VE7YV - Homebrew UV-3R USB Programming Cable

The construction of the USB to TTL level Programming cable for the UV-3R consist of the components out of a cannibalized USB to Serial cable plus a MAX-232E Serial to TTL converter Integrated Circuit mounted on a grid style Printed Circuit Board. An USB to TTL level Programming cable is cannibalized to reduce parts count and to provide access to the 5VDC USB computer power supply for both the USB to Serial converter and the MAX232E chip. Details below are self explanatory.

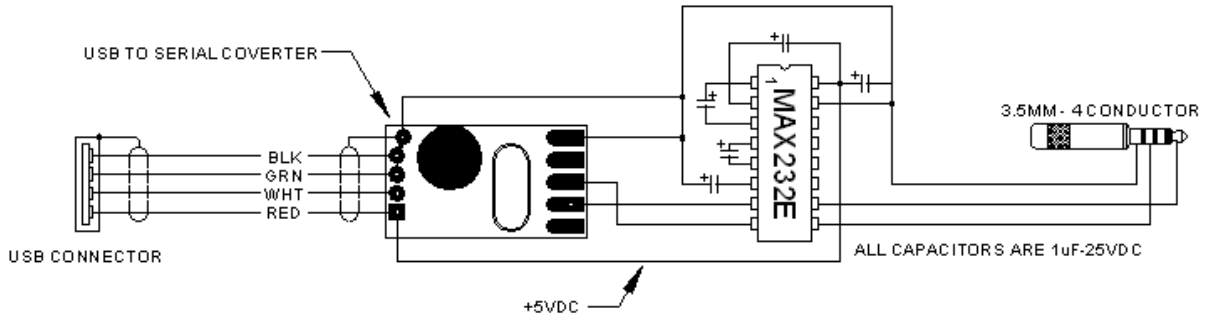


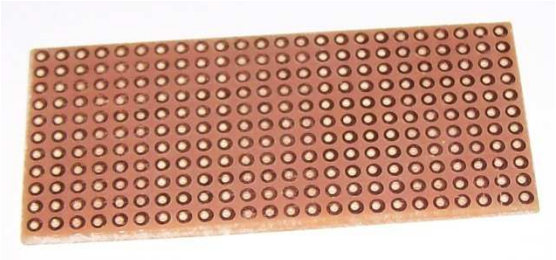
Figure 1 - Schematic Diagram

Qty	Part Number	Description	Notes
1	276-147	Grid-Style PC Prototype Printed Circuit Board	.1 inch grid spacing – Radio Shack or equivalent
1	MAX232E	Integrated Circuit	RS-232 to 5 Volt Level Converter
1	39-116-0	16 Pin IC Socket	Optional – Mode Electronics
1		USB to Serial Cable	
5	272-1434	1µF-25VDC	Tantalum Capacitor or equivalent
1		USB to Serial Cable	
1	35-4CON-LP		3.5mm TRRS 4 Conductor Low Profile All Metal Connector
A/R			3-conductor stranded wire – 24 gauge
12		Header Pins	.1 inch spacing
1	1551KTBU	Translucent Blue Plastic Enclosure	Hammond Manufacturing – 3.2”x1.6”x.8”
A/R		Solder	Kester 44 or equivalent
2		Tywraps™	Small, 4 inch long
1½”		Fiberglass tubing	Shrink tubing can be used in lieu of Fiberglass tubing
24”	24TC-01	24 gauge tinned bus wire	Consolidated or equivalent
A/R = As Required.			

Figure 2 – Parts List

There are three items in the parts list which need alteration before being used in the construction of the programming cable.

1. Drill a 3/16” diameter hole in each end of the blue plastic Hammond enclosure. The holes are centered on the short sides of the enclosure and approximately ¼ inch from the edge (which mates with the cover). See photographs.
2. Cut a piece of Grid-Style PC Printed Circuit Board, to 24 by 11 usable solder pads (holes). See Photograph 1. File or sand all four sides nice and smooth.



