

Station Automation at K1VR

Makin' a contest station *smart*

...

Marty Sullaway, KC1CWF

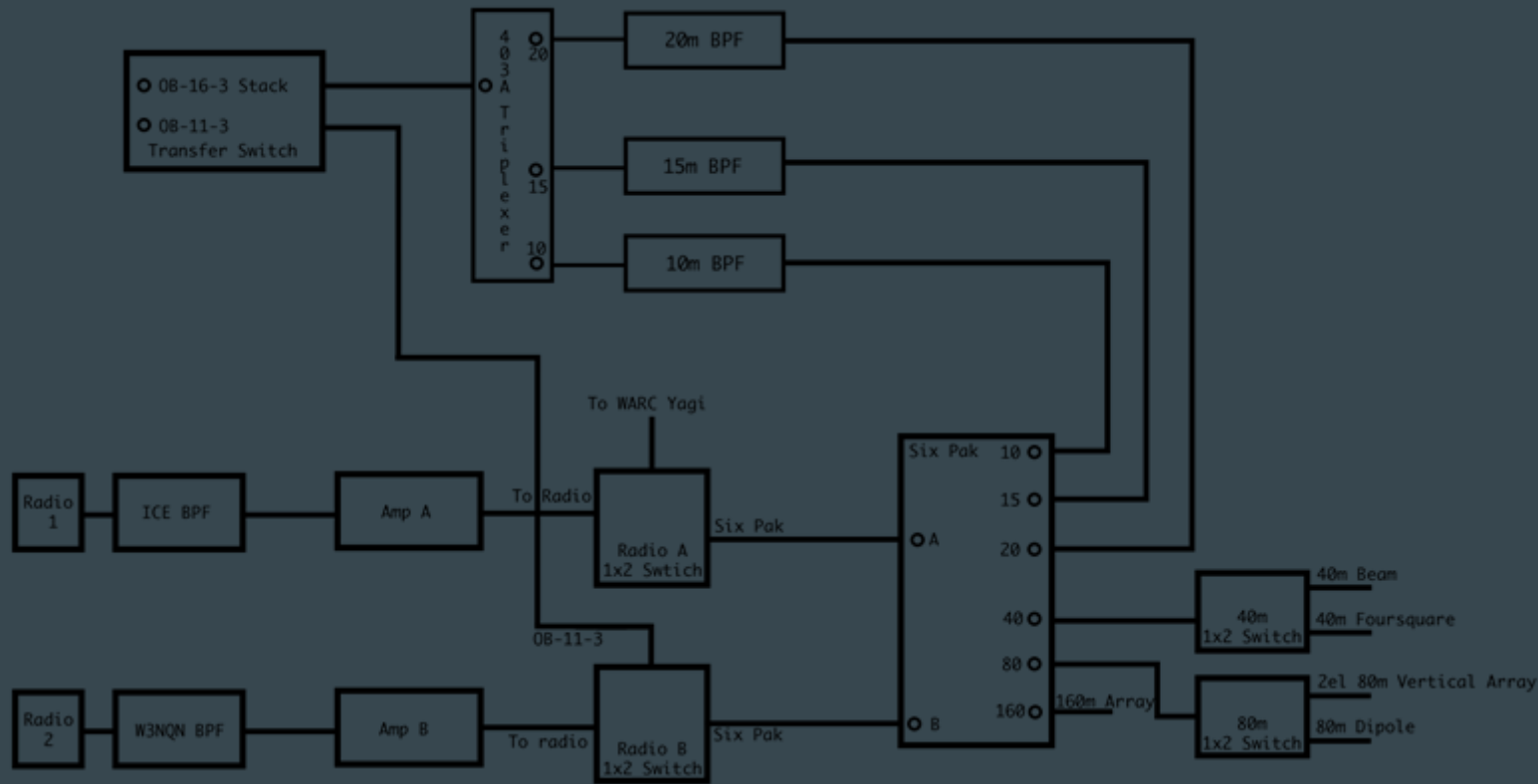
Project Goals

- Create a fully automated station - no operator intervention besides retuning amps
- All antennas can be used by each radio
- Handle full legal limit power (1.5kw)
- Full manual backup controls in case of electronics failure (Not that it ever happens :)

A little bit of station background

- Fred has two towers, 100' of Rohn 55g and 40' of Rohn 25g
- The big tower carries Yagi antennas for 10/15/20/40
 - Three stack of Optibeam OB 16-3s at 35/55/95 ft for 10/15/20 (8/4/4)
 - 2 element 40m Yagi (402CD) at 105' ft
 - All antennas independently rotatable except low tribander fixed EU
- The shorter tower carries antennas for 10/12/15/17/20
 - 3el 12/17m WARC Dual bander at 50'
 - Optibeam 11-3 at 40' for 10/15/20 - mainly used pointed south

RF Switching System



Key RF Parts!

