

Remote CW Over the Internet from a Restricted Location

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Many of us have thought about how it would be great to use our home stations while away from home. My desire was to be able to have some enjoyable CW QSOs while sitting in a hotel room, using my notebook computer. This was achieved with some excellent help from Red, K5ALU, as evidenced by this photo taken in Florida in January 2008.



It may be fun to take a rig along and operate portable, but this is not always feasible. Thanks to the development of computer rig control and some clever Internet-based PC applications, it is feasible to operate CW and SSB from your hotel room using nothing more than a notebook PC.

Every ham station is unique to the needs and wants of its operator, and remote operations are no different. Before I tell the whole story, let me jump to the conclusion and list the components of my remote radio system:

Home station:

IC 756 PRO 2

PW1 amplifier

Sony Vaio laptop running the following software

- Windows XP
- TRX Manager, v 4.1.7

- LogMeIn Free
- Skype v 2.0
- Smart Keyboard GUI (N4YG) v 2.0.4

N4YG Smart Keyboard USB Morse interface

MicroHam Micro Band Decoder (to isolate the PRO 2 yet allow it to control the amp and screwdriver properly)

Ameritron Automatic Screwdriver Antenna Controller for Icom SDC 103

Webcams on the rig (Logitech Quickcam) and backyard (Linksys Wireless Webcam WGC)

