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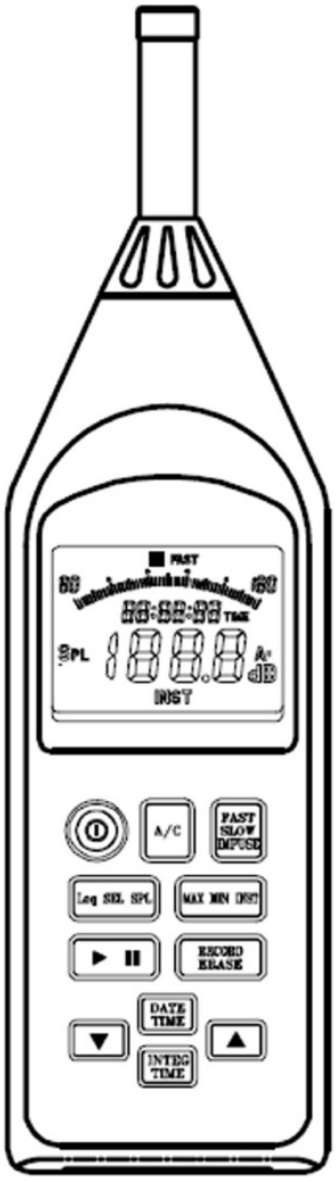
Manual
Sound level meter PCE-353



1. SAFETY INFORMATION

Read the following safety information carefully before attempting to operate or service the meter. Use the meter only as specified in this manual; otherwise, the protection provided by the meter may be impaired.

Environment conditions

1. Altitude up to 2000 meters
2. Relative humidity 90% max.
3. Operation Ambient 0 ~40□

Maintenance & Clearing

1. Repairs or servicing not covered in this manual should only be performed by qualified personnel.
2. Periodically wipe the case with a dry cloth. Do not use abrasives or solvents on this instrument.

Safety symbols

Meter is protected throughout by double insulation or reinforced insulation.
When servicing, use only specified replacement parts.

Comply with EMC

2. GENERAL & FEATURES

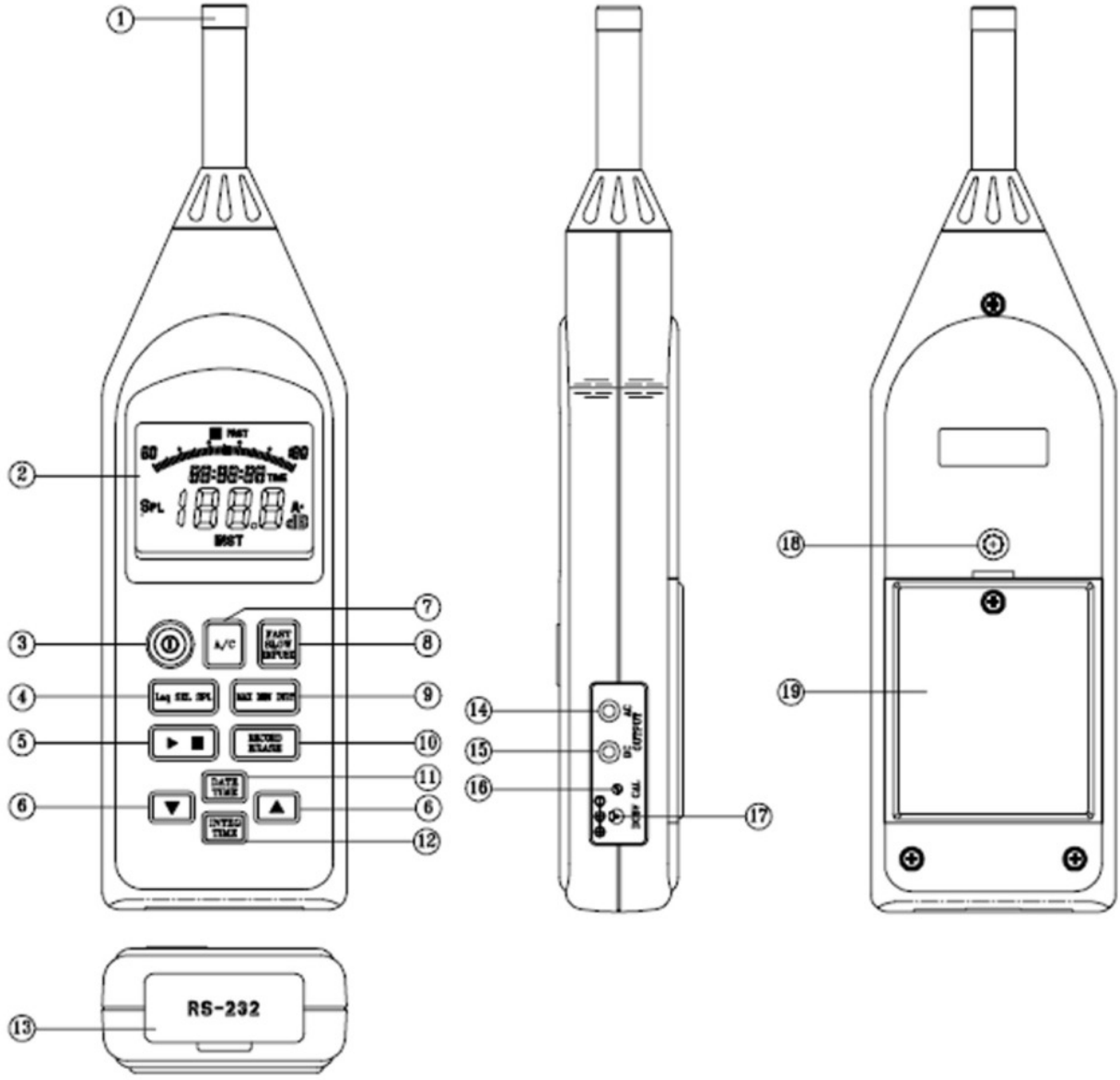
Thank for you selecting our Integrating Sound Level Meter. To ensure that you can get the most from your instrument we recommend that you read and follow the manual carefully before use. The Integrating Sound Level Meter has been designed to meet the measurement requirements at Safety Engineers, Health Industrial safety offices and sound quality control in various environments.