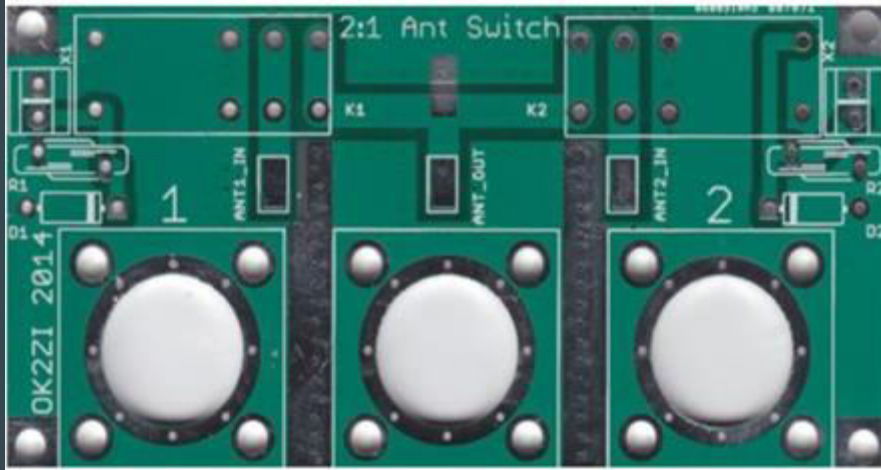
1. Obtain Parts

- a. 6 Pak (1x)
- b. 1x2 RF Switches (5x)
- c. 2x2 RF Switch (1x)
- d. 403A Triplexer + HP BPFs (1x)
- e. K1XM MOAS II
- f. Lots of RG-213 and multi-conductor control cable

Project Base



Those eBay 2x1 Switches



Costs, ETC

- PCB - \$10
- Parts - \$8
- Case - \$8
- Total Cost - \$26
 - Compare at \$75 for Top Ten Devices Model



Construction Steps

1. Gather Supplies
2. Cut and paint plywood board
3. Measure and lay out components
4. Attach components to board
5. Wire components together
6. Create operator----> antenna / antenna ----> operator control console cabling
7. Mount plywood board to wall
8. Build manual antenna control console
9. Make all final interconnections

