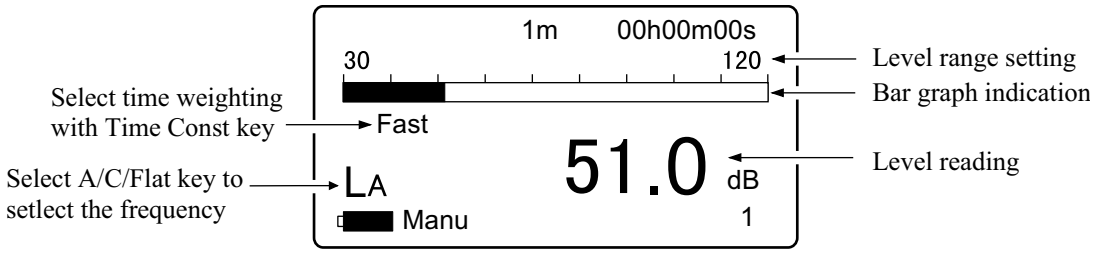
For using the memory function, the backup battery must be installed (see page 11). Otherwise stored data will be lost when the unit is turned off.

Storing Data in Memory

Pressing the Store key enters the current instantaneous value and all currently existing processing results into the memory. Immediately after turning the unit on, no processing results exist. Therefore only the instantaneous value gets stored.

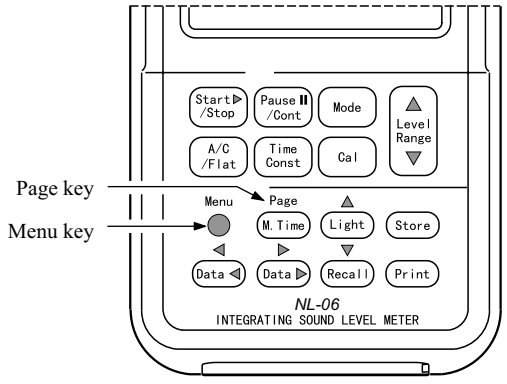
To store data, proceed as follows.

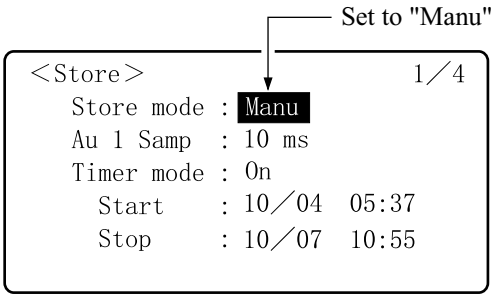
1. Set the power switch on the side of the unit to On.



Measurement screen

2. Press the Menu key to call up the menu screen on display.
3. If necessary, use the Page key to call up page 1/4.
4. If the store mode is not already set to "Manu", use the ▲ and ▼ keys to highlight the item and use the ◀ and ▶ keys to set it to "Manu". The indication "Manu" appears on display.



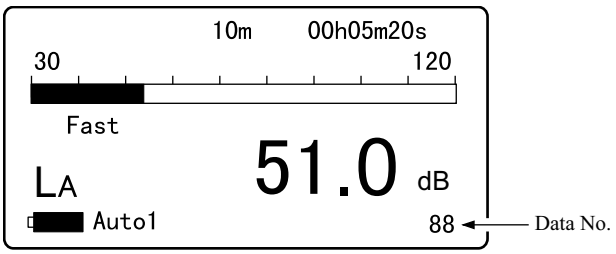


Menu screen (1/4)

5. When store the instantaneous value:
   (When wishing to store the processed value only, skip this step and perform step 6.)
   Confirm that there is no data of every processed value (every processed value is 0.00 dB). If ther is any processed values, turn off the unit and turn it on again. Call up the measurement screen and perform step 7.

Important
When instantaneous values are stored after processed values, the frequency weighting and time constant settings used for processing will be applied to the data.

6. When store the processed value:
   Perform a measurement as described in the previous chapter (except instantaneous value measurement).
7. When the measurement is completed, select the data number where the data should be stored. Data No. is shown on the display.



Measurement screen

The data number can be selected in the range from 1 to 100 using the ▲ and ▼ (Data No) keys. If data are already stored in the selected data number, the earlier data will be overwritten.
When wishing to check whether data are already stored, perform the steps described in "Reading Stored Data" on page 67.

8. Press the Store key.
   The instantaneous value at the time of pressing the Store key is stored. When the measurement for the processed value is performed in step 6, every processed value data are stored simultaneously.

   The store process is completed in about one second. After the store process is completed, the data number is incremented by one count. By pressing the Store key repeatedly, you can consecutively store data.

   The stored data comprise all information shown on display 1 (except for the battery indication), all processing results, and the date and time at the point when the Store key was pressed. The time/level graph shown on display is not stored.

Important

The unit does not check whether data to be stored are present. When the Store key is pressed, the data in the currently selected data number are overwritten.

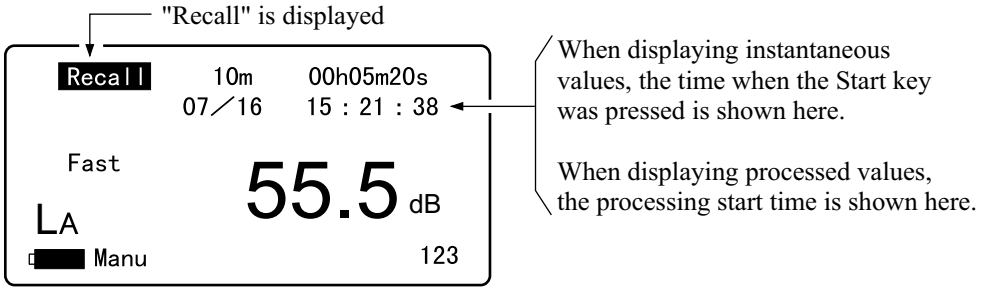
Note

When the data number 100 is reached, the indication does not change further and does not return to 1. When the Store key is pressed in this condition, the "100" indication flashes. (Pressing the ▲ and ▼ (Data No) keys to select another number causes the indication to stop flashing.) The flashing serves to indicate that all data numbers are full (although there still may be empty data numbers if any numbers were skipped).

Reading Stored Data

To read data stored in manual mode, proceed as follows.

1. Set the power switch on the side of the unit to On.
2. Press the Menu key to call up the menu screen on display.
3. If necessary, use the Page key to call up page 1/4.
4. If the store mode is not already set to "Manu", use the ▲ and ▼ keys to highlight the item and use the ◀ and ▶ keys to set it to "Manu". The indication "Manu" appears on display.
5. Press the Recall key.
   The indication "Recall" appears on display.



Recall screen

6. Use the ▲ and ▼ (Data No) keys to select the data number from which you want to read data. The data stored in that number are shown on display. If there are no data, only "--.-" is shown.
   Use the Mode key to switch between the data determined in instantaneous mode and various processing modes.

Important
When wishing to check whether data are present in a data number, use the Mode key to switch the display to instantaneous value and then verify whether data or "--.-" is shown on the display. If "--.-" is shown in other mode settings, that data number may still contain instantaneous value data.

7. To terminate the recall mode, press the Recall key once more.

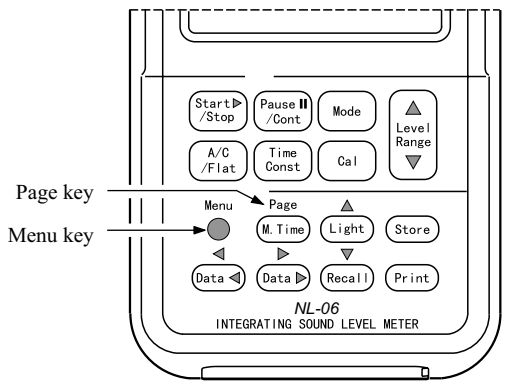
Auto 1

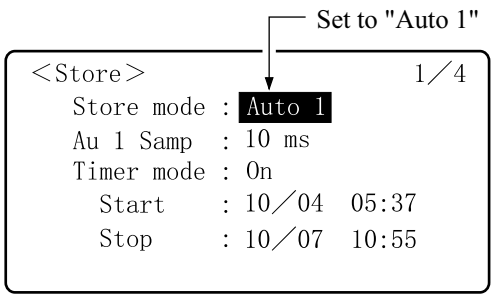
In this mode, up to 432,000 instantaneous values can be stored continuously. For using the memory function, the backup battery must be installed (see page 12). Otherwise stored data will be lost when the unit is turned off.
The modes Auto 1 and Auto 2 can only be used exclusively. If Auto 1 is selected, data stored with Auto 2 are erased. (Data stored in manual mode are not affected.)

Storing Data in Memory

To store data using the Auto 1 mode, proceed as follows.

1. Set the power switch on the side of the unit to On.
2. Press the Menu key to call up the menu screen on display.
3. Use the Page key to call up page 1/4.
4. If the store mode is not already set to "Auto1", use the ▲ and ▼ keys to highlight the item and use the ◀ and ▶ keys to set it to "Auto1". The indication "Auto 1" appears on display.



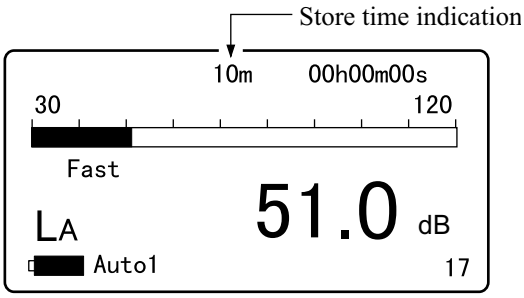


Menu screen (1/4)

5. The second item on this screen ("Au 1 Samp") determines the sampling interval. Use the ▲ and ▼ keys to highlight the item and use the ◀ and ▶ keys to select "10 msec", "100 msec", "200 msec","1 sec", or "1 sec-Leq".
   When "1 sec-Leq" is selected, Leq of every one second is stored continuously. The maximum store time period for every setting is shown in the below table.

