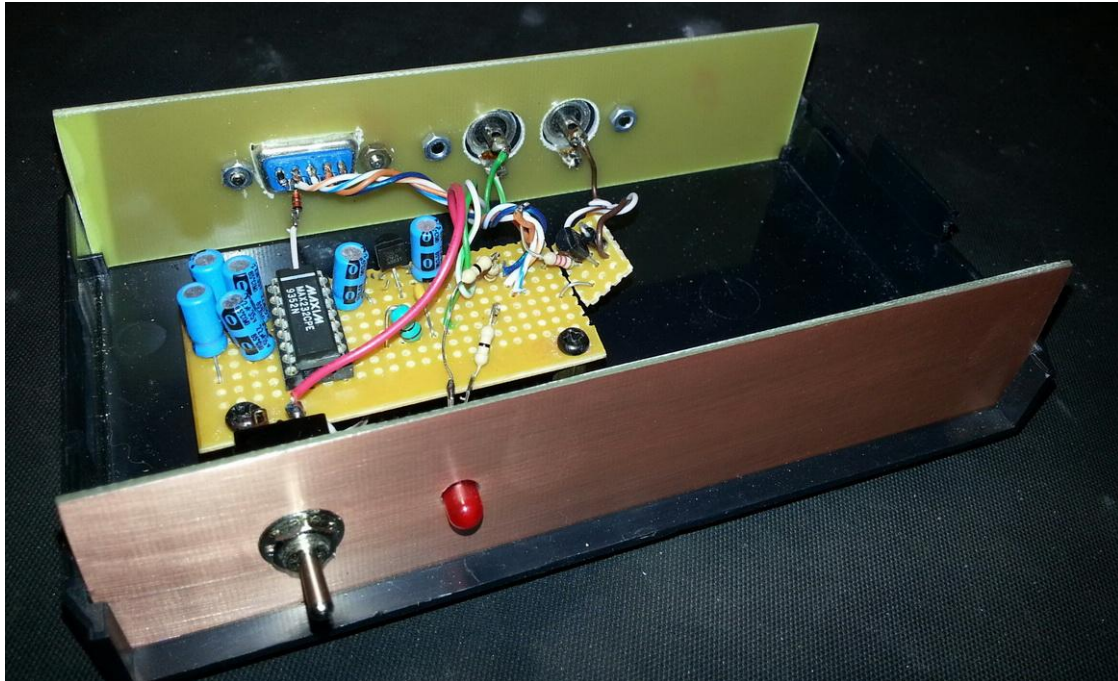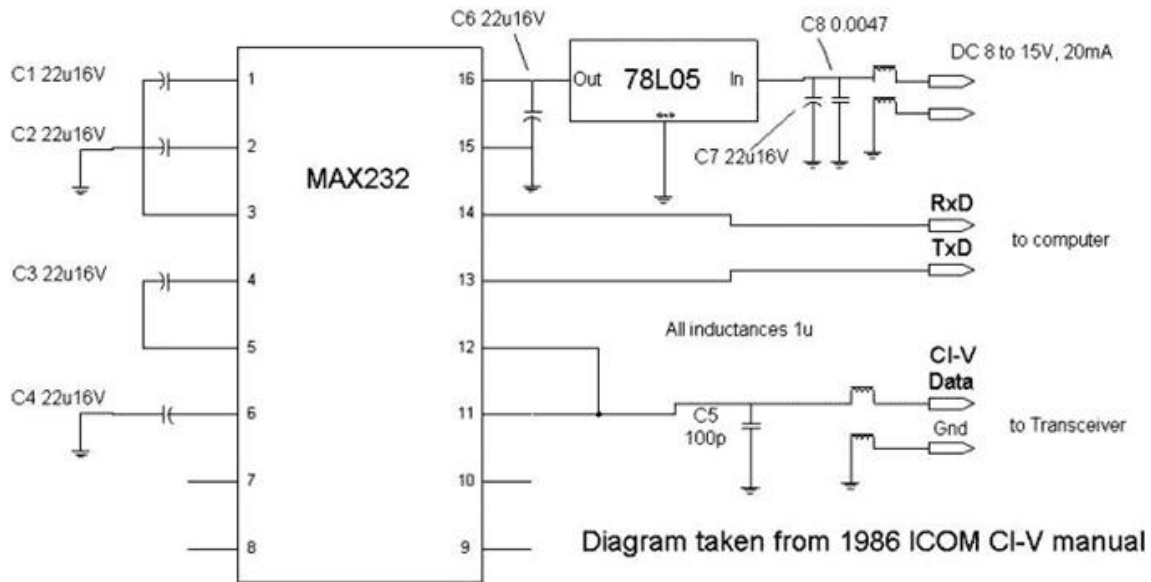# Amateur Radio CAT Control

By Kevin Mc Donald ZS6KMD

Most radios from the mid to late '80's and all new radios have the capability to connect via a serial port (RS232) to a computer for either programming or computer aided tuning. For contesting this is a huge benefit as software applications such as Ham Radio Deluxe allow for the immediate log book completion and submission as it "grabs" the frequency, mode, your details, time, etc based on the current operating setup at that time. This speeds up the whole process and there is no longer a need to manually copy everything down in a paper based log. Additionally CAT interfaces allow for further exploration of digital modes on some radios.

