

THEORY OF OPERATION

The Whirlwind Qbox is a dual function testing device that combines an audio signal source with a monitor amplifier. Connections to both sections of the Qbox are made through a set of male and female XLR jacks which are parallel wired and electronically balanced. A separate Tip Sleeve jack is also included with a DC blocking cap, wired to pin 2 and pin 1 of the XLRs. This jack typically is for passively monitoring line level with TV IFB type high impedance mono earpieces (2 K ohms).

The source section of the Qbox provides two options for sending a test signal down an audio line, tone or mic. One three position switch selects the balanced output of either a 440 Hz sine wave oscillator or an internal electret condenser mic and also turns on the power to the circuit being used. A second three position switch sets the output level at full +4dBm balanced or attenuated to -20dBm or -50dBm. This switch should be left in the +4 position when not using the source, as this makes the output impedance 20 K ohms, which minimizes any loading effects on the monitor section input. The operating output impedance of the source circuit is 950 ohms. This will protect an external microphone plugged into the Qbox if the source tone is inadvertently switched into the microphone element.

The internal mic is an omnidirectional electret condenser mic and can pick up most sounds within 10 feet of the Qbox. It is not necessary to talk directly into the INT MIC hole. Electret mics can easily be damaged by water, therefore if using the Qbox in rainy conditions, cover the INT MIC hole with tape. Should the element need to be replaced, it is available from whirlwind.

The speaker section of the Qbox allows the user to listen to audio signals through either the internal speaker or stereo headphones. The input is balanced and will accept mic or line level signals up to +14dBm.

Due to an input impedance of 40 K ohms, looping

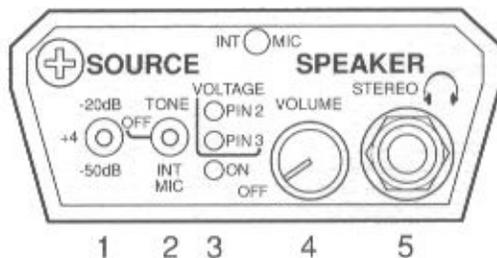
through the Qbox will not affect audio quality. The speaker volume control turns on the power to the amplifier and acts like an attenuator. The amplifier circuit provides up to 60dB of gain and only draws significant power when audio is present. Using the speaker at full volume continuously will draw 100 mA dc from the battery and wear it down quickly (1/2 hour). When troubleshooting, turning the volume up with no audio present will not wear down the battery. The speaker used in the Qbox is a 2.25" 8 ohm 1/2 watt type with a paper cone which can be damaged in severely wet conditions. A replacement is available from whirlwind. The 1/4" TRS headphone monitor jack turns off the speaker when utilized. The headphone driver is mono and drives both earpieces on headphones with 8 to 600 ohm impedances. To use mono Tip Sleeve earpieces with this jack an internal jumper must be changed, which disconnects the Ring to prevent shorting of the driver. The small black header jumper is located on the front corner of the circuit board and is easily accessible by removing the back of the enclosure (see diagram).

The Qbox also features green and yellow LEDs which detect the presence of positive DC voltages from 9 to 48 volts relative to pin 1 of the XLR jacks. The green LED monitors pin 2 and the yellow LED monitors pin 3. A red power LED illuminates when either the source or speaker section is turned on.

Since the Qbox has both a mic and a speaker, it is possible to turn both of them on and get feedback. The Qbox was configured this way so 2 units can be used as a 2 way intercom. Headphones or an external speaker must be plugged into the headphone jack so that the internal speakers are off. An external speaker is available from whirlwind, model number QBOXSPKR.

A 9 volt 100 ma battery eliminator with battery clip connector can be used to power the Qbox. Do not use a power source greater than 9 volts, as it will damage the speaker driver circuit.

CONTROLS AND FUNCTIONS



1. ATTENUATOR SWITCH selects output level at the XLRs and unbalanced 1/4 inch JACK.
2. TONE/INTERNAL MIC SWITCH selects source sent to XLRs and unbalanced 1/4" JACK.
3. PIN 2 and PIN 3 LEDES sense phantom or intercom power presence. ON LED indicates either source or speaker side is turned on.
4. VOLUME CONTROL adjusts the signal level to either the headphones or the speaker.
5. STEREO PHONES JACK allows the use of stereo or mono headphones and disconnects the speaker.

(NOT SHOWN) XLR JACKS are parallel wired and located on the front of the unit with 1/4" Tip Sleeve JACK wired to PIN 2 and PIN 1.

CHANGING THE JUMPER

To change the JUMPER you will first need to remove the four screws and the rear panel. The JUMPER is located in the front left corner near the face plate. Lift straight up on it to change positions, taking care not to bend the pins. When reassembling, make sure that the speaker lies flat beside the two built in STANDOFFS on the rear panel to prevent puncturing of the speaker cone. Also, speaker CONTACTS need to be resting on top of the INSULATING FOAM covering the back of the circuit board.

