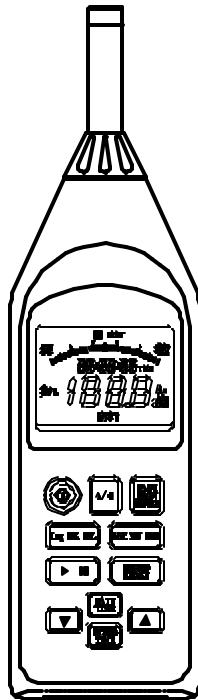


## Integrating Sound Level Datalogger

### Model 407780



### ***Introduction***

Congratulations on your purchase of the Extech 407780 Integrating Sound Level Meter. The 407780 with programmable integrating time provides precise linearity over a wide range (100dB) and displays Leq, SEL, SPL, MAX-L, and MIN-L measurements. Response time (FAST, SLOW, and IMPULSE) and frequency weighting (A and C) are programmable. The analog output (AC and DC) can be used with chart recorders or other devices to store data. The 407780 with PC Interface and real-time calendar clock datalogs (stores) up to 32,000 readings for later transfer to PC. Careful use of this meter will provide years of reliable service.

## Warranty

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EXTECH INSTRUMENTS CORPORATION warrants this instrument to be free of defects in parts and workmanship for one year from date of shipment (a six month limited warranty applies on sensors and cables). If it should become necessary to return the instrument for service during or beyond the warranty period, contact the Customer Service Department at (781) 890-7440 ext. 210 for authorization or visit our website at [www.extech.com](http://www.extech.com) (click on 'Contact Extech' and go to 'Service Department' to request an RA number). A Return Authorization (RA) number must be issued before any product is returned to Extech. The sender is responsible for shipping charges, freight, insurance and proper packaging to prevent damage in transit. This warranty does not apply to defects resulting from action of the user such as misuse, improper wiring, operation outside of specification, improper maintenance or repair, or unauthorized modification. Extech specifically disclaims any implied warranties or merchantability or fitness for a specific purpose and will not be liable for any direct, indirect, incidental or consequential damages. Extech's total liability is limited to repair or replacement of the product. The warranty set forth above is inclusive and no other warranty, whether written or oral, is expressed or implied.

## Specifications

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### General Specifications

Applicable Standards	IEC 651 / 804 type 2 and ANSI S1.4 type 2
Measurement types	SPL, SEL, Leq, MAX-L, and MIN-L
Measurement range	30 to 130dB
Frequency Range	31.5Hz to 8kHz
Frequency weighting	'A' and 'C'
Response time	FAST, SLOW, and IMPULSE selections
Linearity range	100dB
Display resolution	0.1dB
Accuracy	±1.5db (94dB @ 1kHz)
Microphone	0.5" Electret Condensor
Numeric Display	4-digit LCD
Display update rate	Twice per second
Bargraph Display	4dB per step (over 100dB range) with 50 segments
Bargraph update rate	16 times per second
Display warnings	'OVER' and 'UNDER' range status indicators
Analog outputs	DC: 10mV per dB; AC: 2Vrms full scale
Power supply	Four (4) 1.5V 'AA' batteries (optional AC adaptors)
Battery life	20 hours (approx.)
Operating conditions	41 to 104°F (5 to 40°C); 90% Relative Humidity
Storage conditions	14 to 140°F (-10 to 60°C); 75% Relative Humidity
Dimensions	10.4 x 2.8 x 0.8" (265 x 72 x 21mm)
Weight	Approx. 10.9 oz. (310g)

