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Creative Contest/DX Station Switching Solutions

Editor's note: Because of space limitations, we could not include all of the figures and drawings referenced in this article. Figures 3 through 9 are available on the NCJ *Web site,* ***www.ncjweb.com***

One of the "pleasures" of being a young ham in the late 1950s was building things as cheaply as possible. Some of our schemes did not work out, of course, such as the pole with the homebrew 10 meter Yagi that fell over as we teenagers tried to put it up. Still, when something we tried *did* work out, the satisfaction was incredible.

A More User-Friendly Station

It's not always as easy to get the same sort of satisfaction these days, given the nature of the available rigs. We no longer need to combine such things as converters, car radios and the venerable "Q5er" (a military surplus ARC-5 receiver used as a second IF) to work the world. The desire to feel the satisfaction of such accomplishments has never left many of us, however, so we still look for ways to improve our stations through home-built modifications. It is within that context that the W7VP station model was developed. Figure 1 is a block diagram of that concept.

Someone once observed that if you want to design something that's easy to use, turn the job over to a lazy person. Maybe I *am* that person, because I'm always looking for ways to make my station more convenient to use. While designing my station I had four primary goals in mind.

1. Make the station user-friendly for DXing and contesting.
2. Keep band switching as simple as possible.
3. Incorporate full-break-in CW (QSK) throughout.
4. Make it possible to use any permutation or combination of transceiver, amplifier and antenna.

My first question was, "How few buttons can I push to change a combination of band, amplifier and antenna?" The answer depends of several issues. First, my setup requires the use of two QSK switches. Both are Ameritron QSK-5s. Each in turn is connected to a separate amplifier, and each amplifier is attached to a separate MFJ-986 antenna tuner. Each tuner can be switched between two antennas, for a choice of four antennas.

The Icom IC-756PROIII has two output ports, designated "Antenna Connector 1" and "Antenna Connector 2." This arrangement permits each port to be connected to its own QSK switch. Since each QSK switch is connected through a separate amp/tuner

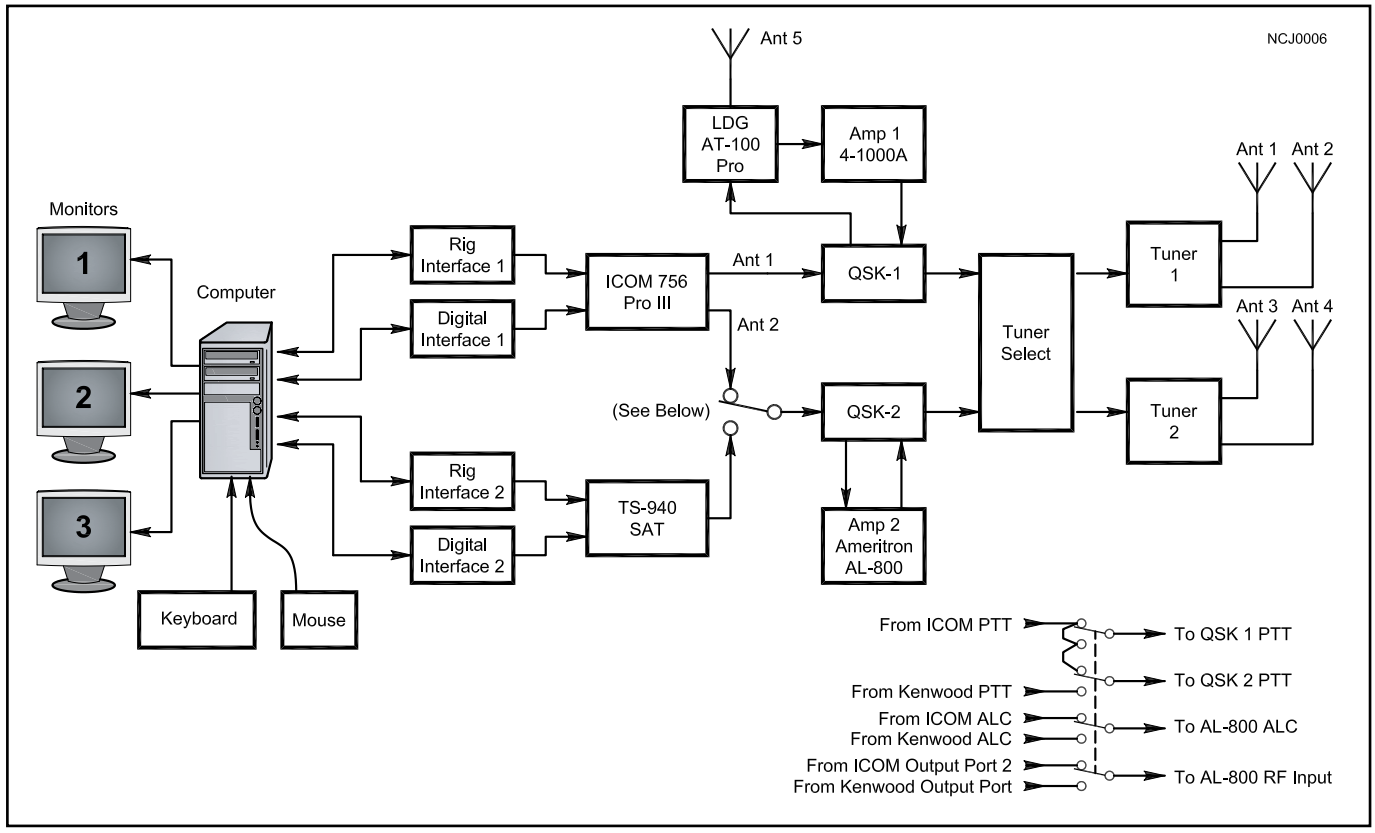

Figure 1 — A block diagram of the W7VP station configuration, which provides full-break-in CW and flexible switching for two transceivers, two amplifiers, two antenna tuners and five antennas. The tuner select switch permits inverting the relationship between amplifiers and tuners. As shown, the PTT/ALC/output relay is in the SO2V position using both ICOM transceiver VFOs.

combination, it's conceivable, for example, to have one amp tuned to 20 meters through a tuner to a 20 meter antenna, while the other amp is tuned to 40 meters through the second tuner to a 40 meter antenna. All that's necessary is to push one button on the transceiver to change amp/antenna combinations.

