CIVBT01

Bluetooth CAT interface for Icom transceivers
Version 1.0

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Contents

Introduction

This is a Bluetooth CAT interface compatible with CI-V interface. Can be used with several Icom transceivers. It was tested with IC-7000 and IC-7300 transceivers.

The power is taken from the 4-pin tuner connector. This interface is built using a single side PCB and SMD components (mainly 1206 size). Only the programming connector is mounted through holes on the top of the PCB. In fact, as this interface was designed in Eagle, the top site is the one used for the SMD components.

The final products look like in the following picture.
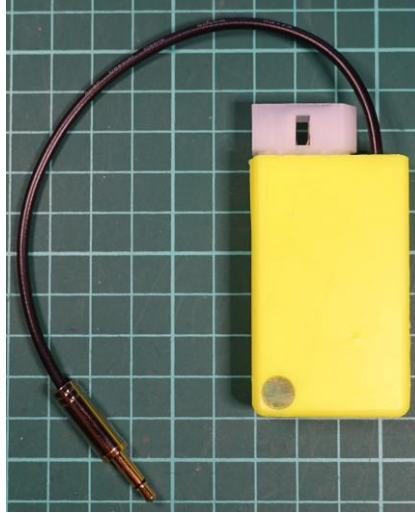

The schematic

CIVBT01 is based on a classic HC-06 Bluetooth slave mode only serial module. To combine Rx and Tx on a single line, a single diode is used (D5). To provide extra protection for the Rx and Tx pins of the module, R2, D2 and D4 are used.

Because the module consumption is only ~30mA, an AMS1117 linear stabilizer chip is enough to power it from the 12V supply available on the tuner connector, without heating. C1, C2 and L1 provides extra protection for RF over the power supply line.

In order to be able to program the module in-circuit, the same CI-V bus is used for programming too. Connector JP5 allows direct connection to an USB/serial module used for programming, without requiring extra wires.

The blue LED is used to display module status: fast blinking when in waiting for connection (or pairing) and full on when connected.
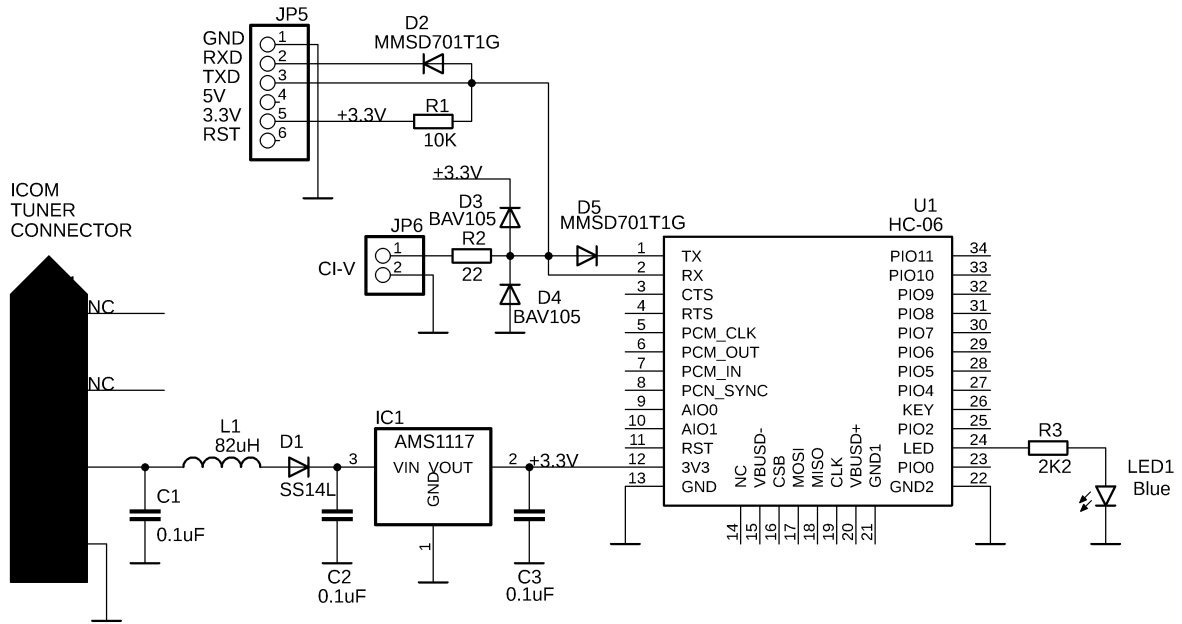
The 3.5mm audio jack is connected instead of JP6, through a 12cm piece of 3mm coax cable (ex. RG174).

