

instructions for

Model QC-10M Sound Calibrator



053-047 Rev B
01/01



Thank you for choosing Quest Technologies' Metrosonics brand to meet your calibration needs. To ensure the accuracy of your sound measuring instrumentation, Metrosonics model QC-10M calibrators provide quick, precise calibration. The instrument generates a stable acoustic signal at a controlled frequency and amplitude to verify the accuracy of sound level meters and noise dosimeters. It is our goal to make your decision to by Metrosonics products the right one, and to provide support for any questions or concerns that might arise.

The purpose of this manual is to provide the user with the necessary information to operate the QC-10M calibrator. The entire manual should be read to fully understand the many features this instrument offers.

This manual is not all inclusive and cannot cover all unique situations. In addition no warranties are contained in this manual except as described under the warranty policy section.

**MODEL QC-10M SOUND CALIBRATOR
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MODEL QC-10M SOUND CALIBRATOR

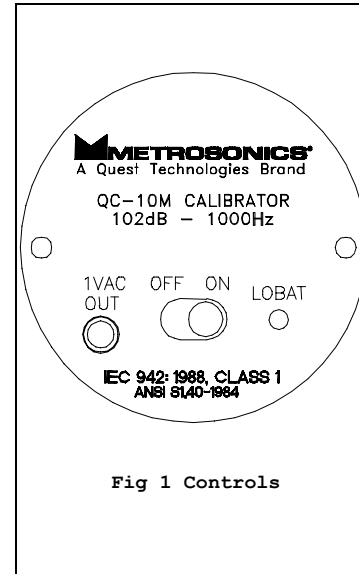


Fig 1 Controls

1 GENERAL DESCRIPTION

The Metrsonics model QC-10M is an acoustic calibrator for calibrating precision type 1 as well as general purpose type 2 sound level meters and other instrumentation with a microphone input. The QC-10M is a single frequency calibrator which generates 1000 Hz at 102dB SPL. The calibrator is powered by a single 9 volt battery.

The calibrator consists of an oscillator to generate the frequency, an amplifier stage, a transducer and microphone coupler. The coupler directly accepts a standard 1" (15/16") diameter microphone. Separate adapters are available to accommodate other sizes of microphones. The calibrator also provides a 1 volt RMS signal through a 1/8" phone jack.

2 THEORY OF OPERATION

Figure 2 shows the basic functional blocks of the QC-10M. The oscillator is a low distortion wein-bridge type with automatic gain control and temperature compensation for high stability. Precision capacitors and resistors control the frequency, and the amplitude is adjustable for precise calibration of the SPL. The oscillator's output is fed through a temperature compensated driver circuit to the transducer where it is converted to sound pressure in the coupler cavity.

The battery test circuit compares the battery voltage to a reference voltage. If the battery is too low for proper operation, the circuit automatically disables the oscillator and no sound is produced. The red LOBAT light will indicate this condition.

3 OPERATING PROCEDURE

3.1 The coupler cavity of the calibrator is designed to directly accept a standard 1 inch diameter microphone (actual size is 15/16"). The proper adapter must be used for microphones whose diameter is less than 1 inch. Place this adapter into the coupler cavity with a slight twisting motion to ensure that it is fully seated. An O-ring will hold the adapter in place and provide an acoustic seal between the cavity and the adapter.

NOTE: If the calibrator has recently been moved from one area to another of substantially differing temperature (>10EC difference), it is advisable to allow 1/2 hour before attempting to calibrate equipment. This is to assure proper temperature stabilization of the equipment. The calibrator need not be "ON" during this period.

3.2 Carefully lower the calibrator over the microphone. If the adapter has an O-ring to provide a seal around the microphone, a slight twisting motion should be used to ensure proper seating of the microphone into the adapter. Take care not to unscrew the microphone while twisting.

NOTE: If the calibrator is not lowered slowly, damage to microphone diaphragms may result. Be sure the calibrator is seated squarely with the adapter and microphone or significant errors may result.

3.3 Turn the unit on. Allow 15 seconds after turning on for the output to stabilize. If no sound is apparent after 15 seconds or the LOBAT light is lit, refer to the section on battery replacement (page 5).