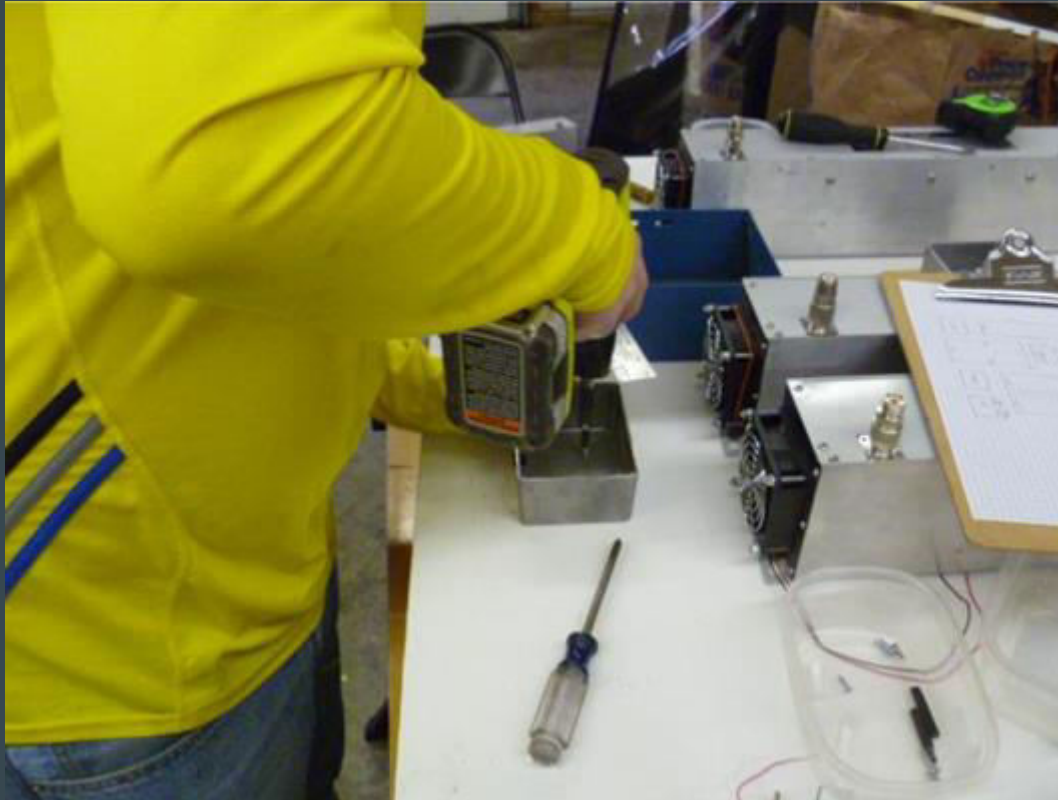
Laying Out and Securing Components



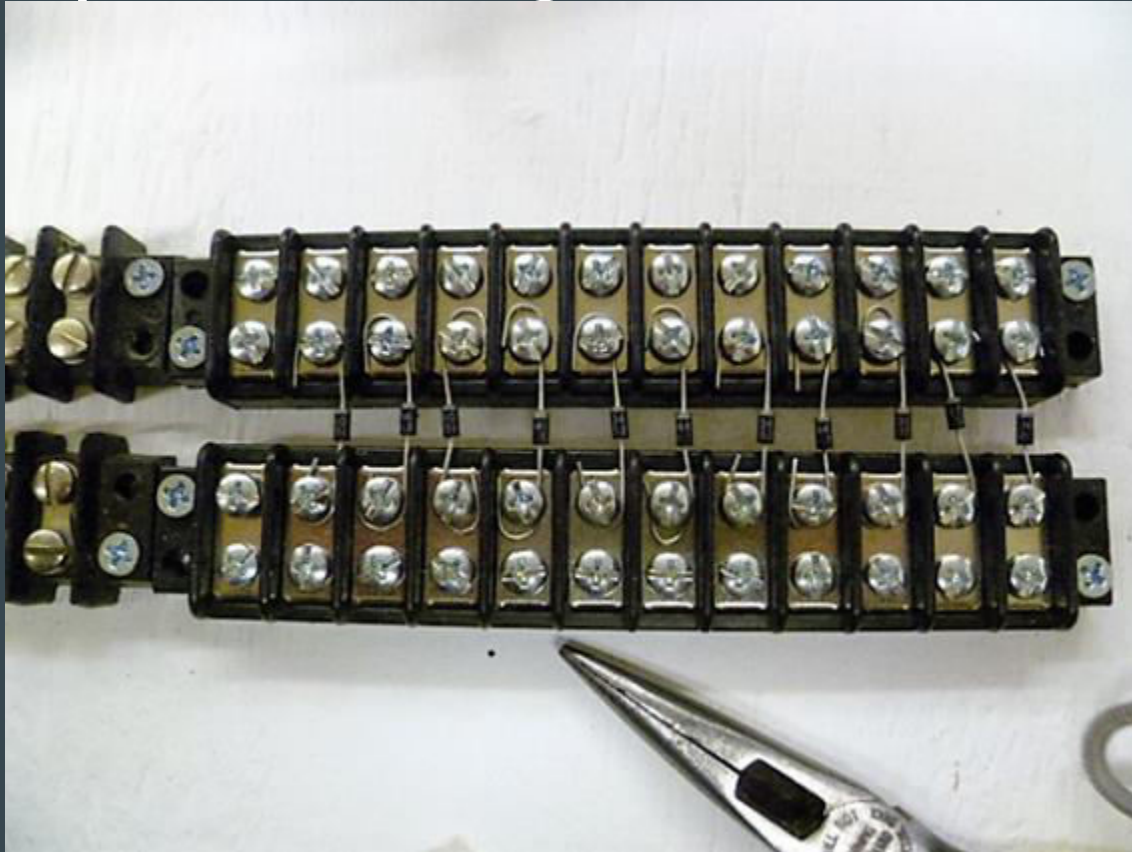
Marty, KC1CWF placing HF BPFs on board



...and attaching a 2x1 RF switch too!



