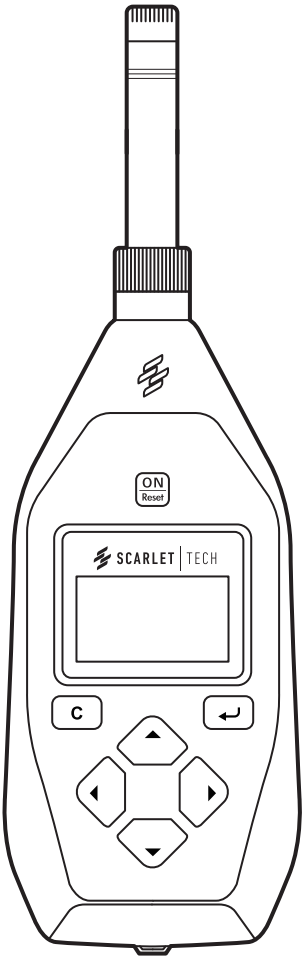
SCARLET | TECH



ST-11D

Sound Level Meter

User Guide

Precaution

- Use the sound level meter gently, especially for microphone part, microphone is delicate sensor that require careful handling, please avoid any crashing, knocking and hitting, no water or oil entering.

- If choose to use alkaline batteries, please use high capacity of alkaline batteries. And remember to remove the batteries when don't use sound level meter for more than one week.

- Do calibration before and after measurement if needed.

- Keep sound level meter powering on status at least 8 hours every month for charging internal clock battery.

Contents

1. General Introduction

Model ST-11D Sound level meter is a digital and multifunction sound level meter with modular design. Its measurement solution is in accordance with IEC 61672: 2013 Class 1 standard and its sensitivity for emission in radio frequency filed is classified as group X. The meter has adopted advanced digital detection technology and has automatic range conversion, reliable and steady performance, wide linear operating range etc. The shell adopts ABS engineering plastic with beautiful shape, light-weight and is easy to carry. The power consumption of it is small. Through the RS-232 digital output interface, users can use a computer remotely to control telemetry, also set a network with computer control and measurements.

It is applied widely in the measurement of noise produced by various machines, vehicle, boat, electro etc. Also can be used to measure environmental noise and industrial noise, e.g. labor protection, industrial hygiene.

2. Specification

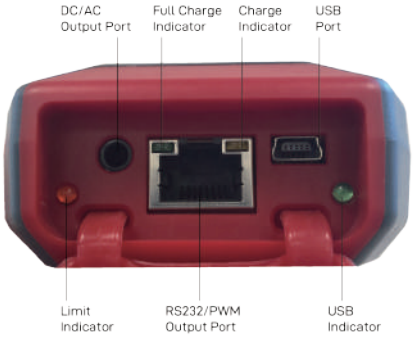
Model	ST-11D
Fulfils Standard	IEC 61672:2013 Class 1
Normal frequency	10 Hz~20 kHz
Measurement range	20~140 dB
Accuracy	±0.7 dB
Resolution	0.1dB
Frequency Weighting	A, C, Z, B
Time Weighting	F, S, I, Peak
Integrating time	1s~24h
Dimensions	310×72×32 mm
Display	128×64 OLED
Weight	0.4kg
Main Parameters of Measurement	LFp, LSp, LIp, Leq,t, Lpeak, Leq,T, LFmax, LFmin, LSmax, LSmin, LImax, LImin< SEL, Lex8h, LAVG, TWA, DOSE, Ln1, Ln2, Ln3, Ln4, Ln5, SD, Ts, Tm, Volt, E.
Audio Recording	48kHz, 16bit", "24kHz, 16bit", "12kHz, 8bit"
Datalogging	Stores 2G Memory, Stores more than 14400 groups measurement results including Timestamp, %Dose, TWA
Power Supply	4x AAA Batteries or external power supply
Output Interface	AC, DC, RS-232, USB interface
Application	Sound Level Meter/ Noise Dosimeter/ Data logging & Audio recording
Operation Environment	Air temperature: -15°C~+50 °C Relative humidity: 10 %~90 % Air pressure: 65 kPa~108 kPa
Package Contents	Sound Level Meter, Calibration Certificate, 1/2" Prepolarized Condenser Microphone, Windscreen, RS232 Cable, Mini USB Cable, User Manual, Waterproof Carrying Case.

3. Structure Features and Function

The outline of the Sound Level Meter is shown in figure 1 and figure 3. It consists of microphone, preamplifier and main unit. During normal operation, the microphone and the preamplifier are installed on head of the main unit which can be taken off from the main unit through knurled nut. Extension cable can also be used between the main unit and the preamplifier. The function of the socket's pins between preamplifier and the sound level meter are shown in figure 4. The outline of the sound level meter is sharp to reduce the reflection of the sound wave. The nominal influence of the reflection caused by the shell of sound level meter and the indication features of the sound level meter at different incidence directions are mentioned in Appendix C. The shell is molded with ABS plastic, the batteries are put in battery box, and it is very convenient to replace the batteries through turning down the battery cover plate. All switches are button switches which are located in the central of the obverse side. Overload indicator light is located on front top, external power supply socket is located on the right side of the bottom, and on the bottom is a 8 core socket and a 2 core stereo socket, the definition and function of pins is shown in figure 2 and 5.

3.1 Front View

3.2 Bottom base



3.3 Back View

Fig 4x9

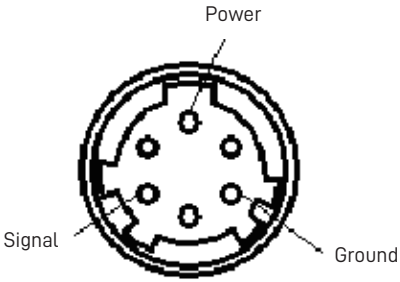
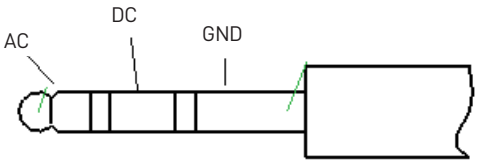
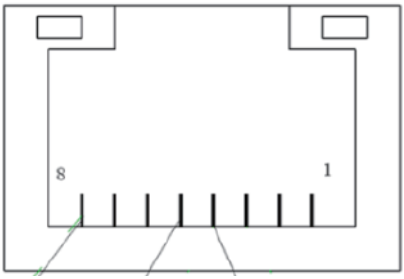


Fig 5. AC/DC output



RS232 output socket, the socket type uses the RJ45 socket, pins are defined as below:



RS232 port serial input, only two serial output signal, the pins are defined as follows.
The pins are defined as follows:

1	2	3	4	5	6	7	8
Power	Empty	PWM	RXD	TXD	Reset	Power control	GND

1. External power：input 4.5 V～5.5 V/output batteries voltage
2. Empty
3. PWM output
4. RXD
5. TXD
6. Reset: at ordinary times, it should be hung up, instrument would be reset when level is higher.
7. Power control: at ordinary times, it should be hung up, power supply of instrument would be turned on when level is higher.
8. GND