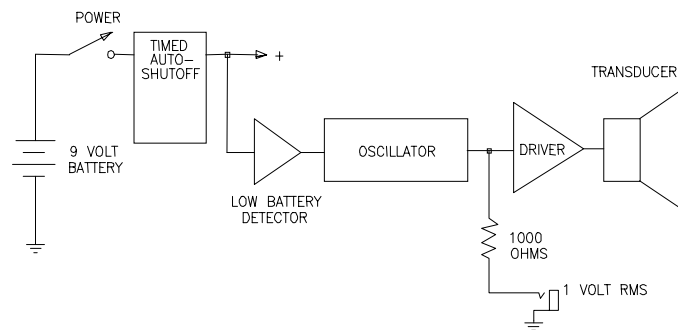


Figure 2
Calibrator Block Diagram

3.4 Verify the sound level meter's accuracy by comparing its reading with the calibrator's output. Following the manufacturer's instructions, adjust the sound level meter for a correct reading.

3.5 After calibration is complete, slowly remove the calibrator and switch off the unit. For further details of calibration, refer to the most recent revision of ANSI S1.10.

3.6 The QC-10M has an automatic shutoff feature. This prevents draining the battery by accidentally leaving the calibrator turned on. A timer circuit will shut the calibrator off after a minimum of two minutes. To restart the calibrator, turn the power switch OFF and then ON again.

4 ALTITUDE EFFECTS

Most calibrators are affected by changes in barometric pressure. The QC-10M calibrator, however, has negligible altitude correction requirements. The calibrators are set at the factory to produce its rated SPL at standard barometric pressure at sea level (760mm Hg).

5 MICROPHONE CORRECTIONS

Different models of microphones have differing air volumes between the grid and diaphragm. They also have diaphragms that vary in stiffness. Because of this, the generated sound pressure at the microphone diaphragm may vary from the nominal level of the calibrator. However, by designing the microphone adapters to compensate for the air volume variations of different microphones, corrections to the calibrator output are not needed.

6 CALIBRATION ADAPTERS

The coupler cavity of the calibrator is designed to directly accept a standard 1 inch diameter microphone (actual size is 15/16"). Smaller microphones require an adapter for proper calibration. The Metrosonics model QC-10M has a wide selection of adapter sizes available to fit most microphones currently available. Contact your Metrosonics dealer for further details.

7 BATTERY CHECK AND REPLACEMENT

No operator judgments are needed to determine the condition of the battery. If the battery is so low (approximately 7 volts) as to affect the unit's calibration, a battery-condition detector circuit disables the oscillator, lights the LOBAT indicator, and no sound is produced. Please note that the QC-10M has a circuitry stabilization time of 3 to 5 seconds, and no sound is produced during this time. This "warm-up" time should not be misconstrued as a low-battery condition. If, however, after 15 seconds no tone is heard, replace the battery with a fresh NEDA Type 1604 9 volt transistor battery. The automatic shutoff feature will run for a shorter length of time as the battery weakens.

To change the battery, remove the two screws in the cover plate. Remove the cover plate and metal sleeve to expose the battery. Pull the battery away from the snap connector and remove. To install a new battery, press its flat end into the foam retainer, compressing the foam. Slide the connector end of the battery in line with the battery socket and snap it into place. The battery will not "snap-in" in the wrong orientation. Reinstall the sleeve, cover plate and screws.

8 CALIBRATION

The QC-10M is calibrated at the Quest laboratory with a standard microphone (B&K 4144) and special instrumentation traceable to NIST. The QC-10M is very stable; but since it is used to calibrate other equipment, it should be checked periodically against laboratory standards. It is recommended that the calibrator be returned to the factory at least yearly for recalibration, or whenever there is a question as to its accuracy.

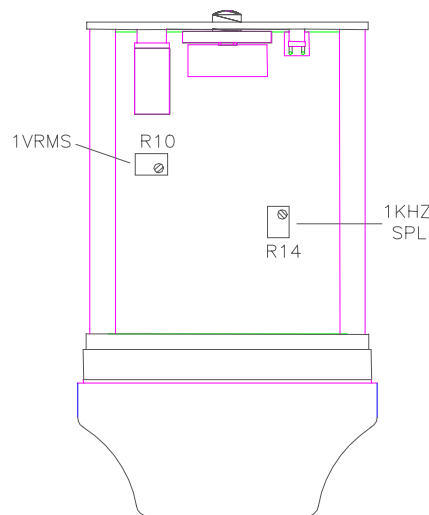


Figure 3
Calibrator Adjustments

Figure 3 depicts the calibrator with the sleeve removed. Calibration is not affected by removing the sleeve. Calibration potentiometers are indicated for adjusting the SPL and the 1 volt output. The 1 volt adjustment is the master output adjustment and as such affects the SPL.