Not all CAT interfaces are equal. Some only provide the computer aided tuning, some provide the ability to control the RX/TX of the radio, and some even provide the ability to record and playback audio and full digital mode operation.

What we will be looking at here is a simple interface that allows you to connect your RS232 capable radio to your computer, use a suitable software product and control the tuning via the computer. Where possible, I have tried to include the RX/TX capability, but not having a plethora of brands and models at my disposal, I have had to rely on web research to cater for these capabilities for Yeasu and Kenwood, they are documented but untested.

Icom CAT Interface

Icom uses a simple two wire RX/TX interface on their radios. This makes for a very simple interface to connect the radio and computer. There are many transistor based circuits available on the web, but I settled for a tried and trusted RS232 solution I have used many times; The MAX232 chip. The circuit below can be built on a piece of vero board and popped into a suitable project box or even hidden inside the cover of the radio providing there is suitable space available.

C1 22u16V C2 22u16V C6 22u16V C8 0.0047 DC 8 to 15V, 20mA

MAX232

78L05

C3 22u16V C4 22u16V C7 22u16V

All inductances 1u

RxD
TxD to computer

CI-V
Data

C5
100p

Gnd to Transceiver

Diagram taken from 1986 ICOM CI-V manual

The RX/TX on my setup uses pin7 (RTS) on the 9 pin serial connector for TX. To interface this to the Icom I had to make use of the accessory socket in addition to the two pin serial data connection. The CAT circuit is also powered via the +13.8V supply from the accessory socket. This means no need for batteries or power supplies. Refer to the technical spec on your radio to make sure you use the correct pins for this. On my Icom IC77 (IC707), the TX pin is pin 3 for TX and pin 7 for the +13.8v. The circuit uses a 78L05 voltage regulator and draws around 250mA so this will be safe. You will notice that there are filters placed in the TX/RX line as well as in the supply rail. This is to eliminate RF. The mini inductors are all 1uH and are as cheap as chips...

Below are the pinouts for a standard D Sub 9 so you can get the RX/TX pins right first time.

Serial port
D-SUB 9PIN
female
line side view

1 2 3 4 5
6 7 8 9
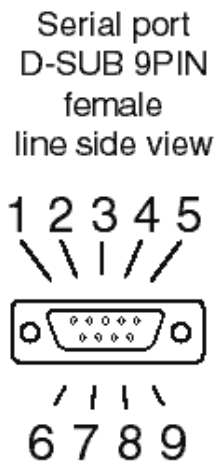
| Pin	direction	Description	
1.	In	Data Carrier detect	(DCD)
2.	In	Receive Date	(RXD)
3.	Out	Transmit Data	(TXD)
4.	Out	Data Terminal Ready	(DTR)
5.	GND	Signal Ground	(GND)
6.	In	Data Set Ready	(DSR)
7.	Out	Request To Send	(RTS)
8.	In	Clear To Send	(CTR)
9.	In	Ring Indicator	(RI)

THE ARRL HAND BOOK

Kenwood & Yeasu CAT Interface

Because the sending and receiving of serial data remains a constant, there should be no difference in how we build the interface for an Icom, a Yeasu or a Kenwood, however they use separate RX/TX lines to the radio. Hence a small modification to our original circuit diagram where we have pins 11 and 12 bridged on the Icom, we use these as direct inputs and outputs to the Yeasu and Kenwood Transceivers and include the RTS and CTS signals. I am not sure about the TX line for either the Kenwood or Yeasu as I don't have one to test on, however you can in some cases (I know Kenwood allows it) use the CW socket for keying. In that case you just add a plug with the ground to the sleeve and the keyed pin to the tip.

That is as simple as it gets...