The BOM

This is the complete list of parts (BOM):

Qty	Value	Package	Part	Description
1	MX-1490-P1			Icom tuner connector
1	PINHD-1X2_2.54	1X02	JP6	PIN HEADER 2 pins
1	PINHD-1X6_2.54	1X06	JP5	PIN HEADER 6 pins
3	0.1uF	1206	C1, C2, C3	SMD ceramic capacitor
1	10K	1206	R1	SMD resistor
1	22	1206	R2	SMD resistor
1	2K2	1206	R3	SMD resistor
1	82uH	1812	L1	SMD inductor
1	AMS1117	SOT223	IC1	800mA (LDO) Positive Regulator
2	BAV105	SOD80	D3, D4	SMD diode
1	Blue	1206	LED1	SMD LED
1	HC-06		U1	HC-06 Bluetooth Module
2	MMSD701T1G	SOD-123FL	D2, D5	SMD diode
1	SS14L	SOD-123FL	D1	SMD Schottky rectifier diode
1	jack 3.5mm audio			Jack audio mono/stereo 3.5mm

Let's now see where we can find the main components from a trusted source.

MOLEX 03-09-2042 - Plug; Standard .093"; 5.03mm; PIN: 4 (~ 20c/pcs.) at:

https://www.tme.eu/ro/en/details/mx-1490-p1/raster-signal-connectors-5-03mm/molex/03-09-2042/

MOLEX 02-09-2103 - Contact; male; 20AWG-14AWG; Standard .093"; tinned; crimped (~ 8c/pcs.) at:

https://www.tme.eu/ro/en/details/mx-1190--p901-l/raster-signal-connectors-5-03mm/molex/02-09-2103/

NL12KTC820 - Inductor: wire; SMD; 1812; 82uH; 200mA; 3.5Ω; ftest: 2.52MHz; Q: 10(~ 15c/pcs) at:

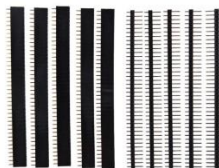https://www.tme.eu/ro/en/details/nl12ktc820/smd-1812-inductors/viking/

AMS1117-3.3 (~ 10c/pcs.) at:

https://www.ebay.com/itm/NEW-10pcs-AMS1117-3-3-LM1117-3-3V-1A-SOT-223-Voltage-Regulator-ca/312556111651

Pin header, pin, male & female, 2.54mm (~ 10c/pcs.) at:

https://www.ebay.com/itm/5-PCS-40-Pin-2-54mm-Single-Row-Straight-Male-Female-Pin-Header-Strip-AD/112176232585

BAV105 - High speed switching diode 300mA / 60V (~ 20c/pcs.) at:

https://www.ebay.com/itm/15-Stuck-BAV105-High-Speed-Switching-SMD-Gleichrichter-Diode-60V-600mA-M2725/273823166377

SMD 1206 Blue LED - LED Light SMD Super bright BSG (~,/pcs.) at:

https://www.ebay.co.uk/itm/0603-0805-1206-7030-3020-5730-5050-3528-335-LED-Light-SMD-Super-bright-BSG/123447067788

HC-06 – Serial Bluetooth module, slave (~ $4/pcs.) at:

https://www.ebay.com/itm/Wireless-Bluetooth-RF-Transceiver-Module-Serial-RS232-TTL-HC-05-HC-06-Base-Board/163424002293

MMSD701T1G - RF Schottky Diode, Barrier, Single, 70 V, 200 mA, 500 mV, 0.5 pF, SOD-123 (~ 25c) at:

https://ro.farnell.com/on-semiconductor/mmsd701t1g/diode-schottky-70v-sod-123/dp/1431102

SS14L R3 - Schottky Rectifier, 40 V, 1 A, Single, SMD, 2 Pins, 550 mV (~10c) at:

https://ro.farnell.com/taiwan-semiconductor/ss14l/diode-schottky-sma-1a-40v/dp/1559159
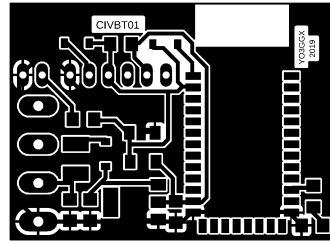
Jack audio mono sau stereo 3.5mm (~ $1/buc.) la:

https://www.ebay.com/itm/1pc-3-5mm-3-Pole-Headphone-Replacement-Audio-Jack-Male-Plug-Solder-Connector/142869621639

The PCB

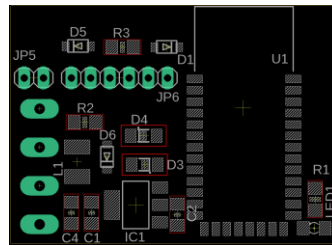The PCB (single side - top) is presented in the following picture.