Internet access at 300 kbps or better

Remote PC

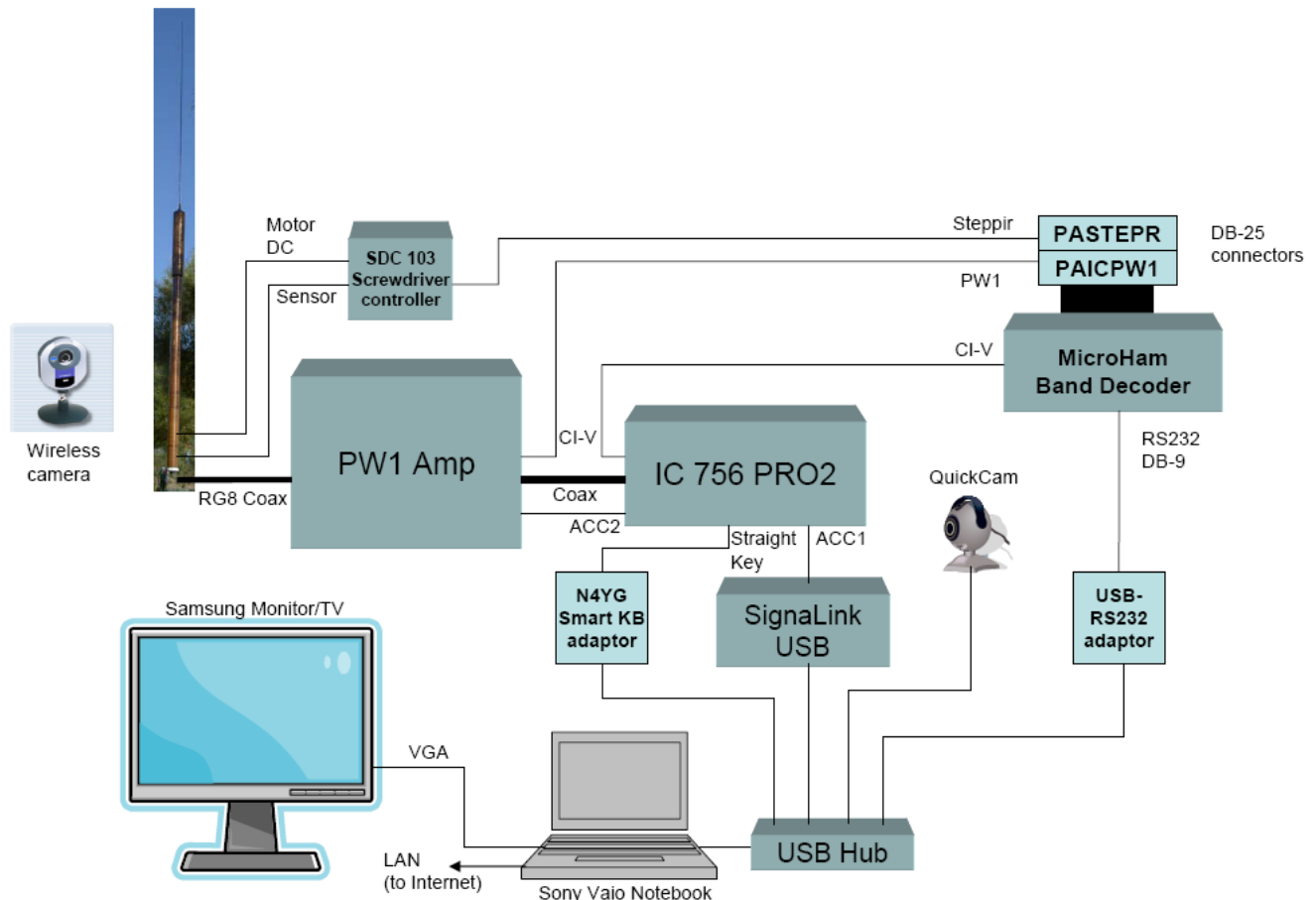
Sony Vaio notebook running Windows XP

Internet access at 300 kbps or better

Connection to the following web services:

- www.logmein.com
- www.skype.com (running Skype v 2.0)

The diagram below shows the appropriate elements and their interconnection at the home station.



For me, this was a journey that lasted nearly two years, starting first with a single station setup using local rig control of an FT 847 through a free program called Ham Radio Deluxe (HRD). I chose the 847 because it provides automatic tuning of an ATAS-120, which I wanted to set up as my fixed HF antenna. I happen to live in a CC&R restricted area, where neither outdoor antennas nor even a radio station are

permitted. I needed to practice the stealthiest form of ham radio if I wanted to stay legal and be a good neighbor.

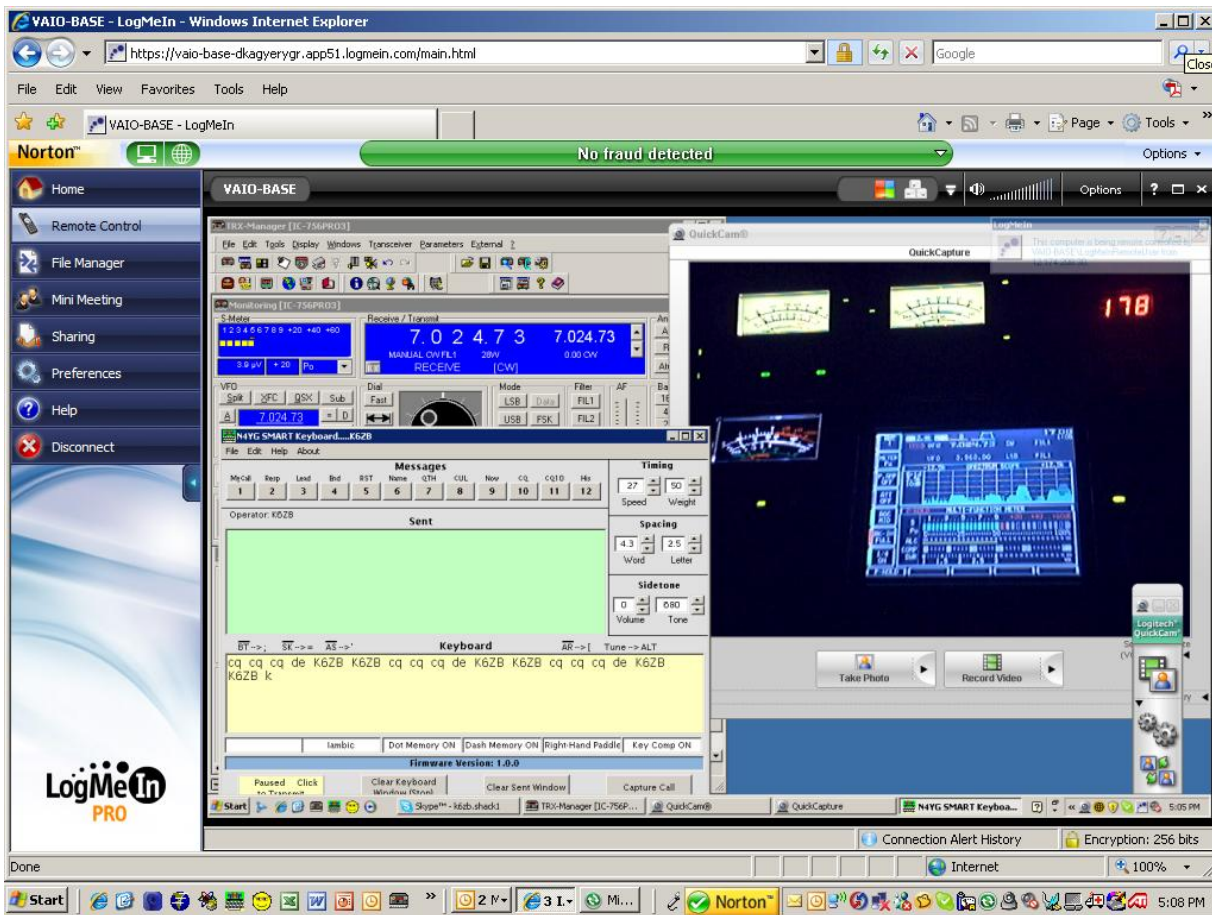
The 847 with HRD proved that it would be feasible to operate a radio using a PC, but there were some limitations for CW and remote operations. At first, I couldn't even get high-speed Internet service in my community, but a second cable company informed me that they would include it with their offering. On the other hand, getting connected remotely over the Internet would take a lot more trial and error.