With so many models of radios available, I am unable to provide all the pinouts for the various models, so you will need to refer to the manual for your respective radio to ensure that you connect the CAT interface to the correct port and pins. For the TS-50S Kenwood, there is a tiny hole at the bottom which provides access to a socket marked CN6. The pinouts for this are as follows.
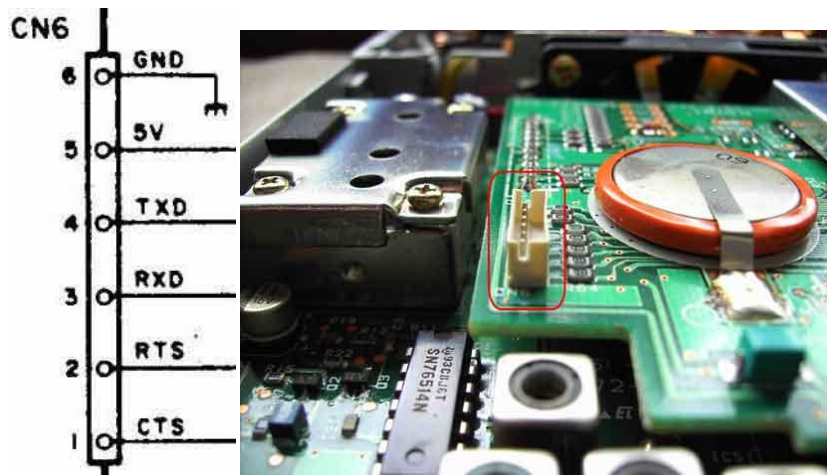
Power for the interface can be picked up from pin 5 on the Kenwood TS-50S, and for that matter on most of the accessory outlets.
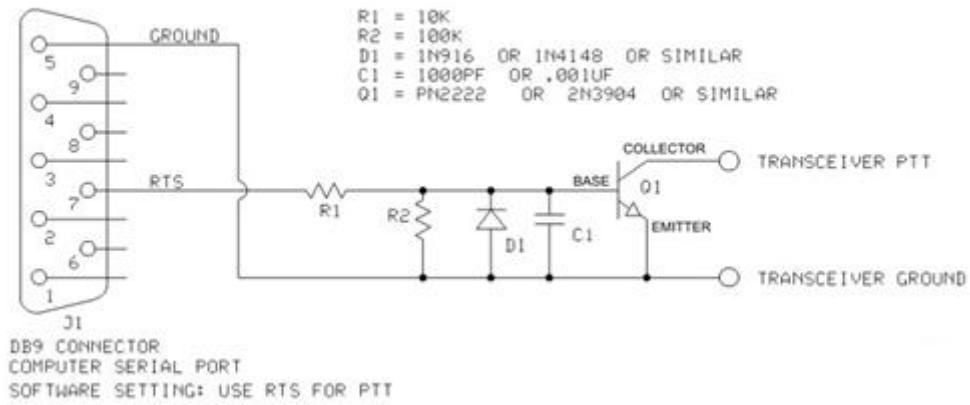
For the Yeasu FT 857 the rear panel provides direct access via the accessories socket as below
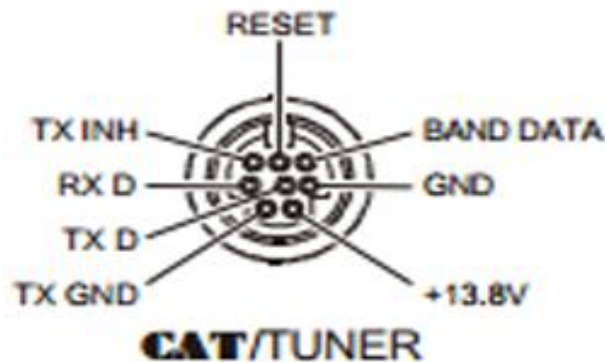
The only pins we are interested in here are the RX D, the TX D, the TX Gnd, the GND and the +13.8V. The same modifications to the diagram exist as per the Kenwood interface.

As I mentioned before, the PTT keying could be an issue with some radios, but there may be a workaround you would like to experiment with. Below is a simple keying circuit for RS232. I use a similar configuration in my interface and it works very well.

PTT TRANSISTOR CIRCUIT

```
R1 = 10K
R2 = 100K
D1 = 1N916  OR 1N4148  OR SIMILAR
C1 = 1000PF  OR .001UF
Q1 = PN2222  OR  2N3904  OR SIMILAR
```

GROUND

RTS

R1   R2   D1   C1

BASE   Q1
COLLECTOR → TRANSCEIVER PTT
EMITTER

→ TRANSCEIVER GROUND

J1
DB9 CONNECTOR
COMPUTER SERIAL PORT
SOFTWARE SETTING: USE RTS FOR PTT

That about covers the simple interface for computer control of your amateur radio. Below is a list of some of the more popular software including the link to where you can download from. Should you have a radio that is CAT capable that I have failed to mention, please drop me a mail at Kevin@zs6kmd.za.net and I will do my best to find a solution that fits your budget… (we all want freebies don't we). I will try and draw one specific to your radio to make it easier.

Ham Radio Deluxe: http://www.mannini.it/software/Ham-Radio-Deluxe-Download/setuphrd52438.exe

Commander: http://www.dxzone.com/dx4541/commander.html

Visual Radio: http://www.dxzone.com/dx3886/visualradio.html

TRX Manager: http://www.dxzone.com/dx1125/trx-manager-ham-radio-cat-software.html

Happy building and hope to catch you all on the air using your new CAT controlled radio.

73 de ZS6KMD