My Journey to Remote Operation

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For the last couple of years I'd been seeing all of the interest and equipment for use in remote control of amateur stations and I was fascinated. The possibility of operating my station in Washington from my winter QTH in Arizona was compelling. I'd tried various stealth and attic antennas in Arizona and never had much luck. Add the poor grounds, high noise level and HOA antenna restrictions and it made me an unhappy ham. I was always thinking of that modest station with a couple of nice antennas, sitting on a hill in rural Washington.

And then when I was home in Washington, I began to think that maybe I didn't really need a bunch of radios in my office/shack anymore. One radio, remotely controlled, with the possibility of expansion to amplifiers, including coax relays, multiple antennas and beam antenna controls were enough to start me to seriously consider the idea.

With one good, remote controlled 100 Watt radio, I thought why not remotely control the whole system at home too. I could easily control a radio in the garage over the home LAN from my basement office. The garage, about 150 ft away was closer to my antennas anyway, and one radio control panel would sure de-clutter my desk.

I started some research on current offerings of remote control systems and software schemes and finally decided on the Remote Rig RRC1258 MkII-s from Microbit. This system was developed specially for remote control of Amateur radio

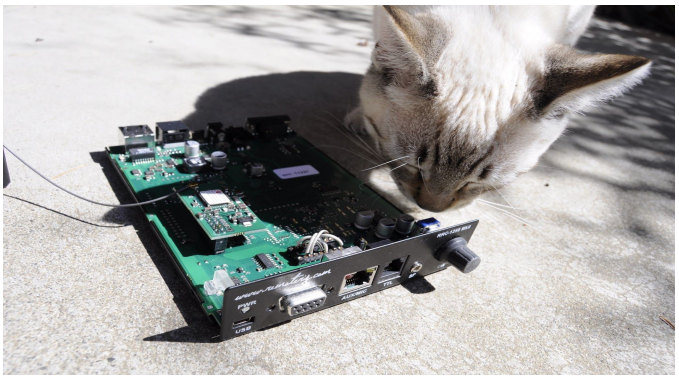
stations via the Internet and has a large and enthusiastic following of amateurs.

The RRC system requires a radio transceiver with a detachable front panel or a network jack. The RRC units are used in pairs, one is connected to the radio (the "radio" unit) and the other, (the "control" unit) is connected to the control panel or a PC with ham radio software such as HRD.

Each RRC box is the size of a paperback book and runs off 12 Volts DC and has an Ethernet jack for connection to a local area network/internet. I ordered the WiFi option for the control RRC so I wouldn't be limited to plugging in a network cable to use the radio.

Initially I planned to use my Icom 706 transceiver but it required a careful modification of the thin and fragile separation cable to make it work. Decided it was time for a new rig anyway and after some research I chose the Kenwood TS480SAT. I was keen to try the Kenwood brand after being an ICOM enthusiast for years. The TS480 lends itself nicely to remote operation with a good looking standalone front panel. A solid 100 Watt radio with DSP, a built-in antenna tuner and the ability to select one of two antennas from the panel was a plus.

The RRC units run about $475/pair and are manufactured in Sweden. The system is unique because no PC is needed; both voice and data communication are handled by the two units which include two com ports and a CW Keyer. The RRC-1258 can be configured to work together with current Amateur radio transceivers available on the market from ICOM, Kenwood, Yaesu, Elecraft, Alinco and Tentec. Because most Internet Service Providers (ISPs) change your outside internet address, Microbit provides a unique address using their own dynamic DNS service. This allows the control RRC to find your radio anywhere on the internet.



The setup requires some patience and it helps if you have experience with networking equipment such as routers. The online owners manual is thorough and well written and does a good job of telling you how to set up the boxes. There is both a hardware setup to do in your workshop and a software setup using a PC.

The hardware setup is straightforward with six small jumper wires installed in IC socket headers inside each box. This makes the units compatible with your radio's mike, control panel power data bus and key-line. Getting these working is not for the faint of heart.

You communicate with each box initially with the supplied USB cable and then over your network using its IP address. During the first tryout, my system worked on the home LAN but not over the outside internet. I just could not get it to work.