Amplifier T/R Relays

The key to dealing with the amplifiers' T/R relays is *dynamic biasing*, a feature that cuts off the amplifier tube(s) between words or CW characters, mainly to reduce heat and save power. Since the QSK switches do all the T/R work and are on the whole degrees faster than the typical amplifier T/R switch, the amps can be left in "operate" mode with their internal T/R relays in a ready-to-transmit state, provided there is no idling current during non-transmitting periods. This is accomplished through dynamic biasing.

While most Ameritron amplifiers have dynamic biasing, my 4-1000A amp was another matter. A few years ago I decided to modify the venerable 4-1000A by making it a grid-driven amp instead of a grounded-grid amp. Figures 3, 4, and 5 show the result. The amp is driven through a 4:1 balun terminated by a 200 Ω non-inductive resistor. For input tuning, I removed the input switching and replaced it with an LDG AT-100 Pro automatic antenna tuner. This permits tuning for each band's input without switching in different inductances to balance out the inherent capacitive reactance of the tube.

The input bias was designed to switch between approximately –90 V dc and –62 V dc to accomplish cutoff during non-transmitting periods. In order to make the bias switching as instantaneous as possible I inserted the circuit board shown in the Figure 6 schematic. Switching was so fast that for QSK purposes it was virtually instantaneous — at least for the CW speeds I'm used to. Figure 7 depicts the RF envelope during a series of dits at about 27 WPM. In fact, the switching was so fast that most SSB contacts could not tell that the bias was being switched during breaks in modulation.

The result of these changes allows me to switch between two bands with the push of one button — the band selector on the transceiver. This assumes that each amp/tuner/antenna combination has been tuned in advance. This is very useful during contesting, since it allows me to chase a needed station on another band as soon as it appears.

DXing and Contesting

This brings us to how the station can be used for DXing and contesting. To be truly useful the station should be able to work all modes. This is accomplished by use of computer interface software and hardware.

Figure 2 — The "as-built" station, with all switching methods implemented

I chose to install a second COM port board, so I could interface the transceiver with the computer for both rig control and digital operation.

For general logging purposes I use *Logger 32*; for contests I use *N1MM Logger*. Each can handle digital modes, and both can use the *MMTTY* and *MMVARI* digital engines. When making digital contacts, stations appearing on the digital interface can be logged immediately with one mouse click. To control audio I built an audio control box using the parallel port, LPT1. The control box senses transmit focus and mutes the transmitting radio while operating SO2R. Note that Figure 1 does not show the audio control box or any of the band-pass filters or stubs necessary to operate high-power SO2R.

During contests the *N1MM Logger* interface also allows the use of "F" keys in run, S&P and ESM ("ENTER sends message") modes, as well making logging quite simple. Careful setup of the rig/software interface also permits the kind of band/amp/tuner/antenna switching discussed above by clicking on a spot on the *N1MM Logger* bandmap for either antenna port, assuming the computer is connected to a cluster that is reporting spots. I connect to a cluster using telnet within *N1MM Logger*.

DXing is similar, although perhaps not as complex as setting up for a contest. I recently used this system to achieve the ARRL Triple Play Award in about a month. *Logger 32* and similar programs permit uploading ADIF files to Logbook of The World or e-QSL, so keeping track of awards is pretty easy. Card files can also be created for snail-mail QSLing.

The Digital Interface

Many very capable digital interfaces are now available, including ones that permit the use of USB ports. Rather than buy one, I fell back on my old habit of making use of what was available and simply modified a MFJ-1279 sound card/radio interface for that purpose. It was my desire not to use the radio's mic connector for digital purposes, since audio levels are variable in that configuration. Therefore it was necessary to modify the MFJ-1279 so it would work with FSK as well as CW and PSK31. The second rig is fitted with a SignaLink USB integrated USB sound card for digital operation. As a result the SO2R control functions are ported to the computer's four COM ports (two for CW/PTT/FSK and two for rig control) and the LPT1 port.

Amplifier/Tuner Combinations

The 4-1000A amplifier has highly geared plate and load dial mechanisms attached to their respective vacuum variable capacitors, so changing bands often involves a lot of dial spinning. On the other hand the Ameritron can be retuned to another band fairly quickly. Being a lazy sort of guy I wanted to be able to switch between amplifier/tuner combinations so that each amp could be connected to *any* antenna. To accomplish this, I included a set of DPDT relays (see Figure 1).

Each of these station modifications has given me a lot of satisfaction by simplifying the way I use it. Different combinations of equipment can be used for the same purpose, with the same kind of goal-setting and equipment evaluation available. Not everyone has two amps or four antennas. Many who contest do, however, so I hope this article will be useful to others who are as lazy as I am. The assembled station is shown in Figure 2. NCJ