Terminal Strips With Blocking Diodes To MOAS



Why Blocking Diodes?

- Allows feeding switching hardware with +12v DC from the MOAS II or manual control console
- Without these, the MOAS II can be back-fed with voltage from manual control console, simplified installation.

Fred, K1VR installing those diodes in the chilly garage!



Fred is still working on those diodes...



Getting there...



Fred is STILL putting those diodes on!



Fred took his hat off for a picture... it was ~45 degrees in W1UE's garage during work. Get those diodes done, Fred!



Marty, KC1CWF Soldering systems together



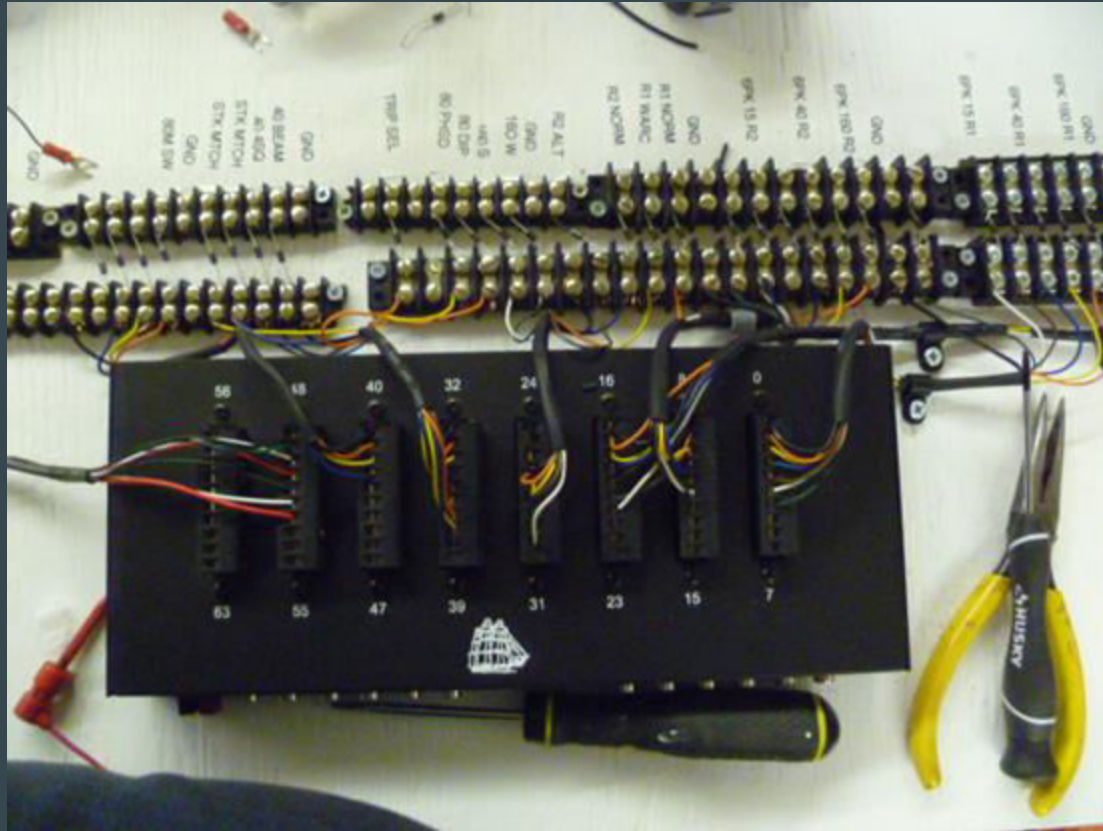
Fred Finished! Woohoo! Board is wired!



