

# Operating Manual

## Q 2003 Impedance Meter



### FEATURES:

- 16 x 2 LCD shows impedance, 100V and 70V load value.
- 1Ω to 19KΩ test range
- Single push button operation.
- Auto ranging.
- Inbuilt Battery charger circuit.
- Display accuracy +/-10%.
- Low battery indication.
- Backlit display.
- Rugged yet easy to hold hand held case.
- Easy battery replacement.
- System test mode.

### INTRODUCTION:

Measuring a transformer with a regular ohm meter or multimeter is very difficult and provides inaccurate results. This is because an ohm meter or multimeter uses DC to measure the resistance.

Consider a transformer, which is basically a coil of wire, the DC resistance will be fairly low. If an AC signal is passed through the winding the impedance will be much higher, unless the winding is shorted. In this case the reading will be very low.

In the case of a short circuit the inductance of the transformer tries to impede the current flow through the winding. The nature of transformers will result in the impedance being reflected into other windings on the transformer being tested. This means a shorted turn on any winding will show up on the other windings.

An impedance meter is also critical for accurately measuring low impedance loudspeaker systems, incorporating multiple speakers and crossovers, and for measuring commercial 100V line speaker systems, which may include many speakers with line transformers and several hundred meters of cable. Trying

to measure this type of load is virtually impossible with a standard multimeter.

For example a short circuit on several hundred metres of cable will not show up as a short circuit on a standard multimeter. You will actually measure the DC resistance of the cable which will be around 22 ohms for 500 meters of 24/0.2 cable.

Using an impedance meter, measuring the AC resistance will read a short circuit. A short circuit located remotely in a speaker line is the major cause for amplifiers overheating and blowing DC fuses.

Shorted turns on mains transformers primary windings can also be measured with this meter. If this meter displays a value of less than 100 ohms, this will indicate that the transformer has a shorted turn.

### OPERATION:

#### TO MEASURE IMPEDANCE

Make sure the amplifier has been completely disconnected from the line to be measured.

Connect the test leads to the Q 2003.

Connect the test leads to the speaker line.

Once your meter is connected press the TEST button for approximately 1 second (or 2 seconds if the LCD backlight is required). The impedance meter will display "CHECKING LOAD" for approximately 3 seconds while it checks the speaker load. You will be able to hear a tone from the speaker load that is under test. After 3 seconds the load impedance will be displayed on the LCD along with the 100V load value. After 8 seconds the 70V load value will replace the 100V load value on the LCD.

**SYSTEM CHECK MODE**

System check Mode is included for audible testing of larger speaker installations. It allows the Q 2003 to run at full output for a period of approximately 6 minutes so the installer can walk around the install to check sound is present on all speakers.

To activate this mode connect the test leads to the load to be checked, ensure that an amplifier is not connected. Make sure the Q 2003 is OFF then press the TEST button and hold for 5 seconds. "SYSTEM CHECK" will display on the LCD and a 1kHz tone will be put out the test leads.

**SWITCHING OFF**

To switch off the Q 2003 all you need to do is press the TEST button again. The LCD will display "OFF" for a short time then the unit will power down. The Q 2003 is also equipped with an auto power off function. The unit will automatically power down after a period of 20 seconds in Single test mode and 6 minutes in System check mode, saving precious battery life.

**BATTERY INSTALLATION AND OR CHARGING**

"LOW BATTERY" will display on the LCD when the battery requires replacing or if a rechargeable 9V Nicad/Nimh battery (such as the Altronics S 4740C, not supplied) needs charging. To replace or install the 9V (type 216) battery required to power the Impedance Meter, simply slide off the battery compartment on the back of the unit. Remove and unclip the old battery from the connector and replace it with a fresh battery. Slide the cover back until it locks into place.

To recharge an installed Nicad/Nimh battery connect a 12VDC source (car battery, cigarette lighter socket or plug pack) >300mA with a 2.1mm centre positive plug to the charging socket located on the top of the Q 2003.

"CHARGING" will display on the LCD along with the charge %. When the charge % reaches 100%, the unit will stop charging and display "CHARGE FINISHED" on the LCD. The charger can then be unplugged. The inbuilt charging circuit is a slow charger and will take up to 12 hours to charge a completely flat battery.

**NOTE:**

- 1) The Q 2003 will not function as an Impedance meter when charging.
- 2) The charger can be removed at anytime during charging though battery life will suffer.
- 3) The Q 2003 will still function when "LOW BATTERY" is being shown on the LCD but the measured results may be out by as much as 10%.

**IMPORTANT GUIDELINES:**

**Don't connect the meter to a line that has an amplifier attached to it. The impedance of the output transformer of an amplifier is extremely low and you could be easily be looking for a non-existing short.**

**Don't connect the meter to an active line. You will damage the meter with the applied voltage.**

**Don't continue to use a battery once the "LOW BATTERY" is being shown on the LCD. The readings you will get will be incorrect.**

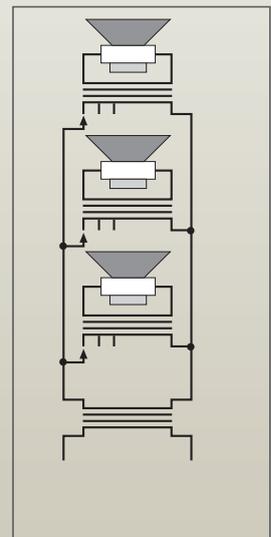


**About 70V & 100V Line Speaker Systems**

**Wiring speakers in parallel for 70/100V line:** Where several speakers are to be used at one time, on one circuit, it becomes necessary to use speakers fitted with line-matching transformers. This is to overcome the effects of connecting speakers in parallel and cable losses. The amplifier generally has an output voltage of 100 volts (70 volts is typically used in North America, however operation is similar). In this configuration the total wattage load on the amplifier is derived from adding all the line transformer primary tap ratings together. For example, 70 one watt speakers will have a total speaker load of 70 watts. Or alternatively, it is conceivable to connect 100 one watt speakers to a 100 watt, 100 volt line amplifier.

**Measuring 70/100V Line Speaker Impedance:** To measure amplifier system load, you must use an impedance meter in order to measure the ac resistance of the connected speaker network. Impedance cannot be measured with a standard multimeter, as this measures the dc resistance. Use the Altronics Q 2003 or similar impedance meter.

Load	70V	100V
0.5W	9.4kΩ	20kΩ
0.66W	7.12kΩ	15kΩ
1W	4.7kΩ	10kΩ
1.25W	3.76kΩ	8kΩ
2W	2.35kΩ	5kΩ
2.5W	1.88kΩ	4kΩ
3W	1.56kΩ	3.3kΩ
5W	940Ω	2kΩ
7.5W	626Ω	1.3kΩ
10W	470Ω	1kΩ
15W	313Ω	666Ω
20W	235Ω	500Ω
30W	156Ω	333Ω
40W	117Ω	250Ω
60W	78Ω	166Ω
100W	47Ω	100Ω
125W	37Ω	80Ω
250W	19Ω	40Ω
500W	9.4Ω	20Ω



\* Specifications subject to change without notice.