## Supplied Material and Optional Accessories

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### Supplied Material

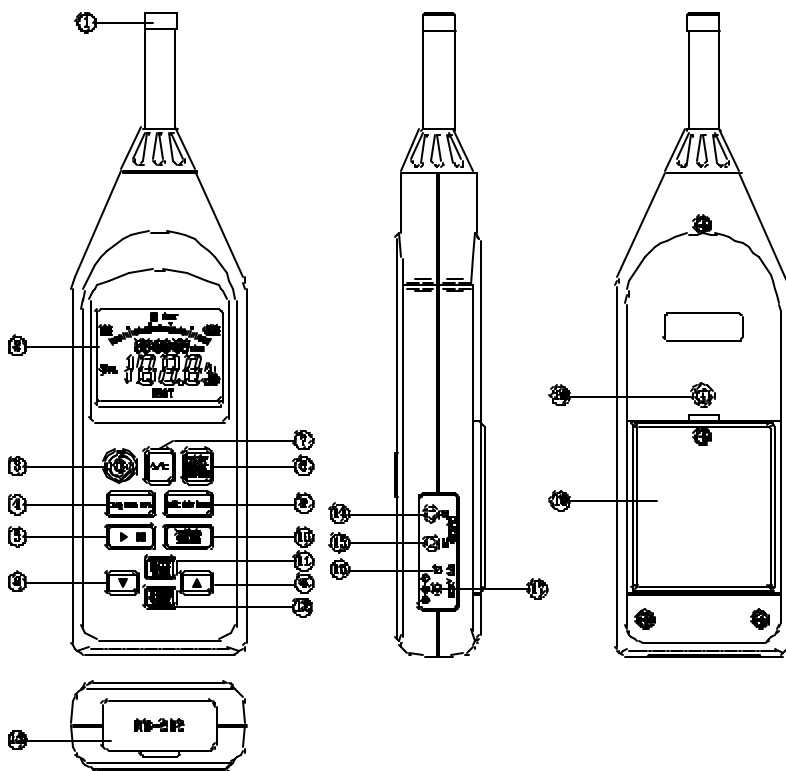
1. Adjustment screwdriver
2. Batteries (four 'AA' 1.5V cells)
3. Operation Manual
4. Windows™ Software
5. RS-232 Interface cable and 25 pin adaptor
6. Windscreen
7. 3.5mm plug for analog output access

### Optional Accessories

1. Sound Level Calibrator
2. Microphone extension cables (5 or 10 meters)

## Meter Description

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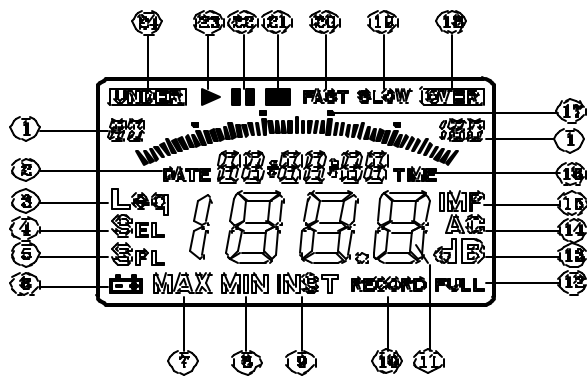


**Refer to the diagram above for the list below:**

1. 1/2-inch microphone
2. LCD display
3. Power Switch
4. Leq / SEL / SPL select switch
5. RUN / Pause switch
6. Use the UP/DOWN arrow keys to change the measurement preset time.
7. A / C Frequency weighting select switch
8. FAST / SLOW / IMPULSE time weighting select switch.  
**FAST:** 125ms  
**SLOW:** 1 second  
**IMPULSE:** 35ms with slow decay
9. Press to select MAX MIN recording. Press again to step through MAX and MIN values. Press and hold for 3 seconds to erase the MAX and MIN values and exit this mode.
10. RECORD / ERASE  
**Record standby:** The RECORD symbol appears in standby mode.  
**Recording:** The RECORD symbol flashes once per second while recording.  
**Erase data:** Press & hold the RECORD/ERASE key for 3 seconds to erase data (the entire LCD will flash three times).
11. Real time clock with calendar
12. Measuring time selection for Leq and SEL
13. RS-232 interface connector
14. AC output terminal  
2 Vrms at 130dB  
Output impedance 600Ω Max.  
Output signal uses standard 3.5mm phono jack (supplied). Signal on tip; ground on sleeve.
15. DC output terminal  
Output: 10mV/dB  
Output impedance 1000 max.  
Output signal uses standard 3.5mm phono jack (supplied). Signal on tip and ground on sleeve.
16. CAL (calibration) potentiometer
17. External DC 6V power supply terminal
18. Tripod mounting screw
19. Battery cover

