Upgrading my Ham Shack to Single Op 2-Radio - SO2R
With an Intermediate Stop at 2-Radio Multi Op for IARU 2013

By Bill Hider, N3RR

Since fully-retiring in October, 2012, and becoming a full-time ham radio contest operator, I started thinking about learning to operate SO2R and having Twice the Fun! Thinking about, and doing, though, are two different things.

During 2011, I had upgraded my contest software to N1MM Logger and was intrigued with its SO2V (Single Op 2 VFO) and its SO2R modes of operation. I decided to first learn SO2V.

So, I started my upgrade in the fall of 2012 with the purchase of an IC-7800 to replace the several IC-781s I'd been using in my single-radio operation for over 23 years. With the dual independent receivers and 2-VFO IC-7800, I would have the capability to implement and learn SO2V with one radio and gradually improve my SO2V skills, with an eye towards becoming a competent SO2R operator. I knew I had a lot to learn.

A Schedule Is defined

In February, 2013, Frank, W3LPL, offered me the opportunity to participate in IARU as one of the NU1AW/3 HQ stations. I jumped at the chance and ultimately chose 15m CW as my station's band-mode for the 24-hour event, then still 5 months away on July 13th – July 14th.

And, oh by the way, Frank told me, you'll have to upgrade your station operation to accommodate two operator positions (Run and S&P) required for each band-mode of our NU1AW/3 operation and include a hardware radio-lockout mechanism to prevent more than one signal on the band at any time.

"Of course," I said, fully understanding that I would need to "gut" my 12' x 14' ham shack and completely remodel it to handle two operator positions for IARU.

My mind was full of ideas and possibilities. I decided to upgrade my shack to handle three types of contest operations: Multi-single with two operator/radio positions, Multi-2, and SO2R.

Since IARU was in July, that became the driving factor in my schedule.

And, since my IARU operation is limited to one band mode (15m CW), a single-band effort, there won't be any receiver interference caused by "other band" transmissions. So, I'll first upgrade for the IARU two-position/two-radio operation in July then follow that in late July/August with the further multi-band hardware and radio control hardware upgrades required for SO2R and Multi-2. My goal is to be ready with all that for the fall 2013 contest season.

I now had an implementation work schedule that would span February to September, 2013!

Decisions, decisions, decisions

I knew my current 6-foot wide desk, upon which I had built a home-made shelf, would not accommodate a 2-radio, 2-operator, 2-PC operation, along with all five of my Ring Rotors, Ham IV rotor, 80m antenna frequency switching controller, and my HI-Z 160, 80, 40 m 4-square switching, even without my supervising cat, Charlie:

But, I wasn't sure how large a two-operator, operating desk should really be.

Additionally, my four Upper/Lower/Both manual antenna switching console, using four Bird 74 coax switches, takes up valuable real estate on my operating desk (below the monitor in the picture), causing me to locate my PC monitor on the shelf and giving me a significant neck-ache because I have to look up at the monitor during contests.

I know from my corporate-America OSHA training, that the proper look angle of the eyes looking at a PC monitor is down, below horizontal, with the head positioned at the top of, or above the top of the monitor. I wanted to incorporate that concept into my new station design.

So, I decided to visit some multi-op stations, take measurements, and talk to the hosts. My first stops were at N3HBX's "Farm" and W3LPL's 6-band multi op station.

Both stations had many operator-specific design details incorporated within them. Each had a 7 foot operating desk for two operators, with two radios and two PC monitors. N3HBX's operating desk was integrated into a 2x4 frame structure that supported the desk and operating equipment shelves. I had great meetings with both station hosts and gleaned several ideas I would incorporate into my station.

The biggest design consideration I now had was whether to build (or buy) the actual operating desk. But there were other elements of my station upgrade to get underway now, if I was to be ready for the IARU contest.

Multi-op/SO2R hardware needed

My upgrade to Multi-op and SO2R would require another IC-7800 and another PW-1 amplifier. I wanted a complete 2-radio/2-amplifier system.

