China Earthquake Victims Aided By Amateur Operators

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JUNE 28 & 29, 2008

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The Greensboro Amateur Radio Association

Feed Line

Providing Amateur Radio news for the Triad

Volume 17, No. 5 | May, 2008

Editor: Tom Forrest, N4GVK | Web Site: www.w4gso.org | E-mail: info@w4gso.org

A Relatively Low Cost, Low Loss, Home Built Center-Fed Vertical For 20m - 10m

(And some thoughts on why we might want a vertical antenna anyway)

Story and Photos
by Will Ravenel, AI4VE

Introduction and Background

There's relatively little home-brew activity in Ham Radio today compared to the days before surface mount components and DSP chips. Antennas, however, are still something the average Ham can build that will provide performance as good as many commercial products at a much lower cost. Unless you're into serious contesting there's plenty that can be accomplished with basic wire and simple aluminum tube antennas. If you want to feel more like a "real" ham and less like a high tech consumer, build your own antennas. You'll have fun and learn a lot in the process.

Since my HF rig (Ten-Tec Argo V) tops out at 20 watts I'm interested in high efficiency antennas, and since I don't have much real-estate I want my antennas to operate on multiple bands. So far the best solution I've found for these requirements is to build center fed antennas and use balanced feed-lines into an antenna tuner. These antennas look like the basic dipole, but are different since they might not be resonant on even one band and certainly not on all they are used on. These mulitband antennas are more properly called "doublets" and some call them "center-fed Zepps". The balanced feed line makes it possible to operate these antennas on frequencies for which the antenna length represents _ wavelengths and longer. This works because balanced feedlines, unlike coax, can handle fairly high impedances with very low loss as long as those impedances don't exceed the tuner's ability to convert them to a 50 ohm non-reactive load from the radio's perspective.

Prior to this project I've been operating with a doublet cut at 88 feet, a design recommended by L. B. Cebik, W4RNL (check out his web site, http://www.cebik.com/radio.html, for a treasure trove of information about antennas). This antenna permits operation on 80m through 20m with a dipole-like beam pattern that maintains the same lobe orientation over those bands. This means that if you have a variety of suitable trees or other supports you can string the antenna so that the two opposing directions of gain you're interested in will remain at a constant bearing as you tune the impedance match from 80 through 20 meters.

The problem is that unless you can get these horizontal antennas up in the air close to a wavelength in height, the vertical angle of maximum gain (take-off angle) is pretty high. OK for working toward your WAS certificate, but not too good for DXCC. On 20 meters that means an optimum height of about 60 feet.

Vertical antennas have lower overall gain than dipoles, but have three big advantages:

1. They produce very low take-off angles - This is important for DX performance. Low take-off angles result in long bounces (refraction) off the ionosphere meaning longer distances with less signal loss. A properly designed vertical can even result in higher gain at these low angles than you can get with a horizontal dipole that's not high enough.

2. They radiate equally well in all directions - No need to rotate the antenna or build multiple horizontal dipoles and antenna switching systems to perform on all azimuths.

3. They have a significant null overhead - This attenuates a lot of the high angle, short range, multi-hop QRM that clobbers low level DX signals. Vertical antennas are quieter (unless you have vertically polarized noise sources in the immediate vicinity).

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NEXT MEETING
May 26

The next meeting of the Greensboro Amateur Radio Assoc. will be May 26, at the Golden Corral Steak House, 4404 Landview Dr, Greensboro, NC 27407, off Wendover Ave., near Sam's Club.

The program will be software defined radios, Flexradio and a demonstration the power SDR software.

Vertical antenna construction from page 1

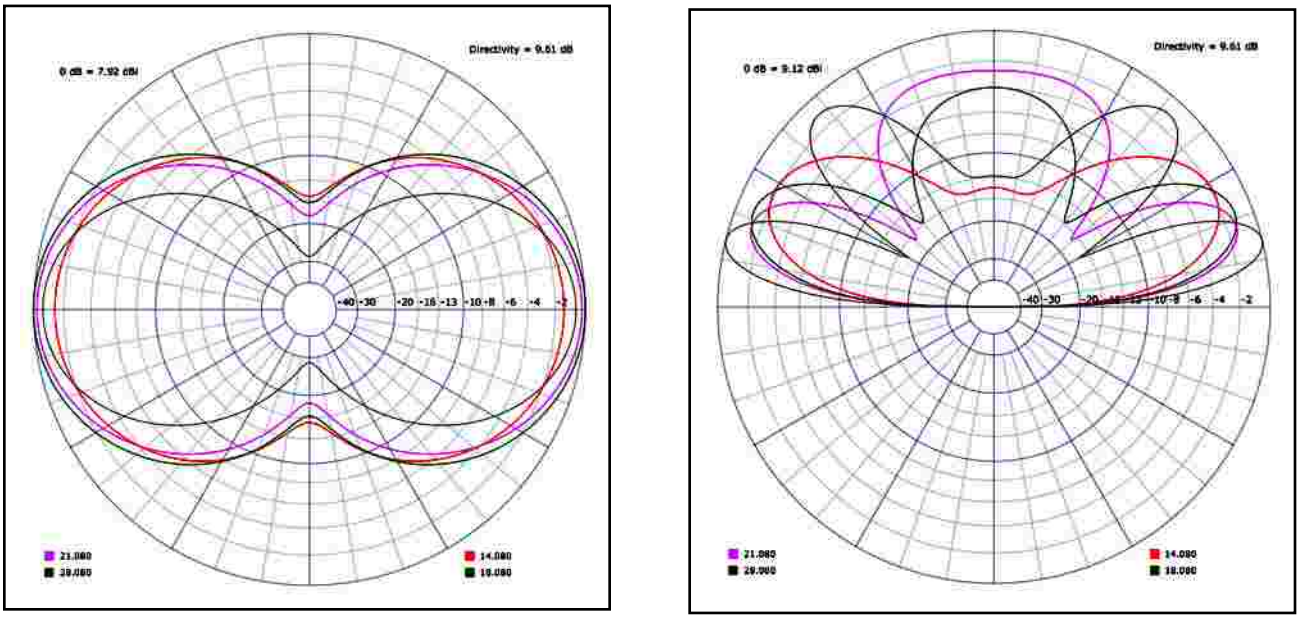

Figure 1. Horizontal doublet with same dimensions as my vertical antenna - radiation patterns at 35 ft. Azimuth (left): Note the loss of gain at bearings off of broadside. Vertical (right): Note the high take off angles and vertical lobes

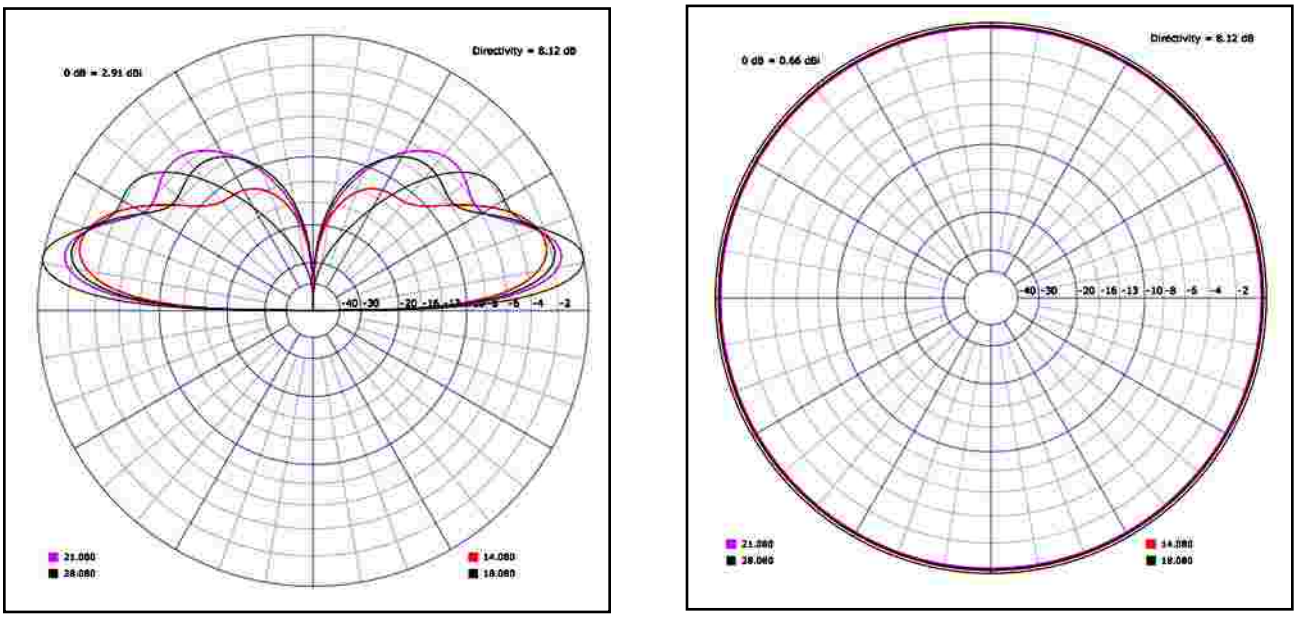

Figure 2. My vertical antenna radiation patterns. Azimuth (left): Note the uniform radiation at all bearings. Vertical (right): Note the low Take-Off angles and lack of vertical lobes.

