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NCCC

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## Our Next Meeting

**High Rate RTTY Contesting, by W0YK**
**CQP Plans, by K6TD**

**Date:** Monday, 13 August 2007
**Time:** 6:00 pm schmooze, 6:30 pm dinner, 7:00pm program
**Location**: Tied House, 954 Villa Street, Mountain View, CA 94041 (650) 965-2739

**Directions:**

Go to www.nccc.cc, and select "meetings."

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## Presidential Musings

By: Bob Tellefsen, N6WG

Well, another IARU contest is behind us. I hope many of you took part in it. I managed a few hours and a very modest score, due to other commitments. It was fun for a while, but I heard no EU stations at all.

Our membership renewal program, run by our Sec/Treas John K6MM, is doing well. It would be nice to reach our goal early and be done with it for the year.

The joint meeting of NCCC and MLDXCC was great. As always, they put on a great feed. We could have fed another 15-20 people, I'd bet. The weather was a bit cooler than last year, too.

Bob Vallio's talk on the BS7H Scarborough Reef expedition was well received. I still have trouble thinking of a few rocks sticking out of the water as a DX entity. I sure admire the adventurousness of the team members who put the expedition on the air.

From the various propagation reports I see, it looks like we may finally be at the bottom of the solar cycle. Hopefully we will see some small improvement by winter when our main contest season gets rolling. I'd love to see 10m get hopping again.

Our August meeting will include a talk on RTTY contesting by Ed W0YK, and Kevin, K6TD will begin talking up CQP.

I hope we can generate a really great turnout for CQP this year.

73, Bob N6WG

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## VP/CC Report

By: Fred Jensen, K6DGW (Alan was gone for most of July)

Well, yet again, Alan is on the move and I agreed to fill in for him once again.

**Aug Contests:** I go through Bruce's calendar near the end of each month and mark mine with the ones that look interesting. Here are the ones I put down for August, the complete list can be found on Bruce's page at www.hornucopia.com/contestcal/

NAQP CW: 4 Aug 1800Z – 5 Aug 0600Z
ncjweb.com/naqprules.php

WAE CW: 11 Aug 0000Z – 12 Aug 2359Z
www.waedc.de

NAQP SSB: 18 Aug 1800Z – 19 Aug 0600Z
Ncjweb.com/naqprules.php

Ohio QSO Party: 25 Aug 1600Z – 26 Aug 0400Z
www.opq.us

**General Drivel:** I got serious about contesting when I retired in 2000, and now, contests account for perhaps 95% of all of the HF Q's I make and upload to LoTW. DXing probably takes up nearly all of the remaining 5%, usually going after DXpeditions.

I ran across some of my original logs as KN6DGW and early General K6DGW not long ago, and they were filled with non-contest QSO's, the majority with strangers. My high school buddies' calls show up repeatedly, but the majority were stations I'd never worked before.

That prompted me to search my master log [MS Access] for the last non-contest HF QSO. I was surprised that my last rag chew QSO with another station I didn't already know on HF CW was in the spring of 2003. The last HF SSB non-contest QSO was even earlier, summer of 2002.

I've gone through a number of operating phases in ham radio including traffic handling, satellites, various digital modes, phone patches for my comrades after I got home from SE Asia, and the like. I guess contesting is one of those phases, although it's lasted longer than most of the others did.

The CQP Team [that would be mainly Matt, WX5S and the "Ham of Many Calls" Kevin, K6TD] are working hard for the 2007 running of the planet's most popular State/Province QSO Party.

Matt is working feverishly on log checking software and somehow managed to get me involved. He is doing most of it in Perl, a computer language I learned out of necessity [and by myself] a number of years ago. So, I had to hit Amazon and now have about 15 lbs of Perl texts in an attempt to reverse the forgetting process.

The one thing I have already learned is that the CQP Log Checking process is extraordinarily complex and difficult [I suppose it is that way for most contests, but CQP results in a lot of logs].

And speaking of CQP, it is only 2.3 months away as I write this, and that time will slip away very fast for all of us. If you don't have expedition plans, yet, but want to do one, now is the time to beginning planning.

If you're going to operate at home, there's still a little time to get everything optimized. And, if you operate CQP in any capacity, please submit your log, no matter how small. It really helps the log checkers.

73, and KB/D

For Alan, K6SRZ, I remain
Fred K6DGW
VP/CC Emeritus

## The K6XX Automatic Antenna Selection System

By: Bob Wolbert, K6XX

Our JUG-meister, K6RB, prodded me to update NCCCers as to what has been happening at K6XX. Be careful what you wish/ask for, Rob! But then this is a slow month for contesting…

Over the past several months, most efforts have been directed toward repairing antenna damage from the huge wind storm last December. I'm happy to report that all but one antenna has been fully restored to operation, and the last (a log periodic) is usable on all except for its lowest-frequency band. That only gets me back to almost where the station was in November… but it definitely beats the alternative.