Table 1 Keys function

No	Button	Definition
1	Power on/reset	Power on or reset the meter
2	Enter	Enter the next menu or Input the current operation
3	Exit	Exit from the current menu or keep pressing for 3s to power off the meter
4	Right cursor	Move cursor to next position
5	Left cursor	Move cursor to former position
6	Parameter up	Parameter data increases which the cursor is pointed
7	Parameter down	Parameter data decreases which the cursor is pointed

Table 2 Definition of symbol

No	Symbol	Definition
1		Battery level display
2		Microphone setup: diffusion field type
3		Integrating measurement and statistical analysis are in progress
4		Integrating measurement and statistical analysis are paused
5		Logging the varying waves of SPL with time
6		Recording
7		The measured signal surpasses the upper limit of measurement range
8		The measured signal under the lower limit of measurement range

4. Operation

4.1 Preparation before using

1. Check whether the microphone has been installed correctly.
2. Check whether battery has been put in.
3. If necessary, calibrate it with a sound calibrator. Regular method is in chapter 5.
4. The meter should be tested by relevant department regularly (such as one year), so as to ensure its accuracy.

4.2 Use of windscreen

If windy, you may use a windscreen to reduce the influence of wind noise. There are different models for you to choose. Windscreen can reduce noise about 10-15 dB · See Appendix D the influence of free-field responses for a meter with a windscreen when there are no wind.

4.3 External power supply

The Sound Level Meter can be connected with external power through the USB socket at the lower right of the instrument. At this time, the inner battery will be cut-off automatically. The voltage range of the external power supply is 4.5 V~5.5 V. The shell of plug is the cathode and the core of plug is the anode. When the Sound Level Meter is used for long time continuously, it is recommended to use external power supply.

4.4 Check and change battery

While operating, the meter will check battery power automatically, if it is low, the under-voltage indicator on will be lighted, which reminds to change battery. After you change the battery, the meter will operate normal again.

5. Calibration

Power on the ST-11D sound level meter and let it on "F", "Lp" state, preheat the sound level meter for 5 seconds, then insert the ½ inch microphone to the hole of sound calibrator, turn on the power supply of sound calibrator. The sound level meter should indicate 113.8dB.
If the sound pressure level of the calibrator is not 114 dB, deduct 0.2 dB from the normal sound pressure level of the calibrator as calibrating sound pressure level.

5.1 Acoustic calibration

Move the cursor on the first row and press ↵ key, then you enter the calibration interface. The display shown as follows:

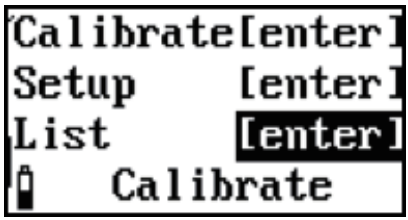


Fig 6 Calibration submenu

First row: Acoustic calibration. You can use acoustic calibrator to calibrate the sensitivity of the instrument.
Second row: Calibration setup. You can set the SPL of the acoustic calibrator, or the sensitivity of the microphone.
Third row: Calibration history of the instrument.

5.1.1 Acoustic calibration

Move the cursor to the first row and press ↵ key, then you enter the calibration interface. It displays as follows:

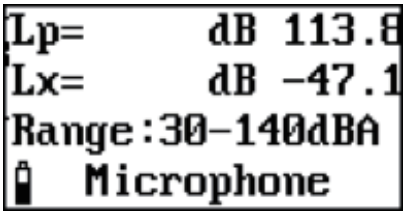


Fig 7 Acoustic calibration of microphone

"Lp= dB 113.8": The latter "113.8" is the SPL of the calibrator, i.e. the SPL for the instrument to be calibrated. The data after "Lp=" is the SPL which is measured by the instrument during the calibration.

"Lx= dB -47.1": The latter "-47.1" is the sensitivity level of microphone. The data after "Lx=" is the newly calibrated sensitivity level of the microphone.

When sound level calibrator is covered on the microphone, turn on the power supply. Press ↵ key to initiate the calibration process. A number is displayed on the lower right corner of the screen, which changes to 9 from 0 and then stops, press ↵ key and the new microphone sensitivity level is saved.

5.1.2 Calibration setup

Move the cursor to the second row when on the calibration submenu, press ↵ key and enter calibration setup interface. The following message appears:

Fig 8 Calibration setup

"Serial": Serial number of the microphone set by the producer. It cannot be modified.
"MIC.Sen.": Sensitivity level of the microphone. You can adjust the sensitivity level of the microphone by pressing ▲ or ▼ key while the cursor stays here.
"Cali.SPL": Sound pressure level of the calibrator. If your calibration SPL is not 113.8 dB, press ▲ or ▼ key to make it reach the output SPL of the calibrator.

Press ↵ key after the adjustment, the instrument will save the operation and display "OK" on the lower right corner of the screen.

5.1.3 Calibration history list

Move the cursor on the second row while on calibration submenu, and press ↵ key, you can enter the calibration history list. The following message appears:

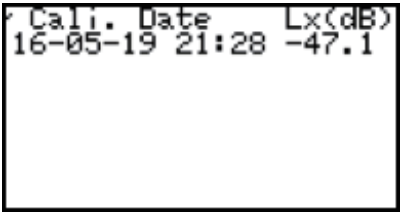


Fig 9 Calibration history list

One line for one calibration record. One calibration record includes record time and the sensitivity level of the microphone. You can view the calibration history of microphone 1 by pressing ▲ or ▼ key which will help you turn the pages.

Press ↵ key and the instrument will ask you whether to delete the calibration history. If press ↵ key again, all of the calibration history will be erased.

6. The operation of ST-11D

6.1 Main menu

After pressing ON Reset key, the instrument does self-check and shows the host number, microphones number, model and configuration number, 2 seconds later the main menu is shown as follows:

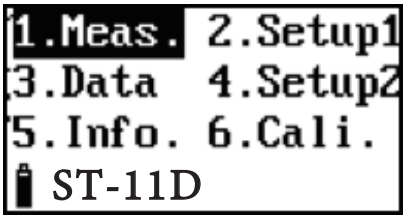


Fig 10 Main menu

6.2 Big display interface

Under the main menu, move the cursor to "1.Meas", press ↵ , the display interface will be following:

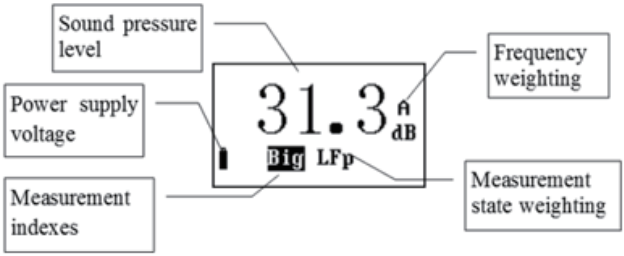


Fig 11 Big interface

When the cursor is moved to the "Big", "LFp" or "A", then press ▲ or ▼ key can change indexes. The indexes are these: LFp, LSp, LIp, Leq,t, Lpeak, Leq,T, LFmax, LFmin, LSmax, LSmin, LImax, LImin, SEL, Lex8h, LAVG, TWA, DOSE, L5, L10, L50, L90, L95, SD, Ts, Tm, Volt, Date, Time, E.