## Display Description

- |   |  |
|---|--|
| 1. Level range  | 13. Unit   |
| 2. Date information                                   | 14. Frequency weighting (A/C)  |
| 3. Leq: Equivalent continuous                         | 15. IMPULSE time weighting   |
| 4. SEL: Sound exposure level                          | 16. When the TIME display icon switches on, the real time clock is displayed. When the TIME icon is off the display shows elapsed time for Leq and SEL measurements. |
| 5. SPL: Instantaneous sound pressure level            | 17. Bargraph (100dB range with 50 segments)  |
| 6. Low-Battery indicator                              | 18. Range over   |
| 7. MAX: Maximum SPL value is held during measurement. | 19. SLOW time weighting  |
| 8. MIN: Minimum SPL value is held during measurement. | 20. FAST time weighting  |
| 9. INST: Instantaneous of sound pressure level        | 21. Measurement completion of Leq and SEL  |
| 10. Data recording                                    | 22. Measurement interruption of Leq and SEL  |
| 11. Measuring value                                   | 23. Leq and SEL readings   |
| 12. Memory full                                       | 24. Under Range  |



## Meter Operation

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### Calibration

Calibrating the Model 407780 Integrating Sound Level Datalogger requires an acoustical calibrator such as the Extech Model 407766 or 407744.

1. Configure the meter as follows:
  - Display: SPL (dBA)
  - Time weighting mode: FAST
  - Measurement mode: INST
2. Insert the 407780 microphone into the opening of the acoustical calibrator.
3. Adjust the 407780 calibration potentiometer until the 407780 display matches the acoustical calibrator output signal (typically 94 or 114dB).

### Measurement Preparation

1. Install the four (4) 'AA' 1.5V batteries in the rear battery compartment. Observe polarity.
2. If the battery level falls low the battery symbol will appear on the LCD. Replace the batteries when the symbol appears.
3. For use of the optional AC Adaptor, plug the adaptor into the side of the meter in the jack labeled '6V' and then into an appropriate AC power source.

### Taking Measurements

There are two ways to take a basic measurement. One is to manually start and stop the instrument and the other is to use a preset measurement period. In each case, the meter must be correctly configured before starting. Settings that affect measurements are:

- Time Weighting
- Frequency Weighting
- Preset Time
- Date and Time
- Calibration

### Setting the measurement time

The instrument can be configured to measure sound for a fixed amount of time. When the programmed time has elapsed, the measurement is stopped automatically. There are 13 preset time settings available (refer to table below).

1 second	10 minutes
3 seconds	15 minutes
10 seconds	30 minutes
30 seconds	1 hour
1 minute	8 hours
5 minutes	24 hours
8 minutes	

To set the preset time:

1. Press the INTEG/TIME key. The preset time shown on the display above the dB reading will be ready to edit
2. Use the UP/DOWN arrow keys to set the time. Note that the numbers wrap around from 24h to 1s.

## Taking manually timed measurements

To take a manually timed measurement, the time must be set to "24:00:00" (24 hours).

1. Press the green power key to switch on the instrument.
2. Wait for the Sound Level Meter to warm-up (approx. 30 seconds).
3. Press the RUN/PAUSE button to begin measuring. During the measurement, "▶" will appear in the upper left section of the display.
4. When the RUN/PAUSE key is pressed again, the measurement will pause and the display will show "■".
5. Press the AC or the FAST/SLOW/IMPULSE key to stop the measurement and "■" will appear on the display.

## Taking preset-timed measurements

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

1. Press the green power key to switch on the instrument.
2. Wait for the sound level meter to warm-up (approx. 30 seconds).
3. Press the RUN/PAUSE key to begin measuring. During the measurement, "▶" will appear in the upper left section of the display.
4. The measurement will stop automatically after the preset time interval has expired.

### Notes:

1. When the IMPULSE mode is selected, the meter will only operate in the SPL mode. When the RUN/PAUSE key is pressed, the meter will switch to SLOW mode automatically and start Leq measurements. When Leq mode is active, the IMPULSE mode cannot be used.
2. When the meter is measuring noise level, the "▶" will display and the following keys cannot be used:
  - FAST, SLOW, IMPULSE
  - A/C Weighting
  - DATE/TIME
  - INTEG TIME
  - RECORD ERASE
  - UP/DOWN Arrow keys
  - Note that the RS-232 interface is also disabled

## Datalogging

The 407780 can store up to 32,000 measurements. To view, save, print, and manipulate the data, the records must be down-loaded to a PC. Each data set holds the following information:

- Date and Time of reading
- Response time and frequency weighting
- Sampling time (rate of data recording)
- Total number of records
- Leq
- Max L
- Min L
- SEL
- Measurement duration

### **Start Recording**

1. Connect the sound level meter to a PC via the supplied RS-232 cable.
2. Use the supplied Windows™ software to activate communication.
3. Set the sampling rate and the measurement time in the supplied software (described later in this manual). The meter can now record remotely (disconnected from the PC) at the rate selected.
4. Press the RECORD/ERASE key to put the meter in Record Standby. The RECORD display icon will appear on the display.
5. Press the RUN/PAUSE key to start data recording. The RECORD icon will flash once per second. One reading will be stored for each sampling interval (set in the sampling rate parameter above).
6. When the measurement time expires, the meter stops recording and the RECORD display icon switches off.
7. The recorded data can then be down-loaded to the PC using the supplied Windows™ software.