The bigger news is the installation of the automatic antenna selection system. Long time members may recall previous "show-and-tell" progress reports at meetings over the past six years as different experimental blocks were completed. These small steps toward full automation were not always appreciated by guest operators, as they were built for functionality rather than intuitive operation. I'm happy to state that the entire system is now installed and performs to expectations. The only operator input required now is *direction* ("Which way do you wanna beam?").

### What Is It?

This system allows routing multiple (up to 36) antennas to six stations. It is designed for stations with multiple fixed-azimuth antennas, and works with single, SO2R, or multi-transmitter configurations. The operator chooses one (or more) beam directions and the system automatically connects the correct antenna to that particular station.

What does this mean? It means the station comes close to power-up & play. It means the transmitter/amplifier always sees a decent impedance match. It means each receiver has automatically selected band- pass-filter protection. It means a guest operator (or sleepy owner) may run the station without destroying things. It means that if things break anyway, another station is immediately ready to take over.

An operator sitting down at any one of the six stations may chose from every available (i.e., not being used by another station) antenna—cable swapping is never required. SO2R? Sure. Two of the stations (that means four transceivers/amps) are ready for SO2R without any reconfiguration. M/2 or M/M? QRV. All stations are offered equal capability; none are crippled for the sake of another.

This flexibility creates inter-station hazards that must be detected and prevented, since receivers must be protected from transmissions on the same or different bands. A hardware (***no*** software involved) controller tracks which band each station is using and prevents deadly antenna sharing. Relay-switched band-pass filters keep cross-band QRM out of receiver front ends.

### Configuration

The antenna system consists of four blocks: the operator's **Console**, the **Controller**, the antenna-band **Matrix**, and the **Direction** relays.

The operator's **Console** (Figure 1) consists of a direction selector and rig interface. There are six Consoles, one at each station.

Direction selection is accomplished by a combination of a rotary switch and toggle switches, arranged around an azimuthal equidistant map (a "beam heading" map) centered on my QTH. Most of the time, the rotary switch is used since it is much faster to twist a rotary knob than to turn OFF one toggle switch and turn ON another when checking propagation in another direction—to hear a VK or LU calling while beaming JA, for example, If situations require beaming in multiple directions, the toggle switches are used. Up to six azimuths may be chosen simultaneously. LEDs circling the map depict which direction(s) are active.

**Figure 1. The Operator Console and Display. Note the Azimuthal map inside the direction control.**

Console Rig Interfacing Functions:

- Read Band data from rig (see the various circuits in the SS Handbook)
- Allow manual band override (for testing or when something breaks)
- Send Band and Direction data to Controller
- Drive BPF relays
- Latch band and direction data during transmission to prevent hot-switching relays
- Amplifier T/R control buffering
- Amplifier Disable (when band contention fault occurs)
- Tells Controller to power-up

The **Controller** (Figure 2) reads the band data from each station and checks for contention. If all is OK, the direction data is routed to the proper Direction relay, and the antenna band Matrix is instructed which bank of antennas (basically, which band) is routed to which station. If contention is detected—meaning that more than one station is trying to use the same band—all relays are locked down in their last safe state, an obnoxious klaxon horn sounds, and a bright red LED on each Console illuminates. All amplifiers are disabled during the fault.

**Figure 2. Controller (A) innards. (B) Buttoned up and operating. There are many more wires beneath the board!**

Independently, a Basic Stamp programmable controller reads band data from each station, processes this information, and pipes it to a small display (Figure 3) next to each operator console.

These displays, built from old Palm Pilot handhelds, show which antennas correspond to which switch direction on the Console, as well as which band each of the other stations is presently using. While not necessary for system operation, it lets a guest operator see what choices are available in each direction. It has also proven invaluable for debugging, by showing which relay positions the controller *thinks* it is selecting; comparing this information to which relays are actually driven has helped quickly narrow down wiring problems. (Alright, I'll admit another use: it helps ***me*** remember what hardware is up in the air, too!)

**Figure3. Palm Pilot PDA at each station shows available antennas. This view indicates that Station 4 is on 20m and all other stations are QRT.**

The antenna-band **Matrix** (Figure 4) is a bank of relays that directs a band's worth of antennas to a given station. Formerly built with a large number of discrete coaxial relays, it now consists of three Array Solutions SixPaks, interlaced with small diameter hardline. This new configuration is much less reminiscent of a rat's nest, but still uses lots of cabling.