10 msec	100 msec	200 msec	1 sec	1 sec-Leq
1 hour 12 min	12 hours	24 hours	120 hours	120 hours

6. Set frequency weighting (A/C/Flat) and the time weighting (Time Const) to the desired settings.
7. Use the Level Range keys to select the level range. Choose a setting in which the bar graph indication registers to about the middle of the range. If the "Ov"(Over) or "Un"(Under) indication appears frequently, change the level range setting.
8. Use the M.Time key to select the total store time.
   With each push of the M.Time key, the displayed store time is switched as listed below.
   No indication (arbitrary measurement time) → 1 s (second) → 3 s → 5 s → 10 s → 1 m (minute) → 5 m → 10 m → 15 m → 30 m → 1 h (hour) → 8 h → 24 h → no indication



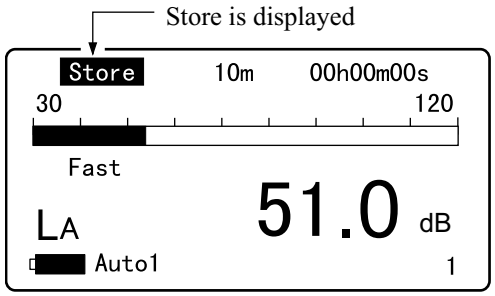
Measurement screen

When "no indication" was selected, data are stored until the memory becomes full.

9. When wishing to exclude data, proceed as described on page 62.

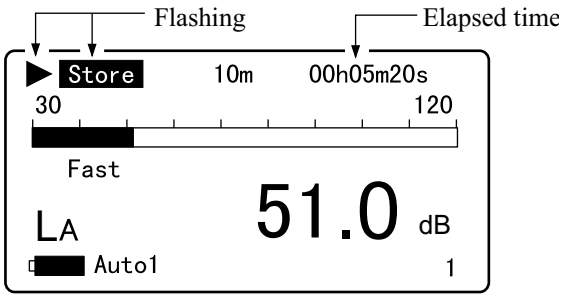
Note
In addition to the regular pause function it is also possible to exclude (back-erase) data from the immediately preceding 3 seconds or 5 seconds.

10. Press the Menu key to return to the measurement screen.
11. Press the Store key.
    The indication "Store" appears on display.



Measurement screen

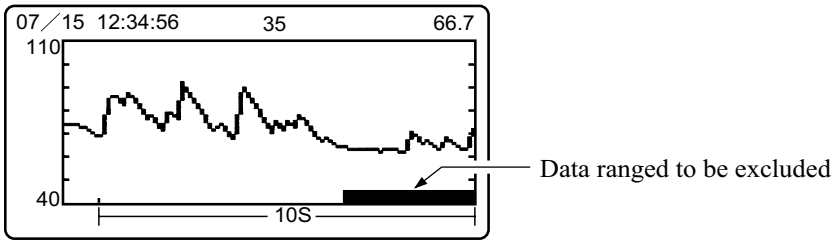
12. Press the Start/Stop key.
    In Auto 1 mode, the data number cannot be specified. The store process always starts at data number 1.(All previous data are erased.)
    During store, the "▶" symbol and the "Store" indication are flashing, and the elapsed time is displayed.



Measurement screen

Important
During the store operation, most of the keys such as the A/C/Flat key and Time Const key are inoperative. Only the following three keys can be used: Start/Stop, Pause/Cont, Light. All other settings must be made before starting the measurement.

During store, the Pause/Cont key can be used to pause and resume the operation. During pause, the pause symbol (⏸) is shown. Any pause intervals and are not included in the store time.
If data were selected for exclusion in step 9, these data are indicated on display, as shown below.



Measurement screen

12. When the number of samples has reached 432000, the store process terminates automatically. When wishing to terminate the store process earlier, press the Start/Stop key.

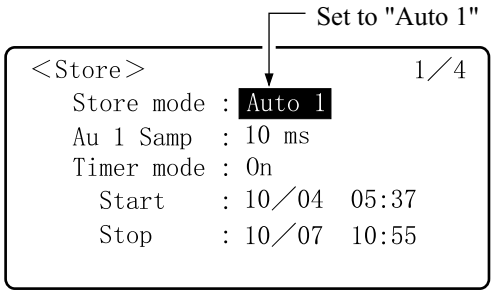
Note
Because this unit performs L_{eq} and L_{AE} processing by sampling the sound pressure waveform at a high sampling rate (20.8 μs), precise results will be obtained regardless of weighting characteristics, also with short measurements.

Note
Do not use the data exclusion function when Auto 1 Samp is set to "1Sec-Leq".

Reading Stored Data

To read data stored in Auto 1 mode, proceed as follows.

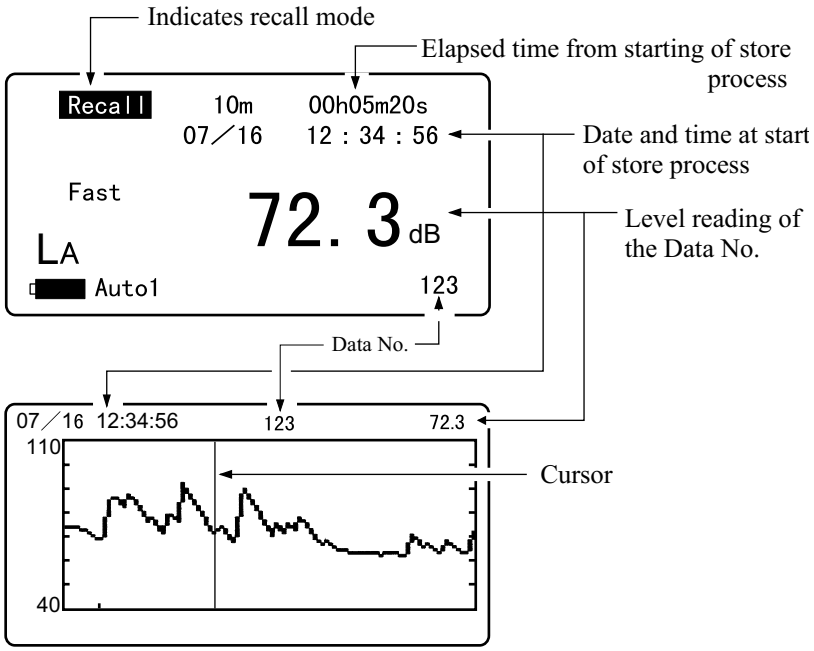
1. Set the power switch on the side of the unit to On.
2. Press the Menu key to call up the menu screen on display.
3. Use the Page key to call up page 1/4.
4. If the store mode is not already set to "Auto1", use the ▲ and ▼ keys to highlight the item and use the ◀ and ▶ keys to set it to "Auto1".



Menu screen (1/4)

5. Press the Recall key.

   The indication "Recall" appears on display. Display shows the stored data. Mode key Display now shows the time vs. level waveform of the stored instantaneous values. The ▲ and ▼ (Data No) keys can be used to move the cursor to read the level at a desired point. The elapsed time since the start of the store process is also shown.



Recall screen

6. To terminate the recall mode, press the Recall key once more.

Note
Auto 1 supports only one store operation. With each store operation, all previous data are erased and the store process begins again from data number 1.

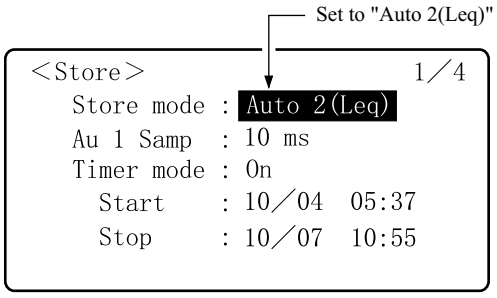
Auto 2

In this mode, up to 7200 data sets containing processed values can be stored continuously.
One data set contains 9 data: equivalent continuous sound pressure level, sound exposure level, maximum value, minimum value, percentile level (for five settings).
For using the memory function, the backup battery must be installed (see page 11). Otherwise stored data will be lost when the unit is turned off.
The modes Auto 1 and Auto 2 can only be used exclusively. If Auto 2 is selected, data stored with Auto 1 are erased. (Data stored in manual mode are not affected.)

Storing Data in Memory

To store data using the Auto 2 mode, proceed as follows.

1. Set the power switch on the side of the unit to On.
2. Press the Menu key to call up the menu screen on display.
3. Uuse the Page key to call up page 1/4.
4. If the store mode is not already set to "Auto2", use the ▲ and ▼ keys to highlight the item and use the ◀ and ▶ keys to set it to "Auto2". The indication "Auto 2" appears on display 1.
5. Set frequency weighting (A/C/Flat) and the time weighting (Time Const) to the desired settings.

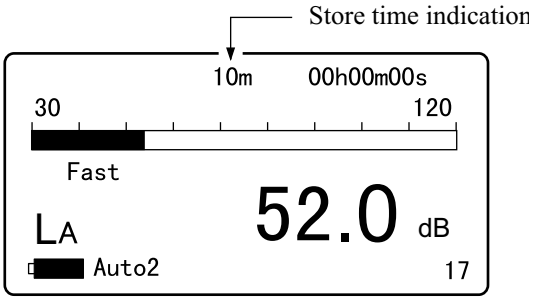


Menu screen (1/4)

6. Use the Level Range keys to select the level range. Choose a setting in which the bar graph indication registers to about the middle of the range. If the "Ov"(Over) or "Un"(Un) indication appears frequently, change

the level range setting.

7. Use the M.Time key to select the measurement time.
   With each push of the M.Time key, the displayed measurement time is switched as listed below.
   No indication (arbitrary measurement time) → 1 s (second) → 3 s → 5 s → 10 s → 1 m (minute) → 5 m → 10 m → 15 m → 30 m → 1 h (hour) → 8 h → 24 h → no indication

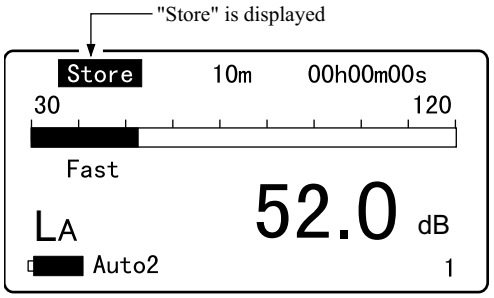


Measurement screen

   The measurement time here means the time for calculating the values for one data set. Because up to 7200 data sets can be stored in Auto 2 mode, the time required for the full store process is the selected measurement time multiplied by 7200.
   When wishing to measure the percentile sound pressure level with user-selected settings, perform step 8 on page 59.
8. When wishing to exclude data, proceed as described on page 62.

