K8JHR Headset-Transceiver Adapter Box

OBJECTIVE: Build an adapter to connect a computer gaming headset, and PTT switch, to my HF transceiver. I will attenuate the typical 8-10 v bias voltage supplied by the radio, to approximately 5 volts, consistent with a typical computer sound card. I will include a 2-resistor, 10 dB attenuator pad (L-network voltage divider) to to reduce the microphone's signal strength.

DESCRIPTION: The adapter is constructed in a plastic project box which can be anchored to the station work surface or under a shelf to keep it from wandering about. It connects to the transceiver microphone jack with a 5-wire cable terminated with an 8-pin Foster plug. Two wires carry microphone audio, and bias voltage, respectively. Two other wires form the PTT circuit. Shield is Mic Ground. The individual electrical components are mounted on a small printed circuit board. A separate patch cable carries headphone audio.

There is an in-line resistor to attenuate bias voltage from approximately 8-10 v DC to approximately 5 v DC. There is a 10 dB (+/-) 2-resistor, L-network, attenuator pad (voltage divider) to reduce the electret condenser microphone's signal strength. There are three, 3.5 mm phone jacks to connect microphone, headphones, and PTT switch, respectively.

PARTS LIST		
Part:	Quantity	Description
3.5 mm phone jack	4	3.5 mm (1/8") 3-conductor stereo (TRS) phone jacks, Radio Shack Part 274—249, two (2) jacks per package
R1	2	2.2k Ohm Resistor,, Radio Shack Part No. 271-1325
R2	1	470 Ohm Resistor, Radio Shack Part No. 271-1317
R3	1	220 Ohm Resistor, Radio Shack Part No. 271-1313
C1	1	4.7 uf Electrolytic Capacitor, Radio Shack Part No. 272-1024
Board	1	Printed Circuit Board, Radio Shack Part No. 276-148 (One half of one dual board)
Box	1	Plastic project box, (4" x 2" x 1") Radio Shack Part No 270-1802
Cable	1	MFJ-5082 Cable, 8-Pin round microphone connector, unterminated far end
Wire	3	Various lengths of 3-color, 22 gauge stranded insulated hook up wire

Audio Signal Attenuation: Computer gaming headsets can work well with ham radio transceivers. The earphone receivers are typically low impedance (30-60 ohms +/-) and are a good match to the rig's headphone output. In contrast, some audiophile and studio grade headphones have much higher impedance earphone speakers, which necessitates the use of a head phone amp. The original plan called for R2, 415 Ohm, and R3, 270 Ohm, resistors, but the local Radio Shack only carries the above-listed close substitute resistors in stock. These should work fine, but your mileage may vary.

Recent ICOM transceivers are usually designed or set up for electret condenser capsules, but a dynamic type microphone is the default for most other transceivers. Gaming headsets typically have electret condenser capsules, which produce a substantially stronger signal compared with dynamic microphone cartridges. Because gaming headset capsules are usually rated "impedance equal to load," mic impedance is rarely an issue. Unfortunately, electret capsules are so "hot" they crowd the rig's AGC or ALC (auto input level control) – and in come case, the mic is fully loud, and the ALC or AGC circuit is on full time, with a mic gain setting as low as just 2 or 3 percent, giving the AGC or ALC circuit very little room to work in. Often, it is either on or off, full time, instead of coming on only upon voice peaks as it should. An inline 10 dB attenuator pad can solve this problem, and allows the operator to set the radio's mic gain much higher, perhaps as high as 40 to 50 percent, within the range of a typical dynamic microphone, giving the AGC or ALC circuit sufficient head room to operate normally.