I went directly to a known source of a IC-7800 & PW-1 pair that was for sale, and purchased the pair in early March. Meantime, I borrowed a PowerMaster I meter from W9GE (his spare) to try it out. Using it convinced me to buy a new one from Array Solutions.

During March, I ordered the hardware I would need for IARU & SO2R, including the StackMatch boxes to replace my Bird 74 coax switches. My orders to the suppliers:

Supplier	QTY
Array Solutions	
PowerMaster II w/ two 3KW HF couplers & cables	1
AS-419 6-Band Bandpass filter (controlled by band decoder)	2
Stackmatch II 3KW, 2 antenna	4
Stackmatch II new pushbutton controllers for the above	4
Dual feed option, SPDT RF relay for Stackmatch II	2
AS-RX FEP	2
"Managing Interstation Interference" by W2VJN	1
Top 10 Devices	
DX Doubler (DXD)	1
AY Technologies	
RAS 8x2 receive antenna switch	1
K9JM (http://k9jm.com/CIV_Router/CI-V%20Router.html)	
K9JM Arduino-based ICOM CI-V router	1

With these orders (and a few others for other components) placed, I could concentrate on finalizing my ham shack room layout & begin construction. (I already have an Array Solutions 6-Pak, so I didn't need to order that.)

Back to room design/construction

I was still looking for an operating desk when the opportunity to buy a IC-7000 mobile rig appeared on the PVRC reflector from KU1T. I visited Z at his QTH in WV, tested out the rig, and purchased it. While I was there, Z gave me a tour of his shack.

Serendipitously, he was using IKEA furniture for his operating desk. Now, I had an IKEA desk for my home office, but the legs on my desk would interfere with sitting at the desk if it were 7 feet long. KU1T's IKEA desk had legs that were inverted "T" shaped - such that the legs were located in the middle of the table depth and did not interfere with anyone's legs while sitting at any place along the length of the desk. What a great idea – I finally found my operating desk!

My operating desk design was taking shape.

I purchased two 4-foot IKEA tables, with the inverted "T" legs. My plan was to install the two tables end-to-end, creating one 8 foot long operating table/desk. As you sit at the table, a 2' x 4' frame, 8 feet long and 7 feet tall (a la N3HBX), supports shelves on the side facing you. Behind the desk, there will be 42" of workspace. The back-side of the 2' x 4' frame will support all of the cable harnesses, power outlets, 12V distribution, and other hardware that will be mounted on the 2' x 4' frame. W3MC has always encouraged me to someday create a large workspace behind my operating desk. This idea of his will now be implemented.

Construction proceeds

First, I removed the radio, PC monitor, Rotor controllers & most of the wiring from my old desk, including the "rats nest" of 25 year-old wiring behind the desk:

With lots more work ahead of me:

Old desk removed, 2' x 4' frame constructed using 2.5 inch plastic-coated deck screws. N3RR at work, building his new ham shack:

The 2' x 4' frame was constructed such that the spacing between the vertical studs was precisely the spacing I needed to accommodate the radio and the PC monitors I intended to use. Before I began construction, I made several trips to Micro Center, measuring monitor heights, widths, and lengths – finally settling on 21.5" Dell LED monitors and designing the 2' x 4' stud spacing appropriately.

The 2' x 4' frame was leveled, plumed, and secured to an existing wall stud (as seen on the left of the frame in the photo below), secured to the concrete floor using a nail gun and two 2.5 inch nails between each vertical stud. Shelving supports were installed and test shelves were set in place. One inverted "T" leg on the IKEA desk is partially visible:


The right-most of the five vertical studs forming the 2' x 4' frame was secured with the plastic-coated deck screws to a floor joist of the room above, through the suspended ceiling, as seen in this photo:

Construction is finished. The two-position operating desk of the NU1AW/3 15m CW station is complete!