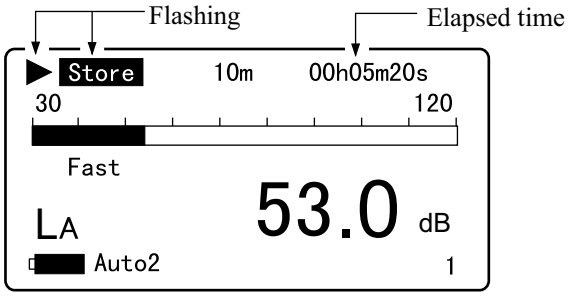
Note
In addition to the regular pause function it is also possible to exclude (back-erase) data from the immediately preceding 3 seconds or 5 seconds.

9. Press the Store key.
   The indication "Store" appears on display 1.



Measurement screen

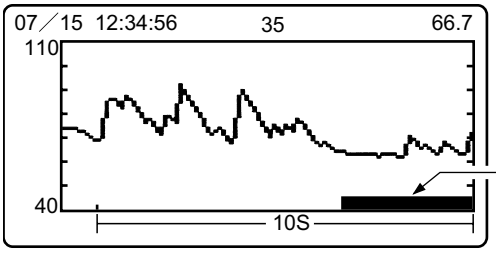
10. Press the Start/Stop key.
    In Auto 2 mode, the data number cannot be specified. The store process always starts at data number 1. (All previous data are erased.)
    During store, the "▶" symbol and the "Store" indication are flashing, and the elapsed time (time for measuring one data set) is displayed.
    If the menu screen was shown on display 2, the mode is automatically switched to the measurement screen.



Measurement screen

Important
During the store operation, most of the keys such as the A/C/Flat key and Time Const key are inoperative. Only the following three keys can be used: Start/Stop, Pause/Cont, Light. All other settings must be made before starting the measurement.

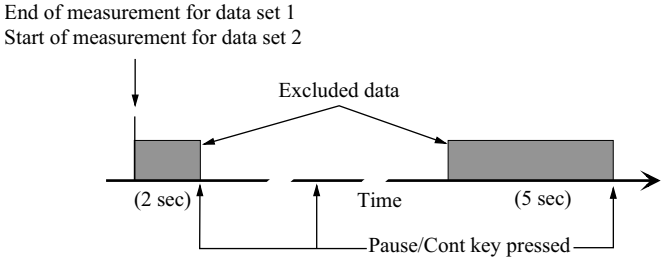
During store, the Pause/Cont key can be used to pause and resume the operation. During pause, the pause symbol (⏸) is shown. Any pause intervals are not included in the store time.
If data were selected for exclusion in step 8, these data are indicated on display, as shown below.



Measurement screen

Note

The data exclusion (back-erase) function cannot extend over two data sets.
As shown in the illustration below, if measurement for the second data set has already started, pressing the Pause/Cont key two seconds into the measurement will only erase the data from the start of this measurement, not those in the already completed data set.



11. When the number of data sets has reached 7200, the store process terminates automatically. When wishing to terminate the store process earlier, press the Start/Stop key.

Reading Stored Data

To read data stored in Auto 2 mode, proceed as follows.

1. Set the power switch on the side of the unit to On.
2. Press the Menu key to call up the menu screen on display.
3. Use the Page key to call up page 1/4.
4. If the store mode is not already set to "Auto2", use the ▲ and ▼ keys to highlight the item and use the ◀ and ▶ keys to set it to "Auto2".
5. Press the Recall key.
   The indication "Recall" appears on display.
6. Use the ▲ and ▼ (Data No) keys to select the data number to display. The stored data are shown on display.
   Use the Mode key to switch between the data determined in various processing modes.
   The date and time field shows the date and time when the store process was started (by pressing the Start/Stop key).

Note
If a certain processing result is not displayed, use the menu screen (press the Menu key) to set the respective item to "On". Processing results are on menu screen 3/4.

7. To terminate the recall mode, press the Recall key once more.

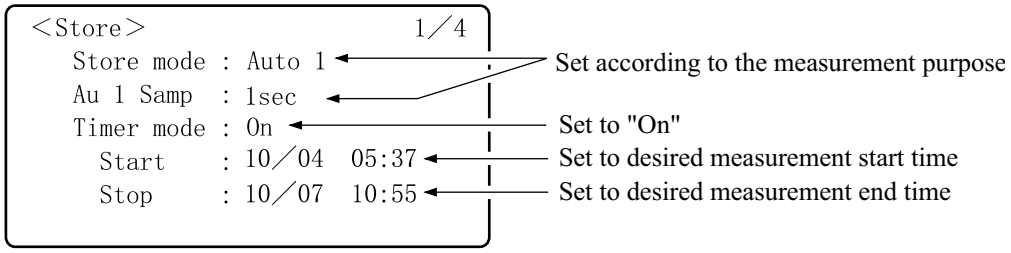
Auto 1, Auto 2 Timer Function

In the Auto 1 and Auto 2 modes, the timer can be used to automatically start and stop measurement.

Setting the timer

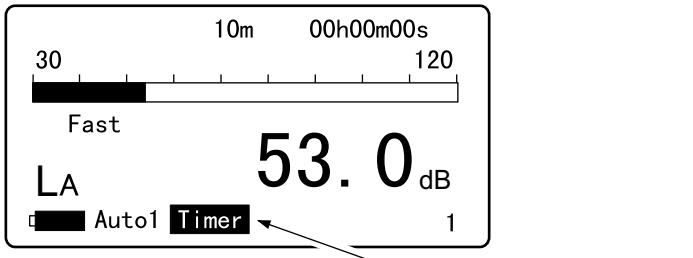
The timer setting procedure is as follows.

1. Set the power switch on the side of the unit to On.
2. Press the Menu key to call up the menu screen.
3. Press the Page key so that "1/4" is displayed at the top right of the screen.



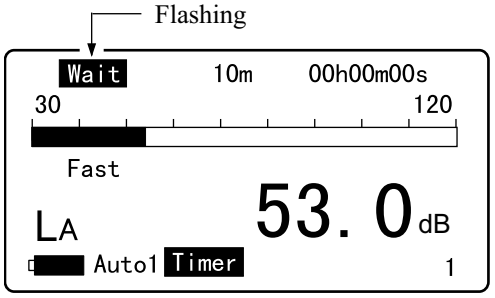
Menu screen (1/4)

4. Set the store mode to Auto 1 or Auto 2 (Leq), depending on the purpose of the measurement. For information on the settings, refer to page 68 (Auto 1) and page 74 (Auto 2).
5. Set the Timer mode item to On.
6. Enter the measurement start time (month, day, hour, minute) and end time (month, day, hour, minute). (The year must not be specified.)
7. Press the Menu key to return to the measurement screen.
   The indication for timer mode is now shown on the display.

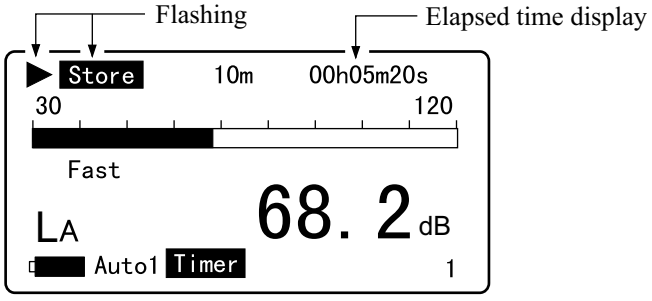


Measurement screen

8. Press the Store key. The indication "Store" appears on the display. Next, press the Start/Stop key. The indication "Wait" flashes on the screen, indicating that the unit is now in standby mode. When the preset start time is reached, "▶ Store" starts flashing and the measurement begins.



Standby screen



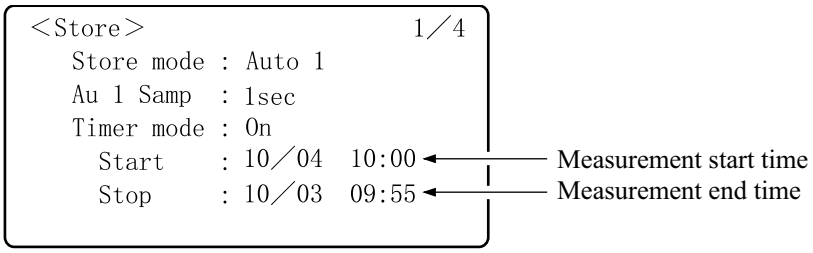
Measurement screen

When the measurement is completed, the "Timer" indication disappears and the display reverts to the normal measurement screen.

Note
This unit incorporates two clocks, one for the elapsed time measurement and one for the date and time clock. A slight divergence may occur between the two, but this is not a defect.

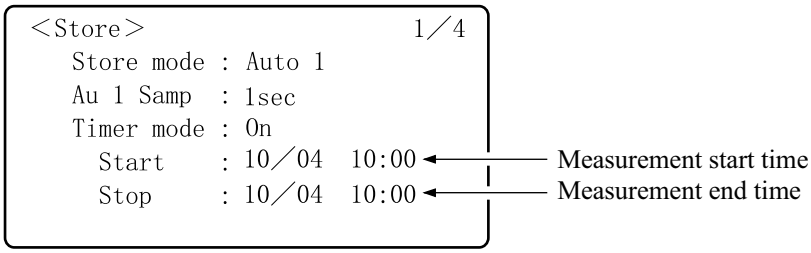
Timer operation examples

Since the timer of this unit does not specify the year, the measurement will end after approximately a year if a setting such as shown below is made.



Menu screen (1/4)

If the start time and end time are set to the same values, no measurement is carried out.



Menu screen (1/4)

If the end of the measurement time (Auto 1 only) is reached or if the memory becomes full before the preset Stop time, the measurement will terminate.