Before starting integrating measurement, the measurement indexes "Lpeak", "Leq,T", "LFmax", "LFmin", "LSmax", "LSmin", "LImax", "LImin", "SEL", "Lex8h", "LAVG", "TWA", "DOSE", "L5", "L10", "L50", "L90", "L95", "SD" are displayed "0.0". While move the cursor to "A", press ▲ or ▼ key can get "C" or "Z" weighting.

6.3 List measurement interface

Under the main menu, move the cursor to "1.Meas", press ↵ key, the display interface will be following:

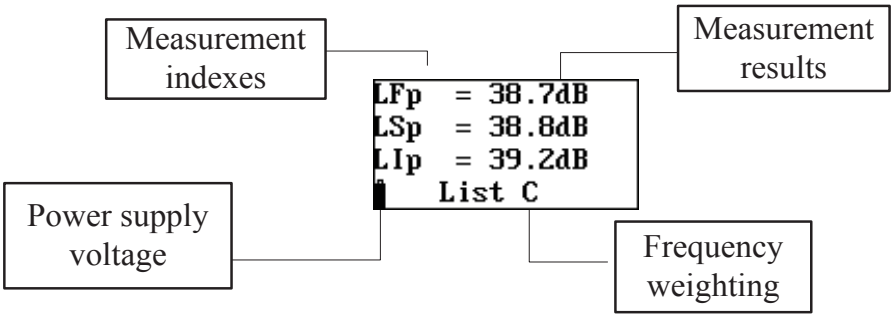


Fig 12 List interface

The former lines are displayed the measurement result. When the cursor is moved on the "List", "C", "LFp", "LSp", "LIp", then press ▲ or ▼ key can change indexes. The indexes are these: LFp, LSp, LIp, Leq,t, Lpeak, Leq,T, LFmax, LFmin, LSmax, LSmin, LImax, LImin, SEL, Lex8h, LAVG, TWA, DOSE, L5, L10, L50, L90, L95, SD, Ts, Tm, Volt, Date, Time, E.

6.4 “2.Setup1” submenu

6.4.1 The 1st page

Move the cursor on “2.Setup1” and press ↵ key, the instrument will enter “2.Setup1” interface and display as follows:

Fig 13 The 1st page of SETUP 1

“Work Mode” ：To meet different measurement standards and purposes, ST-11D sound level meter has many parameters for users to choose. Users can preset the parameters according to the relevant standards and purposes, divide them into different parameter combinations and make different names. Then you only need to choose the relevant parameter combinations for your measurement requests and do not need to set every parameter. If there are not proper parameter combinations in the instrument, “----” is displayed behind and new parameters combinations can be made by PC. ST-11D can store at most 32 parameter combinations.

“Auto name”: after finishing measuring, it will save and change the group name. N/A means cancel this function, Yes means open this function.
“Name: DATA _0000”: the measurement group name of the results. The former 4 characters will be kept as the former 4 characters of the filename saved in USB flash disk. The instrument can save 128 measurement group names at most.

“P:1”: The 1st page. The cursor can be moved among “P:”, “Work Mode”, “Auto name”, “Name”. Press c or ↵ key to turn back to the main menu.

Table 3 the cursor location and the relevant available options on the 1st page

Cursor position	Available options	Remarks
P:	2 or 4	Page turning
Work Mode	Next preset work mode	Choose other work mode
Auto Name	N/A, Yes	Whether automatically make name by the instrument
Name	Next preset measurement name	Recall other measurement names

6.4.2 The 2nd page

Move the cursor on"P:1" and press the key, the instrument will enter the 2nd page and display as follows:

Fig 14 The 2nd page of SETUP 1

"Ts=00h00m00s": preset measuring time. When reach the preset time, the instrument will stop integral measurement, statistical analysis, data logging and the measurement results will be saved meanwhile. It can be set from 1 second to 24 hours.

"N: 5, 10, 50, 90, 95": the statistic numbers. 5 statistic sound levels can be measured simultaneously through either channel of the instrument. You can set the statistic numbers from 1 ~ 99 casually.

"Sta. weighting" ： time weighting when make statistical analysis

Cursor position	Available options	Remarks
P:	3 or 1	Page turning
h	01h~24h	hour
M	01m~59m	minute
S	01s~59s	second
5, 10, 50, 90 or 95	Numbers from 1 to 99	Set statistic sound level
Sta. weighting	F, S, I	Time weighting

6.4.3 The 3rd page

Move the cursor on "P:2" and press key under "2.Setup1" interface, the instrument will enter the 3rd page and display as follows:

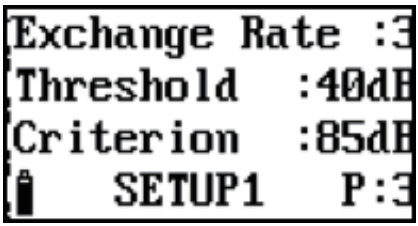


Fig 15 The 3rd page of SETUP1

"Exchange Rate": exchange rate which can be set between 3, 4, 5 and 6.
"Threshold": the threshold value which can be set from 40 to 90dB. If time weighted SPL less than the value, it will not participate in TWA, Dose and LAVG calculations.
"Criterion": the criterion value which can be set from 70 to 90dB. Regulated by the relevant law of the criterion value of 8 hours should be input.

6.4.4 The 4th page

Move the cursor on "P:3" and press ◆ key under "2.Setup1" interface, the instrument will enter the 4th page and display as follows:

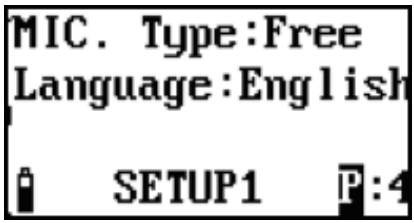


Fig 16 The 4th page of SETUP1

"MIC. Type": Free and Random mode are optional, means free field model and random incidence model. The ST-11D is equipped with free field microphone by the producer. If random incidence microphone is requested by some countries' standards, change the option to "Random", so the instrument will automatically modify the high frequency to meet the request of frequency response of random incidence microphone.