1. Ease of use
2. Three measured parameters (LeqQSELQSPL)
3. Fast , Slow and Impulse time weightings
4. Preset measurement time up to 24 hours
5. Datalogging capacity 32000 records
6. RS-232 interface with PC
7. Auto-Ranging
8. Real time clock with calendar
9. Both AC and DC signals output is available for frequency analyzer, level recorder, FFT analyzer, and graphic recorder.

3. SPECIFICATIONS

- **Standard applied:** IEC 651 and 804 type 2 , ANSI S1.4 type2
- **Accuracy:** ə1.5dB (ref 94dBʌ1KHz)
- **Measurement item:** SPL, Leq, SEL, MaxL, and MinL Measurement frequency
- **Range:** 31.5Hzι8KHz Linearity range : 100dB
- **Measurement level:** 30 to 130dB Frequency weighting : A and C
- **Time weighting:** Impulse, FAST and SLOW
- **Microphone:** 1 2 inch electret condenser microphone
- **Digital display:** 4 digital LCD, 0.1dB resolution, updated 2 times per second
- **Quasi-analog bar indicator:** 4-dB step, 100dB-display range, updated 16 time per second
- **Start-up time:** Less than 30sec
- **Display warning function:**
  - OVER indicator (Displayed at the upper limit)
  - UNDER indicator (Displayed at the lower limit)
- **Analog AC/DC output:** 2 Vrms/130dB, 10mVdc/dB Power
- **Supply:** Four 1.5V LR-6 AA size alkaline cell
- **AC adapter:**
  - Voltage 6Vdc
  - Voltage ripple <100mVpp
  - Supply current >100mAdc
  - Socket : Pin Ground
    - Casing Positive
    - External diameter 3.5mm
- **Battery life :** about 28 hours
- **Operating temperature / humidity:** 5 ι + 40 Yǩ10 ι 90 ʍ RH
- **Storage temperature / humidity :** - 10 ι + 60 Yǩ30 ι 75 ʍ RH
- **Dimensions:** 265 (L) ɗ 72 (W) ɗ 21 (H) mm
- **Weight** : Approx. 380g
- **Included accessories**: Instruction manual, Battery, Adjustment screwdriver, soft ware, wind shield, RS 232 connecting cable, 9 pins to 25 pins gender changer, 3.5ɳ plug, Carrying case.
- **Optional accessories:** Microphone extension cable (5M or 10M) QSound Level, CalibratorQTripod

4. NAME AND FUNCTONS



1). 1/2-inch microphone

2). LCD display

3). Power Switch

4). Leq / SEL / SPL select switch

5). RUN / Pause switch

6). Each time this switch is pressed, the time will be increased / decreased.

7). A / C Frequency weighting select switch

8). FAST / SLOW / IMPULSE time weighting select switch.

FAST : uses a 125ms-time constant. This setting is used in most situations.
SLOW : uses a 1s time constant, which smooths out fluctuating levels.
IMPULSE: uses a 35ms time constant with a slow decay, which allows readings of short-duration sound events.

9). Press to select MAX MIN recording.
Press to step through MAX MIN.
Press and hold 3 sec. to set INST made and erase MAX. MIN value.

10). RECORD / ERASE
Record standby: The display will show the " RECORD" symbol.
Recording : "RECORD" symbol flashes 1 time per sec in the display
Erase data : press & hold the key for 3 sec to erase data and LCD all symbol flashes 3 times.

11). Real time clock with calendar

12). This selects the measuring time for Leq and SEL

13). RS-232 interface connector

14). AC output terminal
2 Vrms at 130dB
Output impedance ɕ600Ω
Output signal by standard 3.5mm coaxial socket signal on pin and intermediate, ground on sleeve.

15). DC output terminal
Output : 10mV/dB
Output impedance ɕ100
Output signal by standard 3.5mm coaxial socket signal on pin and intermediate, ground on sleeve.

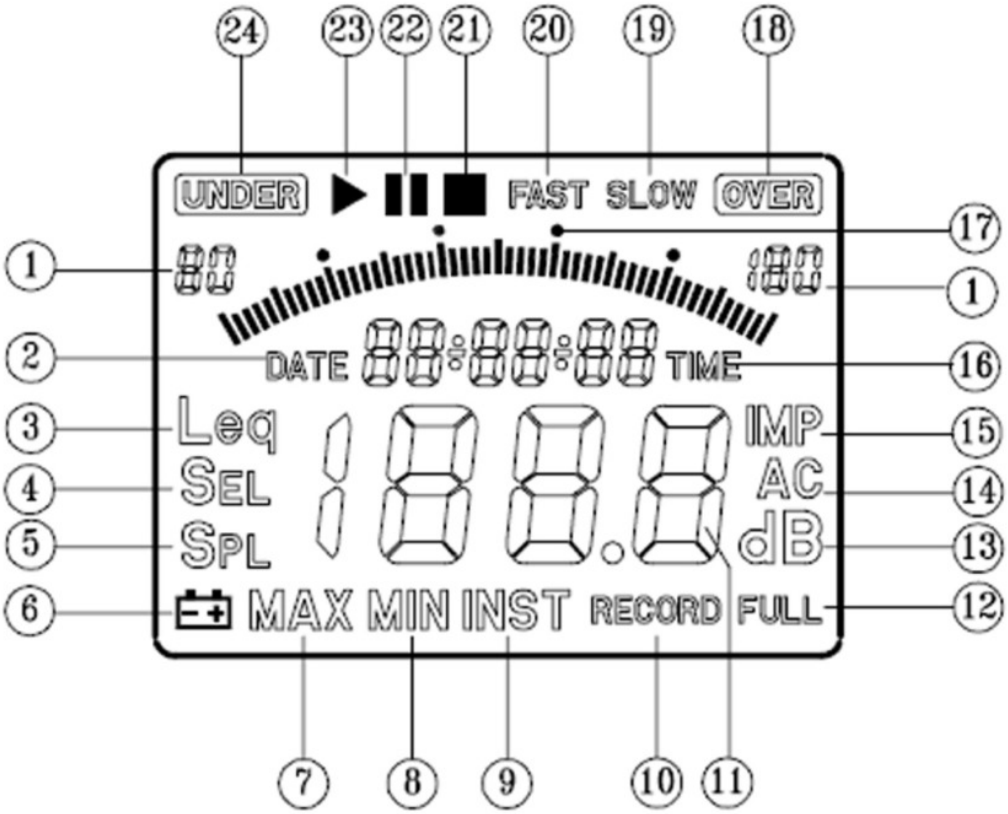
16). CAL potentiometer Calibration control, for level calibration adjustment.