I joined the RRC Forum and soon had several people helping me. I found that even though I had a normal "everyday" router, getting the whole thing to work on the outside internet can be complex and frustrating. It helps if you have an understanding of networking protocols such as port forwarding. I thought I had a fair grasp of these things but was humbled more than once during the troubleshooting process. But I stuck with it, asking questions and getting help on the forum. I even had one ham, Mitch K7DX use the "team viewer" app to actually log onto my system and help figure out the problem. We solved it and the RRC has worked flawlessly since.

My next step was to work on the radio-end of the remote system. This is probably the most important part of the whole remote setup. When you are miles away from your station, everything has to turn on and work when you hit the power button on the remote end.

That means the whole radio installation has to be gone over with an eye for detail and safety. The power wiring must be cabled correctly, tied and separated from other signal paths. All DC components must be correctly fused and the right gauge of wire for the current flow expected. The coax runs, the ground system and the antennas all must be installed so as to need little maintenance. That is not to mean I don't experiment with antennas and station modifications but the main part of the station should be as mature as you can make it.
I felt that for my base of operations, the remote transceiver should be in a safe and secure box with the power supply and radio RRC. Residing under my workbench in the garage, the box had to have cooling and look decent. I built a custom box from plywood with three interior shelves sized for each module, with openings for air flow.

Smoked Plexiglas covers with 1" holes near the bottom were fastened to the front and rear along with a pair of lift handles on the top. A 12 Volt muffin fan was mounted externally to pull cool air in from the bottom and exhaust out the top rear of the box. I felt that no air filtering was needed but could be added at a later date.

I initially ran the muffin fan power off of the external antenna tuner plug on the TS480, so when the radio was commanded on, it powered the fan. I thought this was a great idea but I was unable to find any specs on permissible current draw for the Kenwood external tuner so I considered it best to power the fan from the main DC supply. But I only wanted the fan to run when I was operating the radio.

By this time I was onto the next step in remote control, a web relay. Microbit offers a module called a Webswitch 1216H. This is a remote controlled "switch" with 5 relay outputs 230V/16A which can be controlled independently from any computer connected to the internet. An important feature is that the Webswitch restores the status of the relays after a power failure. This was the piece I needed to expand my remote station to the next level. I wired three of the Webswitch relays to power the fan, a remote coax relay and an auto antenna tuner.

I left the other two relays open for future expansion, possibly for switching an amplifier. The Webswitch will also control an antenna rotor with an optional RS232 cable. The setup on this one was easy and I had it up and running in just a few minutes. I have the Webswitch bookmarked and during operating sessions, I turn on the power to the fan and then control the other equipment as needed.

How well does everything work? Exceptional! I've been using the remote rig system now for about 18 months and have not had one failure or glitch. The RRC system seems bulletproof once it is correctly set up and running. Making a contact remotely in arizona, I have to keep reminding myself that my transmitter/antenna is actually 2000 miles north of where I am sitting!

With this project, I had to look at my amateur station a little differently. Station components and wiring had to be more permanent than my usual "hook it up and try it out" way of doing things. I made the station configuration more durable and currently run two multiband antennas, one dipole and one vertical. I've learned a lot more about internet networking and protocols and patience while troubleshooting. In the end I have a very durable station and one that will grow with my future equipment and operating skills.

Notes
Microbit Website: http://www.remoterig.com/wp/

Remote Rig Uses Manual:
http://www.remoterig.com/downloads/RemoteRig_RRC1258-MkII_Users_manual.pdf

Remote Rig Forum: http://www.remoterig.com/wp/?page_id=906

Webswitch Page: http://www.webswitch.se/wp/

About the author

Dave Ingebright, WB7ELY, holds a General class license and is active with a digital station on the HF bands. Dave holds an Electronic Technician certificate from DeVry and a 2yr Electronics Technology degree from Shoreline College. Dave was a technician and then a manager in the Boeing Flight Test Avionics shop for 25 yrs and later retired as a flightline manager from the Boeing Co. He is a tireless designer and builder of electronic gadgets in his spare time. Dave holds a patent on an optically isolated intercom system for flight test aircraft. You can reach Dave at daveingeb@comcast.net