



Vancura Innovations Co.

Imagination is more important than knowledge ... until you have to build what you've imagined.

QT100A

Quad Tone Generator And Channel Marker

QT100A User Manual

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It is presumed that the reader of this manual is familiar with PC computers and knows how to use the Windows operating system that will be running this software. The administrator of this machine/software may be required to set up a network connection, install programs, move files, edit text files, and run programs. This set of programs may be used as stand-alone or in conjunction with external hardware. Setup may be used to assign ID numbers and network information.

The end operator should be able to read numbers and simple text. The operator may need to understand how to use a touch screen without damaging it.

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Product Description

The QT100A Quad Tone Generator and Channel Marker provides outputs for four channels of audio and has a distinct marker chirp on each channel for identifying and tracing the channel.

The QT100A front panel allows the operator to:

- 1) Select one of three frequencies, Default: 250, 400, and 1000 Hz
- 2) Select one of three amplitudes, Default: 0, 4, and 8 dBu
- 3) Turn channel makers ON or OFF,
- 4) Turn the tone ON or OFF
- 5) Select INTERNAL or EXTERNAL tone source,
- 6) Connect an EXTERNAL audio source through a standard XLR female connector
- 7) Turn QT100 ON/OFF
- 8) Connect to a PC support program through a **Universal Serial Bus (USB)** connection

The QT100A back panel has:

- 1) Four standard XLR male connectors for connection to your audio system, and
- 2) A power jack for 12VDC or 9VAC to 12VAC @ 200ma.

The channel marker mode injects a distinct no-tone chirp on each of the channels. Channel one has a single chirp, channel two has two chirps, channel three has three chirps, and channel four has four chirps. All four channels chirp in tandem, that is, the first chirp is heard on all four channels; the second chirp is heard on channels 2, 3, and 4; the third chirp is heard on channels 3, and 4; and the fourth is heard only on channel 4.

Optional software:

The optional PC based support program allows the operator several additional functions. The support program will allow:

- 1) Complete computer remote operation of the QT100A.
- 2) Selection of one of five preset frequencies, Default: 125, 250, 400, 1000, 2000 Hz
- 3) Selection of one of five preset Amplitudes. Default: -10, 0, 2, 4, and 8 dBu
- 4) Calibrate/change any of the preset frequencies. Range: 0.715 Hz to 7.8 KHz
- 5) Calibrate/change any of the preset amplitudes. Range: - 32 dBu to 8 dBu in 99 steps
- 6) Modify the front panel switch preset frequencies and amplitudes.
- 7) Modify the marker repeat rate from 0.067 to 16.8 seconds.
- 8) Modify the marker chirp size and spacing from 0.033 to 8.3 seconds.
- 9) Restore factory default settings or last saved calibration settings.
- 10) Save any changes/calibrations so that the QT100A can be operated with the new default settings without the support program.

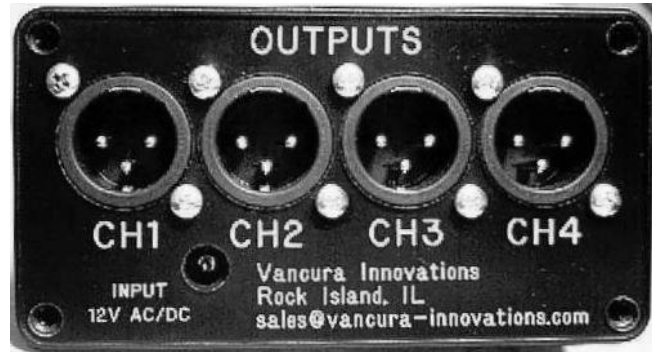
Optional hardware:

To use the optional software, a USB-A to USB-B cable is needed to connect between the computer and the QT100A. This is not normally supplied with either the QT100 or the Optional Software. This cable is fairly standard and can be purchased from a variety of electronics and office supply stores. It may also be purchased directly from Vancura Innovations for \$9.99 plus shipping.

Operation of the QT100A Hardware

The QT100A was designed with simplicity in mind.