17). External DC 6V power supply terminal

18). Tripod mounting screw

19). Battery cover

5. LCD DISPLAY DESCRIPTION



1). Level range

2). Date information

3). Leq: Equivalent continuous

4). SEL: Sound exposure level

5). SPL: Instantaneous sound pressure level

6). Low-Battery mark

7). MAX: Maximum SPL value is held during measurement.

8). MIN: Minimum SPL value is held during measurement.

9). INST:Instantaneous of sound pressure level

10). Data recording

11). Measuring value

12). Memory full

13). Unit

14). Frequency weighting (A/C)

15). IMPULSE time weighting

16). When “TIME” symbol appeared to counter indicated real time. When “TIME” symbol disappeared to counter indicated preset time and elapsed time for Leq and SEL measurement.

17). 100dB level range with Bar graph of 50 points.

18). Range over

19). SLOW time weighting

20). FAST time weighting

21). Measurement completion of Leq and SEL

22). Measurement interruption of Leq and SEL

23). During measurement of Leq and SEL

24). Range under.

6. CALIBRATION PROCEDURES

Using a standard acoustic calibrator

a). Make the following switch settings.
- Display: SPL (dBA) Time weighting: FAST
- Measurement mode: INST

b). Insert the microphone housing carefully into the insertion hole of the calibrator.

c). Turn on the switch of calibrator and adjust the CAL potentiometer of the unit and the level display will indicate the desired level. Our products are all well calibrated before shipment.

Note: Recommended recalibration cycle: 1 year

7. MEASUREMENT PREPARATION

(1). Battery loading
Remove the battery cover on the back and put in four 1.5V AA size battery.
(**Note:** Take care to observe battery polarity)

(2). Battery Replacement
When the battery voltage drops below the operating voltage, mark appears and flashes. If it appears, battery should be replaced with new one.

(3). AC Adapter Connection
When the AC adapter is used, insert the plugs of the adapter into the DC 6V connector on the side panel.

8. TAKING MEASUREMENTS

There are two ways to take a basic measurement. One is to start and stop the instrument manually; the other is to use a preset measurement period. In both cases, the sound level meter must be correctly configured before you start the measurement.

8-1 Making measurement settings

Before you begin measuring, your sound level meter must be set up correctly. Settings that affect easurements and record are:

1. Time Weighting
2. Frequency Weighting
3. Preset Time
4. Date and Time
5. Calibration

8-2 Setting the measurement time

The instrument can be set to measure for a fixed amount of time. When the set time has elapsed, measurement is stopped automatically.

There are 13 preset time settings available”

- 1s
- 3s
- 10s
- 30s
- 1min
- 5min
- 8min
- 10min
- 15min
- 30min
- 1h
- 8h
- 24h

To set the preset time:

1. Press the INTEG TIME key, the preset time is visible on the display.

2. Press ▲ key to increase the preset time; press ▼ key to decrease it. The setting will wrap around between 24h and 1s. Stop when the desired setting appears on the display.

8-3 Taking manually timed measurements

To take a manually timed measurement, the preset time must be set to “24:00:00”.

1. Press ⏻ key to switch on the instrument.

2. Wait for the Sound Level Meter to warm-up (about 30 seconds).

3. Press ▶ II key to begin measuring. During measurement, “ ▶ ” will appear in the upper left section of the display.

4. Wait an appropriate amount of time. In some situations, the measurement time will be prescribed by regulations.

5. When the ▶ II key is pressed, the measuring will be interrupted and the display will show “ II ” mark.

6. Press A/C or FAST SLOW IMPUSE SLOW to stop measuring and “ ■ ” will appear in the upper of the display.

8-4 Taking preset-timed measurements

To take a preset-time measurement, the preset time must be set to a specific internal.

1. Press ⏻ to switch on the instrument.
2. Wait for the sound level meter to warm-up (about 30 seconds).
   This gives you time to step away from the instrument, if required.
3. Press the ▶ II key to begin measuring. During measurement,
   “ ▶ ” will appear in the upper left section of display.
4. Measurement will stop automatically after the preset time interval has expired.

NOTE :

(1). When IMPULSE mode is selected, the meter can only measure real time noise (SPL). When the key is pressed, the meter will switch to SLOW mode automatically and start Leq measurement. When Leq mode is active, the time weight can not switch to IMPULSE mode.

(2). When the meter is measuring noise level, the " ▶ " will be displayed and the following functions will not be available FAST SLOW IMPULSE and A/C , DATE TIME , INTEG TIME , RECORD ERASE , ▼ , ▲ . Button and compu- ter linking will also be disable.

9. DATA OPERATIONS

9-1 Working with Records

The instrument is capable of saving up to 32000 records of measured results. This enables you to take several readings at different locations or at different time of day and store each for future reference.
All records must downloaded to a computer.

Each data set holds the following information:

1. Date and Time of start record
2. Time and frequency weightings
3. Sampling time
4. Total record points of the record
5. Leq
6. Max L
7. Min L
8. SEL
9. Measurement duration

9-2 To start record

1. Connect the sound level meter and a PC with RS-232 cable and use the INTEGRATING SOUND LEVEL METER program to activate the communication. Set the sampling parameter in the Data Logger window. After the setting process, the meter can record in dependently with out the PC linking.
2. Press RECORD ERASE key to set the meter ready for data recording. You will see "RECORD" mark in the display.
3. Press ▶ II key to start data recording. You will see "RECORD" mark flashes 1 time per second.
4. After measuring stops, the recording function will stop at the same time and "RECORD" mark will also vanish.
5. The recording data can be down loaded through RS-232 cable to a PC for further analysis.