"Language": English

6.5 "2.Setup2" submenu

Move the cursor on "4.Setup2" and press ↵ key, the instrument will enter the 1st page under "4.Setup2" interface and display as follows:

"SETUP2" is for setup of starting mode, auto-pause, restart, hardware, power supply, clock, logging and recording. Move the cursor on "P:1", then press ▲ or ▼ key and enter the 2nd page. It displays as follows:

Fig 18 The 2nd page of SETUP 2

6.5.1 Starting setup

When on the 1st page under SETUP2 interface, move the cursor to the first row, press ↵ key and enter start setup interface. It displays as follows:

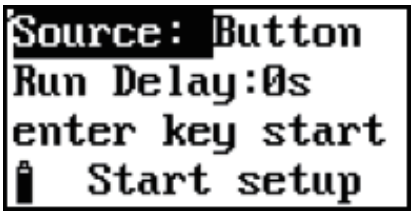


Fig 19 Starting setup

"Source": trigger source, including Clock, Button, Equivalent interval and Limit-surpassing, serial. Applications of each trigger source are listed in the Table 5:

Table 4 Applications of the trigger sources

No	Source	Remarks
1	Clock	Start when reach the specified time
2	Button	Start by pressing the Button
3	Equivalent interval	Start when each time measurement has the equivalent intervals
4	Limit-surpassing	Start when the currently selected weighted instantaneous value for statistics exceeds the specified limit value
5	Serial	Continuously measure

6.5.1.1 Clock

When choose "Clock", Date and Time are displayed on second row on the screen. You can preset a certain time, and when the preset time is reached, the instrument will automatically start measuring. You can move the cursor on Year, Month, Day, Hour, Minute and Second either, and use ▲ or ▼ key to adjust the time. When a parameter reaches its end, it displays "**" which means the parameter does not participate in comparison. So the instrument can be triggered once an hour, once a day, or once a month.....

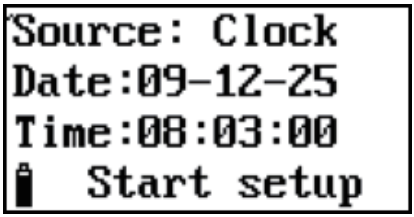


Fig 20 Starting mode of Clock

6.5.1.2 Button

When choose "Button", it displays as follows:

Fig 21 Button-pressing start

"Run Delay": delay time for starting measurement can be set after pressing ↵ key. If 0s is chosen, the measurement begins at once. 0 ~ 9s can be chosen.

Note：Though some certain trigger mode is chosen, you can still start measurement by pressing the Enter key while on "1.Meas"submenu.

6.5.1.3 Equivalent interval activation

When choose "Equivalent interval", the instrument displays as follows:

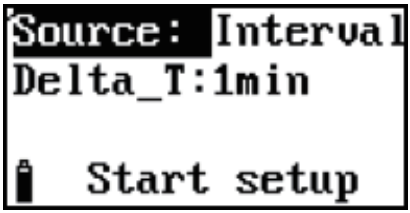


Fig 22 Equivalent interval activation

"Delta_T": interval time for each starting measurement, which can be set between 1min, 5min, 10min, 20min, 30min and 1hour. It means starting at whole minute, for example "5 min" means starting at every whole 5minutes.

Note: when Ts is longer that this interval, the actual measurement time is according to Ts and actual starting time will be delayed.

6.5.1.4 Limit-surpassing starting

When choose "Limit", the instrument displays as follows:

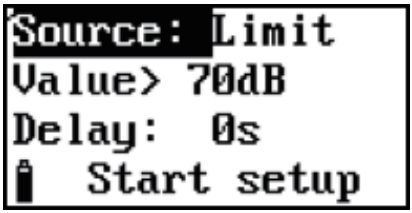


Fig 23 Limit-surpassing start

"Value": the preset limit value. If the value is exceeded, the instrument will start measurement. The value can be set between 20 ~ 140.

"Delay": the continuous limit-surpassing time. The instrument starts measurement when the time-weighted average index SPL for analysis of channel 0 surpasses the limit. The measurement will continue when the accumulated limit-surpassing time exceeds the "Delay" value, otherwise it stops. The value can be set from 0 to 999s.

6.5.1.5 Serial measurement

When choose "serial", the display shows following:

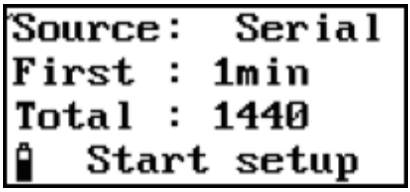


Fig 24 Continuous measurement

"First Ts": the measurement time for each group, the time can be set by user or choose, 1min, 5mim, 10min, 20min, 30min, 1hour.
"Total": the total groups of continuous measurement. The number is between 1~1440.

6.5.2 Auto-on/Auto-off

Move the cursor to the second and third line under setup 2 interface and press ↵ key, then enter Auto-on/Auto-off setup interface.

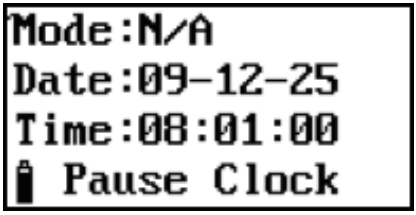


Fig 25 Auto-on/Auto-off

Note：when enter Auto-off interface, "Auto-off" is displayed on the bottom row.

"Mode": working mode of Auto-on or Auto-off which can be chosen between N/A and Clock. When N/A is chosen, the instrument will not switch on or off at the fixed time. When Clock is chosen, the instrument will switch on or off when the internal clock reaches at the fixed time.

"Date": the fixed date for Auto-on/Auto-off
"Time": the fixed time for Auto-on/Auto-off

You can move the cursor on Year, Month, Day, Hour, Minute and Second either, and use ▲ or ▼ key to adjust the time. When a parameter reaches its end, it displays "**" which means the parameter does not participate in comparison when auto-on or auto-off. So the instrument can switch on or off once an hour, once a day, once a month……

It is suggested that the Auto-on or Auto-off function is used together with Timed Activation function to make automatic measurement.

6.5.3 Hardware setup

Move the cursor to the "hardware" on the 2ndpage under SETUP 2 interface. Press ↵ then it displays as follows:

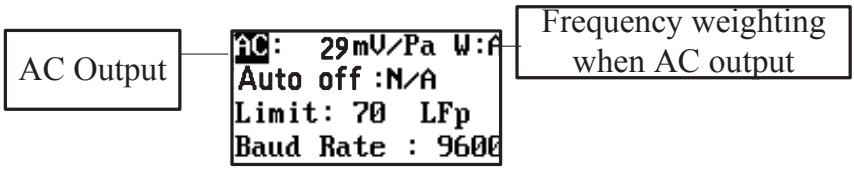


Fig 26 Hardware setup

The first line shows the amplitude of AC output and frequency weighting. The second line shows whether the instrument will turn off automatically for a long time without any operation. The third line shows the indicator lamp light specified threshold. The fourth line shows the baud rate of serial port. The cursor can be moved to "AC", "W", "Display", "Limit", "LFp" and "Baud rate".

6.5.3.1 Adjust the amplitude of AC output

Move the cursor to "AC", press ▲ and ▼ key to setup the amplitude of AC output. There're three gears can be set and each gear differs 10 times. "4 mV/Pa" means that when microphone gets 1 Pa sound pressure, the pins of AC output will output of about 4 mV AC signal. When the AC output set to 44 mV/Pa or 446 mV/Pa, the amplitude of the AC output will increase on the same pressure, but when the sound pressure effects on the microphone is too high, AC output may distort.

Amplitude of AC output	4mV/Pa	44mV/Pa	446mV/Pa
the upper limit sound pressure when maximum output of no distortion	100Pa	10Pa	1Pa

6.5.3.2 Choose of frequency weighting for AC output

Behind of "W", "Z" means do not take frequency weighting, "A" means the AC output signal do A frequency weighting, "C" means the AC output signal do C frequency weighting. Move the cursor to "W", the frequency can be changed.

6.5.3.3 Auto-off function

The instrument can be auto-off when there's no any operation in a period of time (except C Key), also can cancel this function. When the second line show "100 (s)" behind of "auto-off", means if over 100s there's no any operation, the instrument will auto-off. If it shows "invalid" means the auto-off function is invalid. Move the cursor to "auto-off", pressing ▲ or ▼ key can change "auto-off" between "invalid", "100 s", "200 s", "300 s", "400 s", "500 s" , "600 s", "700 s", "800 s", "900 s".

6.5.3.5 Baud rate

If the user matched serial port, the RS232 output port at the bottom of the instrument can be connected with PC for data transmission. Move the cursor to "Baud rate" and pressing ▲ or ▼ key can change "baud rate" between "9600", "19200", "57600".

6.5.3.6 Printer setup

Move the cursor to "AC", press ◀ or move the cursor to "Baud Rate", press ▶ , the printer setup will appear as following:

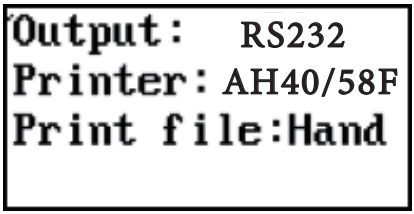


Fig 27 Printer setup

"Output": print output method. Note: When select "RS232" mode for printing with cable, reset the sound level meter is not necessary.

"Printer" ： Printer model, "AH40/58F"and"Thermal"are optional.

"Print file" ： "Hand" and"Auto"are optional. When select "Hand", it means data can be manually selected for printing; when you select "Auto", it means automatically print the results of current measurement after the measurement.

6.5.4 Calendar clock adjustment

Move the cursor to the third row on the 2nd page under setup 2 interface. Press ↵ key and enter calendar clock adjustment setup interface. It displays as follows:

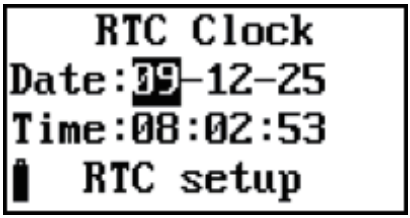


Fig 28 Calendar clock adjustment

You can move the cursor on Year, Month, Day, Hour, Minute and Second either, and use ▲ or ▼ key to adjust the time. After the adjustment, press ↵ or c and back to page 2 under setup 2 interface.

6.6 “3.Data” submenu

Move the cursor on “3.Data" on the main menu and enter submenu of data management. It displays as follows:

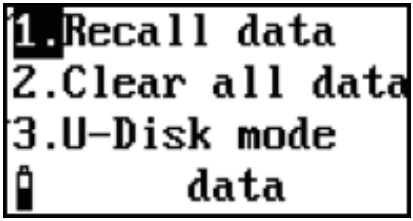


Fig 31 Submenu of data management

“1.Recall data”: to recall the data stored in the instrument
“2.Clear all data": to delete all the data saved in the flash ram of the instrument.

“3.U-Disk mode": When sound level meter enter the U-Disk mode and connect it to PC via USB cable, the PC will find the file, it's possible to copy or cut the data out to computer. It's the way to download data inside the sound level meter.

6.6.1 Data recall

Move the cursor on the first row under data management interface, and press ↵ key. It displays as follows:

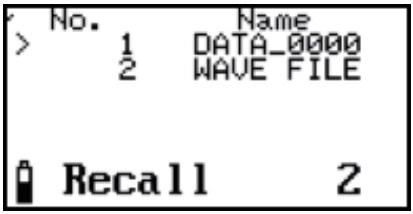


Fig 32 Data recall

First row: the header ;

Last row: working status of the instrument, from left to right is: battery voltage, Recall, total groups of the data ;

Middle: the serial number and name of each group of data. The symbol ">"on the far is the cursor.

Note : If the measurement name is "WAVE FILE" , it means the file is recording results of waves and cannot recall data. It should be download to PC and play by media.
The instrument displays group serial number with measurement date or measurement time by pressing ▲ or ▼ key.

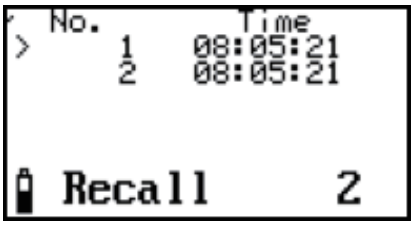
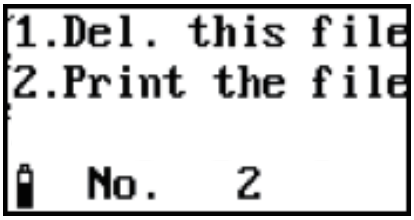


Fig 33 Data recall

Press ▲ and ▼ key and the cursor can be moved to the next row. When the cursor is moved to the bottom of the screen, the screen will automatically turn the pages; when reach the bottom of the file list, the screen will return to page1.

You can press ↵ key and view the data that the cursor is at. See the followings:



"1.Del. this file": Press ↵ key when the cursor stays here, the instrument will delete the data group which is being viewed.
"2.Print the file": Press ↵ key to print out this group of data.

6.6.2 Clear all

If you press ↵ key when the cursor stays on the second row on data management submenu, the instrument will warn as follows:

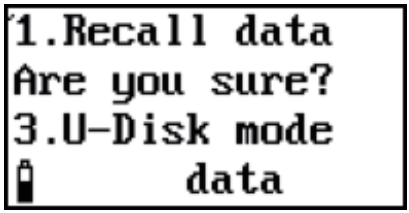


Fig 36 Delete data

If you want to delete all the data in the instrument, press ↵ key; otherwise, press other key to return.

6.6.3 Turn to U disk mode

Press ↵ key while the cursor stays on the second row on data management submenu, the instrument will turn the stored data into FAT32 format to let the data be read correctly when the instrument is connected to PC as a U disk.

When the instrument works as a U disk, the filename inside is composed of 3 parts: the former 4 characters of the measurement name, 4 serial numbers and the filename extension. The filename extension includes 3 kinds: AWA for integral analysis data, LOG for logged data, WAV for recording data. ASV and LOG files can be opened by Notepad or Excel program while WAV files can be opened by "windows media player".

