

User's Manual

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**EXTECH**  
INSTRUMENTS



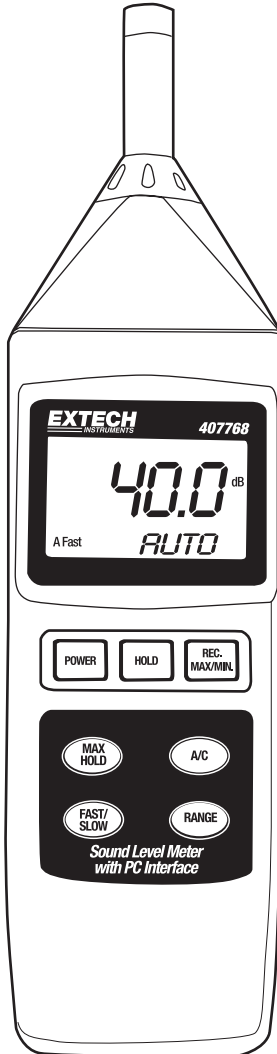
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## Digital Sound Level Meter

Model 407768



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## Introduction

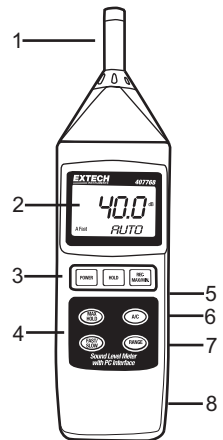
Congratulations on your purchase of the Extech 407768 Sound Level Meter. This Auto Range Sound Level Meter meets ANSI and IEC Type II accuracy standards. Professional features include programmable Frequency Weighting and Time Response, Min/Max Memory, Max Hold, Analog output, and RS-232 PC Interface. Careful use of this meter will provide years of reliable service.

## Specifications

Display	5 Digit LCD with overload, low battery and multifunction indication
Frequency bandwidth	31.5 Hz to 8 KHz
Microphone	0.5" Electret Condensor Microphone
Output terminals	Optically isolated RS-232 port and AC output
Measurement ranges	Auto Range: 30 to 130dB Manual Ranges: 30 to 80dB, 50 to 100dB, 80 to 130dB
Frequency weighting	'A' and 'C' (Programmable)
Applicable standards	ANSI / IEC Type 2
Resolution	0.1dB
Maximum/Minimum record	Highest and lowest readings are stored for later recall
Data Hold	Displayed reading is held when HOLD key is pressed
Max Hold	Highest reading displayed only
Response time	Fast: 125ms / Slow: 1s (Programmable)
AC Analog output	0.5VAC rms full scale (600Ω output impedance)
Power	9V Battery; Consumption: 6mADC approx.
Operating temperature	32 to 122°F (0 to 50°C)
Operating humidity	Less than 80% RH
Dimensions / Weight	10.6 x 2.7 x 1.1" / 0.63 lbs. (268 x 68 x 29mm / 285g)

## Meter Description

1. Microphone
2. LCD Display
3. Power, Hold, and Min/Max buttons
4. Max, Weighting, Response Time, & Range buttons
5. AC output jack
6. Calibration potentiometer
7. RS-232 PC interface jack
8. Battery compartment, tilt stand, and tripod mount on rear



## **Sound Level Meter Operation**

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### **Meter Power**

1. The meter is powered by a 9V battery. The battery compartment is located on the rear of the meter and the compartment cover is secured by one Phillips screw. When the battery icon appears on the top left corner of the meter's display, replace the battery.
2. Press the POWER button to turn the meter on. Note that the Meter is equipped with an Auto Power Off feature that shuts the meter off after 10 minutes. To defeat Auto Power Off, put the meter in Record mode by pressing the REC MAX/MIN button.
3. Press the POWER button to turn the meter off.

### **Default Configuration**

1. The meter's default configuration is as follows: Auto Range, 'A' Frequency Weighting, and 'FAST' Response Time
2. The lower portion of the LCD will reflect the meter's configuration, i.e., 'A', 'Fast', 'Auto'.

### **Measurement Considerations**

1. Use a windscreen (not included) to cover the microphone in windy conditions.
2. Calibrate the meter often, especially if the meter has been idle for a long period of time.
3. Do not store/operate the meter in areas of high temperature or humidity.
4. Keep the meter and the microphone dry.
5. Avoid severe vibration when using the meter.
6. Remove the battery when the meter will be stored for long periods of time.

### **Frequency Weighting**

Change the Frequency Weighting by pressing the 'A/C' button. The 'A' or 'C' icon will display on the lower left-hand area of the LCD.

**Note:** With 'A' weighting selected, the meter responds like the human ear (boosting and cutting the noise amplitude over the frequency spectrum - see Appendix). 'A' weighting is used for environmental measurements, OSHA regulatory testing, law enforcement, and workplace design. Select 'C' weighting for flat response measurements (no boost or cut). 'C' weighting is suitable for the sound level analysis of machines, engines, etc. Most OSHA related testing is performed using 'A' Weighting and SLOW Response Time settings.

### **Response Time**

Change the Response Time by pressing the 'FAST/SLOW' button. The 'FAST' or 'SLOW' icon will display on the lower left-hand area of the LCD.