9-3 Erasing Records

1. When memory is full, you will see "FULL" mark in the display, on the right hand side lower corner.
2. Press the key RECORD ERASE and hold the key for 3 seconds to erase all records. You will see "FULL" mark will also vanish.

10. SETTING THE DATE AND TIME

Date and time information is stored with each record you save. There fore, it is important to make sure this information is correct.

To set the date and time:

1. Start with the power off mode. Press the DATE TIME key and hold, then press the ⏻ key to switch the instrument into setting mode.

2. A blinking number indicates the currently selected parameter, which is the year. To increment the year, press. ▲ To decrement the year, press. ▼

3. Press the DATE TIME key to move to the next parameter (the month). Use the ▲ or ▼ keys to set the current month.

4. Repeat step 3 until you have set the current day, hour, minute, and second. If you want to adjust a previous parameter (for example, to set the day after you have set the month), then you must return back step 1.

5. To store the new date and time, press the DATE TIME key.

The sound level meter has a back-up battery for running the clock.

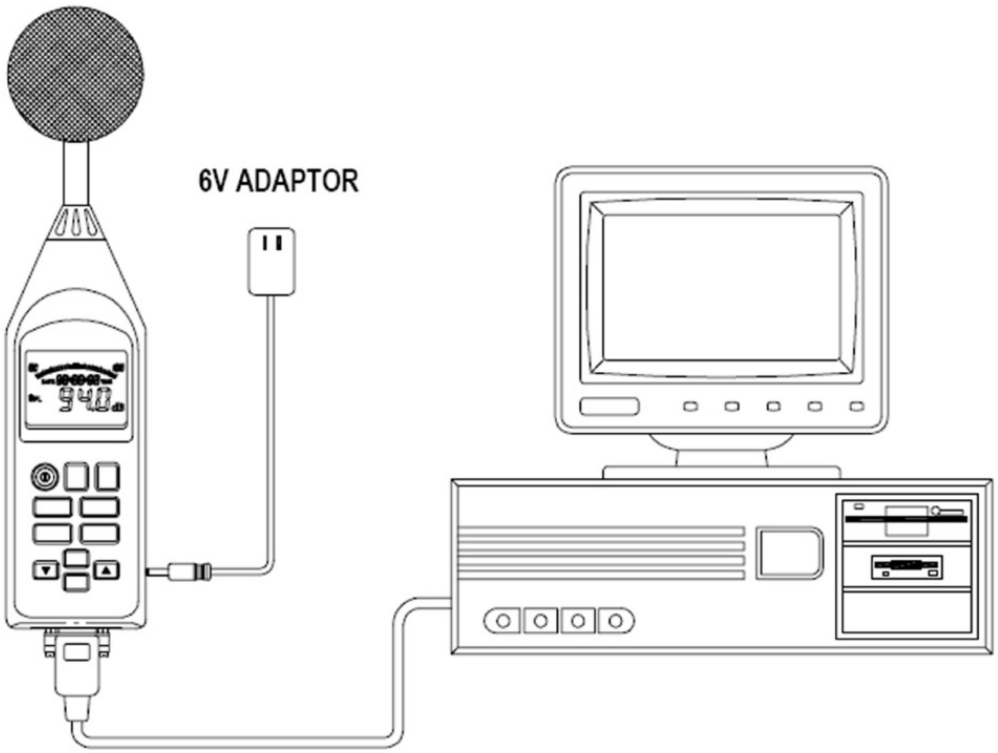
11. READ M E FIRST

This software manual is written for Integrating Sound Level Meter (briefed as ISLM).

When ISLM is connected to PC, user can do long time recording, on-line quality control or factory automation.

Data Logger is a step further comparing to the ISLM. It is a stand-alone recorder using only battery power. User can record up to 32000 data anywhere possible, without PC connected.

12. HARDWARE SETUP



Connect the SLM to a PC

Connect the RS-232, 9 pins male connector to the ISLM, and connect the 9 pins female connector to the 9 pins COM1 of PC. If COM1 is used by mouse (usually), then connect 25pins female connector to the 25 pins COM2 of PC (Of course, you need a 9 pins to 25pins adapter).

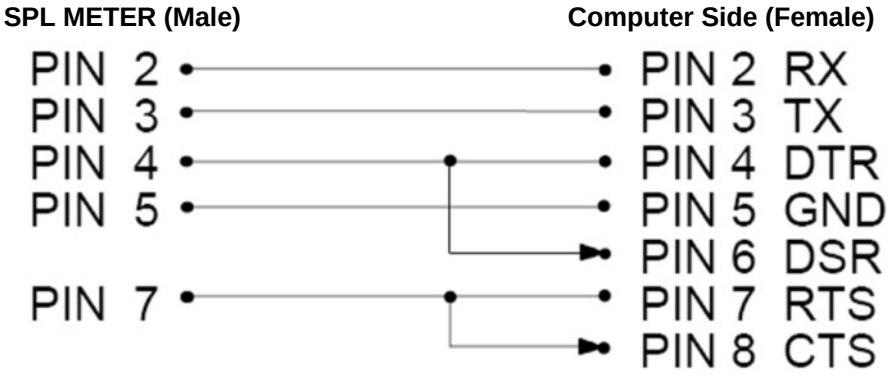
Most notebook computers have only one RS-232 port, COM1, but it always comes with a system mouse. You can use 9 pins COM1 for communication.

For desktop computer, there are two RS-232 ports, COM1, and COM2. Most of the time, COM1 is used for mouse, so you have to use COM2 (25 pins).

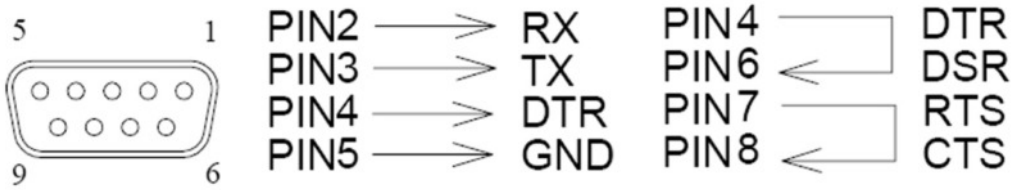
Cable/Wiring Diagram

Sound Level Meter /DATA LOGGER:
In order to ignore hardware handshake, the RS-232 wiring should be wired as in RS232 Wiring Diagram (9 pins to 9 pins). The RTS must be pulled low (-10V or -12V) by the software in order to communicate with PC.