Bias Voltage Attenuation: Most transceivers produce 8-10 v DC bias voltage on one pin of a 8-pin round Foster jack, or on one conductor of an RJ45 / 8P8C-45 jack. Computer gaming headsets are usually designed for the 2.5v to 5v bias voltage found on industry standard internal computer sound cards. Occasionally, the cable is terminated with a 2-pole 3.5 mm phone plug., such that the bias voltage is placed on the tip of a two-pole TS

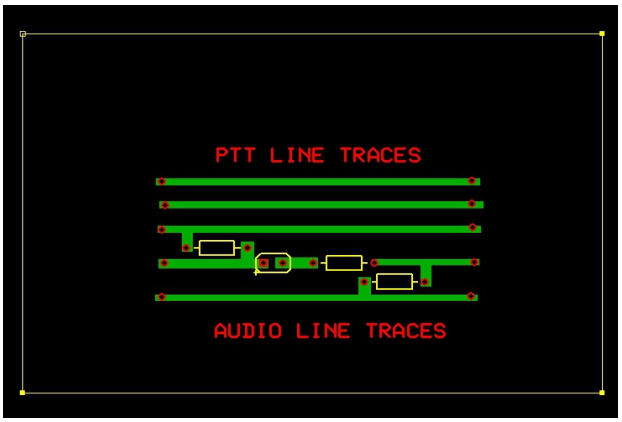
(phone) jack, but most often bias voltage is applied to the ring of a three-pole TRS jack. You can put the bias voltage on either the ring or tip of the plug. The two lines will eventually be merged in or before the mic capsule. The schematic drawings show variations. You pick the one that suits your mic or your personal predilections.

After extensive experience testing and reviewing headsets for use with speech recognition software, I conclude gaming headsets work better with lower bias voltage. Higher voltage increases sensitivity, and adversely alters the microphone's dynamic range. An in-line resistor reduces bias voltage to approximately 5v. One could use a voltage divider comprised of two or more resistors in a L, U, T network or more precise reduction, but I figure a single resistor is sufficient. You be the Judge.

A capacitor is placed in-line between the point where bias voltage is applied, and the transceiver's microphone input jack to prevent bias voltage current from mixing with the radio's audio circuit. Many radios already have a capacitor in the audio input circuit, so this capacitor may be redundant. I use one, just in case.

I hope this helps others match their computer gaming headset to their HF transceiver. Good luck. No warrant of any kind is expressed or implied herein. Each radio owner must determine whether or not the date and circuits presented or described herein are correct or appropriate for any use or application.

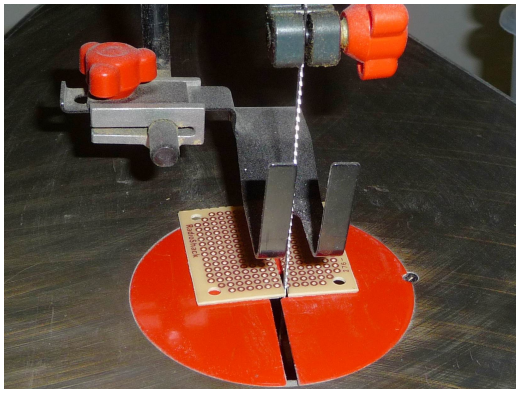
PARTS LAYOUT AND TRACE DIAGRAM



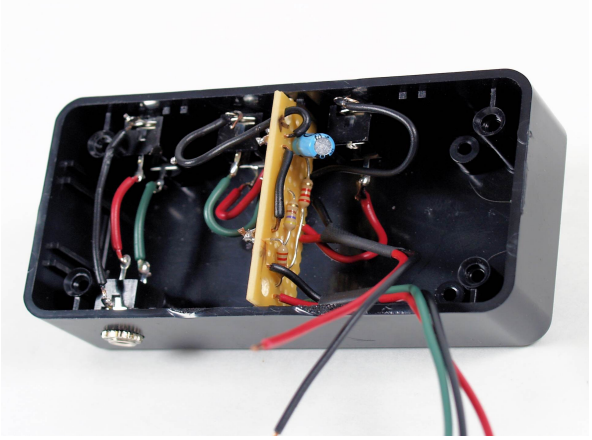
FINISHED PROJECT INSTALLED

PHOTOS OF COMPLETED PROJECT:

Most of the parts.



Cutting the board to size.



Project Box Interior.

Finished project.

SCHEMATIC CIRCUIT DRAWING: