ATCK Build Notes

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

ATCK Build Notes

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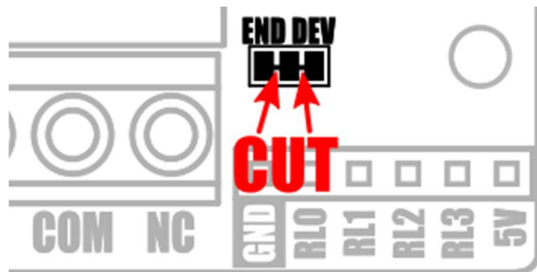
Use a multimeter to make sure that the three pads are not anymore connected together.

IC3: MAX3232 module pinout

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

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

ATCK Build Notes

About the Software

In order to load the code to the ESP32 you will need to setup the Arduino IDE with the right libraries and the right modifications to some files.

I assume that you will use a PC running Windows 11.

Connect the ESP32-S3 module to a PC using a USB cable.
The PC will detect and install automatically two new two serial ports.
In this example they are COM3 and COM4:
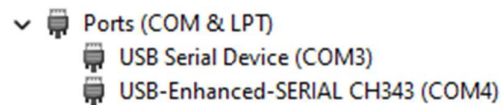
We will use the enhanced serial port (COM4 in this example)

Arduino IDE installation

The Arduino IDE can be downloaded from the Arduino page https://www.arduino.cc/
Install it using the default options. No need to change anything.

Define the board that you use.

- Start the Arduino IDE. You will be asked if you want some components to have access to the network. I would suggest that you accept in order to be able to download updates etc…
- Open the Tools menu, chose Board and then Boards Manager.
- In the search line, enter ESP32 and install the "esp32 by Espressif"
- On the top of the IDE environment, you will need to choose a board:
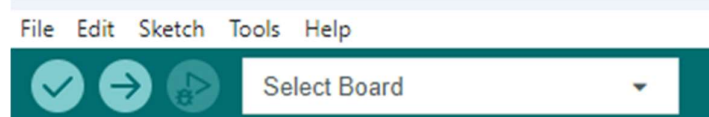
- Choose the board "ESP32S3 Dev Module" and choose the enhanced serial port (in the above example, COM4)

Adding necessary libraries

- Press Ctrl+Shift+I to open the Library Manager
- Search for "seesaw" and install the library "Adafruit seesaw Library by Adafruit"
  You will be asked if you want to install all dependencies. Choose "Install All"
- Then, search for TFT_eSPI and install the library "TFT_eSPI by Bodmer"

The last library that you need is the mlink library.

- You need to download it from its Github page https://github.com/HobbyComponents/mLink as a zip file.
- In Arduino IDE enviroment open the "Sketch" menu and choose "Include Library" and then "Add .ZIP library…"
- Now choose the mlink ZIP file that you downloaded in the previous steps.

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

ATCK Build Notes

Modify mLink.h file

You will need to modify the file mLink.h that was installed with the mlink library in order to be able to work with the ESP32.

Normally, you will find it in this folder: Documents\Arduino\libraries\mLink

- Open the mLink.h file with an editor (for example Notepad), find the line that starts with #include <avr/dtostrf.h>
- change it to:
//#include <avr/dtostrf.h>
- Don't forget to save the mlink.h file before you close the editor.

Display parameters file

Finally, you will need to replace the file "User_Setup.h" which you can find in the folder Documents\Arduino\libraries\TFT_eSPI with the same name file that you can find on the GitHub page of my project.

Open the ATCK sketch in the Arduino IDE

- First create a folder named "ATCK-for-Yaesu" wherever you want.
- Into this new folder, save the file "ATCK-for-Yaesu.ino" that you can find on the GitHub page of my project.

Now you are ready to load the sketch to the ESP32.

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