RS232 Wiring Diagram

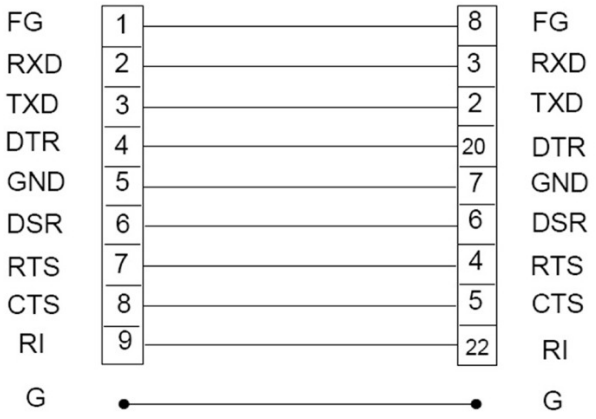


Connector Wiring Diagram



If COM2 is used, you need 9 pins (male) to 25 pins (female) adapter. See next wiring diagram.

9 pins to 25 pins connection diagram



Life of the Non-volatile Memory:

The non-volatile memory is guaranteed 100,000 times of WRITE by the IC manufacturer. If the user sets the sampling time at 1.0 seconds and records 24 hours a day every day continuously, it can last for 5 years. If the user uses it once a day, then the memory can last for 273.9 years.

Default RS-232 settings

When RS-232 communication enabled, the default RS-232 settings are:

Baud Rate: 9600

Stop bit: 1

Data bit: 8

Parity: None

13. SOFTWARE COMMUNICATION

DATA LOGGER

Ready_To_Use WindowsTM Application Program

Hardware and Software Requirements

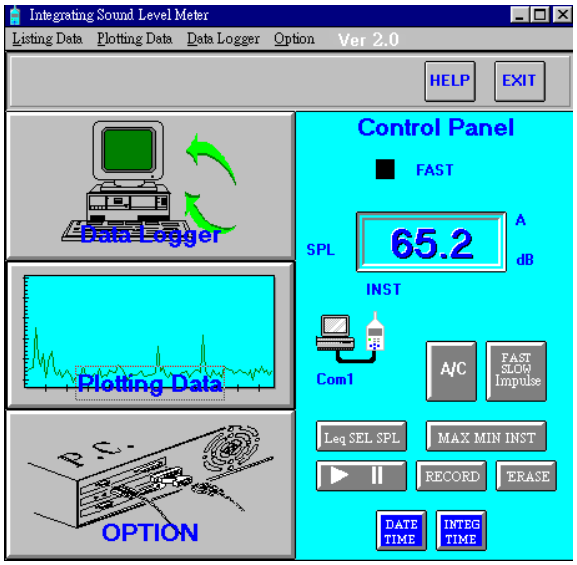
486 personal computer,16 Mbytes of memory or better. WindowsTM 3.1 or Windows TM 95.

Installation of the WindowsTM Application Program

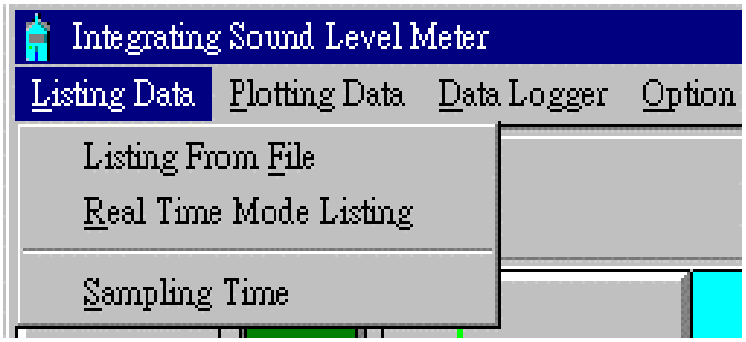
A. Start MicrosoftTM WindowsTM
B. Insert disk in drive A (or B)
C. From the Program Manager, select File menu and choose Run.
D. Type a:\ setup (or b:\ setup) and press Enter key

Description of WindowsTM Application Program

When the ICON "Integrating Sound Level Meter" is selected and executed, the program automatically searches for connected ISLM/ or available serial port. If no serial port is available, then a message of "No communication port" shall be displayed, and the program exits itself. Once communication port is setup, a main window will be displayed on the screen. The Layout of the window:



Main screen:

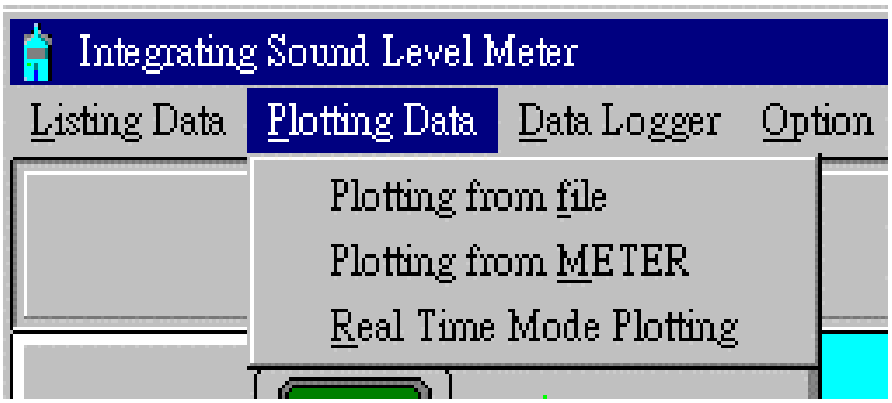


Listing From File – Read data from an opened file to a table.

Real Time Mode listing – Transmit ISLM LCD value to a table which can be saved to a file .

Sampling Time – Setup Real Time Mode Listing sampling rate.
Range from 1second to 65535 seconds.