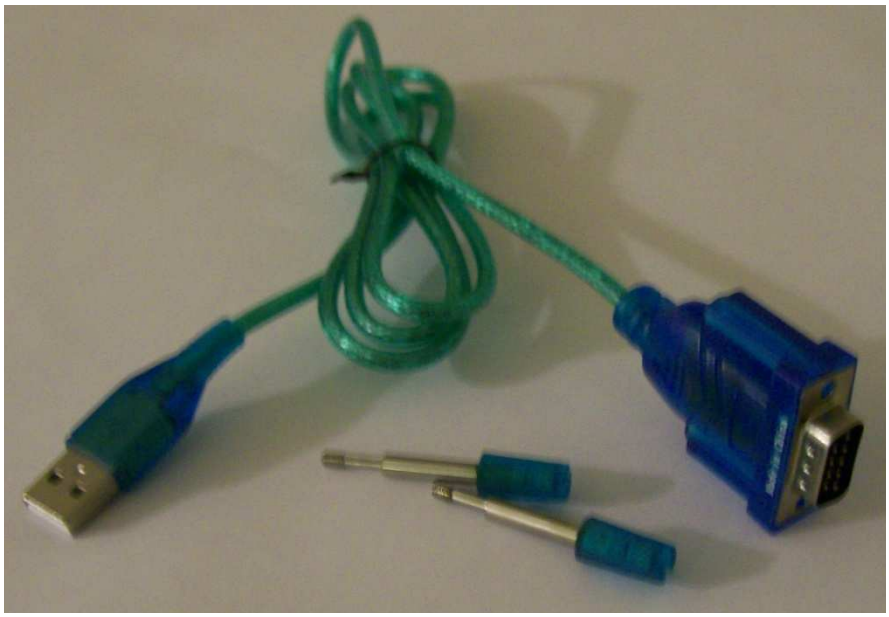
Photograph 1

3. Modify a USB to Serial cable as follows:

Photograph 2 – USB to Serial cable

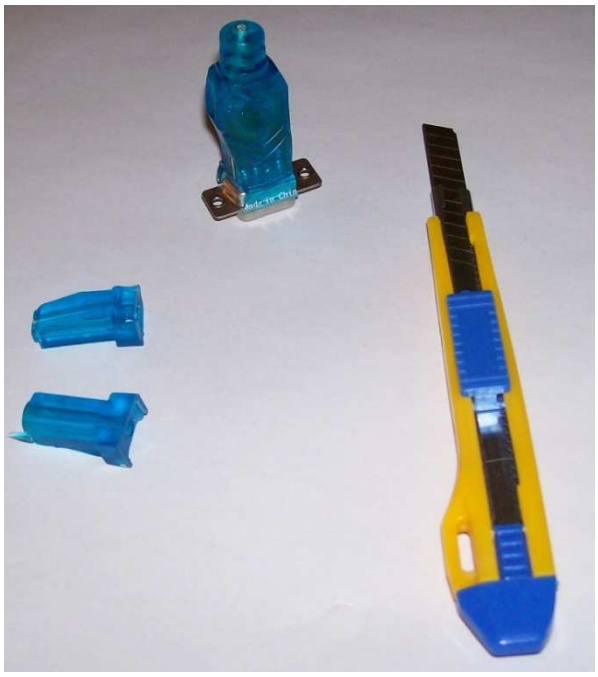
a) Remove the connector mounting hardware. Discard hardware. See Photograph 3.
b) Cut the cable at the 9-pin “D” connector. See Photograph 4.
c) Using a sharp blade, cut the plastic sides of the connector. See Photographs 5 & 6.

Note: Wear safety glasses and observe all necessary safety requirements for working with sharp blades.



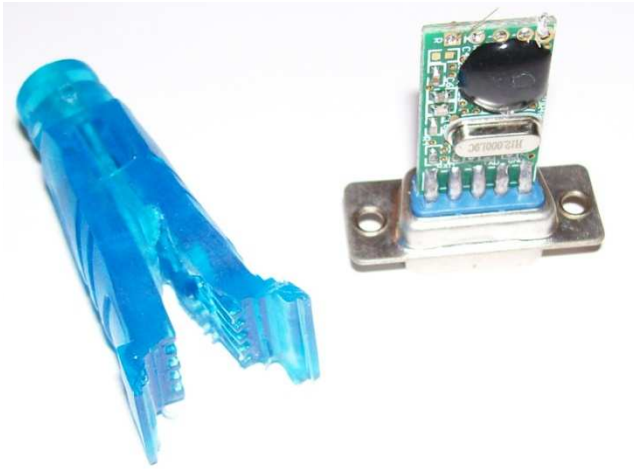
Photograph 3 – Remove mounting hardware.