**Figure 4. The Antenna-Band Matrix consists of three "SixPaks"**

Finally, the **Direction** relays select one or more antennas and route them to the Matrix. There are six Direction relays, organized primarily by band: 160m/WARC, 80m, 40/60m, 20m, 15m, and 10m. The controller allows another Direction relay dedicated for VHF, but this has not been integrated. Of the six available directions, five are fixed on the most important azimuths for Northern California contesting, and the sixth is for a rotatable or omnidirectional antenna.

**Other Flexibility**

Predictably, I cannot leave well enough alone, and have built in more layers of complexity—ah, I mean more "features."

For example, a switch selects a secondary antenna bank, in case the primary bank develops a fault. A *band-segment* switch drives the Phone/CW relay sometimes needed by narrow-bandwidth, low-band antennas. A band-pass-filter disable switch allows measuring SWR or SWLing. Also, a manual band switch will override the automatic value. Guest operators may generally ignore all of these features. With the exception of the BPF disable—which, when activated, lights a bright red warning LED— the controller is smart enough to work with all of these options and prevent damage.

There are a few multiband antennas in use here. The controller knows about them and drives a demultiplexing relay to route each antenna to the required band matrix port (and locks out this antenna for all other stations).

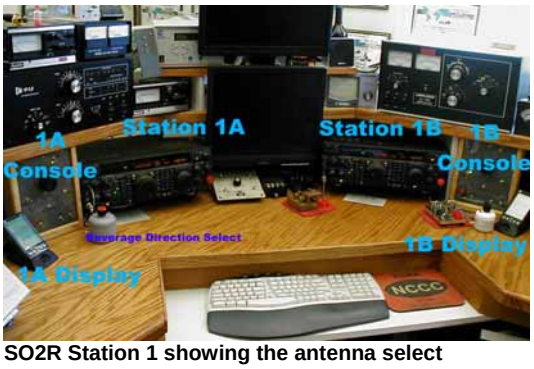
**Future Enhancements**

Its working, but it ain't done! Three additional PC boards are planned. One will replace the controller board, which is a troubleshooting nightmare with its several hundred separate wires. Another will simplify the way the band segment switching (phone/CW) relays are driven. And, another will help flatten the SWR between stations by equally distributing the antennas to the matrix (eliminate some short stubs) and by providing 75ohm :50ohm or 37:50ohm impedance matching to accommodate load variation between single and multiple antennas used simultaneously. All antennas are matched to 75ohm and are fed with CATV semiflex cable (a.k.a. "TV Hardline"), so I have been accepting a built-in 1.5:1 SWR at the station end.

**Summary**

The K6XX Automatic Antenna Selection System has been under development for six years, and has evolved significantly over that time. These six years of operating experience plus valuable feedback from guest operators has shaped what began as a much simpler SO2R automatic antenna relay driver into a system accommodating six simultaneously operating stations controlling 36 antennas.

Once the operator turns on the rig (which powers up the controller) and selects a frequency (on the rig) and a direction (on the six-position switch on the Console), the proper antenna is automatically routed to the rig. Built-in protective features allow all stations to be safely operated, simultaneously, depending upon antenna availability and band conditions, of course!




**SO2R Station 1 showing the antenna select operator interface.**

**RTTY Contesting**
**By: Ed Muns, W0YK**

RTTY contesting is the fastest growing segment of radio sport. Each year, participation in the major RTTY contests increases dramatically. New Hams as well as long-time CW and phone contesters are joining the fun. Unlike RTTY operation a few decades ago, today one can set up in this digital mode with a minimum of incremental equipment beyond a basic CW/phone station.

The majority of RTTY contests use the traditional 60 wpm (45.45 Baud) 8-bit BAUDOT code consisting of sequences of "marks" and "spaces", simply two tones at 2125 and 2295 Hz respectively. Transmitting and receiving can be easily done with any transceiver, an old PC and simple cables. Most contesters already have a computer integrated with their station, so getting on RTTY can be very quick.

For receive, the audio output of the receiver is connected to the PC's sound card input where the RTTY demodulator software decodes it into text on the screen. Alternatively, the receiver audio can be connected to a hardware RTTY modem which in turn is connected to the computer via a standard RS-232 cable. It is recommended to use an audio isolation transformer, e.g., Radio Shack p/n 273-1374, in line between the receiver audio output and the PC sound card or RTTY modem.

To transmit, a simple serial keying cable is connected from the computer to the FSK input of the transmitter, identical to the standard serial CW keying interface. Or, if a hardware RTTY modem is being used, then its output can connect to the transmitter's FSK input. A third transmitting alternative is to use AFSK (Audio Frequency Shift Keying) and connect the PC's sound card output to the transmitter's microphone input, using LSB mode. Again, an audio isolation transformer is recommended.

