Ham 37 – CI-V MOD Control & Audio Hub

Dr. Marc & Rosemary © 220511

1. The CI-V manual or data (MOD) control & audio hub is for radios without a sound card and data ports.
   a. Remote computer operation of a ham radio is often highly desirable.
   b. This is the simplest, passive design compiled from myriad sources.
   c. Commercial interfaces are available, but they tend to be expensive bloatware.
   d. Homebrew solutions are across the web. Many are based on poor information.
   e. The objective is to avoid opening the radio or modifying any circuit boards.

2. The radio is really just a computer with RF in/out, audio in/out, and control in/out.
   a. Control is digital via USB to RS232 serial cable operating at 3.3 V levels.
   b. Audio is analog via speaker-out and mic-in.
   c. The computer and the radio audio inputs are for electret mics.
   d. So, the connector has about 5 - 8 Vdc voltage applied.
   e. A small radial disk capacitor must isolate the DC from the hub.
   f. The capacitor must be large enough to not filter voice bass. (~1µFd).

3. Fortunately, since 1990, many rigs have a common interface called CI-V.
   a. The interface allows normal programming of memory by software like Chirp.
   b. The same cable and connector can provide control, including PTT.
   c. Icom developed CI-V but many other manufacturers adopted parts of it.

4. The diagram shows a connection hub between the computer and radio.
   a. The diagram shows all jacks with capacitors and resistor matching network.
   b. Jacks are 3.5mm, but (1) 2.5mm with (1) RJ45 & (1) RJ14 to radio mics.
   c. For 'K-head' connector, space 12 mm center from the 2.5mm {8} to 3.5mm.{6}
   d. The top pin represents the ring, the middle is sleeve, the bottom is tip.

5. The CI-V from Icom is a stereo, 3-conductor, 3.5 mm plug. {4}
   a. The hub splits the digital-control and the audio-out.

6. CI-V control is the same stereo, 3-conductor, 3.5 mm jack. {5}
   a. Connect to an USB adapter with FTDI FT232RL chip.
   b. This is the same cable used for programming memory.

7. Connect radio speaker-out through a network to computer audio-in. {3}

8. Connect the computer audio-output {1} through a network to the radio-mic.
   a. For Icom, a jumper must connect from mic Earth [E] to PTT [P].
   b. When P line = 0, then PTT is active low and mic is grounded.
   c. The connector varies with rigs, but can easily be adapted from the RJ-45/14.

9. The computer audio may derive from a USB to audio adapter if needed.

10. If PTT is not available from CI-V, connect the I/O pin from Raspi. {7}
    a. A current limiting resistor of 330 Ω protects the computer from shorting.
    b. A controlled USB 232 can use TxD or Rst depending on software.

11. Several pads for soldering jumper wires are available along the board edge.
    a. JP2: V=Vdc, C=[], T=Txd, P=PTT, E=Mic e, G=gnd.
    b. JP1: P=PTT to E= Mic e by RJ45 to mic on radio.

12. Few parts are needed besides connectors.
    a. *Capacitors:* radial, ceramic disk: (2) 1 µFd, 15 Vdc.
    b. *Resistors:* 1/8-watt axial: (2) 10 Ω, (2) 787 Ω, (2) 330 Ω.
   c. R1tip= R3tip= 787, R1gnd= R3gnd= 10, R7tip = R7ring= 330 Ω.

13. Radio options are Icom on 2 & 4, Yaesu on 9 & 4, Baofeng 'K-head' on 6 & 8.

14. Appropriate software is necessary to control the PTT, and to route the audio in the computer through the serial ports. A test configuration is on the next page.

15. This info reasonably configures radios to connect with EchoLink, AllStar, or a stand-alone control.

16. Create a circuit board for the connectors.
    a. Use larger spacing so less experienced users can solder the components.
    b. Make fit perhaps Raspberry Pi size or slimmer: 82mm x 56mm.

Life is good. Enjoy.
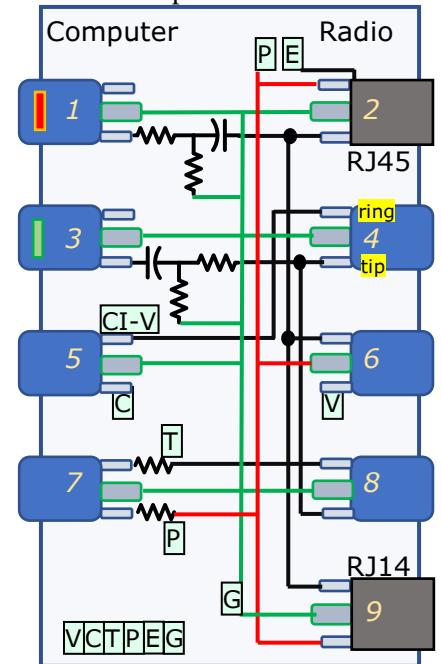
Bottom of board is ground plane.

$105 = 10\ pF * 10^5$
$105 = 1\ µF$

#	Connector	To
1	3 pin stereo 3.5mm	Comp spkr
2	RJ 45	Icom mic
3	3 pin stereo 3.5mm	Comp mic
4	3 pin stereo 3.5mm	Icom spkr2
5	3 pin stereo 3.5mm	FTDI CI-V
6	3 pin stereo 3.5mm	BF mic
7	3 pin stereo 3.5mm	Raspi PTT
8	3 pin stereo 2.5mm	BF spkr
9	RJ 14	Yaesu mic

#	Tip	Ring	Sleeve
1	Comp spkr		gnd [G]
2	RJ 45	See box	
3	Comp mic		gnd [G]
4	Ic spkr2	CI-V	gnd [G]
5	[C]	CI-V /FTDI	gnd [G]
6	8Vdc[V] /BF	mic+	mic-/PTT/Rx
7	resistor PTT	resistor Txd	gnd [G]
8	spkr+ /BF	Txd [T]	gnd [G]
9	RJ 14	See box	

#	Device	Vend	
6	3.5 stereo	Kycon	STX-3120-3
1	2.5 stereo	Kycon	STX-2000-3
1	RJ 45, 8P	Kycon	GMX-S-88
1	RJ 14, 6P	Kycon	GMX-S-66
2	1 µFd, 15 V	disk	Radial 105

or GDLX, GLX, GSX

Front panel view

8 7 6 5 4 3 2 1   6 5 4 3 2 1

RJ-45 Pins
4: *PTT* [P]
5: *Mic e* [E]
6: *Mic*
7: *Gnd* [G]

RJ-14 Pins
1: *PTT* [P]
2: *Mic*
3: *Gnd* [G]