Two IC-7800s, two 21.5" DELL monitors, HAM IV & Ring Rotor controller, AY Technologies controllers, Stack Match controllers, PowerMaster II display unit and one of the PW-1 remote control units are visible.
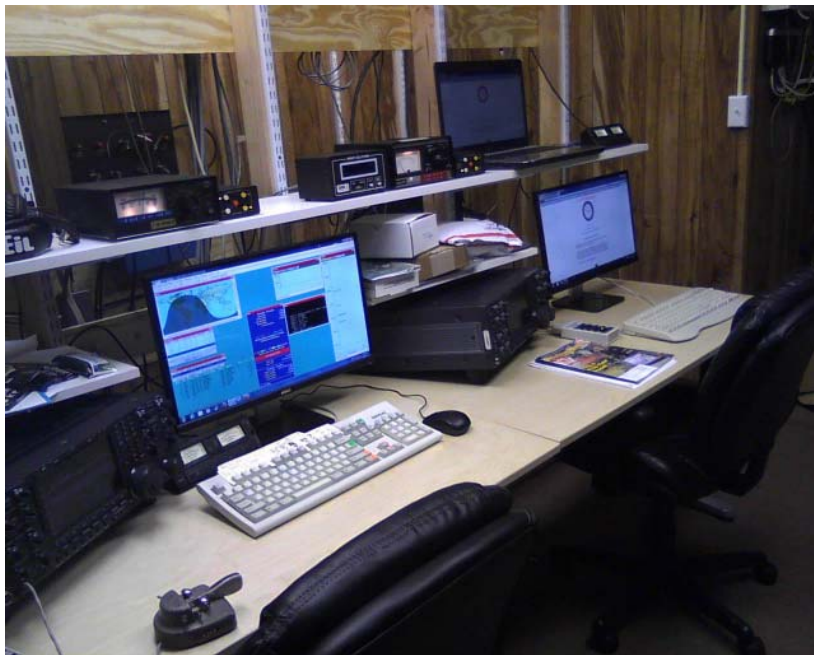
A pair of PW-1 KW auto-tuned amps is shelf-mounted, out of operational view, in the technical workspace behind operating desk. Suspended ceiling "grommets" provide out-of-sight, out-of-the-way, overhead cable-paths for rotor, RX antenna & Stack Match control cables:

Two Stack Matches will be used for IARU, Two more will be installed for SO2R. An Array Solutions 6-Pak will be wall-mounted as well:

Here's what wiring looks like in a 42" work-space. Note the spare amp, IC-4KL, on the floor below this PW-1:
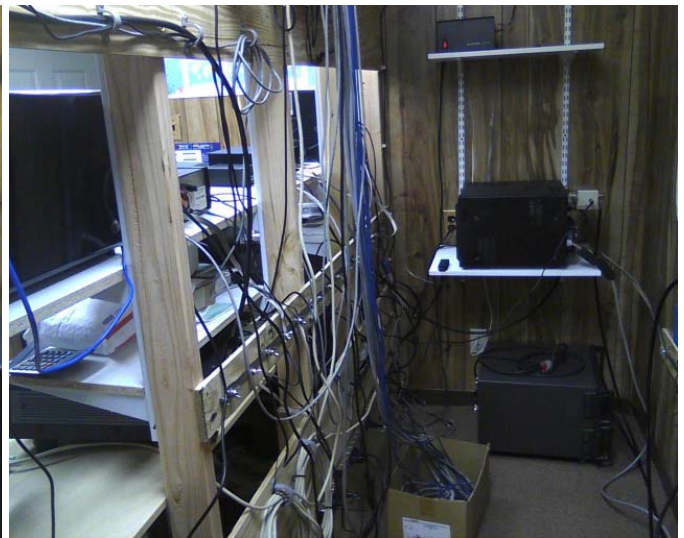
My ham shack is ready for IARU. My thanks to all who provided input, ideas and encouragement.

Check out my website for updates to my SO2R implementation: http://users.erols.com/n3rr/

73!

Bill, N3RR