More details of these connections can be found in the 'Getting Started on RTTY' web page, authored by Don Hill, AA5AU: http://aa5au.com/rtty.html. He also developed and maintains a robust RTTY contesting web site: http://www.rttycontesting.com. Don gives an excellent overview all aspects of RTTY contesting, based on the WriteLog contest logging software. However, much of the information is equally applicable to setups using other software as well. There are also links to many other sources of information for new and experienced RTTY contesters alike.

There are several choices for software, and many people starting out today choose MMTTY, a freeware RTTY PC program for receiving and transmitting. While the RTTY modulation and demodulation capability is superb, the contest logging aspect of MMTTY is far less than what most contesters will want. For RTTY contest logging, three programs are most popular: WriteLog, N1MM Logger and Win-Test. MMTTY can be integrated with each of these so that excellent RTTY encoding/decoding is available with excellent contest logging.

Contrasted to CW contesting, where the operator's brain is timeshared between decoding CW and other tasks, in RTTY the computer does all the decoding for you. When properly tuned in on the receiver, the RTTY signal will result in clear "printing" of the transmitted characters on the computer screen. The good news is that this frees up the operator to attend to other details of contest operation, including very effective use of SO2R. The bad news is that until the receiver is tuned very close to the correct frequency of the incoming signal, only gibberish is available on the screen. Thus, many RTTY contesters use a narrow 250 Hz IF filter. Starting out, you may want to use a 500 Hz filter until you are accustomed to quickly tuning in a RTTY signal. With practice, your ears will be able to help you tune in the signal to within a few Hertz. RTTY decoding software and RTTY modems have tuning indicators to facilitate precise tuning of the signal.

Once you have basic RTTY receiving and transmitting working, and integrated with your choice of contest logging software, you will want to focus on making your system as streamlined as possible for the most efficient RTTY contest operation. Basic to this are the message buffers used almost exclusively for all RTTY contest transmissions. While it is easy to go into "keyboard mode" and be able to type free text, it is far more efficient to use message buffers, just as in CW contesting. Message buffers should be kept as short as possible to reliably convey the necessary information. Each message should be preceded with a Line Feed and ended with a Space. This sets off your transmission within the

screen of the receiving station in case there are gibberish characters around it as there often are. You will soon learn that some "gibberish" is actually numbers that were falsely decoded as letters. For example, 'TOO' is '599' when this occurs. If you suspect a letter group is really a number, as in a contest exchange, look at the keyboard and translate the letters to numbers by mapping the key above and to the left of each letter key.

Efficient RTTY contest operation for high rates also requires minimum keystrokes for each of (hopefully!) hundreds or thousands of contacts. Thus, it is important to study your logging software features to understand how to accomplish each phase of a RTTY contest QSO with minimum keystrokes. In many loggers, each phase can be achieved with a single keystroke. For example, the software will capture valid (based on Super-Check Partial) call signs out of the RTTY characters printed on your screen from incoming transmissions. Properly configured, the logger will grab the most recent call sign that is a new multiplier, else just a new band-station, drop it in the call sign field of the entry window, call the station and send your exchange … all as a result of pressing a single key on the keyboard! As the return exchange comes in, you can use your mouse to click on any part of his exchange that is not already pre-filled in the entry window. At the end of his transmission, you can press another single key to log the QSO and send a TU, QRZ message.

With the RTTY fixed speed of 60 wpm, it quite feasible to achieve hourly QSO rates in excess of 120/hour with a properly configured and tuned SO2R RTTY contesting station. Because the operator does not need to expend brainpower on decoding the signal, more attention can be given to tuning and operating each radio. In fact, this characteristic leads veteran CW contester K5ZD to point out that RTTY contesting is the ideal training ground for SO2R skill development in general.

As with SO2R contesting in the other modes, there is a choice to be made about whether to use a single computer to control both radios and sets of RTTY hardware/software, or whether to use two networked computers, one for each radio/RTTY setup. Basically, the latter is a Multi-Two setup with transmit interlock to guarantee transmission by only one radio at a time. Currently, the vast majority of SO2R contesters use the single-computer model, across all modes, CW, phone and RTTY. However, there are a number of advantages with the two-computer model and with the availability of PCs for Ham usage these days, it is quite practical. Furthermore, in RTTY contesting very little typing actually need be done, so two mini-keyboards (full size, but minus the number pad area) and trackballs/mice can be conveniently arranged at the operating position along with two displays, ideally LCDs. As explained earlier, only two key strokes and perhaps a trackball movement are all that is required for most contest QSOs in an appropriately configured RTTY contest station.

So, jump in and have a blast with RTTY contesting. While there are many similarities to CW and phone contesting, there are also a number of unique differences. This can add diversity and excitement to your overall contesting experience. Be aware of direct comparison to your current favorite mode of contesting and keep an open mind while learning RTTY contesting.

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**Fun at Jackson joint meeting (photos courtesy K6TA)**

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