Basic HF vertical antennas come in two flavors (not considering shortened, loaded antennas): Quarter wave verticals with radials (elevated or ground plane) and vertical half wave dipoles. The radials for the quarter wave variety should also be a quarter wavelength in length. If elevated, you can get by with three to four radials but if ground mounted the more radials the better up to around 120. You can get pretty good performance with 16 to 32. As I stated earlier, I don't have much real-estate, so radials are a problem. That's why I decided to build a vertical dipole.

Construction

OK, enough theory, let me explain how I built my antenna. I went to the Charlotte Hamfest looking for suitable materials. There was a guy there selling four foot lengths of military surplus heavy walled stackable aluminum tubes. You may have seen these at Hamfests, or on eBay, or in the army. I think they're designed to be used as tent poles for large field tents and camoflage netting. You could buy a package of eight with a base (too flimsy to be useful), two guy rope rings, and eight stakes. You lose 3.5 inches per tube in the joint so eight poles will give you a total length of about 30.3 feet. Add a ninth pole and get to about 34 feet. Pretty close to a quarter wavelength on 40 meters or

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Vertical antenna construction from page 2

a half wavelength on 20 meters. I bought a set of eight poles, one additional aluminum tube, and two fiberglass tubes for $70. My plan was to use the eight feet of fiberglass as a base to raise the high voltage bottom of the dipole out of reach of kids and most curious adults.

In order to build the center fed antenna

using an odd number of poles, I had to cut one pole in half. This gave me 4.5 poles, or 14.54 feet, for each half of the

antenna. I needed a non-metallic connector at this center point in order to isolate the two dipole elements where the feedline attaches. Fortunately, fiberglass connectors for these tubes exist and I found one on eBay for ten bucks. Seemed like a lot for this little piece, but it was just what was needed. The connector has a raised center ring that will support one of the two guy rings that came with the tube set. I assembled the two half poles, insulator piece, and guy ring, then drilled holes through the poles and connector near the center ring so that an aluminum pop-rivet could be used to attach pigtails for the feedline. I used a five foot length of pressure treated 4x4 post to give the base of the antenna a firm support. The post was buried 30 inches into the ground and two galvanized conduit clamps were used to hold the base (a little overkill, but they do the job).

The rest of the antenna was assembled after the mating sections were sanded, cleaned with a circuit board solvent, and covered in a conductive, anti-corrosion goop made for aluminum contacts (Gardner Bender's Ox-GuardTM found at Lowes). The fit was pretty good, especially with the goop, so I didn't use any fasteners (might have been a mistake - time will tell). After attaching the 450 Ohm ladder-line and three fifty foot lengths of 6/32" dacron line to the guy ring, my son helped me walk the antenna up against the base post. The thing seemed pretty rigid up to this point. It's amazing how much bend was in the total length before it was vertical. I extended the guys at 120 deg from each other with one opposite the feedline to the rear and attached them to substantial trees (the chosen antenna location was a compromise between relative clearance above, positioning between three suitable trees, and relative proximity to the house). Here's a bad picture of the final product. The object in the pole toward the top of the picture is the guy ring and feed point of the antenna. Viewed from the house the antenna blends in with the trees and is nearly invisible.

So how does it work? With an MFJ 939 tuner I can operate on all bands between 30m and 10m with tuned SWR less than 1.5:1. I've not had a lot of operating time on the antenna so far. Last weekend I heard a European Russian station on 20m calling CQ. This was a CW station and his signal didn't even register above the S5 noise floor on the meter. I sent a call and he came back with QRZ? After three more tries he actually copied my call and we exchanged signal reports before he sank completely into the noise. At 5157 miles this is my second longest range QSO to date. Not bad for 20 watts and no sunspots. Mid-week there were a few sunspots and conditions improved. I was making 30m contacts to Wyoming and the west coast in the early evening. The Wyoming station was running 10 watts on an Elecraft K2 and I was running 20 on my

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GARA Meeting Minutes

Regular Meeting Minutes
April 28, 2008

The regular monthly meeting of the Greensboro Amateur Radio Association was held on Monday April 28, 2008 at the Golden Corral Restaurant near Wendover Avenue and I-40.