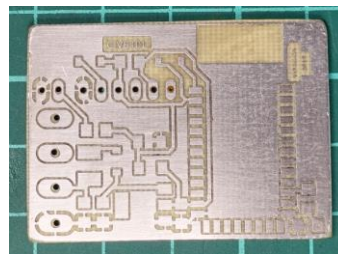You can download the 1:1 (600dpi) mirrored PCB image from here:

https://www.yo3ggx.ro/civbt01/civbt01_pcb_top.png

This png file can be directly sent to a laser printer for the toner transfer procedure.

SMD components are all mounted on the top of the PCB, according to the following picture.

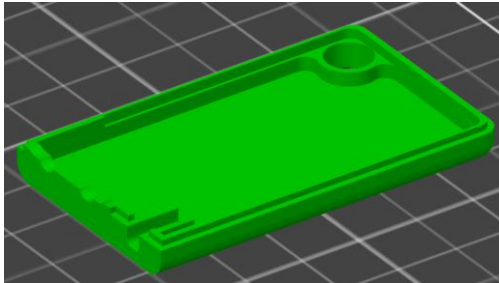This is how my tinned and protected PCB looks like (without components):

The top of the PCB after all components were soldered looks like in the following picture.
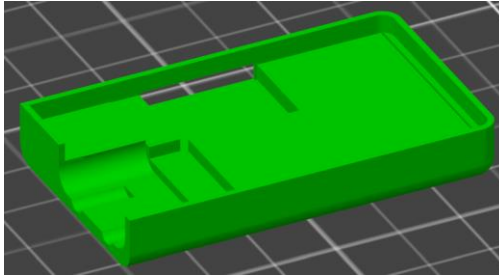
The case

You can easily 3d print the case using the provided files.
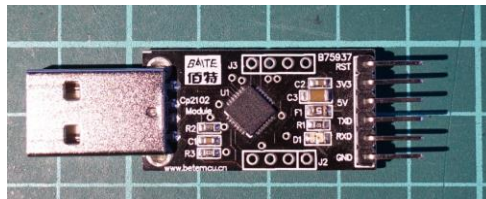
Case top

Case bottom

The STL files can be downloaded from here: https://www.yo3ggx.ro/civbt01/case.zip

The case top and bottom parts must be glued together. Use a piece of 7mm glue pen stick for the LED window.

Configuring HC-06 Bluetooth module

You will need an USB/Serial module, like this one (or any other pin to pin compatible), in order to connect it directly without wires:

Connect the USB/Serial module to the CIVBT01 programming header. The CIVBT01 module will be powered from the USB/Serial Module.

To make life easier, I've developed a small Java application named CIVBT01.jar

The application can be run on any Windows, Linux, Mac or Raspberry Pi computer. Currently only a GUI version of the application is available.

Download the application from the following location:

NOTE: You need to have Java runtime 1.8_xxx installed on your computer in order to run this application.

Unzip the archive in a separate folder on your computer. You don't have to install it. To run it, enter the following command from console, inside the folder where the jar file was unpacked.

```
java -jar civbt01.jar
```

The main application window will open.
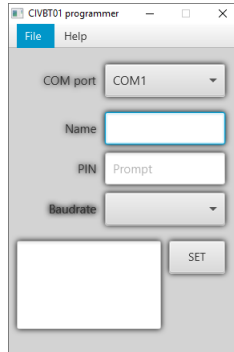
Select the COM port associated with the USB/Serial module, enter a name for your Bluetooth interface, desired pairing PIN and select the Baudrate to be programmed.
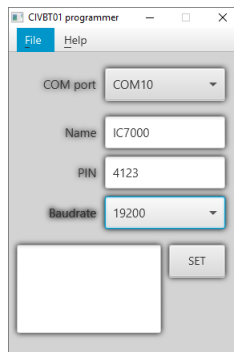
When ready, click **SET**. As the module may be already preprogrammed with an unknown Baudrate, the application will try all the available Baudrates from 1200 to 230400. As soon as the correct Baudrate is found, the module is programed with the entered data.
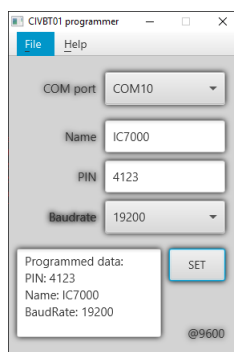
In the lower right part of the window, you can see previous Baudrate of the module.

NOTE: Recommended Baudrate for the Icom transceivers is 19200.

Bibliography

HC-06 modulde datasheet: https://www.olimex.com/Products/Components/RF/BLUETOOTH-SERIAL-HC-06/resources/hc06.pdf

Document History

Initial version of the document (v1.0).

civbt01_v1.0_EN.pdf   Bucharest, Apr 30th 2019   © Dan Toma – YO3GGX – yo3ggx@gmail.com