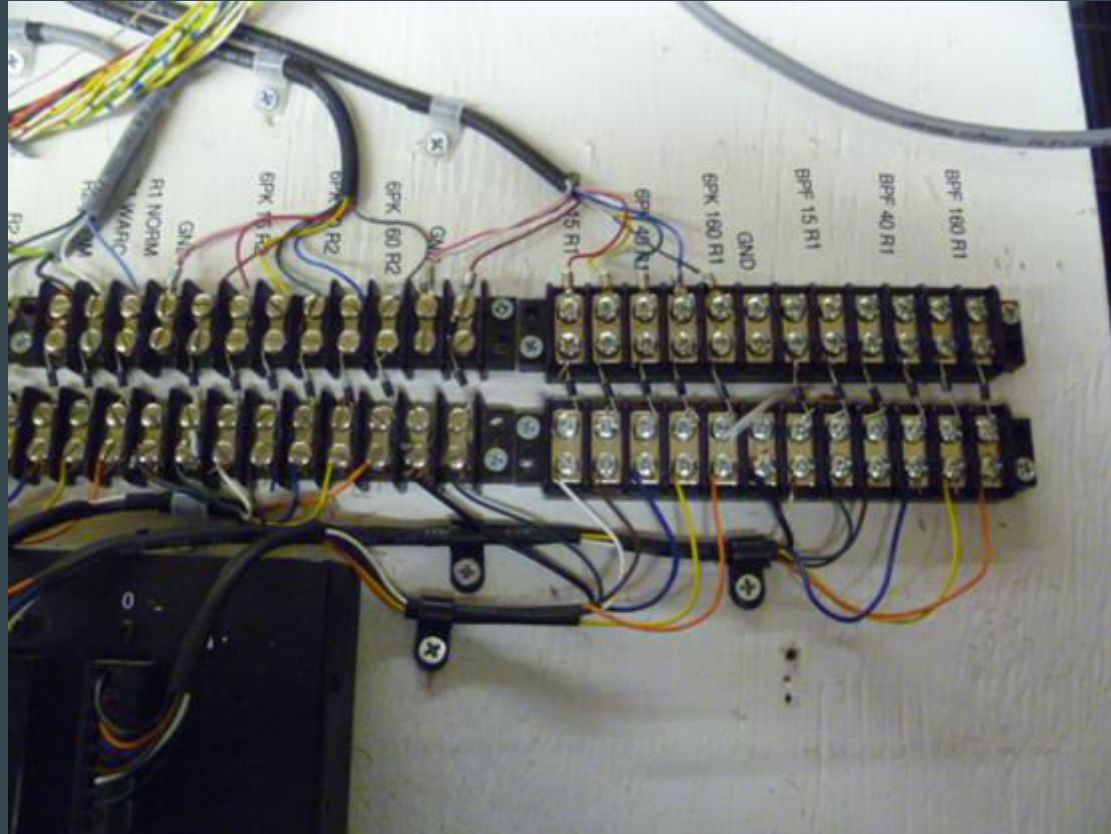
Doing some MOAS testing.



Fred's finished work with MOAS wired in



Another view... Note the labeling for each wire.



Time to get this thing to K1VR!



Mounting 2x4s on wall to attached board to



All done!



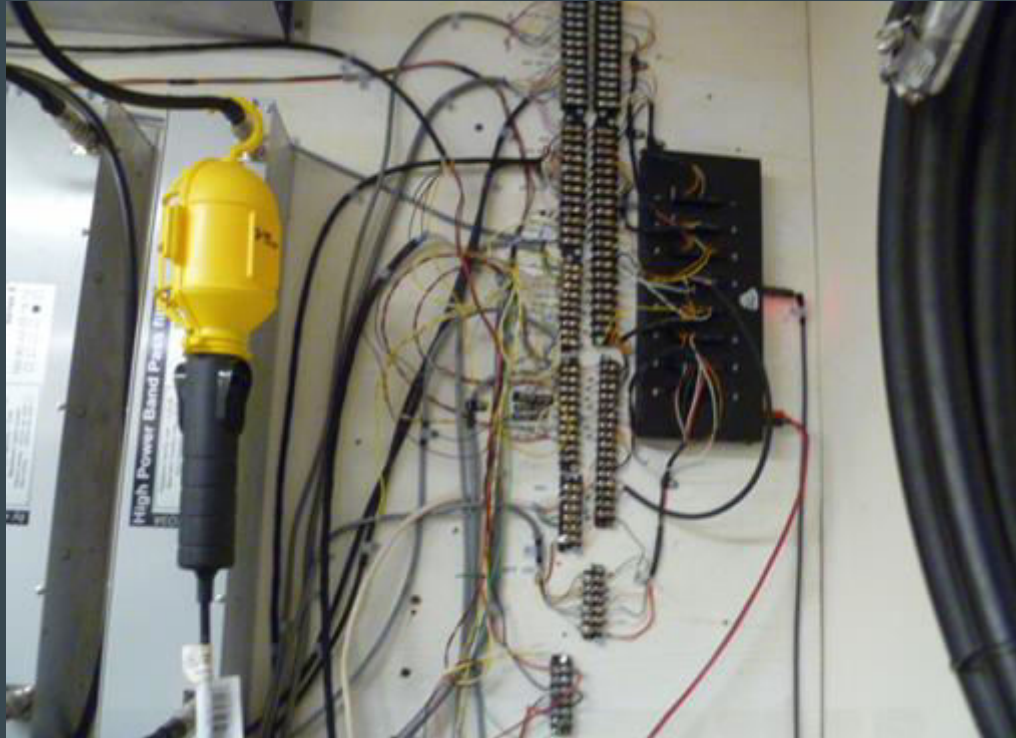
...and up it went.