The meeting was called to order at 7:15PM by President Chris Thompson, K4HC. Roy Smith, N4BYU, suggested that we have the presentation first because our featured speaker was Guilford County Sheriff B.J. Barnes and the possibility that he may need to leave to tend other matters. This was agreed to and we had a great presentation with Sheriff Barnes discussing the need for a new jail and the type of crimes we have in Guilford County. He then held a lengthy question and answer session.

Guilford County Sheriff B.J. Barnes talks with GARA members at the April meeting.

(Photo by TomForrest)

The regular part of the meeting started at 8:25 PM with Chris asking everyone to introduce himself or herself. Chris then explained that we did not have a board meeting in April due to not securing a location soon enough. He then asked for approval of the minutes as published in the newsletter. Roy Smith, N4BYU, made a motion to accept, Bob Morris, W0EG, seconded, and the motion passed. Chris asked the club officers if there was any new business. John Standberg, AJ4BT, suggested an "Open House" type event to show the different types of ham radios to club members as well as the general public.

Bob, W0EG, commented on the successful triathlon that was held at Belews Lake.

Ernie Wall, NC4EW, said, "Bills paid, checkbook balanced and money in the bank."

Ernie also stated that we have an equipment insurance premium to pay in May. Al Allred, K4ZKQ, said that the finances are in line with the forecast.

Alan Bradley, KD4IUN, spoke about the soccer tournament that is coming up on Memorial Day weekend and he still needs more operators to volunteer. You can reach Allen at kd4iun@arrl.net.

Roy said that the equipment inventory is finished, the equipment value is being assessed and that the insurance will probably increase. Roy also spoke more about the open house that John spoke about and asked the club to sponsor it. Roy gave thanks to everyone who worked at the triathlon. Roy then said that two members have asked him if we could build a member data base with member information and equipment lists. Chris said that we have a members only section on the website that would be a great place for a data base like this, Gerald Donnelly N4PAX, who was one of the people asking about a data base, said that he would be happy to type it up if he had the information.

Gerald will look into what it would take to build the database and confer with Tom Forrest about putting it on the website. Chris said that Rick Mainheart WB3EXR and himself are hosting a Technical net on Sunday nights starting around 7:30-8:00 PM.

Al spoke about the highland games coming up on May 3.

Chris mentioned that there is a new gathering spot "Hams at Hams" at the Hams lakeside on cone Blvd Friday afternoon with talk-in on the repeater. Chris then spoke about the informal luncheon with Riley Hollingsworth K4ZDH at Cracker Barrel. Roy made a motion to adjourn, Gerald seconded

GARA Board Meeting Minutes
May 12, 2008

The GARA board of directors met at the home of Ernie Wall, NC4EW, on May 12/2008 at 7:15PM. Members present were Chris Thompson, K4HC; John Strandberg, AJ4BT; Roy Smith, N4BYU; Ernie Wall, NC4EW; Bob Morris, W0EG; Dave Touvell, KN4ZO and Greg Spencer, KG4UQV. Al Allred did not come due to not wanting to drive that far at night. Chris,

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For Sale

Kenwood TH-K2 Handi-Talkie in like new condition and with 2 antennas, the original one and a Diamond RH519, that I will sell for $90... it has all the accessories that it came with, the original box and the User's Guide. E-Mail is jecchile@yahoo.com Phone number: 854-5088 (Anytime except between 11pm and 8:00 am)

About 6-7 years of QST. Maybe more. All in excellent condition. Trying to make room for other things. Just dont use them and they are taking up space. No charge for them but would like to donate them to a young individual excited about ham radio. No picking or choosing. Take entire lot. Bring their own boxes and transportation. John Shea, N4DSP, 336-684-9253, cell; 336-565-0271, home.

Kenwood TH-F6a tri-bander (220mhz, 440mhz, and 2m)- Has had hardly any use - works great - not a scratch on it. Sell for $280. Original box, all paperwork, supplied accessories and charge cord. Already programmed with lots of the local repeaters and surrounding areas, etc. Contact: email at Rudy Langley, kg4hct@aol.com, or call 253-2421 and leave me a message.