Default Settings

The factory default settings for this unit are as follows.

Time Const	Fast
A/C/Fast	A
Level Range	30 to 120
Mode	Lp
Store Mode	Auto 2 (Leq)
AU1	200 msec
Timer Mode	Off
Time Scale	×1
Back Erase	Off
LCD Contrast	＊＊＊＊－－－
I/O Baud rate	9600 bps
Leq	On
L50	On
LE	Off
L05, L10, L90, L95	Off
Lmax, Lmin	Off
LIST	Off

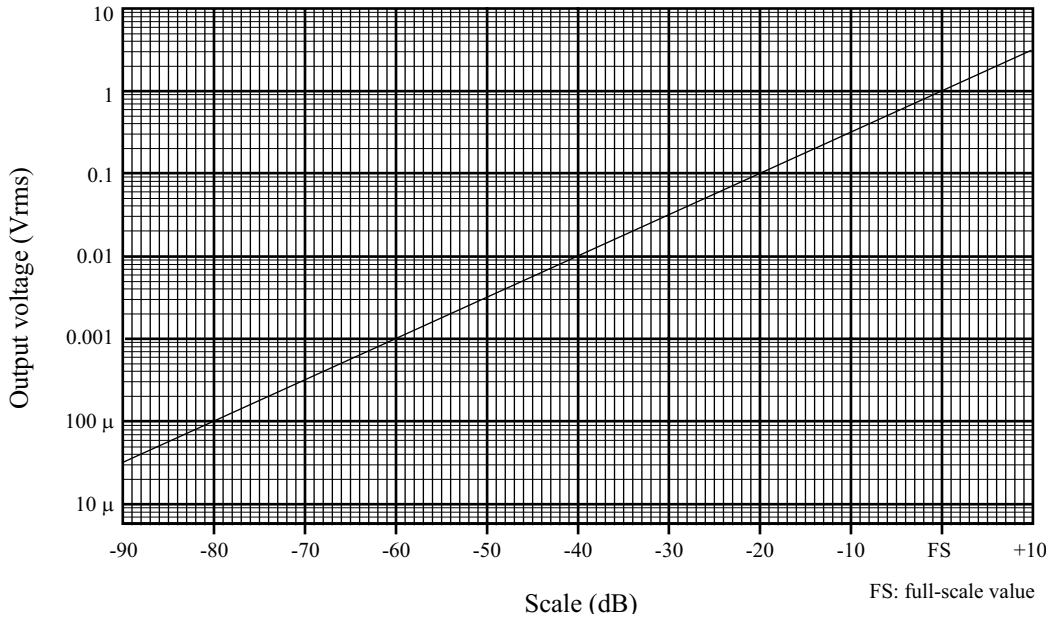
Outputs

AC Output

Common specs

Output voltage:	1 Vrms ± 50 m Vrams (at full-scale)
Output impedance:	approx. 600 Ω
Load impedance:	10 kΩ or more
Suitable cable:	BNC-to-RCA cable CC-24 (option)

The relationship between sound level meter indication and output signal is as shown below.



The output signal in calibration mode (full-scale -6 dB, 1000 Hz sine wave signal) is 0.5 Vrms.

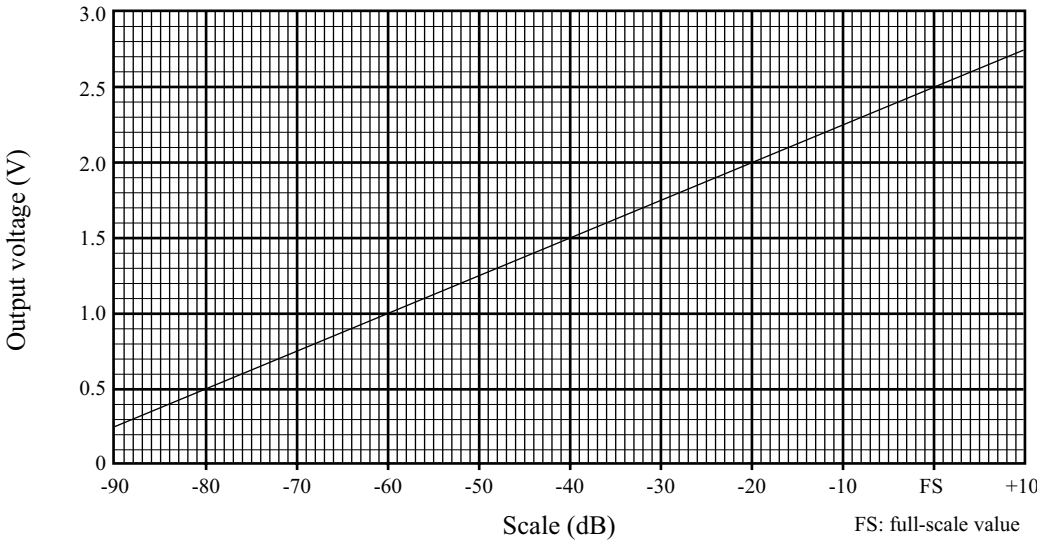
DC Output

The DC signal available at this output has been subject to frequency weighting, rms detection, and logarithmic compression. The signal level corresponds to the measured sound pressure level.

Common specs

Output voltage:	2.5 V (at full-scale), 0.25 V/10 dB
Output impedance:	approx. 50 Ω
Load impedance:	10 kΩ or more
Suitable cable:	BNC-to-RCA cable CC-24 (option)

The relationship between sound level meter indication and output voltage is as shown below.



The output signal in calibration mode (full-scale -6 dB) is 2.35 V.

I/O Port

The I/O connector serves for input of control signals and data input/output. The following cable types can be connected here.

- Printer cable CC-90
  For connection to printer CP-11
- NL data transmission cable CC-31
  For measurement parameter output to level recorder LR-06
- Interface cable CC-87, CC-87E
  For connection to computer

Use of Optional Accessories

Microphone Extension Cables EC-04 Series

For measurements requiring special precision, the microphone/amplifier can be removed from the main unit and connected by means of an extension cable. This reduces measurement deviations due to refraction effects and the acoustic influence of the operator.
As shown in the table below, six types of cables with a length of 2 to 100 meters are available.

Type	Length	Type	Length
EC-04	2 m	EC-04C	30 m
EC-04A	5 m	EC-04D	50 m
EC-04B	10 m	EC-04E	100 m

Note

With long extension cables, the cable capacitance restricts the upper measurement frequency and measurement level. For details, please refer to the Technical Manual.

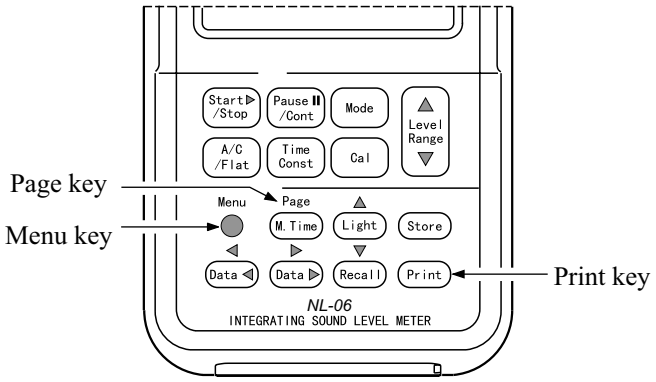
Printer CP-10/CP-11

Measurement data and data stored in the memory of the unit can be printed out on a connected printer. It is also possible to produce hard copy of the graphical representation of memory data shown on display.
The procedure for printing out data is described below. Before starting, connect the printer to the NL-06, turn it on, and set it to the on-line condition. Preparations as described in the chapter "Preparations" (page 12) should also be completed.

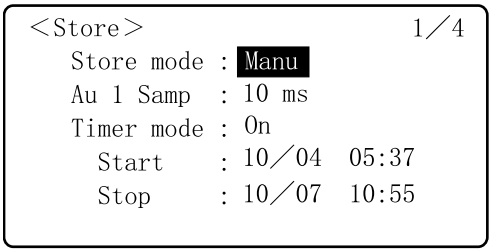
Printing Out Measurement Parameters

The contents of display can be printed out.

1. Press the Menu key to call up the menu screen on display.



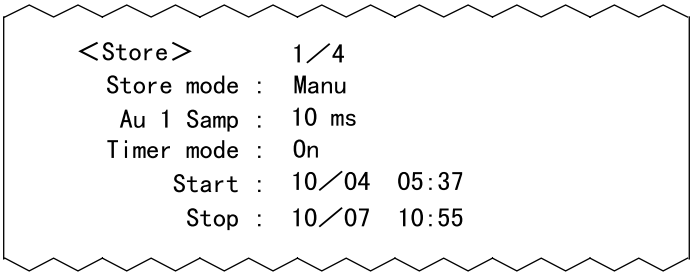
2. Use the Page key to select the page you want to print out (1/4 - 4/4).



Menu screen (1/4)

3. Press the Print key.

Example

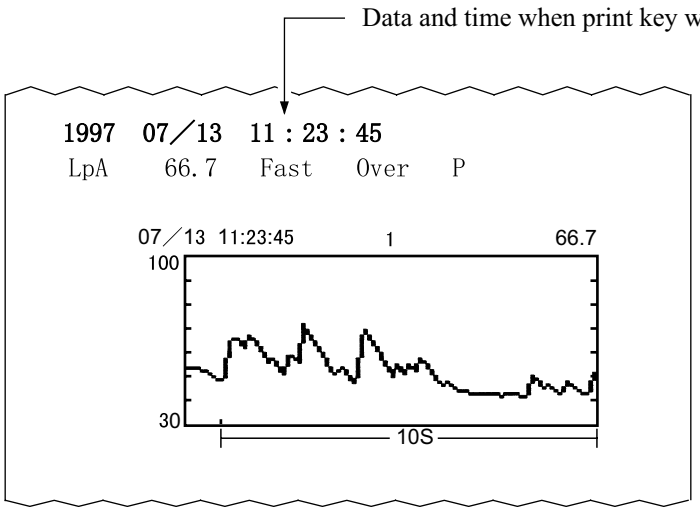


Printing Out Data During a Measurement (when instantaneous value is displayed)

Information shown on display (level reading, frequency weighting, time weighting, overload condition) can be printed out. The level vs. time graph shown on display is also printed out.