**Note:** Select FAST to capture noise peaks and noises that occur very quickly. In FAST mode, the meter responds in 200ms. Select the SLOW Mode (meter responds in 500ms) to monitor a sound source that has a reasonably consistent noise level or to average quickly changing levels. Selection of Fast or Slow is determined by the application and any directives or standards related to that application.

### **Auto/Manual Range**

Press the RANGE button to scroll through the following ranges: Auto, 30-80dB, 50-100dB, and 80-130dB. The display will reflect the range for each button press.

### **Calibration**

The Sound Level meter should be calibrated before each use; an external sound level meter calibrator is required. Set the meter to the Manual range (50-100dB), FAST response and 'A' weighting before starting.

1. Place the external calibrator over the Sound Level Meter's microphone and turn the Calibrator on.

2. The meter should read close to, or exactly, the calibrator's dB output level. Typical Calibrator output levels are 94dB and 114dB.
3. If the meter is within  $\pm 0.2$  dB of the calibrator's output, no adjustment is necessary.
4. Adjust the calibration pot in the output/calibration compartment if necessary to bring the meter display in line with the calibrator output signal.

### **Taking Measurements**

1. Hold the meter in hand, place it on a desktop (using the rear tilt stand), or mount it on a tripod using the tripod mount on the rear of the meter.
2. Point the microphone toward the source of noise/sound to be measured.
3. Read the measurement, in dB units, on the LCD display.

### **Data Hold**

1. Press the HOLD button to freeze the displayed reading. The LCD will display the icon HOLD when Data Hold is engaged.
2. Press the HOLD button to de-activate this feature. The HOLD icon will extinguish.
3. Note that Data Hold is not available while the meter is in the Max/Min Record mode.

### **Max Hold**

1. Press the MAX HOLD button to activate this feature. The LCD will display PH when Max Hold is engaged.
2. The meter will now display only the highest reading. Each time a higher reading is encountered the display will update.
3. Press the MAX HOLD button again to de-activate this feature. The PH icon will extinguish.
4. Note that Max Hold is not available while the meter is in the Max/Min Record mode.

### **Max/Min Data Recording**

The Max/Min feature stores the maximum reading and minimum reading while the user takes measurements. The Max and the Min readings can later be recalled.

1. Press the REC MAX/MIN button to activate this feature. The LCD will display the icon REC and the meter will begin monitoring the highest (Max) and lowest (Min) readings.
2. After measurements are made, press the REC button again to view the Max reading. The MAX icon will appear on the LCD along with the highest reading.
3. Press the REC to view the minimum (MIN) reading. The 'MIN' display icon will appear on the LCD along with the lowest reading.
4. To exit this mode, **press and hold** the REC button until the REC indicator extinguishes.
5. To clear a Max or Min reading, press the HOLD key while viewing either the MAX or MIN value. Note that exiting the Record mode also clears the MAX and MIN values.

### **Analog Output**

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The AC analog output transmits 0.5V AC rms full scale. The output impedance is 600 $\Omega$  maximum. The mono 3.5mm mini-jack is located in the output/calibration compartment on the right side of the instrument. Use a phono plug (3.5mm mono) to connect to the output jack.

## RS-232 PC Interface Data Acquisition System

The optically isolated RS-232 PC Interface port is located in the output/calibration compartment situated on the lower right side of the meter. The supplied Data Acquisition Software package includes Windows™ 95 / 98 / NT / 2000 / XP compatible software and a meter-to-PC interface cable.

### Hardware Connection

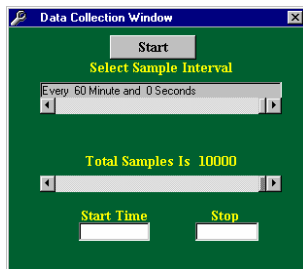
The Digital Sound Level Meter connects to a PC with the supplied interface cable. Connect the DB-9 end of the cable to the PC COM Port and the mini-plug end to the meter's port.

### Software Installation

1. Insert the supplied software disk in the computer's CD-ROM drive.
2. Run the SETUP.EXE program included on the software disk.
3. When prompted, select a directory location for the program files.
4. If a message window appears (when installing the software) prompting the user to overwrite outdated files, cancel the installation. Log onto the Windows Update web page (<http://windowsupdate.microsoft.com/>) and download updates as recommended by the site utility. Perform the recommended updates before attempting to reinstall the software or contacting tech support.

