

Advanced Repeater Systems Serial Port EchoLink® Adapter Kit Installation and Operation Instructions

Overview

The Advanced Repeater Systems Serial Port EchoLink® Adapter Kit provides the computer to radio interface required for EchoLink. The Adapter contains an open collector, pull-to-ground, Push-to-Talk (PTT) circuit and a current limited, resistor divider, Carrier Operated Switch (COS) circuit. A red LED indicates an active PTT from the computer and a green LED indicates a high COS from the radio. On certain versions that use a computer serial port that provides a true -15V when PTT is inactive, a blue power LED alternates with PTT (most USB to serial port converters do not provide -15V and the LED is replaced by a 1N4148 diode). EchoLink receive and transmit audio is via the computer's soundcard; adjustable with potentiometers on the Adapter.

Because of the diversity of installations, the Adapter does not include computer sound card cables or the wiring to the repeater. The Adapter can be ordered with a four conductor, 3.5mm jack and radio interface cable and hardwired to the radio or repeater. Installation requires soldering skills and electronics knowledge.

If receiver COS is not available, you can select the receiver VOX feature in the EchoLink software. Receive audio must be de-emphasized and should be gated by the radio squelch and/or a CTCSS decoder.

The Adapter can be interfaced to almost any portable radio from Kenwood, Icom, Yaesu, and Alinco, among many others, via the speaker/microphone connector. Some portable radios combine Tx key with Tx audio which requires the installation of R38; a 2.2K resistor for Yaesu radios and a 4.7K resistor with Icom and Alinco. Others radios may require different values; refer to your radio's operation manual.

The Adapter can be used as a standalone EchoLink station on a simplex channel, as a half duplex EchoLink link to a repeater, or full-duplex hardwired to a repeater. If used as a link to a repeater, EchoLink prefers that the repeater be modified to pass a user's CTCSS tone or transmit an encoded CTCSS tone when a user is on the input and have the link radio in CTCSS tone decode to prevent the repeater hang time and identification from being broadcast over the EchoLink network.

Operation

Receiver audio is applied to the Adapter where it is AC-coupled via a 0.1uF capacitor and level adjusted with a 10K potentiometer to the computer soundcard microphone input where the EchoLink software passes the audio to the EchoLink network. EchoLink allows either an active high or low COS on the CTS serial port input. If no COS is available and you have squelched receiver audio, you can select the EchoLink VOX option.

When a signal originates from the EchoLink network, the serial port RTS signal goes from a low to high state which lights the red LED and keys the transmitter. The transmit audio is passed from the computer's speaker output to the Adapter through a 1K level adjustment potentiometer and a 0.1uF coupling capacitor to the transmitter. You must have EchoLink software running on your computer and be registered with EchoLink as a Sysop with either a -L (for link) or -R (for repeater) suffix after your Callsign (i.e. W4ABC-R).

Ground Loop Hum, Isolation and Single Point Ground Systems

The Adapter utilizes a common ground design for use in a Single Point Ground System (SPGS) which is the safest and most effective ground and equipment protection method for radio and repeater systems. A SPGS requires all equipment grounds to be tied to a single common point. Some computer to radio interface devices solve ground-loop audio hum by isolating grounds with transformers and optic isolators which is unnecessary with a properly designed and installed SPGS. If you are experiencing ground-loop hum, you likely have a ground-loop. Reverse the computer and/or radio power plug polarity or use a 3 to 2 prong adapter to open the ground loop between the equipment. Multiple equipment ground returns, through audio cables, power supplies and even antenna systems, are often the cause of ground-loop related audio hum and lightning related equipment damage.

Installation

1. Solder computer speaker and microphone cables to the labeled pads on the Adapter board.
2. Identify the radio or repeater connection points: PTT; COS (if used, active high or low); Tx Audio; Rx Audio (squelched and de-emphasized) and ground.
3. Solder interface wires from the radio to the points labeled on the Adapter (and schematic).
4. Plug the Adapter into your computer serial port. If directly connecting the computer serial port, you may have to remove the Adapter's DB-9 connector hood (by removing the 2 nuts).
5. Load and Run the EchoLink software.
6. Using a RF link or repeater requires the user to register as a Sysop found under Tools, Set-up, My Station tabs. Your Sysop Callsign is followed with a -L or -R and must be validated by EchoLink.
7. Under Tools, Set-up, Audio, set your computer soundcard as the Input and Output Device.
8. Under Tools, Sysop RX Ctrl, select CTS (check Invert Sense for active low COS)
9. Under the TX Ctrl, select RTS.
10. Set the computer's speaker output level to mid-high level to maximize signal to noise (the transmit level is set by Tx level potentiometer on the Adapter).
11. Verify that a test radio communicates with the Echolink radio or repeater.
12. Initially set the Adapter potentiometers to mid position (default).
13. Under the Station tab, connect to the Test Server. Verify that the Tx Key Red LED is lit, the transmitter is keyed, and that the test announcer's voice is clear and of nominal level.
14. If the audio sounds over driven and distorted, or low in level, adjust Tx Level on the Adapter for a clear yet sufficient transmit level of the EchoLink announcement voice.
15. Key and speak into the test radio, and adjust the Adapter Rx Level using the EchoLink Audio Adjustment Bar on the computer. Loud audio peaks should just enter the yellow.
16. Verify clear and undistorted audio on playback, if necessary fine tune the audio levels on the Adapter, in the computer Sounds file and on the radio or repeater.
17. Disconnect from the Test Server.
18. Secure the Adapter and wiring.
19. Installation complete.

Troubleshooting

It is always best to dedicate a computer for EchoLink to avoid audio routing problems with your computer's default audio settings and conflicts with other audio related programs. For example, running Skype or a MP3 player may cause the EchoLink audio to route to a different port.

If your Adapter fails to either have Receive or Transmit Audio, the problem is likely with the Computer's Audio Settings found in "Sounds" file under the Control Panel. Make sure your audio device is listed in the Sounds file and that both Transmit and Receive Levels are up (sometimes they may be set to zero).

If the receive audio is being fed to the transmitter; this may be caused by the computer's audio mixer setting feeding the microphone input (which is the receiver audio) directly back to the speaker output (which is the transmitter audio). This setting is used to generate sidetone audio so the user can hear his/her voice when using a headset for applications such as Skype. For EchoLink set the microphone to speaker level to zero.

Computers often default to the internal speakers and microphone on power up which may cause EchoLink audio to be routed to these devices. If this happens you should consider changing the default audio device to the EchoLink soundcard or disabling the internal speaker and microphone.