Press the Print key at the point where you want to initiate the printout.

Example



LpA: Frequency weighting

66.7: Level reading

Fast: Time weighting

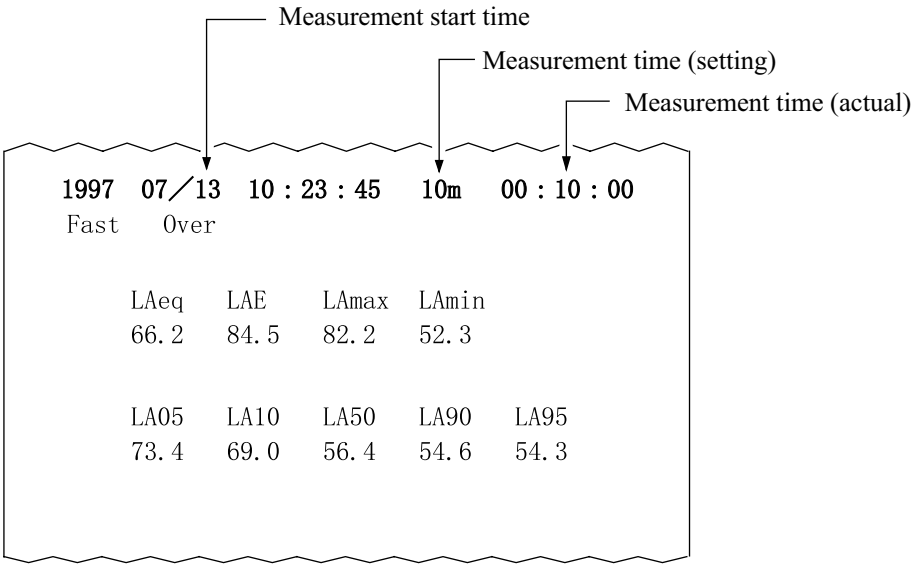
Over: Printed out when overload condition has occurred. If under range has occurred, "Under" is printed. Otherwise, this field will be blank.

P: Printed if Pause/Cont key was pressed

Printing Out Measurement Results (when processed value is displayed)

Measurement results for the various processing functions can be printed. Simply press the Print key at the end of the measurement.

Example



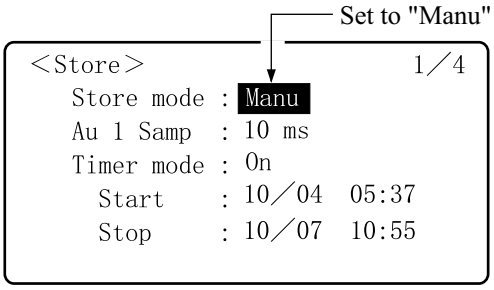
If the measurement was stopped midway, the values for the measurement time setting and the actual measurement time will be different.

Printing Out Data Stored in Manual Mode

The following explanation assumes that data have been stored in the memory of the unit. For an explanation of the store process, see the section "Memory Functions".

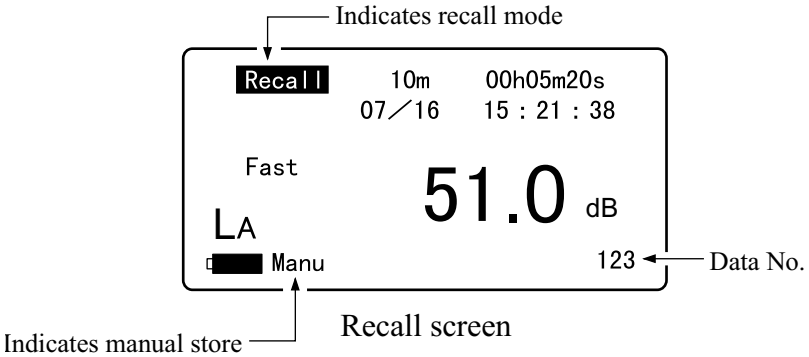
To print out the data, proceed as follows.

1. Press the Menu key to call up the menu screen on display.
2. Uuse the Page key to call up page 1/4.
3. If the store mode is not already set to "Manu", use the ▲ and ▼ keys to highlight the item and use the ◀ and ▶ keys to set it to "Manu". The indication "Man" appears on display 1.



Menu screen (1/4)

4. Press the Menu key to return to the measurement screen.
5. Press the Recall key.

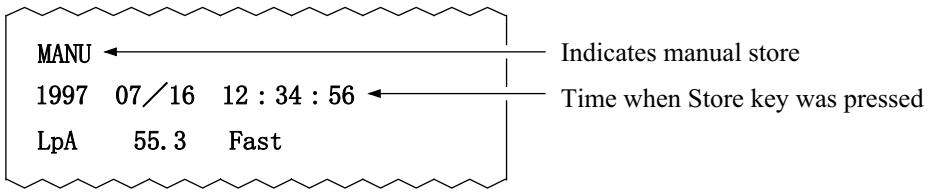


Recall screen

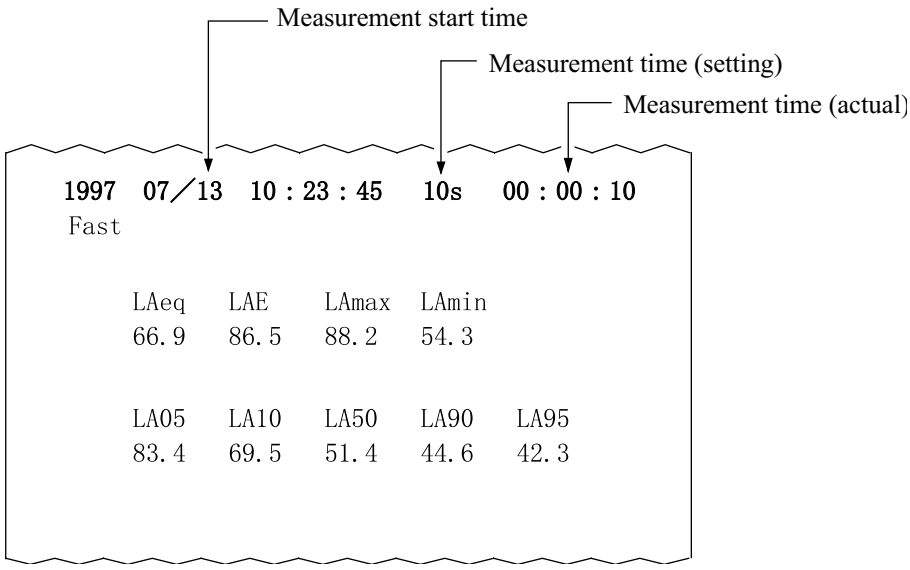
6. Use the ▲ and ▼ (Data No) keys to select the data for printout.

7. Press the Print key.
   Depending on the type of level display on display 1 (instantaneous value or processed value), the printout will be different.

   - Instantaneous value is displayed
     Example



   - Processed values are displayed
     Example



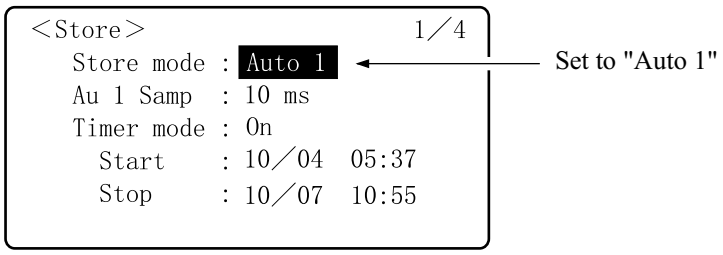
8. To terminate the recall mode, press the Recall key once more.

Printing Out Data Stored in Auto 1 Mode

The following explanation assumes that data have been stored in the memory of the unit. For an explanation of the store process, see the section "Memory Functions".

To print out the data, proceed as follows.

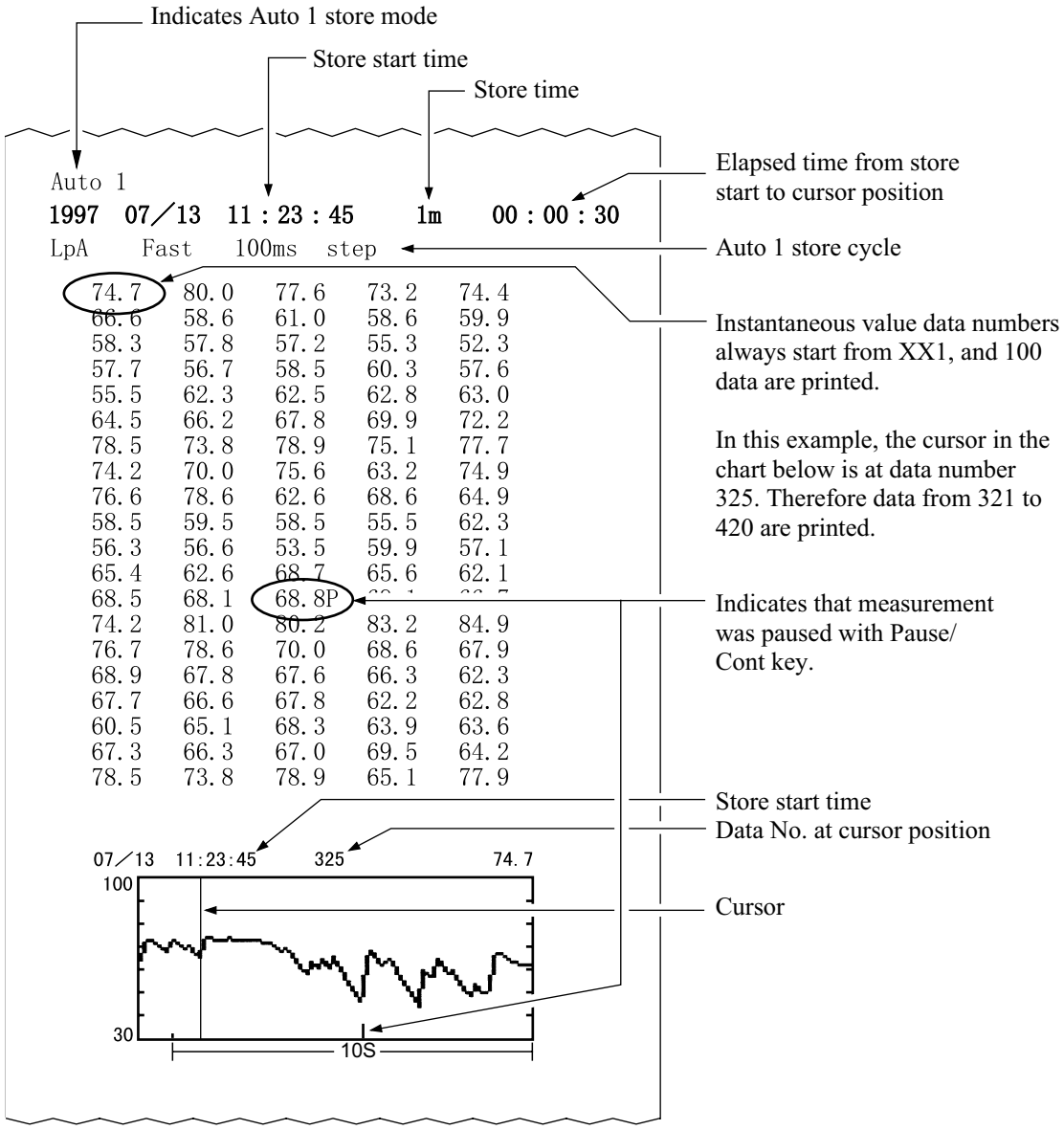
1. Press the Menu key to call up the menu screen on display.
2. Use the Page key to call up page 1/4.
3. If the store mode is not already set to "Auto1", use the ▲ and ▼ keys to highlight the item and use the ◀ and ▶ keys to set it to "Auto1". The indication "Auto 1" appears on display.