Another view



A close-up of the MOAS II in action!



Building the manual control console



We have diodes here too!



Done!



DB-25 Cable between RF board and manual control console



Completed Installation. Note the manual control console.



Full Shack.

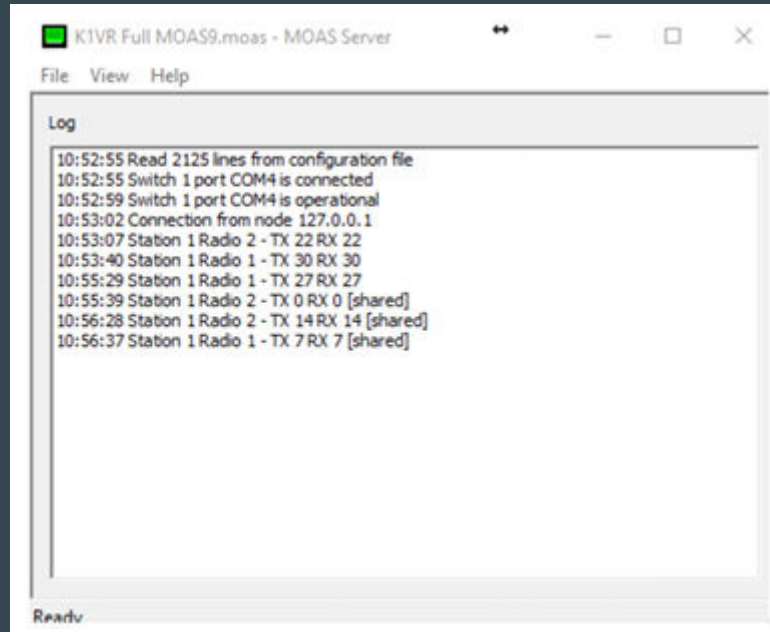


Let's talk software control for a minute here...

- There are two key pieces of software in place
 - MOAS II Client
 - MOAS II Server

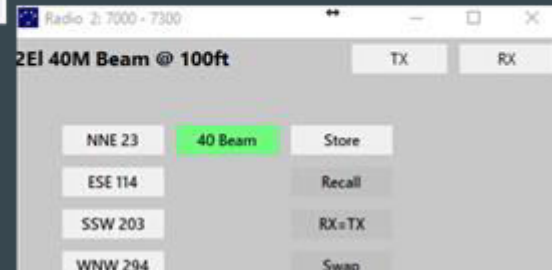
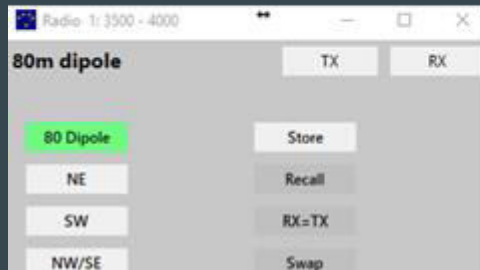
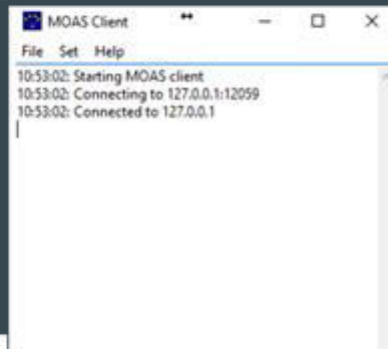
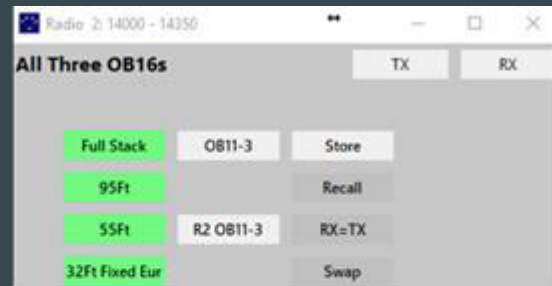
MOAS II Server