6.7 Information of instrument

Move the cursor on "5.Info." on the main menu and press ↵ key, instrument information interface is entered. See as follows:

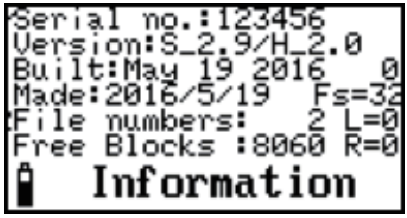


Fig 37 Instrument information

"Serial no.123456": The instrument serial number is 123456.
"Version:S_2.9/H_2.0" ： The software version of the instrument is 2.9, the hardware version is 2.0.

"Built:May 19 2016" ： The software of the instrument was written on "2016, May, 19".
"File numbers:2": 2 data groups are kept in the instrument.

"Free Blocks:8060": 8060 Blocks are available for 8103 groups of data to keep.
"Made:2016/5/9": The instrument was produced on May. 5, 2016.
Press ▲ or ▼ key under this interface, the clock display interface is entered. See as follows:

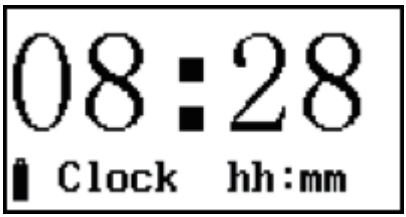


Fig 38 Hours and minutes display of the clock

Current time is displayed under the interface. If you press ◀ or ▶ key, ▲ or ▼ key, it will change the display time.

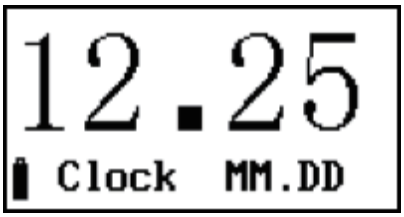
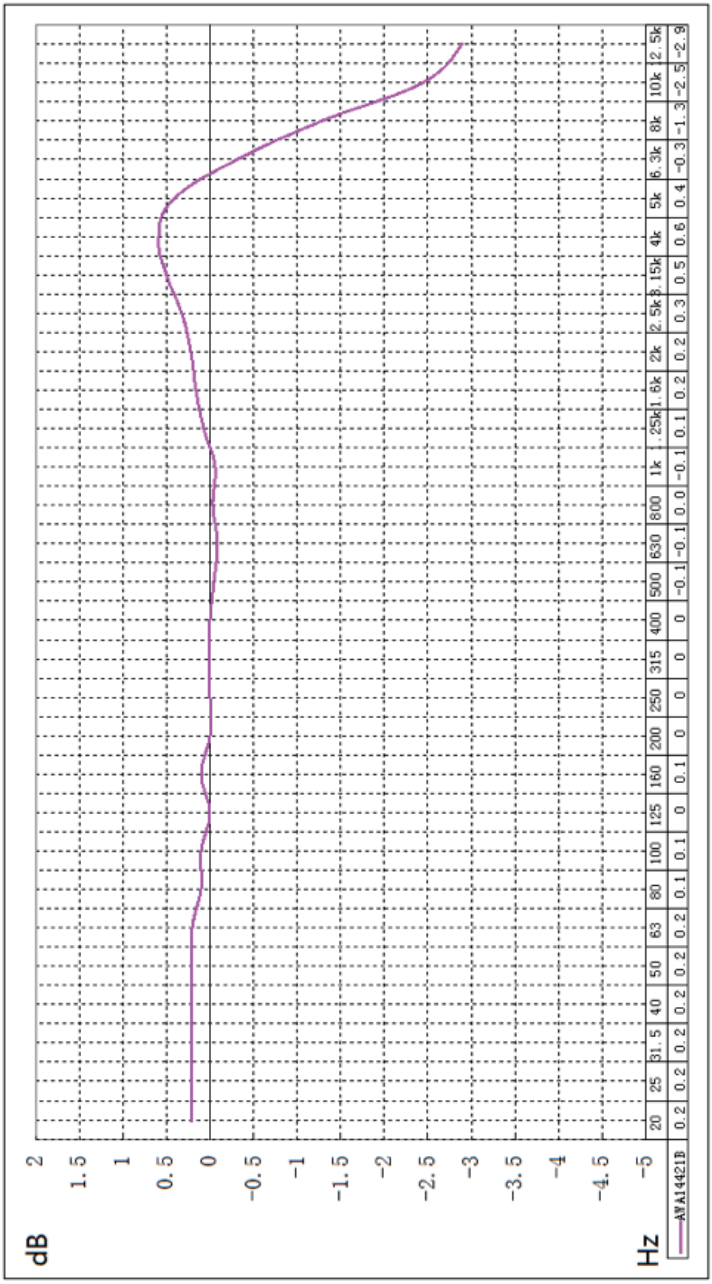


Fig 39 Months and days display of the clock

If you press ↵ key when calendar clock is on display, the instrument will automatically shut off and be in the standby mode, with the power consumption of about 4mA. Press Enter key again and the instrument turns on display again.

Appendix A

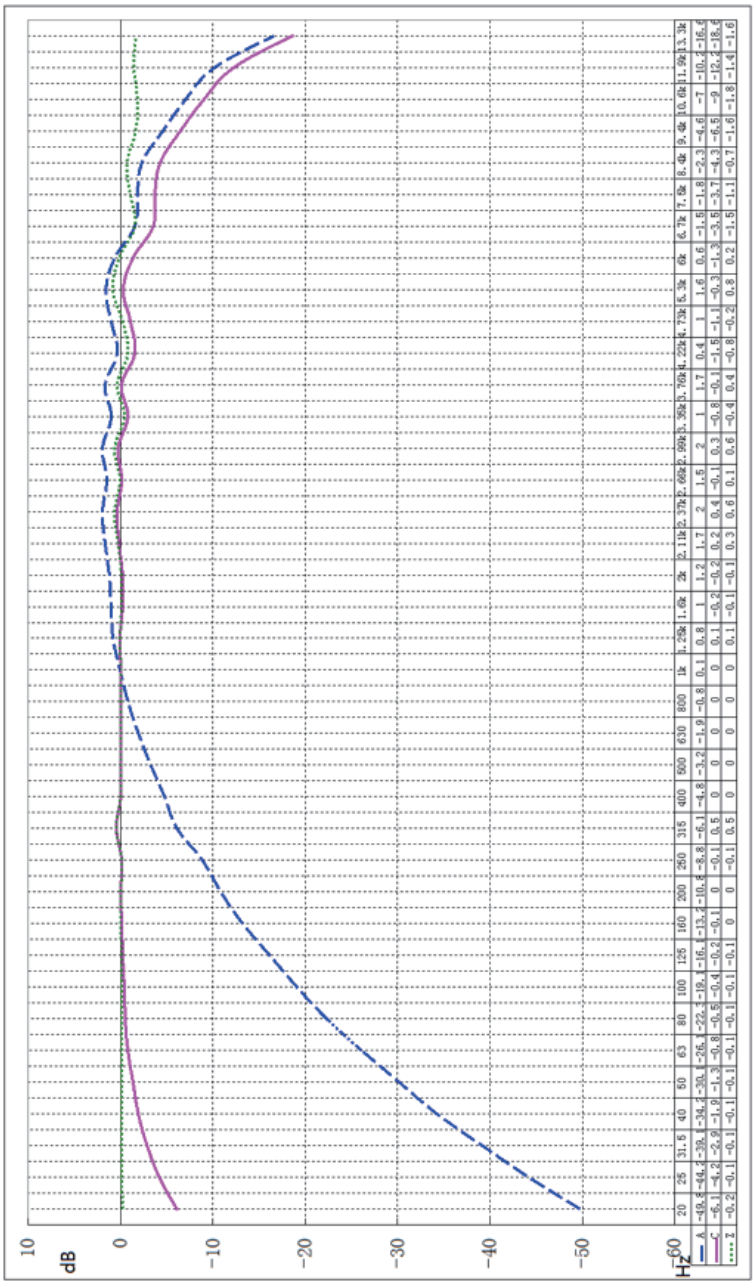
Typical free-field response for model ST-11D