It turned out that the 847 lacked good QSK performance (something I had many years ago on tube gear) and was otherwise not good for my kind of operating. I traded up to an IC 756 PRO2 and this radio proved to be excellent in many respects. Icom uses CI-V, a control and monitoring protocol that is similar to serial networks such as Ethernet. This is a scheme where several radios and devices can share a single two wire line and exchange data as needed. Each radio has its particular set of parameters that can be controlled and monitored, and the PRO2 had nearly everything one could imagine needing.

HRD is a good stand-alone rig control program, where your PC is wired to your rig. At the time, there was no simple way to extend that connection. After researching the alternatives, I ended up purchasing a copy of TRX Manager, a fine piece of software developed by F6DEX. I could run TRX on the home computer connected by wire to the PRO2, and run TRX on my remote laptop as well. After the normal fits and starts in configuring software (and F6DEX was helpful through his Yahoo Group), I could actually control the radio over my household network using Internet Protocol (IP). This proved the concept but left open the big issue that you run into when going out over the public Internet. Home networks reuse a common set of private IP addresses (often 192.168.0.0 through 192.168.254.254) while on the public Internet, we use public addresses that are unique. The conversion is accomplished in the router that connects to your ISP.

When you connect to the Internet, your ISP automatically assigns your computer a temporary IP address; these come from a range of addresses assigned to that ISP. The same goes for your laptop at the remote location. So, both your address at home and the one of your remote PC are unknown and thereby preclude your making the connection. Most ISPs offer fixed (Static) IP addresses, but at a premium price bundled into a Business rate.

There are several workable solutions to the problem, all based on using software that identifies the addresses on both ends for you. You then plug those into TRX and it makes the connection. I never actually made this approach work and so my quest was put on hold for several months. The solution came from Red, K5ALU who figured out that you really don't need to bother with IP addresses. He discovered a simple approach for remote PC control that we all hear about on AM radio broadcast advertising – remote PC desktop access using products like GoToMyPC and PCAnywhere. Red recommended I try the service offered on the Internet by LogMeIn (at www.logmein.com). You can download a free version into your home station PC and then it waits for your request to connect. Then, from your remote location, you access logmein.com, and then connect to your home PC where you have left TRX running. Once connected, you'll see the same desktop as at home and you control just as you would sitting in front. This is a screen shot of the actual desktop in front of me in the photo from Florida, above.



Rig control programs like HRD and TRX fail in one important respect – they don't simultaneously provide an audio link so you can hear the receiver. One suggestion was to use a piece of software called IPSound, but I couldn't figure out how to make it work remotely. Red's simple and effective solution is to use Skype installed on both PCs. You call your home PC, then answer yourself using the facility of LogMeIn. Thanks to the ham digital community, getting the audio from the rig into the PC is simple. You can do it with a sound card interface like Rig Blaster. This works, but you may also need an RS-232 to USB adaptor as well. I ended up with the SignalLink USB from Tigertronics. It's very simple to connect and configure, it's cheap, and it works really well for both CW and SSB, as well as digital modes.