Plotting Data:

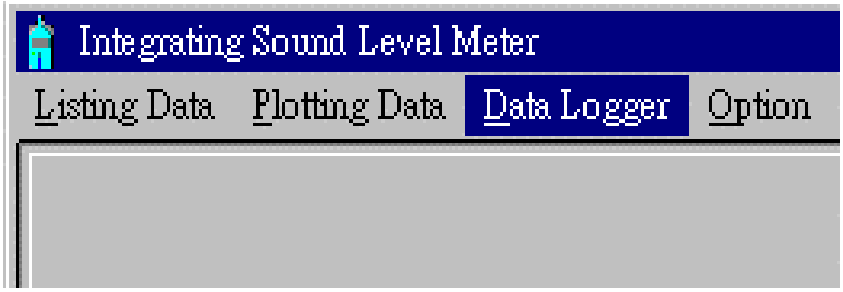


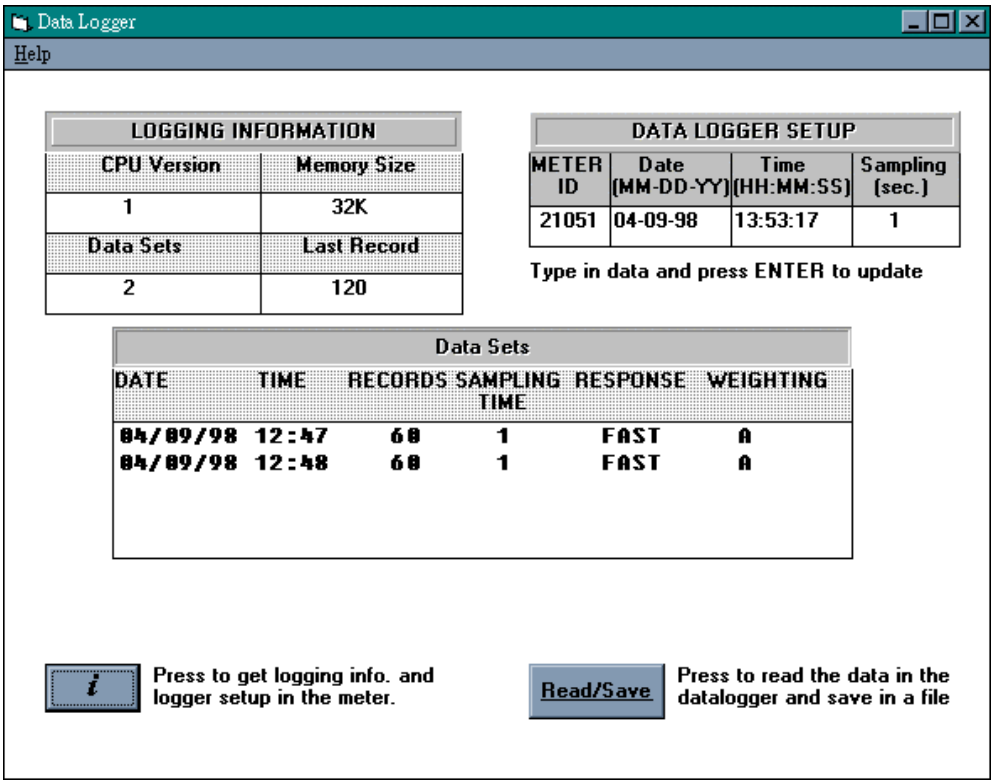
Plotting from file – Graph the data from file .
Plotting from Meter – Plotting the data directly from the memory of meter
Real Time Mode Plotting – Plotting LCD value from ISLM。

Note: The PC communication will be broke if users press or click

"  " (Run/Pause) button.

LOGGING INFORMATION:





Memory Size: the size of data logger memory

Last Record: Current last record number.

DATALOGGER SETUP

ISLM ID:

This is used to identify each data logger; user can enter the number from 0 to 65535.

Date:

This is used as memo for user, must enter in the format of MM-DD-YY.

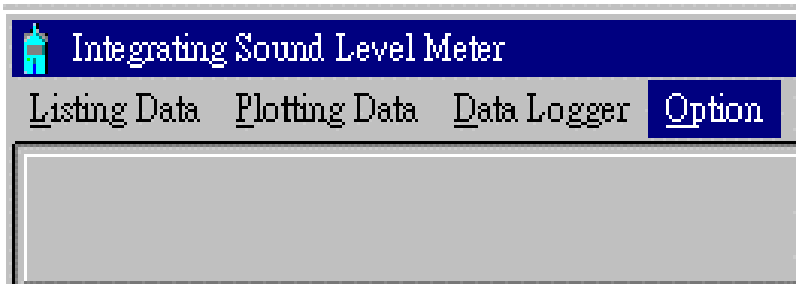
Time:

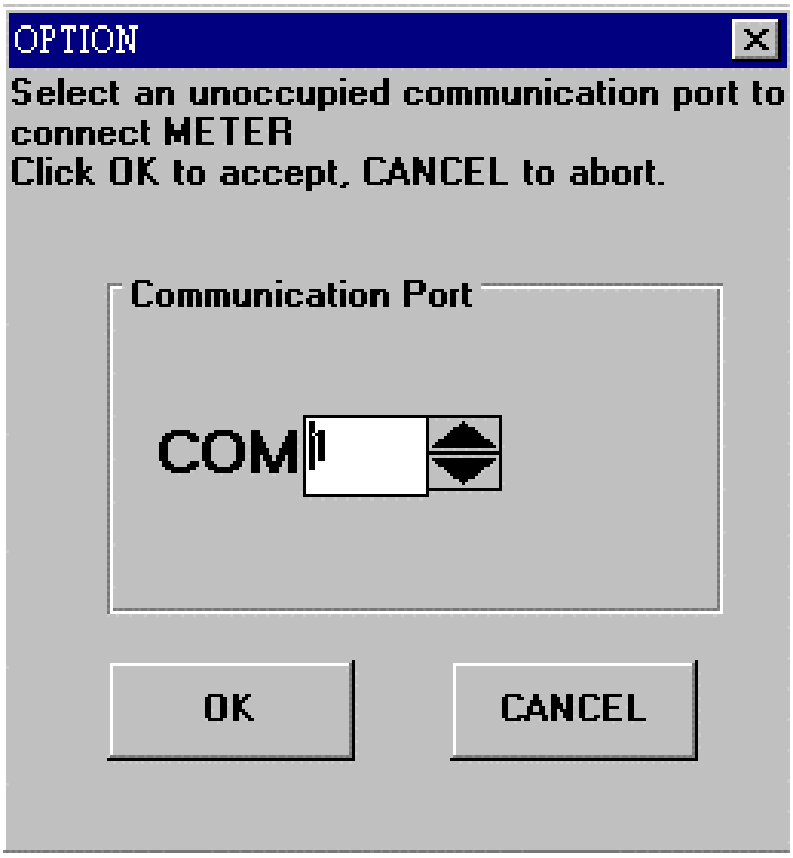
This is also used as memo for user, must enter in the format of HH:MM:SS