measurement condenser microphone from the reference direction.

Appendix B

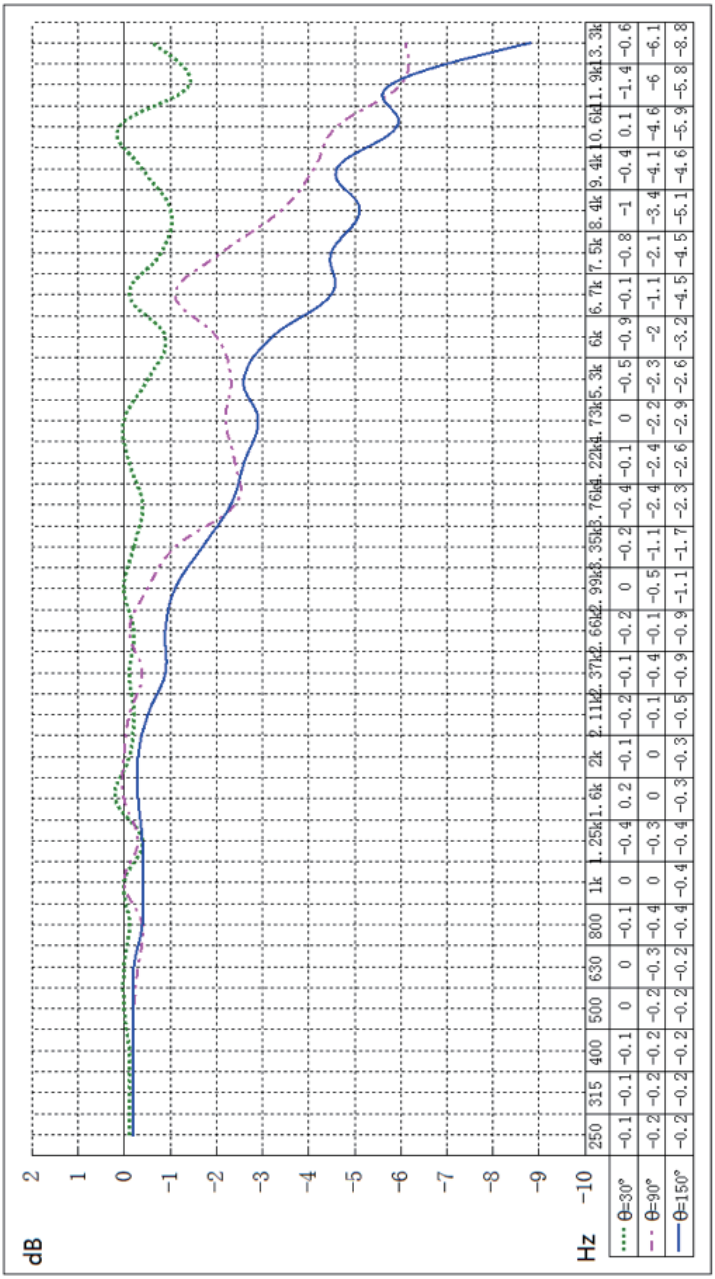
Typical free-field response for the sound level meter from