NOTE: These adjustments are for laboratory calibration only and should not be readjusted by the user.

9 SPECIFICATIONS

STANDARDS: ANSI S1.40-1984 and IEC 60942:1997 Class 1L

OUTPUT FREQUENCY: 1000 Hz " 2%

OUTPUT AMPLITUDE: 102dB ref. 20FN/m² (20FPa)

OUTPUT ACCURACY: "0.3dB @ 20°C 760mmHg

DISTORTION: Less than 1% within temperature and humidity operating ranges.

ELECTRICAL OUTPUT: 1 volt RMS sine wave, "5% (0.4dB)
Output impedance = 1000 ohms. Phone jack (1/8") compatible with Switchcraft 780 plug or equivalent.

TEMPERATURE: Operational Range -10 to +50°C.
Accurate within +/-0.3dB from +5 to 50EC
Below +5EC coefficient of SPL is 0.0 to +0.01dB/°C ref. 20°C
Storage temperature -40 to +65EC with battery removed.

COUPLER VOLUME COEFFICIENT: A 1cc increase in coupler volume will result in a typical decrease in output of .27dB @1kHz.

HUMIDITY: Relative humidity 5 to 95% with less than 0.1dB change in output.

EFFECTS DUE TO EXTERNAL FIELDS:
60 Hz : No measurable effect up to 5 Oersted (1 Oe = 80A/m)
400 Hz: No measurable effect up to 2 Oersted
(Stated field strengths are magnetic test chamber limits)
Tested for RF susceptibility with no effect at field strengths to 65 V/m over the frequency range of 10MHz to 500MHz.

POWER: Battery operated, 9 volt alkaline battery, NEDA 1604A type. Projected battery life greater than 25 operating hours with intermittent use. Battery life is affected by temperature. Consult battery manufacturer's data for specific battery life at a current draw of 10mA.

SIZE AND WEIGHT: 4.1" (10.4 cm) long, 2.4" (6 cm) dia., 12 oz. (0.35 kg).

10 SERVICE POLICY

The Metrosonics product you have purchased is one of the finest acoustic instruments available. It is backed by our full one year warranty which seeks complete customer satisfaction. This is your assurance that you can expect prompt courteous service for your equipment from the entire Metrosonics service organization.

Should your Metrosonics equipment need to be returned for repair or recalibration, please contact the Service Department at 1(800)245-0779 (USA) or Fax (262)567-4047 for a Return Authorization Number. The RA number is valid for 30 days, and must be shown on the shipping label and purchase order/cover letter. If you are unable to return instruments in that time call for a new RA number.

Repair or replacement work done under warranty will be performed free of charge, and the instrument will be returned to you freight prepaid. Your copy or a photocopy of the warranty Registration Card will serve as proof of warranty should the factory require this information.

If for any reason you should find it necessary to contact the factory regarding service or shipping damage, please direct your calls or letters to the attention of Customer Service, Quest Technologies, Inc at (262) 567-9157 or (800) 245-0779. Office hours are from 7 AM to 6 PM (Central Standard Time) Monday through Friday.

For service or recalibration outside the U.S.A. please contact your local Metrosonics dealer or contact the factory.

11 WARRANTY POLICY

Quest Technologies warrants Metrosonics instruments to be free from defects in materials and workmanship for one year under normal conditions of use and service. For U.S.A. customers we will replace or repair (our option) defective instruments at no charge, excluding batteries, abuse, misuse, alterations, physical damage, or instruments previously repaired by other than Quest Technologies. Microphones, sensors and printers may have shorter warranty periods. This warranty states our total obligation in place of any other warranties expressed or implied. Our warranty does not include any liability or obligation directly resulting from any defective instrument or product or any associated damages, injuries, or property loss, including loss of use or measurement data.

For warranty outside the U.S.A., a minimum one year warranty applies to the same limitation and exceptions as above with service provided or arranged through the authorized Metrosonics distributor or our Quest European Service Laboratory. Foreign purchasers should contact the local Metrosonics distributor for details.