ATCK Build Notes

(The document is under revision. Last edited on 31/AUG/2024)

About the hardware

Sourcing the components

Here are the components that you will need based on the schematic rev 1.01

C1: Ceramic capacitor 330nf/50V
C2: Ceramic capacitor 100nf/50V
IC1: ESP32-S3 Pico development board
IC2: L7805CV
IC3: MAX3232 module (see text)
TF1: TFT display 240X320 with ST7789V controller and SPI connection.
KN1-4: Adafruit 5880. Alternatively, Adafruit 4991 (see text)
RL1: HCMODU0183 from Hobby Components
U1-U2: GX16 8-pin male
U3: Power barrel jack
U4-6: RCA female
U7: 3.5mm stereo female (see documentation)
SW1: On-Off switch
SW2: Push-on switch
A box to fit everything inside. I used a 170x135x55mm ABS plastic box.

I sourced all the components from AliExpress except the KN1 to KN4 and the RL1 relay module.
I got them from Mouser and Hobby Components respectively.

IC1 will need to be mounted on a little aluminum cooler. It is not recommended to keep it without any kind of cooling.

Regarding the connectors (U3 to U7) you can use whatever you want in order to connect the ATCK with the transceiver, the mic, the power etc. I have in the components list what I used.

It worth specifically refer to U7:
I used a 3.5mm audio stereo female jack and in order to connect to the transceiver's RS232 port, I used a "db9 female rs232 to 3.5mm cable". Search the internet with that description and you will find it. Make sure the DB9 is female and not male. Also check the file with the photos that I have upload on the project's page on GitHub. (link below)

Also, to connect U2 to the transceiver I use an 8-pin GX16 Aviation connector Female to Female cable. Make sure it is the GX16 connector is female on both sides.
Also check the file with the photos that I have upload on the project's page on GitHub (link in the footer).

I also designed a little pcb to make the build of ATCK a bit easier but of course it is not necessary.
You will find the Gerber files on GitHub

GitHub link: https://github.com/vlachosjm/ATCK-for-Yaesu

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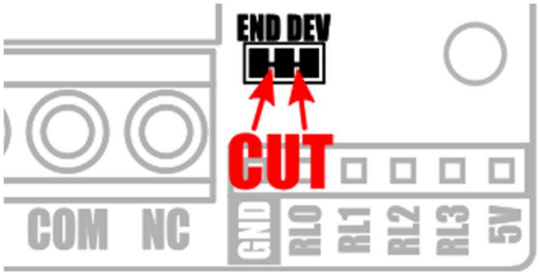
Alternatives

Alternatively, to Adafruit 5880 modules (since there are very often in backorder) you can get Adafruit 4991. The difference is that 4991 comes without a rotary encoder soldered on the board, so you will have to buy and solder the separately.
There is also a tiny change the needs to be made in the code if you use Adafruit 4991.
Search the code for the word “4991” and you will find it.

Necessary hardware modifications

The relay module HCMODU0183, needs a modification since we will use it with a controller that works on 3.3 Volts. It is documented by its manufacturer in page https://forum.hobbycomponents.com/viewtopic.php?f=131&t=3003 under the paragraph “Removing the modules I2C pullup resistors”

It basically consists of cutting two tiny links that connect 3 pads:



Use a multimeter to make sure that the three pads are not anymore connected together.

IC3: MAX3232 module pinout

Here is a picture of the module I used, with labels for each of the pins I use:

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About the Software

In order to load the code to the ESP32 you will need to setup the Arduino IDE.
I will assume that you know how to install the Arduino IDE and how to install libraries. If you don't, there several YouTube videos about this topic.

In my next document update (expected in some days), I will refer to:

Adding support for the Arduino IDE for ESP32 modules.

Adding the necessary libraries for the display, the Adafruit rotary encoders and the relay module.

GitHub link: https://github.com/vlachosjm/ATCK-for-Yaesu