- 1) Attach the power adapter to the back of the unit. Plug the adapter into a suitable power source.
- 2) Connect the four outputs to the appropriate inputs on your audio equipment.
- 3) If an external tone source is desired, connect the external source to the front of the unit.
- 4) Turn ON the unit and verify that the Power LED is illuminated.
- 5) Initial Setup:
 - a. Set the **SOURCE** switch to INT.
 - b. Set the **HZ** (FREQUENCY) switch to 400 Hz.
 - c. Set the **dBu** (AMPLITUDE) switch to 4 dBu.
 - d. Set **MODE** to MARK.



At this time, there should be a 4 dBu (0-VU) 400 Hz tone on each of the four channels and the tones should have an identifying chip on each of the channels that repeats every five seconds.

- 6) The **MODE** switch:
 - a. Set the **MODE** switch to MARK. Note that the MARK LED (Light Emitting Diode) should blink four short blips and repeat every five seconds in sync with the marker chirps.
 - b. Set the **MODE** switch to TONE. Note that the MARK LED should remain OFF.
 - c. Set the **MODE** switch to OFF. Note that the tone should OFF and the MARK LED should remain on continuously.
- 7) The **HZ** (FREQUENCY) switch:
 - a. Select a different frequency and note that the tone has changed to the indicated frequency.
- 8) The **dBu** (AMPLITUDE) switch:
 - a. Select a different amplitude setting and note that the tone has changed to the indicated amplitude.
- 9) The **SOURCE** switch:
 - a. With the **SOURCE** switch set to INT, the internal signal source will be directed to the outputs.
 - b. With the **SOURCE** switch set to EXT, the signal supplied to the front panel EXTERNAL INPUT jack will be directed to the outputs.

Note: The **HZ** switch does not affect the EXTERNAL input signal. The **MODE** and **dBu** settings will affect the external input signal. Always set the **dBu** switch to 8 dBu when using an external input.

Specifications

- **Input Current:** 200ma Maximum.
- **Input Voltage:** 12VDC or 9VAC to 12VAC 50/60Hz. Connector 2.1mm X 5.5mm X 11mm (inner x outer diameter x Length)
- **Input power adapter:** 120VAC converter to 12VDC @ 200 ma.
- **Temperature:** 0 deg C to 50 deg C (32 F to 125 F) non condensing
- **Size L X W X H:** 185mm x 107mm x 60mm (7.25in x 4.22in x 2.4in). Handsome black anodized aluminum box with yellow text that won't rub off.
- **Universal Serial Bus (USB) Interface:** Standard USB-B interface. For connection to PC and optional customizing program. Interface is USB 1.0 compliant
- **Audio:** Single audio tone from internal or external source sent to all four channels after passing through marker controller.
- **Tone:** Internal audio tone is created from a crystal controlled square wave filtered with an 8 pole Bessel digital filter sampled at 64 times the fundamental frequency. The third harmonic is attenuated more than 60 dB. Tone can be adjusted from 60 Hz to 7812 Hz.
- **Amplitude:** Maximum usable amplitude internal or external is 8 dBu. Internal amplitude digitally adjustable in 100 steps from 1.9456 volts (8 dBu) to 0 volts.
- **Marking:** Marking is 200ms Tone-OFF separated by 200ms Tone-ON repeated times the channel number. Sequence is repeated every five seconds. Customizing program can change this in 33 ms steps.

Theory of Operation

The QT-100 is a microprocessor-controlled device that operates from a 12 MHZ crystal and performs all of the control characteristics.

Tone frequency generation is accomplished by setting a timer in the processor to output a clock 128 times the desired frequency. The clock output is divided by 2 and then by 64 to generate a square wave at the desired tone frequency. Both frequencies (the fundamental and 64 X fundamental) are input to an 8 pole digital Bessel filter. The digital filter strips off all of the harmonics and outputs a 64-step sign wave. The amplitude of this tone is constant over the entire frequency range.

Amplitude control is accomplished by using a digital 100 position variable resistor. The resistor is set at maximum and the output is calibrated to 8 dBu. The other calibrated amplitudes are achieved by adjusting the resistor setting to the appropriate value for the selected amplitude.

Tone marking timing is accomplished by setting a second timer for each of the intervals. The actual chirp is the result of setting the digital amplitude resistor to zero at the appropriate times.

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