Photograph 4 – Cut cable (retain cable with USB connector).



Photographs 5 & 6 – Cut off the plastic sides.

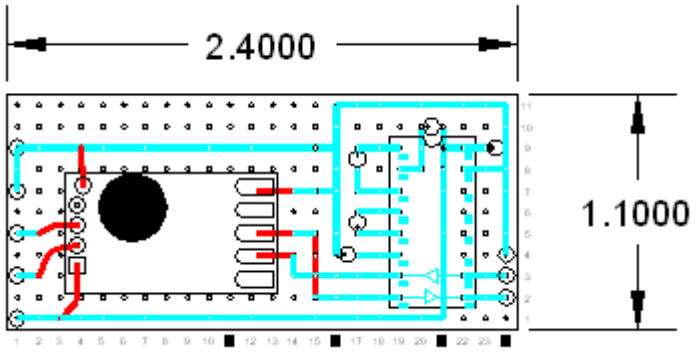
Photograph 7 – Pry the two sides apart.



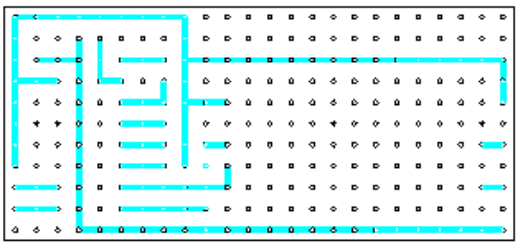
Photograph 8 – Pull plastic away from the PCB.

Photograph 9 – Remove 9 pin “D” connector and clean up PCB.

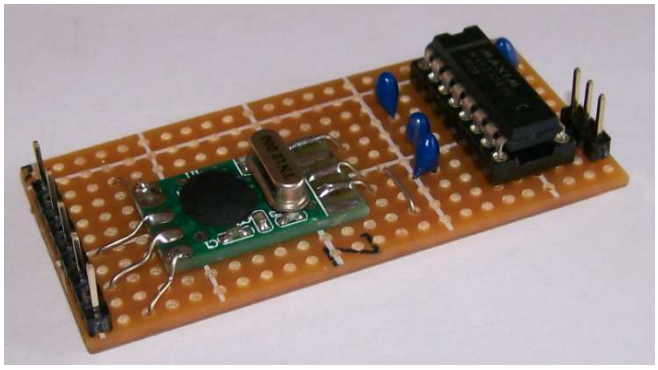
Board Assembly:



Parts Layout & Jumpers – Blue shows jumper on the solder side of the board. Red jumpers are located on the parts side. View is from the parts side. Observe capacitor polarities.

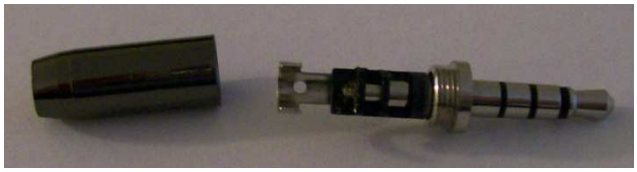


Solder side view.

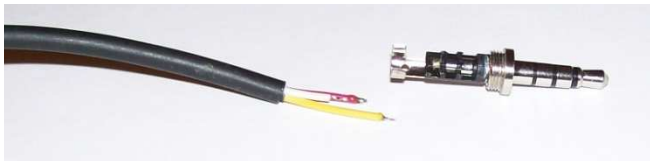


Completed Circuit Board.

Connector Assembly:



The four conductor Part Number 35-4CON-LP 3.5 millimeter diameter connector. This is the most difficult part to solder in the project.