### **Erasing Records**

1. When the meter's memory is full, the FULL display icon will appear on the display.
2. Press and hold the RECORD ERASE key for 3 seconds to erase all records. The FULL display icon will switch off when the data is cleared.

### **Setting the Real Time Calendar Clock**

Date and time information is stored with each saved record.

To set the date and time:

1. Start with the meter off. Press and hold the DATE TIME key, and while holding the key, press the green power key to switch the instrument on. Release the power button when the meter flashes three times.
2. A blinking number indicates the currently selected parameter. The first blinking parameter will represent the current year. Use the up and down arrow keys to set the correct year.
3. Press the DATE TIME key to move to the next parameter (month). Use the arrow keys to set the correct month.
4. Repeat step 3 to set the day, hour, minute, and second.
5. To confirm the new date and time press the DATE TIME key. Note that the 407780 has a back-up battery.

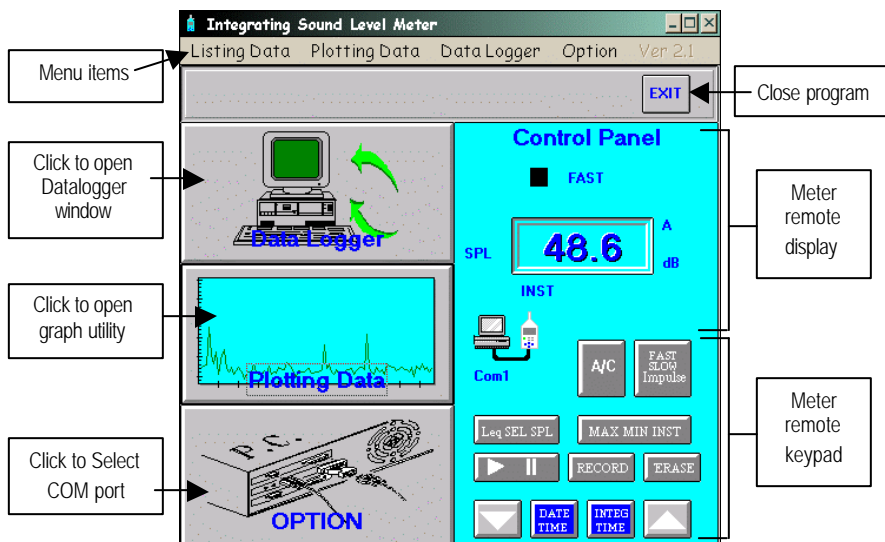
# Windows™ Software Operation

## Software installation

Place the supplied software CD-ROM in the appropriate drive and install the software per the on-screen instructions.

## Main Software Screen

When the program is opened the main software screen will appear as shown below.



## Menu items on Main Software Screen

### LISTING DATA Menu Item

- Listing from File: Opens and displays data from a previously saved file
- Real time listing: Displays readings as they're taken from connected meter.
- Sampling time: Program the rate at which data will be recorded by the meter while remotely datalogging. Set from 1 to 65535 seconds.