the reference direction under approximate reference environmental conditions

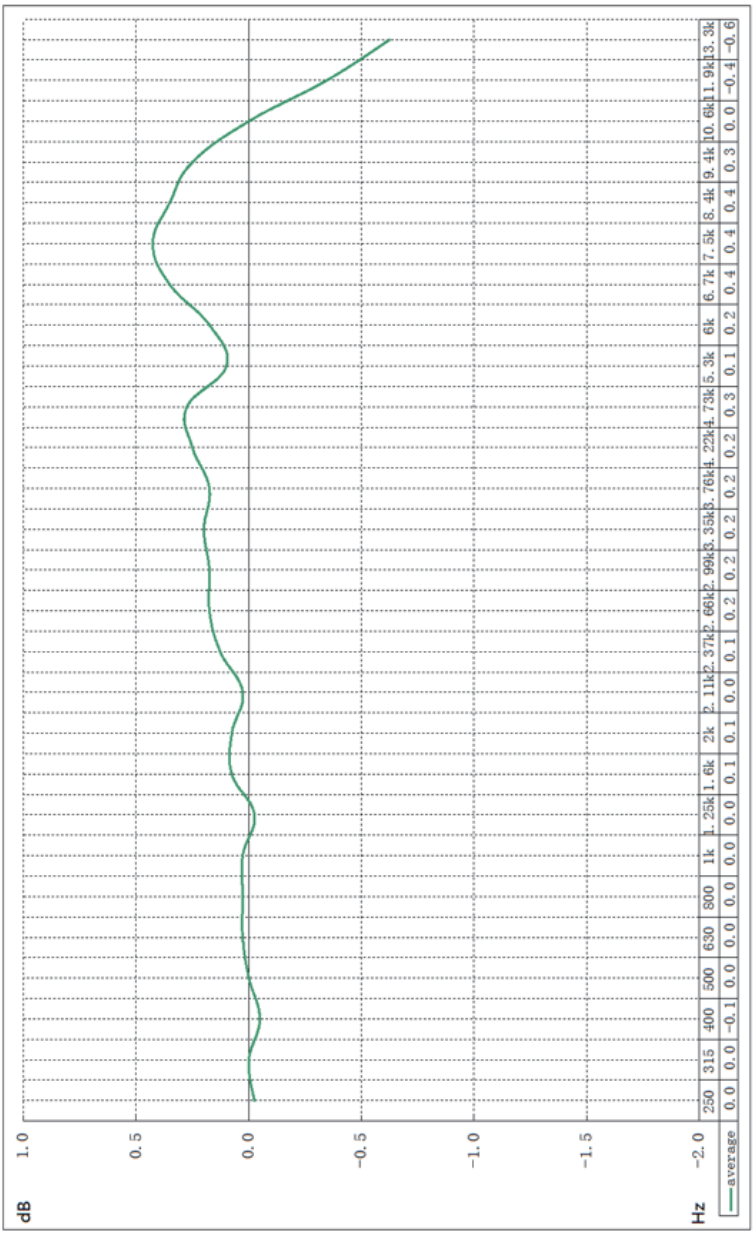
Appendix C

Directional response



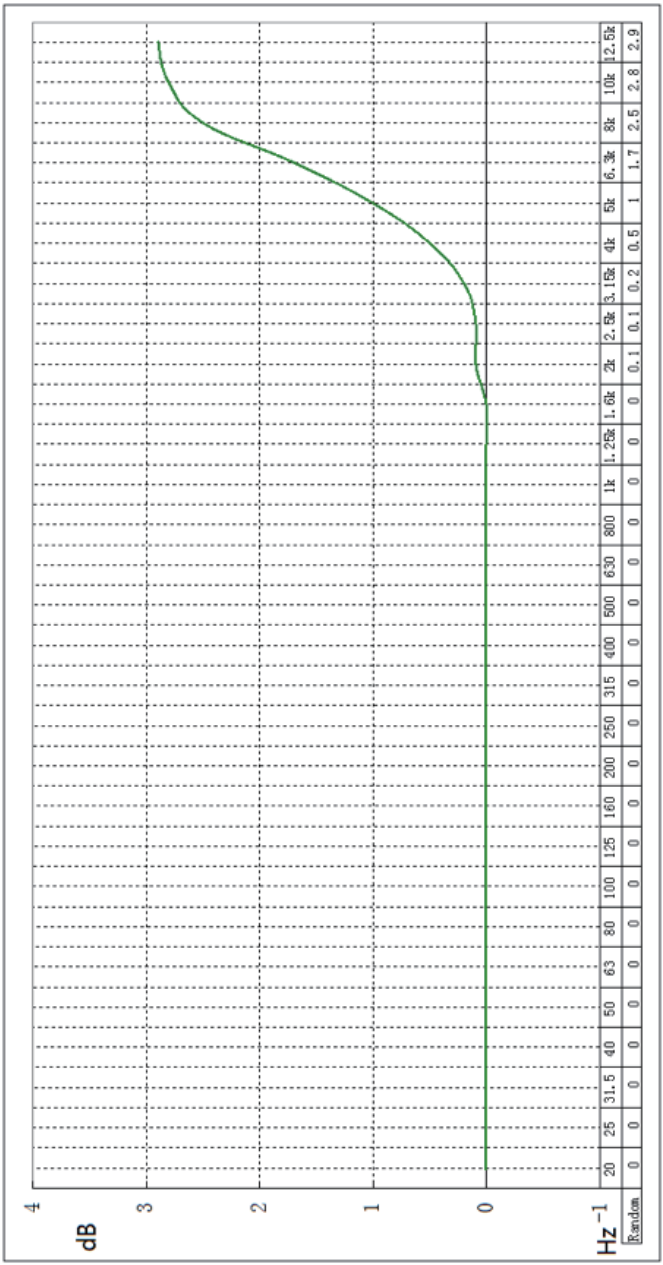
Appendix D

Corrections for the average effects of the windscreen on directional response.



Appendix E

The compensation value when microphone type choose random incidence.



the reference direction under approximate reference environmental conditions

Appendix F

Corrections for the pressure response which produced by B&K4226 to nominal free response from the reference direction.

Frequency(Hz)	500	630	800	1k	1.25k	1.6k	2k	2.5k
Correction data (dB)	0	0	0.1	0	0.1	0.2	0.3	0.4
Frequency(Hz)	3.15k	4k	5k	6.3k	8k	10k	12.5k	
Correction data(dB)	0.5	0.9	1.5	2.2	3.6	5.1	7.2	

Appendix G: Vocabulary of terms

The instrument shows common symbols and terms

Exchange rate	When noise dose doubled, the added value of time weighting average SPL
Threshold	If time weighted SPL less than the value, it will not participate in TWA,LAVG calculations
Criterion	When noise dose is more that this value, the corresponding instructor light will be lighted
LFp	F-weighted maximum SPL(sound pressure level) in 1 second
LSp	F-weighted maximum SPL in 1 second
LIp	I-weighted maximum SPL in 1 second
Leq,t	Short-time equivalent SPL. t is the average integral time, which is determined by the set sampling interval. t is generally less than 10s.
Leq,T	Equivalent-continuous SPL. T is the average integral time which can be set casually from 1 second to 24 hours
Lpeak	Peak SPL
LFmax	Maximum sound pressure level, F-weighted
LFmin	Minimum sound pressure level, F-weighted
LSmax	Maximum sound pressure level, slow detector
LSmin	Minimum sound pressure level, slow detector
LImax	I-weighted maximum SPL
LImin	I-weighted minimum SPL
SEL	Sound exposure level
E	Personal sound exposure, expressed in Pa2h
Lex,8h	Equivalent SPL of 8 hours
LAVG	Average SPL
TWA	Time-weighted average SPL
DOSE	Noise dose, which is the percentage of time that a person is exposed to noise that is potentially damaging to hearing. 100%respresents the noise exposure has exceeded the standard.
LN	Statistic SPL. N is an integer ranges from 1 ~ 99 and can be casually chosen by the user
Linst	The instant value of time-weighted SPL

Safety, Handling, & Maintenance

Important safety information

WARNING: Failure to follow these safety instructions could result in fire, electric shock, or other injuries, or damage to sound level meter or other property. Read all the safety information below before using sound level meter.

Operate Avoid using instrument in humid or wet places. Make sure that humidity is within the limits indicated in the next section. Avoid using meter in presence of explosive gas, combustible gas, steam or excessive dust.. Be sure to turn it off after use. If you expect not to use the instrument for a long period remove batteries to avoid leakages of battery liquid which could damage the its inner components.

Handling Handle the meter with care. It is made of sensitive electronic components. The meter can be damaged if dropped, burned, punctured, or crushed, or if it comes in contact with liquid. Don't use a damaged meter, such as one with a cracked screen, as it may cause injury.

Important handling information

Cleaning Clean instrument immediately if it comes in contact with anything that may cause stains—
such as dirt, ink, makeup, or lotions. To clean:

- Disconnect all cables and turn instrument off.
- Use a soft, lint-free cloth.
- Avoid getting moisture in openings.
- Don't use cleaning products or compressed air.

Operating temperature The instrument is designed to work in ambient temperatures between 5° and 40° C (41° and 104° F) and stored in temperatures between -10° and 60° C (14° and 140° F). The instrument can be damaged and battery life shortened if stored or operated outside of these temperature ranges. Avoid exposing the instrument to direct sunlight even the the air temperature is within the limits.

Operating humidity The instrument is designed to work in humidity < 80%rh and stored in dry place where humidity is less than 70%rh.

Store microphone carefully Microphone is the key component of the instrument and keep it dry and avoid severe shake or vibration.

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