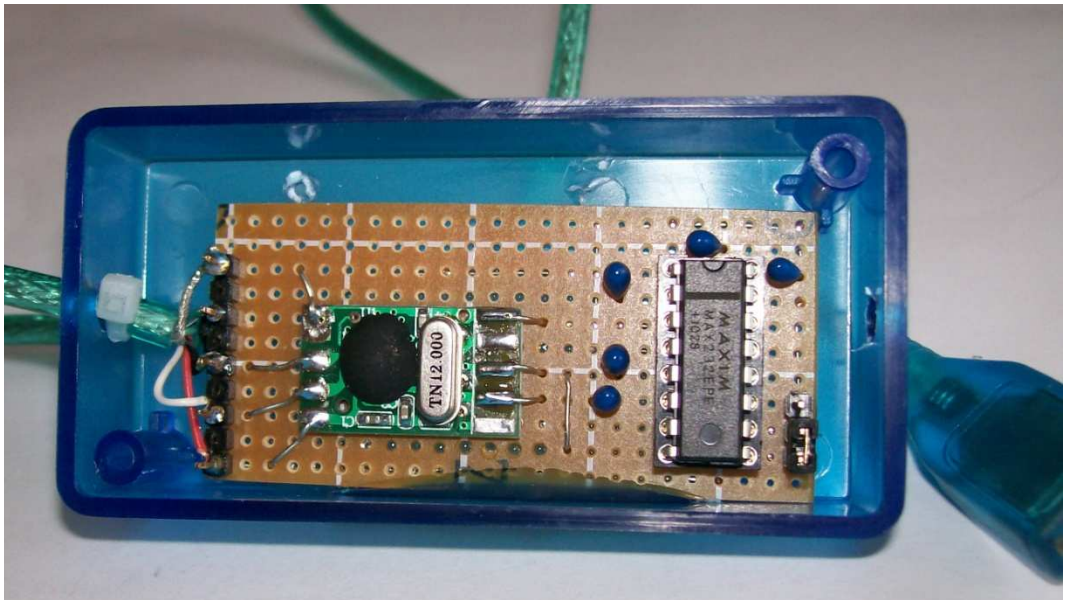
Measure, strip an tin the wires to match the solder contacts on the connector

Carefully solder the wires to the connector

Slide an approximately 1¼ inch piece of snug fitting fiberglass (or shrink) tubing over the soldered contacts.

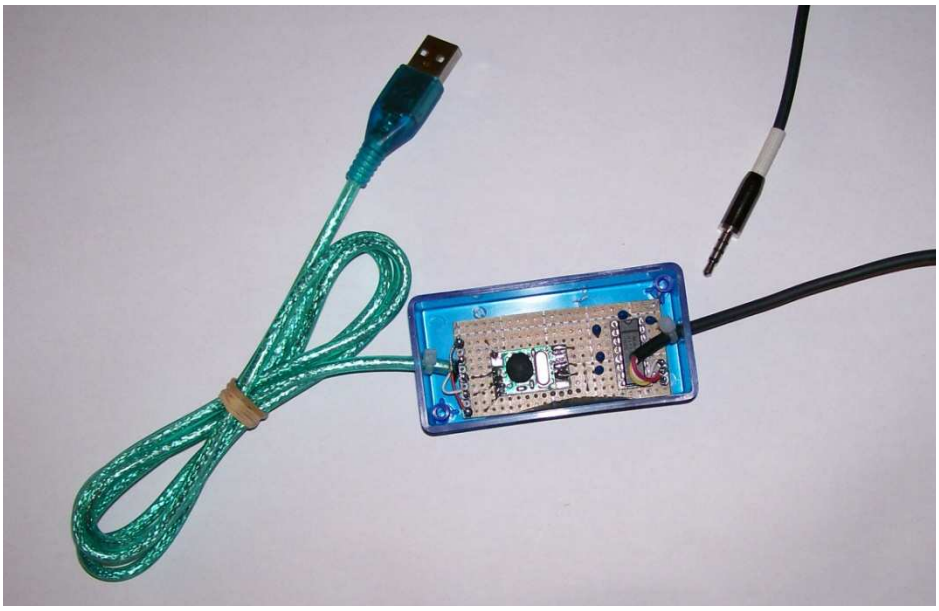
Install the connector barrel.
Note: the tubing extends beyond the barrel to prevent rubbing of the metal barrel against the wire where the wire exits the barrel.

Final Assembly:



Assembled board is glued in a Hammond P/N. 1551KTBU plastic enclosure. Wires are soldered to the header pins A temporary jumper is shown installed to allow loop back

testing of the assembly at this time (use “cabletest” program from KC8UNJ - http://www.kc8unj.com). Remove jumper after testing.



The finished programming cable (less cover).