Sampling:

This is used to set the sampling time for data logger. Every time user presses the RECORD button, it will be read and become effective. Range is from 1 second to 65535 seconds.

Option – Choosing the RS232 communication port.





14. BASIC SAMPLE PROGRAMS

One BASIC sample programs, CTML1.BAS are included in the floppy disk. They can give the programmer a clear picture of how the data are collected from SLM/DATA LOGGER and decoded.

15. LOAD DATA FILE INTO EXCELTM OR LOTUS 123TM

For this Windows™ application program, data is saved in ASCII and EXCEL™ CSV (Comma Separated Variables) format. The file can be reviewed or typed using any text editor, and printed by PRINT command under DOS. If advance graphics are needed, user can port the data into EXCEL™, and achieve that in EXCEL™.

Follow the following steps to load your data file into EXCEL™:

a. “If you already have a data file saved in the program, rename your data file and add extension CSV. (eg. ABCDE.CSV) IF you are entering a new data file in the program, give data file a name, with extension CSV.”

b. When opening the file in EXCEL™, select the file type *.CSV (text file *.txt, *.csv), then load the file into EXCELTM.

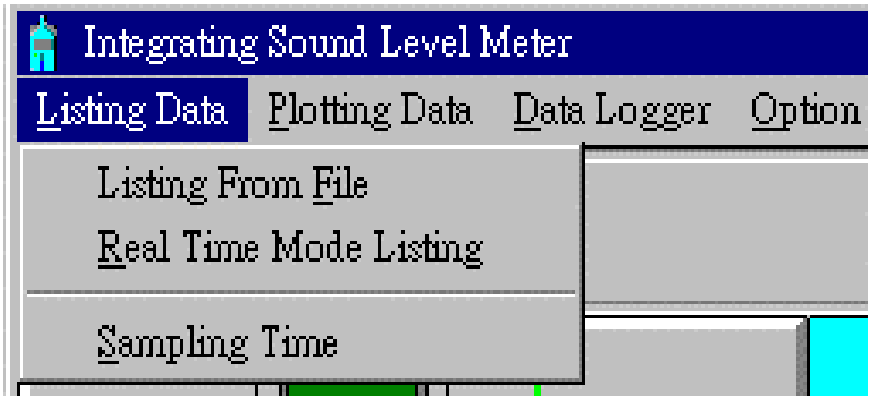
Follow the following steps to load your data file into LOTUS 123™:

1. Select File and choose Import
2. Select File type .CSV with delimiter ",".
3. enter your data file name

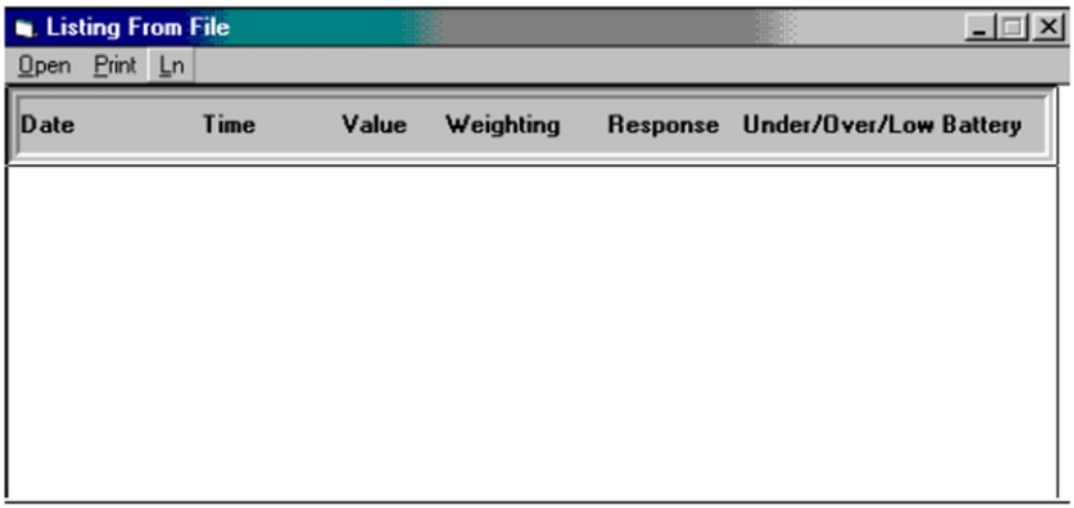
16. LX(PERCENTILE LEVEL)

Follow the steps as below to complete

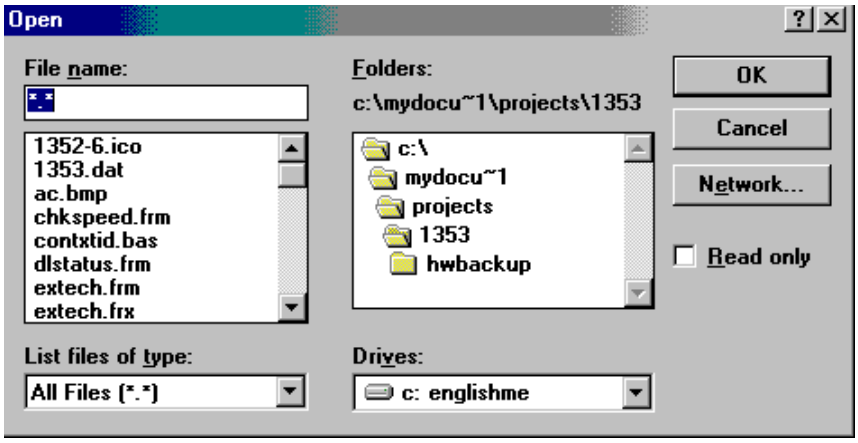
1. Click "Listing Data" then "Listing From File".