The home station is shown below in the recent photo. The webcam provides the display of the "instrument cluster" containing the spectrum scope and frequency of the PRO2, the position of the screwdriver, and the band and status of the PW1 amp. This allows me to be sure that all settings are correct when I key-down at 1 kW. It's also comforting to know that the station isn't smoking! There is also a wireless webcam pointed to the back yard to verify that no one is standing too close to the antenna; or that we don't have an approaching brush fire. The output video is simply displayed on the local PC desktop, allowing the remote computer to have the same view. Having all of this software running at the same time tends to increase latency and audio distortion, so I typically close the camera applications when I'm actually listening or in QSO. The PRO2 and PW1 also allow for full QSK even over the remote link.



Sending CW involves using the keyboard on the notebook, along with either the keyboard feature on TRX or another piece of software for that purpose. I found that the keyboard in TRX is not easy to use and suffers from erratic Morse generation. You can smooth things out by setting the program to complete words, but I found this to be unnatural and less than satisfying. A better approach is to have the home PC buffer the text and use a separate Morse character generator that does not use the CPU of the PC. Also, connecting a paddle to the remote PC might be possible but I don't believe the latency of the Internet and other elements will afford a satisfactory experience.

To provide the external Morse generator, I first used the Morse feature of the PK-232 by Timewave (formerly AEA), which can be had for \$100 on eBay. It can also receive CW as well as operating many digital modes like Packet and PacTOR I. However, the best solution for me turned out to be the Smart Keyboard, presented by N4YG in the July 2007 issue of QST. The article fully describes construction and Joe offers a full parts kit, with case, for about \$60. Once completed, you download for free a simple Windows program that works well and is quite intuitive. You can also use the adaptor at home with your paddle as it performs as a decent keyer as well.

There's another chapter to this story that has to do with my stealth antenna, formerly the ATAS 120 that I set up five years ago. Back then, I quickly discovered that 100 Watts into a five foot screwdriver doesn't make for many QSOs on 40 and 20 meters. I wanted QRO and more metal in the air. I picked up a 600 Watt solid state amp from Tokyo Hi Power and a High Sierra 1800/PRO screwdriver. This 12 foot

tall antenna could work 80 through 15 meters, and took the power. The combination greatly improved the quantity and quality of my CW contacts when at home.

As a former boss once said, “better” is the enemy of “good enough”. Ed, K8RD, told me about a much larger screwdriver called the Predator that had tested out better than nearly every other screwdriver on the market. I contacted the seller, N9JMX, and learned that he was basically selling these babies at cost (around \$500), the same price as the High Sierra. So, I moved up to one of them and found it did improve performance. The next photo shows the Predator as installed on the wrought iron fence along the backyard. The direction is North, over the Simi Valley and toward the San Gabriel Mountains. Note the camouflage coloring and screening trees. There are about 50 ground radials to reduce losses and I’ve installed a few elevated radials for 40, 30 and 20 meters. Percy, KF2AT, analyzed the configuration with Mini NEC to show further improvement.



Without the FT-847 and ATAS 120, I could only control the big screwdriver manually. MFJ, in the guise of the newly acquired Ameritron company, later came out with a neat box called the SDC-103, which contains a PIC controller. Through the CI-V interface, it reads the band information and moves the antenna to an appropriate preset (preprogrammed by me). However, I discovered that the system failed to function once I added the computer and TRX. According to my tests and research, the likely cause was an inability of the PIC controller to sink the current from all of the other boxes at the same time. I found one workaround, demonstrated to a few members at the Orlando Gathering last December,

based on using a second Icom radio to control the screwdriver and the PRO 2 to control the amp. TRX has the ability to toggle back and forth between rigs, which was cumbersome and prone to cockpit errors (Ed had to coach me through my own system during the demo).

There is the old saying that a vertical antenna works equally bad in all directions. There is also the advantage of not needing a rotator! That can be pretty important when your base station is in California.

The key to making this all work from the touch of one key was a smart little box called the Band Decoder, made by MicroHam (www.microham-usa.com). Their US expert, Joe Subich, W4TV, was very helpful getting me the right cables and overcoming some of the configuration issues. Really, the Band Decoder has the flexibility to function the way I wanted, but like any software driven element, it has its learning curve. Now, the system meets my original requirements for true remote operation, with QRO and band changing.

Look for me on the air from anywhere I can get that decent Internet connection! I'd be delighted to answer any questions and provide configuration details. Good luck with your own journey to satisfying remote ham radio.