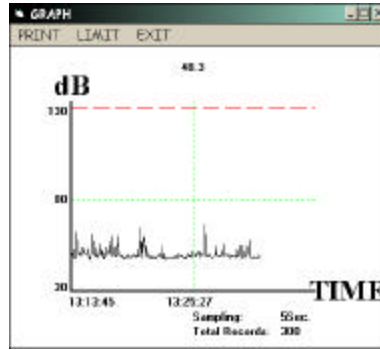
Date	Time	Value	Weighting	Response	Under/Over/Low Battery
05-04-2003	12:23:42	48.4	A	FAST	
05-04-2003	12:23:43	50.5	A	FAST	
05-04-2003	12:23:44	48.3	A	FAST	
05-04-2003	12:23:44	48.1	A	FAST	
05-04-2003	12:23:45	48.7	A	FAST	
05-04-2003	12:23:47	48.6	A	FAST	
05-04-2003	12:23:48	48.3	A	FAST	
05-04-2003	12:23:49	48.9	A	FAST	
05-04-2003	12:23:49	48.2	A	FAST	
05-04-2003	12:23:51	50.8	A	FAST	
05-04-2003	12:23:52	47.3	A	FAST	
05-04-2003	12:23:53	48.1	A	FAST	
05-04-2003	12:23:53	48.7	A	FAST	
05-04-2003	12:23:54	48.5	A	FAST	
05-04-2003	12:23:56	48.6	A	FAST	
05-04-2003	12:23:57	48.3	A	FAST	
05-04-2003	12:23:58	48.3	A	FAST	
05-04-2003	12:23:58	48.2	A	FAST	
05-04-2003	12:24:00	48.3	A	FAST	
05-04-2003	12:24:01	48.2	A	FAST	
05-04-2003	12:24:02	48.8	A	FAST	
05-04-2003	12:24:03	48.5	A	FAST	
05-04-2003	12:24:04	48.8	A	FAST	
05-04-2003	12:24:05	47.3	A	FAST	



**PLOTTING DATA Menu Item**

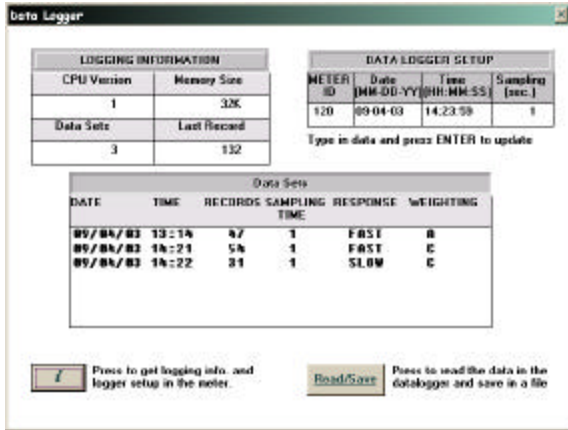
- Plotting from file: A graph is displayed based on data from a previously saved file.
- Plotting from meter: A graph is displayed based on data stored in the meter from a datalog session.
- Real Time Plotting: A graph is displayed as the readings are recorded by the meter.

Use the PRINT menu item to print the graph. Use the LIMIT menu item to set the high and limits of the dB axis.



**DATALOGGER Menu Item**

When the Datalogger menu item is selected the window shown below appears.



In the **Logging Information** window the CPU version (factory diagnostic), memory size (total memory size of the meter), Data Sets (number of separate datalogging sessions), and Last Record (total number of records in all sets) items are shown.

In the **Datalogger Setup** window, the meter's current configuration (meter ID, Date/Time, and Sampling rate) are shown.

In the **Data Sets** window, all of the separately datalogged sets are shown.

When the *i* icon is pressed, all of the sets in the meter will be transferred to the PC. All of the downloaded sets will appear in the **Data Sets** window.

When the **Read/Save** button is pressed the highlighted sets in the Data Sets window are transferred to a file in the PC. The user is prompted for a filename after the button is pressed.

**OPTION Menu Item**

Click the OPTION menu item to select the PC COM port to be used. Alternatively, the OPTION button shown on the Main Software Window can be clicked.



## Remote Display

The display shown on the Main Software window is a real-time remote display representing the meter's display. If the meter and the PC are communicating, the reading on the software display will track the meter's display.

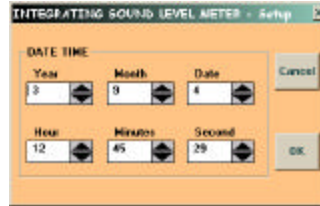
## Remote Keypad

The keypad shown on the Main Software window is a fully functioning remote keypad. All of the remote keys can be used to control the meter remotely.

## Important Note on the TIME DATE and INTEG TIME software keys

### TIME DATE

Ensure that the time and date are correctly set before datalogging in order to secure the proper time and date stamping on recorded data. Click the TIME DATE button and edit the date and time in the programming window (see diagram).



### INTEG TIME

Select a test time by clicking the INTEG TIME button on the Main Software window (see diagram). When a datalogging session is initiated, the meter will record data for the period of time currently selected in the integrating time window. Recording will automatically stop when the recording period has ended. At that point, the data recorded will be a 'set'. For manually recording, the integrating time must be set to 24 hours (see the section earlier in this manual on manual recording).