- Runs on a machine connected to the MOAS II over USB
- Controls MOAS II based on configuration file



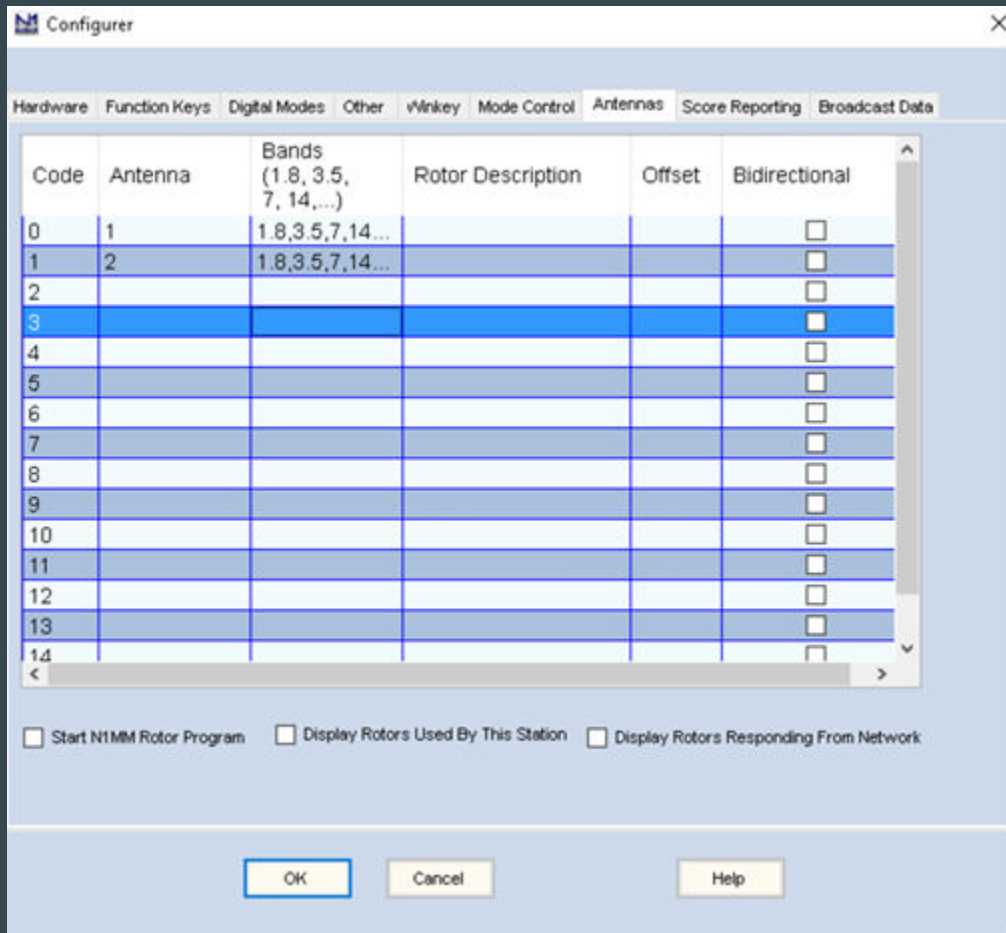
MOAS II Client

Actual
user
input to
antenna
selections



N1MM+ Integration

Allows switching antennas within
a band without using mouse.



Results!

- Everything didn't quite work for the first contest
 - Kept burning out MOAS relay drivers -- traced to 2x2 crossover switch
 - Buffer relay installed, and problem fixed.
- We are slowly tweaking installation for optimum performance
 - Foursquare direction control now manual
 - User can cycle through antenna choices on any given band in N1MM+ by using Alt+F9 (or use mouse)
 - Amp keying lines connected to MOAS II to prevent "hot switching"
 - Buffers choices until a radio is out of transmit.

Future Goals

- RX BPF switching and integration
- Multiop/SO2R automatic configurations
- Multiop interlock/octopus

A Few Last Words

- CQ WW SSB is next month
- Get on the air, strap in, and kick butt.
- Work and spot us.
- Questions?
- We're out of here!