Menu screen (1/4)

4. Press the Menu key to return to the measurement screen.
5. Press the Recall key.
6. Use the ▲ and ▼ (Data No) keys to select the data for printout.

7. Press the Print key.



If overload has occurred, an asterisk "*" is appended to the value. When both pause and overload have occurred, the symbol "#" is used.

Note
When the Print key is pressed, the data number automatically increases by 100. This makes it possible to print all stored instantaneous values simply by repeatedly pressing the Print key.

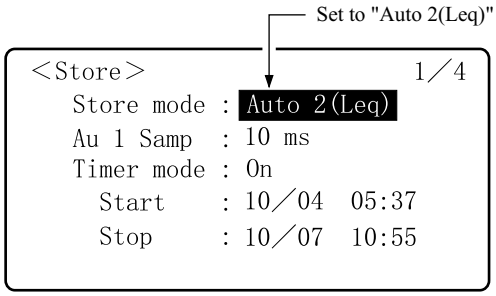
8. To terminate the recall mode, press the Recall key once more.

Printing Out Data Stored in Auto 2 Mode

The following explanation assumes that data have been stored in the memory of the unit. For an explanation of the store process, see the section "Memory Functions".

To print out the data, proceed as follows.

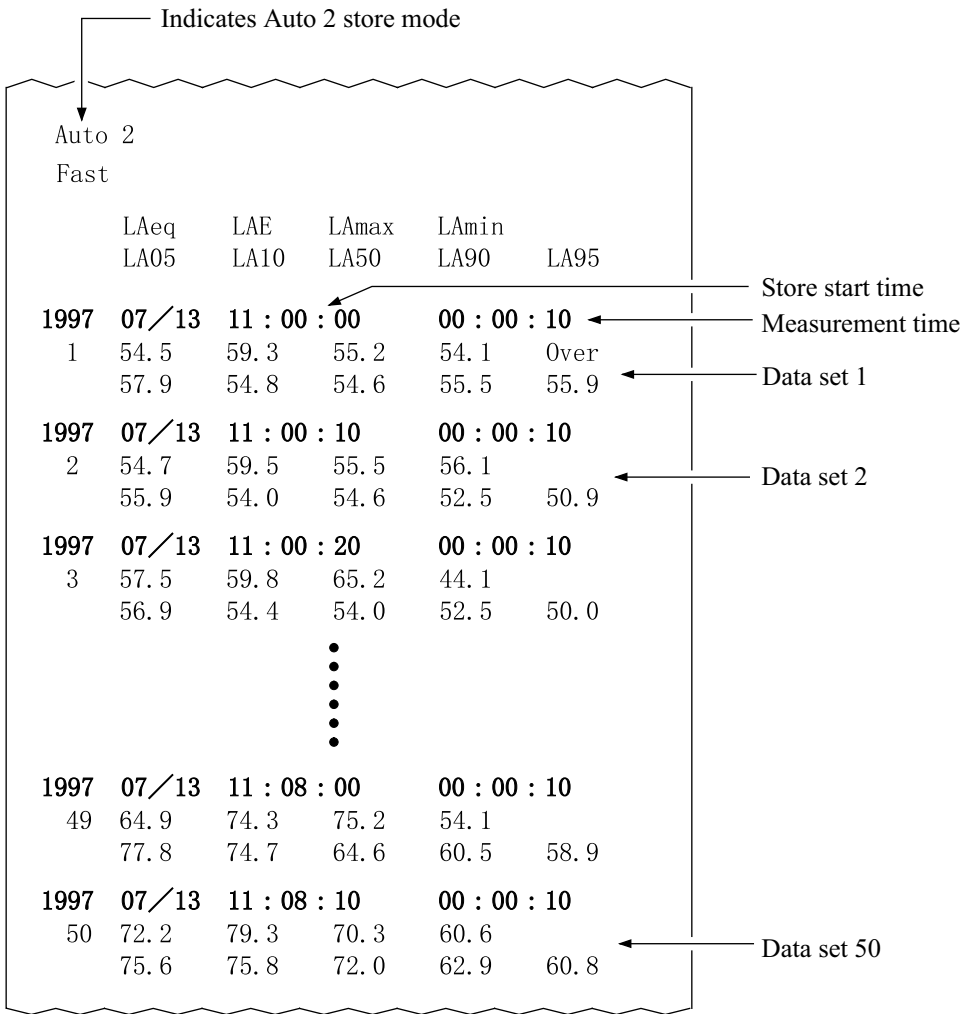
1. Press the Menu key to call up the menu screen on display.
2. If necessary, use the Page key to call up page 1/4.
3. If the store mode is not already set to "Auto2", use the ▲ and ▼ keys to highlight the item and use the ◀ and ▶ keys to set it to "Auto2". The indication "Auto 2" appears on display 1.



Menu screen (1/4)

4. Press the Recall key.
5. Use the ▲ and ▼ (Data No) keys to select the data for printout.

6. Press the Print key.
   Example



   Pressing the Print key once causes data sets 1-50 to be printed. Pressing the Print key again causes printing to continue from data set 51.

7. To terminate the recall mode, press the Recall key once more.

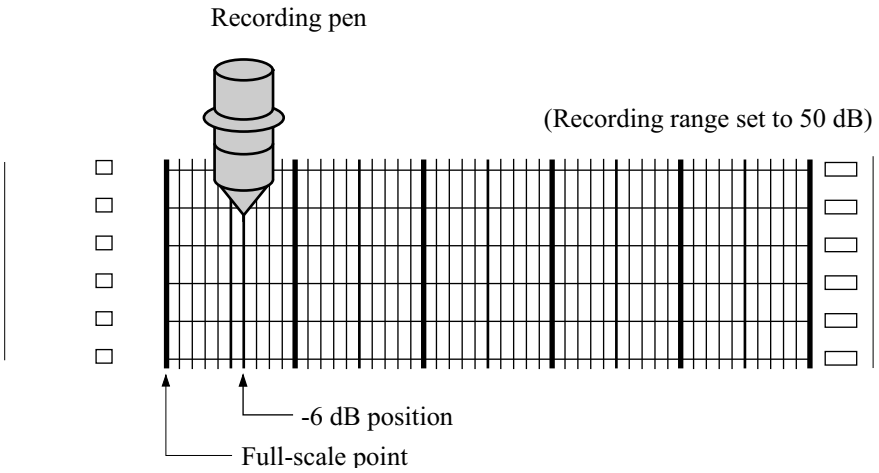
Level Recorder LR-04/LR-06/LR-07

For continuous recording of sound pressure level changes, a level recorder can be connected to the NL-06. The LR-06 has the capability to record setup parameters of the NL-06 (level range, frequency weighting, filter center frequencies) along with the level waveform.

Sound Pressure Level Recording

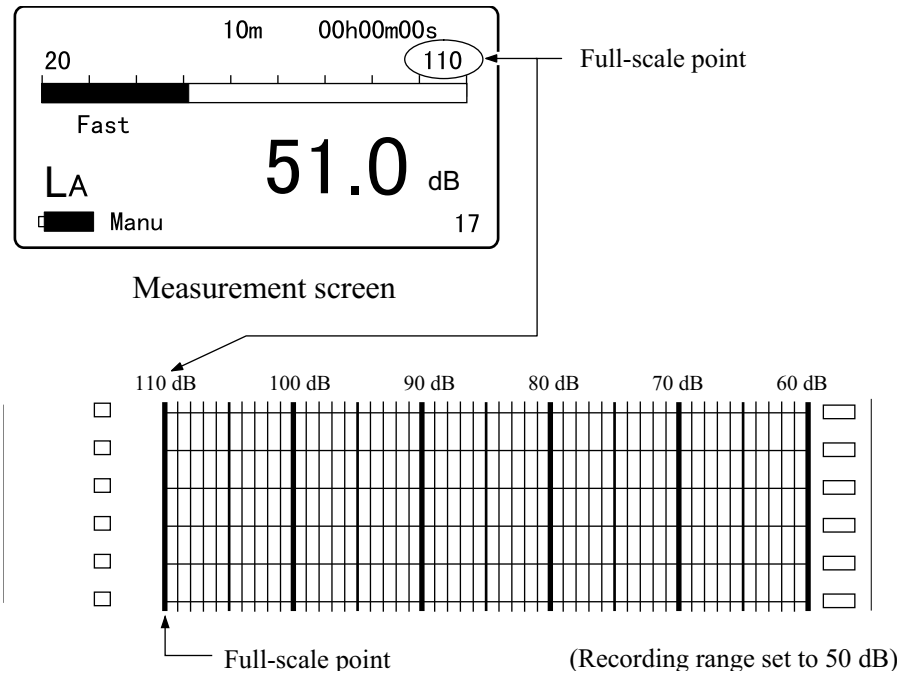
The procedure for sound pressure level recording on a level recorder is described below. Before starting, connect the level recorder to the NL-06 and turn the level recorder and NL-06 on. Preparations as described in the chapter "Preparations" (page 11) must also be completed. For details regarding use of the level recorder, please refer to the instruction manual of the level recorder.

