K3 and ACOM 2S1

General Info

I suppose that ACOM's 2S1 XCVR Commutator is known to most of the contesters participating in multi-* categories. In general, it is well engineered rugged box that not only makes it possible for 2 radios to drive one amplifier but ensures maximum protection for each of the transceivers by controlling PTT, TX INHIBIT and RF lines. More information is available on www.acom-bg.com.The box is designed for use with Yaesu's FT1000MP series of radios and while interworking with other radios of that brand is only a matter of rewiring and connectors, connecting it to K3 is a bit tricky.The main issue here is caused by the TX INHIBIT voltage levels used by the box (+12V) and the K3 (+5V). The TX INHIBIT pin on the K3's 15 pin D-sub connector goes directly to the MCU, so putting voltages higher than 5V on it is definitely a very bad idea. Generally speaking, two options are available to overcome this problem - simple voltage regulator/divider and optical isolation. My personal choice is the second one and this is what I am going to describe here.Theory of operation (simplified)

After connecting all the cables to and from ACOM 2S1 XCVR Commutator according to the user guide, TX Inhibit is set on both radios (TX INH pin on Radio A and B CONTROL connectors is high). A transceiver "requests" TX path towards box output by asserting the PTT pin on its respective CONTROL connector low. I takes some milliseconds for the 2S1 box to react and after the KEY IN-KEY OUT loop is closed it asserts TX INHIBIT low on the requesting radio CONTROL port thus allowing it to transmit RF.

K3 Settings and details

K3 supports inhibiting by either high or low level on its ACC jack pin 7, but his pin has two functions and its default setting is XVTR-ON (Power on signal for Elecraft XV series transverters). The first thing to do is setting the TX INH = HI=Inh in the K3 config menu.

The trick is that you need a pullup resistor to this pin, but +5V terminal is not available on the ACC connector so this cannot be done with cabling. My very first solution of the problem was to solder 5kOhm resistor between pins 20 and 17 on the J90 header connector of the D-Sub IO board while keeping the optocoupler somewhere "in the cable". This is the schematic of the first version of the interface:

Note: the schematic was updated on 29.01.2021, thanks to Adi (S55M) for spotting the obvious error!

Although this works fine, many folks simply don't want to have their K3s "patched" this way. One side effect of this permanent pullup is that you always need to change TX INH setting to LO=inh for normal operation. Another drawback of the solution was that this small ACC connector gets full with cables (especially when you tend to connect band decoder) and becomes hard to manage.

After considering all these drawbacks I finally came to the point to develop a standalone box that connects to K3's ACC connector on one side and has Acom 2S1 and ACC terminals on the other side so I can easily connect my band decoder with the same cable, no matter whether I utilize the 2S1 box or not. I have also added line buffer on the band data outputs so I can drive now more than one band decoder (one for BPFs and one for antennas). Click on the picture below to see the schematic:

In case you have any questions related to this device, you can reach me through the Contact page!