### Software Operation

1. Once the setup is complete, double click the green DataACQ program icon which resides in the same directory selected in step 3 of the procedure above.
2. The COM SELECT window (shown at right) opens, prompting the user to select the PC communications port that will be used to connect to the meter (typically Com Port 1 or 2). Ensure that the SLM Enable box is checked also then click OK.
3. The DISPLAY TYPE window opens. Select Single Display then click OK.
4. The DATA\_ACQ window will open. Press YES to view readings and save them in a file. Press NO to view readings but not save the readings to a file.
5. If YES was selected, the SAVE AS window appears prompting the user to name the data file and to select a directory to place it in. The confirmation window appears showing the new file and its path. Click OK.
6. The DATA COLLECTION window (at right) opens. Refer to steps a. through d. below:



- a. Use the **Select Sample Interval** scroll bar (click in the white area) to coarsely set the time between readings (from 1 second to 60 minutes). Click on the arrows at either end of the bar to fine tune the number.
- b. Use the **Total Number of Samples** selection to save a specific number of measurements. The range is 1 to 10,000 samples.
- c. Use the **Start/Stop Time** fields to define a data collection time period. The time period is entered in 24-hour format (HH:MM:SS). The range is 00:00:00 to 23:59:59. Leave this field blank to start logging immediately.
- d. Press the **START** button to begin datalogging.
- e. If both **Number of Samples** and **Start/Stop Times** are selected, the recording will begin at the start time and end when either the Stop time **or** the Total Samples has been reached, whichever occurs first. FILE CLOSED appears when logging ends.

## Important Note on the Automatic Power OFF feature

The 407768 Sound Level Meter has an AUTO POWER OFF feature that turns the meter off after approximately 10 minutes. This feature must be disabled before starting a datalogging session to avoid having the meter automatically shut off in the middle of a session. Disable it by pressing the REC MAX/MIN button to activate the Record mode. While the meter is in the Record mode, the AUTO POWER OFF feature is disabled.

## Datalogging with the RS-232 PC Interface

Initiate Datalogging by clicking START in the DATA COLLECTION window (shown on the previous page). The main program window appears (as shown on the cover of this manual) displaying the Exttech logo and the following menu selections:

### File

- Create/Save File: Saves the currently opened file or creates a new file
- View File: Opens a previously saved data file
- Close Current File: Closes the file currently open
- Download Datalogger: Reserved function; not for use with this meter

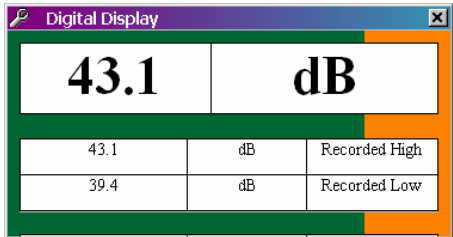
### View Mode

- Display Analog: Presents the data as an analog meter.

*Note that the Analog display is scaled using the largest reading logged. If changes to the unit of measure are made or if large changes in readings occur, the display window should be closed and re-opened to reset the scaling.*

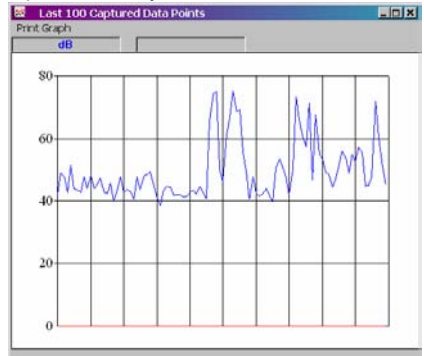
- Digital: LED-type display with High and Low Reading fields (diagram above).
- Display File Count: Provides a tally of data points logged.
- Display Data: Provides logged data in list format. Sample number, reading, time, and date are provided on each line of list.

**Important Note:** The Recorded High and Low values (shown above in the display example) are the highest and lowest values observed at any time during the recording period. These values, especially for long sample rates, may not be the same as the high/low values listed in the data file.



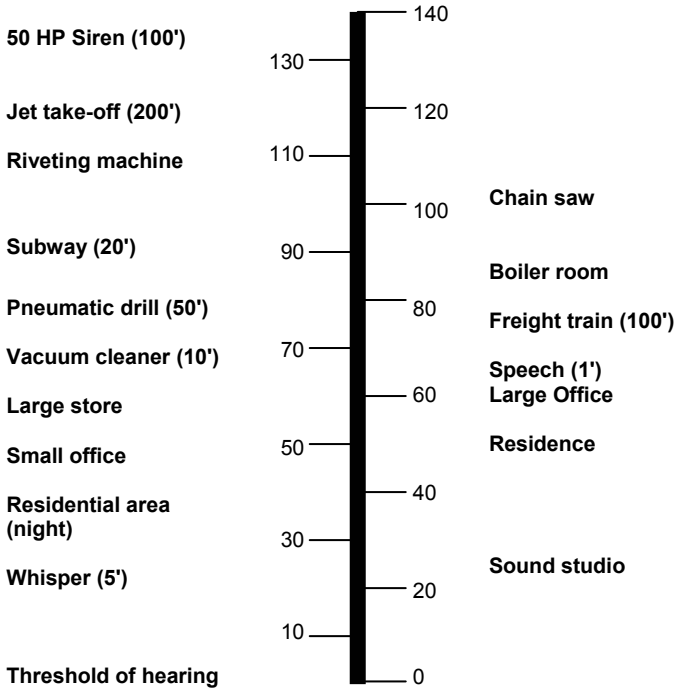
### Data Graph

- The graph plots the last 100 data points in x-y graph format (diagram right).
- Print Graph: Prints the graph to a printer connected to the PC.



# Appendix

## Typical 'A' Weighted dB levels



## Frequency Weighting Graph