1. Press the Cal key on the NL-06 to activate the calibration mode.
2. Activate the paper feed and pen operation of the level recorder to start recording.



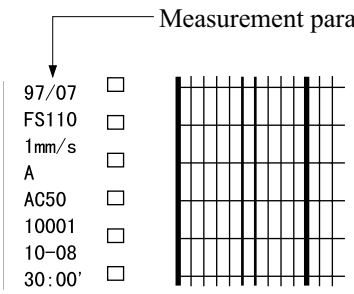
3. Adjust the level control (Level ADJ) of the level recorder so that the pen is at a point -6 dB below the full-scale point.
4. Press the Cal key of the NL-06 to turn off the calibration mode.
5. Use the A/C/Flat key to select the frequency weighting. The time weighting is adjusted at the level recorder.
6. Use the Level Range keys to select the level range. Choose a setting in

which the "Over" or "Under" indication does not appear.
The upper limit of the level range selected at the NL-06 becomes the full-scale point of the level recorder.



Note

If the optional NL data transmission cable CC-31 is used with the LR-06, and TP-30 thermal paper is loaded, the measurement settings of the NL-06 are automatically printed out.
This time I/O port transfer rate should be set to 4800 bps (see page 37).

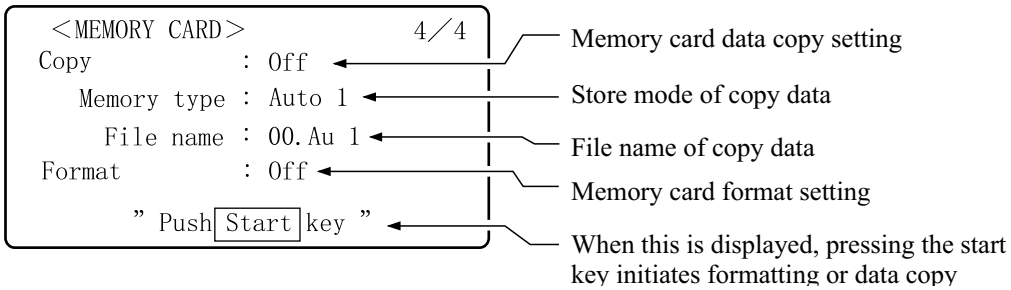


Memory Card

Data stored in the memory of the Noise Level Meter NL-06 can be copied to a memory card (ADV-CF4M, capacity 4 megabytes), for later data processing on a computer.
The procedure for copying data to the memory card is described below.
The preparations described on page 12 are assumed to be completed.

Activate the menu screen 4/4.

Menu screen (4/4)



Important

When "Push Start Key" is displayed, do not remove or insert the memory card, to prevent the possibility of damage.

Copy: On/Off

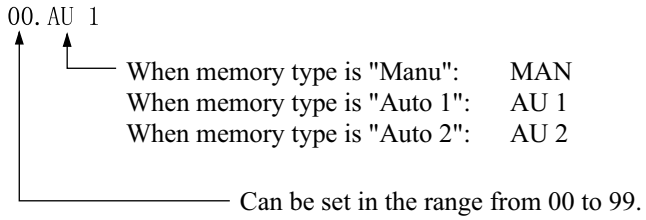
Set to On when wishing to copy data to the memory card. Data collected with auto store are copied up to the data number which contains data. Data collected with manual store are copied in the data number sequence, regardless of whether the data number contains data or not, up to 100 data.

Memory type: Manu/Auto 1 or Auto 2

Select the mode for the data stored in memory. For Auto 1 and Auto 2, the applicable setting is displayed. When there are no stored data, Auto 1 is displayed.

File name

Assigns a file name to the copied data.



Format: On/Off

Set this to On when wishing to format the memory card.

"Push Start Key"

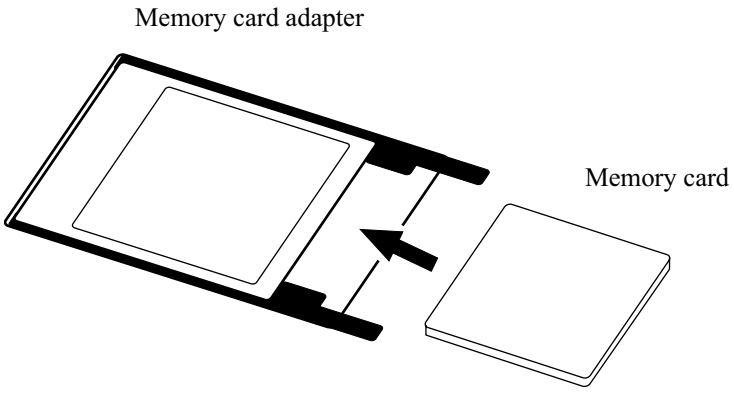
Flashes when Copy or Format has been set to On. Press the Start/Stop key to initiate the copy or formatting process. When the key is pressed, the menu screen disappears, an indication such as listed below is shown for 5 seconds, and then the menu screen returns.

Indication	Description
Now Copying!!	Data are being copied to card
Now Formatting!!	Card is being formatted
Error --- No Data	No noise level data
Error --- No Card	No card inserted
Error --- Card not available	Card is not appropriate
Error --- Card Full	Card is ful
Same File Exists. Over Write? "Yes"---Push [Start] "No" ---Push [Cal]	File with same name exists. Overwrite?

The Copy or Format setting returns to Off after the process is completed. It also returns to Off if the user switches to another screen.

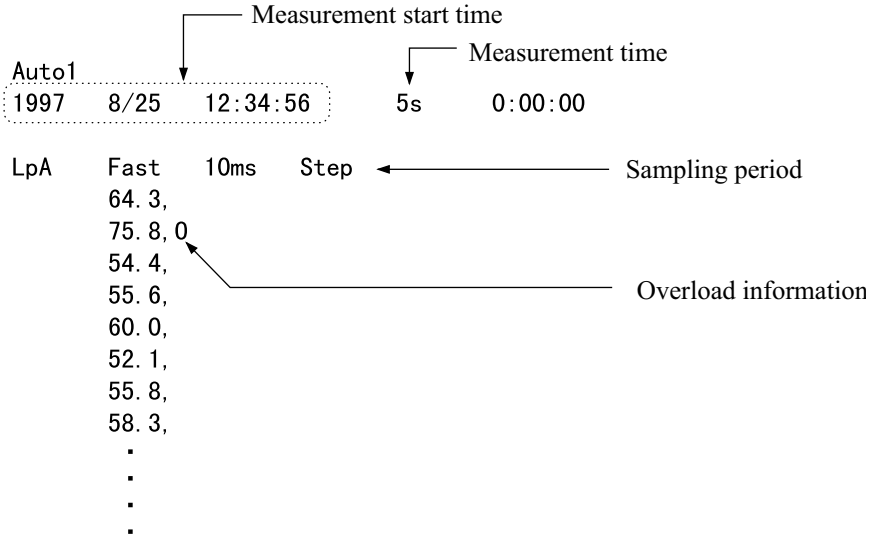
Loading data from memory card

1. Plug the memory card into the memory card adapter (supplied with memory card). The card can now be inserted into the a PC card reader of a PC.



2. Start the appropriate software and open the file on the memory card. Data are stored in text format in the file. For Auto 1 data, the delimiter "," is used. For Auto 2 and Manual data, the delimiter "_ (space)" is used. An output example is shown below.

Auto 1 data output example



Auto 2 data output example

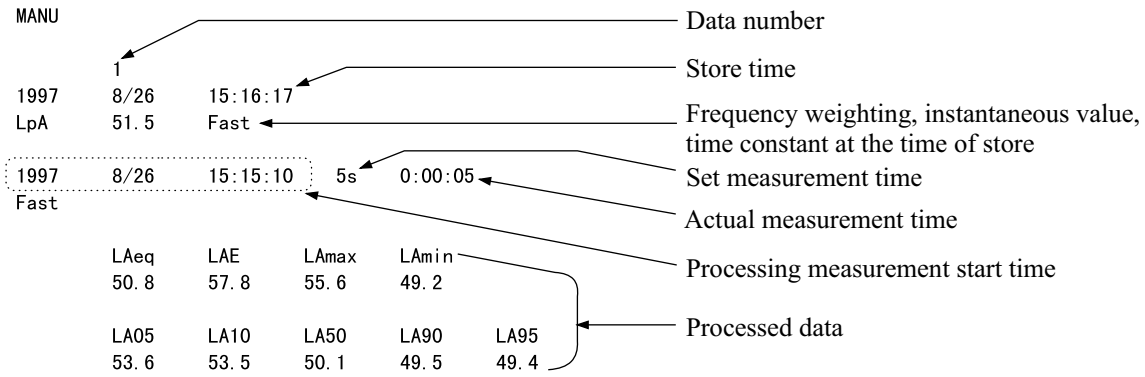
Data No.