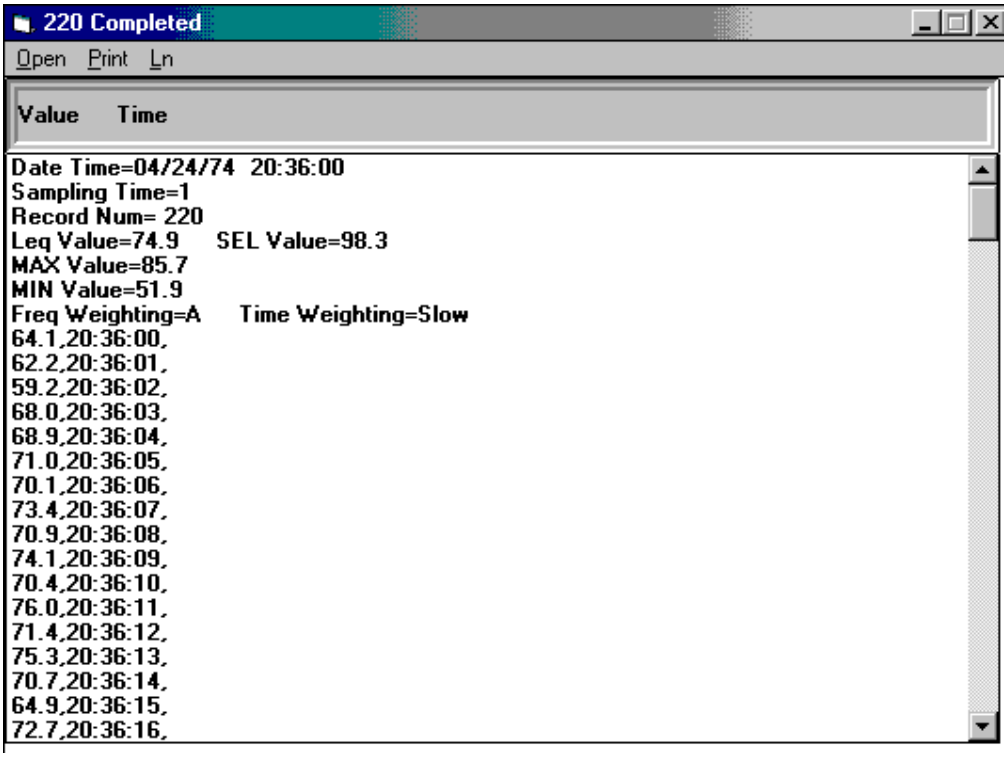
2. Click Ln



3. Open a saved file to launch.



4.



Ln

Print

Ln	0	1	2	3	4	5	6	7	8	9
L(00)	85.3	83.9	83.3	82.8	81.8	81.1	80.6	80.1	79.7	79.3
L(10)	79.0	78.8	78.4	78.3	78.2	77.9	77.8	77.5	77.3	77.3
L(20)	77.1	77.1	76.7	76.6	76.5	76.0	76.0	75.8	75.6	75.3
L(30)	75.2	75.1	75.0	74.8	74.6	74.4	74.2	74.1	74.0	73.8
L(40)	73.7	73.3	73.1	72.7	72.6	72.3	72.3	72.2	72.2	72.1
L(50)	71.9	71.7	71.7	71.5	71.4	71.3	71.2	71.0	70.8	70.7
L(60)	70.7	70.5	70.3	70.3	69.9	69.6	69.3	69.0	68.7	68.5
L(70)	68.5	68.1	67.8	67.4	67.1	67.0	66.7	66.4	66.2	65.7
L(80)	65.3	65.1	65.0	64.8	64.8	64.6	64.3	64.0	63.4	63.2
L(90)	63.0	62.8	62.5	62.3	61.5	61.3	60.9	60.6	60.1	59.1

17. USE THE QUICK DEBUGGING TOOL (CTML1.BAS)

A debugging program also comes with the Sound Level Meter - CTML1.EXE. When the function, range and reading in the application program do not match with those of the Sound Level meter, user can use this program to verify if there is a hardware problem. It is also very useful when you are writing your own application. The source code CTML1.BAS is also included in the floppy. It can be runned in QBASIC or compiled by.

QUICK BASIC.

Type CTML1 under DOSTM operation system, then the following text will appear on the screen:

Communication Port <1> : Baud rate <9600> :9600

Then when the s (Asc, 73H) bar is pressed, the character is sent out to the SLM, and 6 bytes of data received from the SLM shall be displayed in hex format on the screen.

18. QUICK START FOR USERS AND PROGRAMMERS

Regular Users:

a. Connect the ISLM with PC.

b. Click the mouse at the ICON of Integrating Sound Level Meter. Programmers:
a. Connect the ISLM with the PC.
b. Run the debugging program CTML1.EXE to verify if the hardware connector is O.K.

c. Write code (ie. C or BASIC etc.) To set RTS low and send an “s” character to the ISLM.

d. Write code to receive 5 data bytes from the ISLM.

e. Write code to decode 5 data bytes.

f. Write code to perform your desired function.

19. TROUBLE SHOOTING

If no data is received from the Sound Level Meter.

You can run the CTML1 debugging program to make sure the hardware connection is OK. If CTML1 also receives no data, check your cable to see if there is any broken wire or if wiring is not correctly connected.

In this direction will find a vision of the measurement technique:
http://www.industrial-needs.com/measuring-instruments.htm

NOTE: "This instrument doesn’t have ATEX protection, so it should not be used in potentially explosive atmospheres (powder, flammable gases)."