Set measurement time

Measurement start time

```
Auto 2
Fast      3s
                                          LAeq    LAE     LAmax   LAmin   LA05    LA10    LA50    LA90    LA95
1  1997   8/24   14:44:55  0:00:03        52.4    57.2    54.4    51.1    53.5    52.1    50.3    48.6    45.3
2  1997   8/24   14:44:58  0:00:03        57.7    62.5    65.4    52.3    63.0    61.2    54.7    52.7    51.6
3  1997   8/24   14:45:01  0:00:03        60.5    65.5    66.0    63.1    64.8    64.3    59.6    55.3    52.9
4  1997   8/24   14:45:04  0:00:03        59.8    64.5    67.2    52.2    65.8    64.6    56.4    52.6    52.1
5  1997   8/24   14:45:07  0:00:03        56.0    60.8    64.5    51.8    61.3    60.1    53.8    52.5    51.3
6  1997   8/24   14:45:10  0:00:03        58.9    63.8    67.2    52.1    64.8    64.2    53.6    52.4    52.2
7  1997   8/24   14:45:13  0:00:03        52.1    56.9    53.0    51.4    52.5    52.4    52.1    51.0    50.5
8  1997   8/24   14:45:16  0:00:03        57.2    61.5    65.5    52.4    63.4    60.7    52.6    51.8    51.6
.                                         .
.                                         .
.                                         .
.                                         .
32 1997   8/24   14:46:28  0:00:03        52.7    56.5    52.6    51.1    52.2    52.1    51.8    51.2    51.1
```

Manual data output example




```
2
1997   8/26   15:17:20
LpA    53.0   Fast

1997   8/26   15:17:10
Fast

       LAeq   LAE    LAmax  LAmin
       53.7   60.7   60.3   51.5

       LA05   LA10   LA50   LA90   LA95
       57.4   56.0   53.2   52.0   51.9
              .
              .
              .
              .
```

About memory cards

Use only memory cards sold by Rion Corporation.

The memory cards that can be used in this unit are CompactFlash™ cards. Do not use any other kind of memory card, to prevent the possibility of damage.

* CompactFlash is a trademark of SanDisk Corporation.

Memory cards even from the same manufacturer and of the same type exhibit certain variations in specifications which may cause problems. For this reason, be sure to use only the memory cards offered by Rion Corporation.

Note
When using spreadsheet software or other programs on a computer to retrieve data from memory cards, some programs may not be able to read the original file names from the card (for example “00.au2”). In such a case, rename the file using the extension “txt” (for example “00.txt”) and set the software up for reading text files.

Specifications

Applicable standards:	IEC 60651: 1979 Type 2 IEC 60804: 1985 Type 2 JIS C 1502:1990
Measurement functions:	Instantaneous sound pressure level (L_P) Equivalent continuous sound pressure level (L_{eq}) Sound exposure level (L_E) Maximum (L_{max}) and Minimum (L_{min}) sound pressure level Percentile sound pressure level L_x (5 selectable settings) Measurement time: 1, 3, 5, 10 seconds, 1, 5, 10, 15, 30 minutes, 1, 8, 24 hours and manual (max. 199 h 59 m 59 s)
Max. Measurement Level:	142 dB rms
Noise floor:	Typically 18 dB(A)
Reference range:	30 - 120 dB
Reference sound pressure level:	85 dB
Reference frequency:	1 kHz
Linearity range:	100 dB
Pulse range:	103 dB
Level range selection:	7 ranges in 10-dB steps Bar graph display scope for each range (overload occurs at +10 dB from maximum value) 20 - 80 dB 20 - 90 dB 20 - 100 dB 20 - 110 dB 30 - 120 dB 40 - 130 dB 50 - 140 dB

Frequency range:	20 - 8000 Hz (including Microphone) 10 - 20000 Hz (amplifier only)
Frequency weighting:	A, C, Flat
RMS detection:	Digital processing
Time weighting:	Fast, Slow
Calibration:	Electrical calibration with 1-kHz sine wave signal from built-in oscillator
Processing functions:	Digital processing Sampling interval 20.8 μs (L_{eq}, L_E) 10 ms (L_{max}, L_{min}) 100 ms (L_x)
Pause function:	Normal pause function and data exclusion (back-erase) function for 3-second or 5-second interval (selectable)
Internal memory:	Manual and auto store mode for instantaneous value and processing results
Manual:	Up to 100 data sets Instantaneous value and store time, processed values and processing start time stored as a set
Auto1:	Up to 432,000 data Continuous instantaneous values or L_{eq} values stored for preset time Data sampling interval selectable from 10, 100, 200 ms and 1 s for instantaneous value; fixed to 1 s for L_{eq}. Supports onlyonestore operation.
Auto 2:	Up to 7200 data Total processing values of continuous L_{eq}, L_E, L_{max}, L_{min}, L_x and processing start time are stored for preset time. Supports only one store operation.
Timer function:	Allows automatic start and end of auto store function.
Memory card compatibility:	Copy function of data from internal memory to memory card
Memory card format:	CompactFlash™ cards
File format:	MS-DOS compatible text file

Microphone and preamplifier

Microphone:	1/2-inch electret condenser type
Model:	UC-52
Sensitivity:	-33 dB (0 dB = 1 V/Pa)
Preamplifier	
Model:	NH-19

Display:	Backlit LCD panel (128 × 64 dots)
Numeric display:	4-digit display, range 110 dB, update cycle 1 s
Bar graph indication:	Scale range 90 dB, update cycle 0.1 s
Level vs. time display:	Scale range 70 dB, time range 10 s (0.1 s steps) or 100 s (1 s steps)
Warning indications:	Over (overload) at +10 dB from upper scale limit Under (underload) at -0.6 dB from lower scale limit
Battery indication:	4-segment display of remaining battery capacity
Clock indication:	Year, month, day, hour, minute, second

Outputs:

AC output	
Output voltage:	1 Vrms (at full-scale)
Output impedance:	600 Ω
Load impedance:	10 kΩ or more
DC output	
Output voltage:	2.5 V (at full-scale), 0.25 V/10 dB
Output impedance:	50 Ω
Load impedance:	10 kΩ or more

I/O connector

Function: For sound level meter control from and data output to a computer
For data output to printer CP-11 (option)
For measurement parameter output to level recorder LR-06 (option)

Transfer principle

Transfer principle:	synchronous
Data word length:	8 bit
Stop bits:	2
Parity check:	none
Baud rate:	4800, 9600, 19200 bps
Xon/Xoff control:	yes

Power requirements: Four IEC R6 (size "AA") batteries

Battery life: LR6: approx. 24 h (alkaline batteries)
R6P: approx. 11 h (manganese batteries)
Battery life will be approx. 1/3 with backlight

AC adapter NC-34 series (option)
NC-34 (for 100 V AC)
NC-34A (for 120 V AC)
NC-34B (for 220 V AC)
Current rating: approx. 70 mA (6 V DC)

Ambient conditions: -10 to +50ºC, 30 to 90% RH (no condensation)

Dimensions: 286 (length) × 85 (width) × 41 (thickness) mm

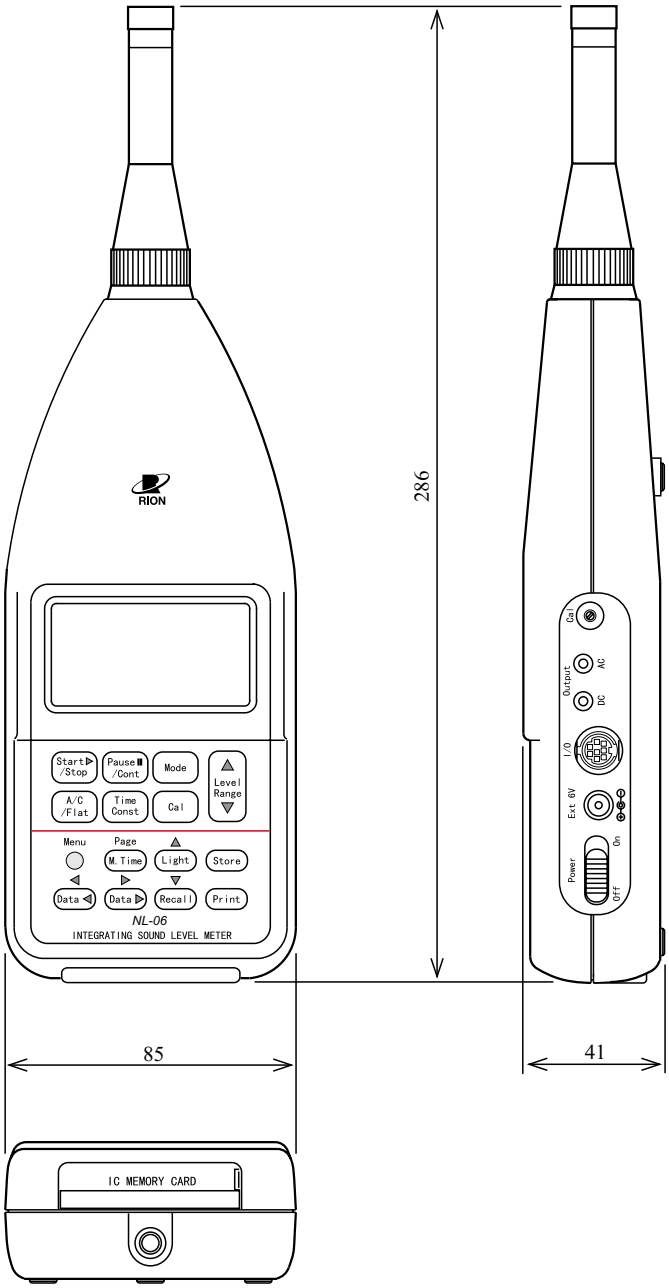
Weight: Approx. 460 g (including 4 batteries)

Supplied accessories:

Windscreen	WS-02	1
Cable	CC-24	1
Miniature screwdriver	D-62	1
IEC R6 batteries		4
Lithium battery	CR-1/3N	1
Case	CF-20	1
Instruction Manual		1 set

Options:

Memory card (CompactFlash) with card adapter for PCMCIA	ADV-CF4M
Microphone extension cable	EC-04 series
Printer	CP-11
Pistonphone	NC-72
Level Recorder	LR-06
Interface cable	CC-87, CC-87E
Printer cable	CC-90
NL data transmission cable for LR-06	CC-31
AC adapter	NC-34 series



Front panel

Right side panel

Bottom panel

Dimensions

Unit: mm

No. 26702 99-09