GARA Board Meeting Minutes
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K4HC, said that we will make plans to pick up Al for upcoming meetings if necessary. Old business, Roy N4BYU passed around the inventory list and we discussed some things that were incorrect. The main item of interest was the VHF duplexer, which was listed as a Phelps Dodge. The Phelps Dodge was replaced last year with a new Telewave duplexer, Chris said we need to list both duplexers on inventory. There are some items, which are still being valued. The inventory list will be updated and forwarded to the insurance company to update their records and a copy placed in the club files.

New business: Bob, W0EG, said that our UHF 442.875 repeater is not compliant with control regulation, Chris said that as far as he knew the automatic control is sufficient. Bob said that he had seen a telephone sharing device that would allow us to use the existing phone line to control both repeaters, Chris said that that would be a good idea and we discussed the issue. Roy, N4BYU made a motion to purchase the device and Dave, KN4ZO seconded, all were in favor and the motion carried. Bob said that he would personally contribute $20.00 to the purchase. Roy, N4BYU gave out a repeater control code list and we discussed the operation of the various controls.

Bob, W8JFQ, is interested in putting an Eccolink node on one of our repeaters; Roy suggested the 442.875 repeater as it is used less than the145.150 repeater. Roy also spoke about the possibility of adding a letter to the repeater control codes to prevent anyone from accidentally getting into the control area of the repeater. This is something we will look into if the repeater is used for Eccolink. Roy said that GARA owns two 440 MHz Radios that were used for linking at one time. We have no need for them at this time and Roy said that we need to use them or possible sell them.

Roy also said that the club has a repeater linking module that we once used on UHF and that is no longer used. Chris said that he did not see a need for that. Roy said that he knows someone who wants to buy them. We would need to establish a fair price for them. The discussion was tabled at this time. At this time the officers were polled to see if anyone had anything else to discuss.

Ernie Wall, NC4EW, said that the bank account is doing well and the bills are paid.

Roy Smith N4BYU wanted to know what the cost was to run the club for a year in relation to what the clubs income is. Without the public service grant we would not be able to stay in the black. We are looking at some other fund raising options for the future.

Roy said that he still has not gotten the phone answering program running to record the Amateur Radio Newsline for our Sunday night information net. He is researching another brand to see if it will work for our needs.

John Standberg, AJ4BT, talked about the open house that we are planning. We are looking at some advertising such as post cards and/or a newspaper ad. The date has not been set but we are looking at sometime after field day. Chris said that he is planning to do another technician license training class after the open house. Roy made a motion to have John Strandberg check with the city about the Lewis Recreation Center as a venue, Chris seconded. Motion passed.

Bob Morris, W0EG, suggested approaching some vendors to advertise in the Feed line.

Roy spoke about the Feed Line mailing to certain members at no charge on a case by case basis. Roy also made a motion to increase the Feed line mailing surcharge to $12.00 starting in January of 2009; Ernie seconded. This will be brought up again at the October meeting. Chris made a motion to adjourn at 8:45 PM; Roy seconded.

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Argo V. He was clear as a bell and gave me a 599. I guess the antenna works!.

[Update: I spent a few hours on 20m and 15m during the CQ WW WPX Contest this last weekend and added 13 new entities to my log from Europe/Africa and a few in South America/the Carribean. I tried the ARRL DX contest the first of March and couldn't get through to any European ops (didn't hear any either). Did alright in the Carribean and South America, though.]

If you have an article you would like to submit to the Feed Line, please send it to Tom Forrest, n4gvk@bellsouth.net

The Greensboro Amateur Radio Association

President Chris Thompson, K4HC
Vice-President John Strandberg, AJ4BT
Treasurer Ernie Wall, NC4EW
Secretary Greg Spencer, KG4UQV
Financial Al Allred, K4ZKQ
Engineering Chairman Bob Morris W0EG
Operations Roy Smith, N4BYU
Member at Large Clark Doggett, KG4HOM
Member at Large Dave Touvell, KN4ZO
Appointed Positions:
News letter editor and Webmaster:
Tom Forrest, N4GVK

Meet Our Members

Will Ravenel, AI4VE

The GARA member for May is Will Ravenel, AI4VE.

Will was born in Charleston, SC and moved to Myrtle Beach, SC when he was 10. He graduated from Myrtle Beach High in 1971 and went to Duke University for a year and a half before transferring to the College of Charleston for a degree in Marine Biology. Not being much work in that field, he then went on to Florida State University and got a Master's degree in Oceanography. With his Master's degree it landed him a job at Western Electric in Greensboro in 1980. He is presently working for General Dynamics on a number of government and commercial contracts where he gets to apply some remnants of his oceanographic training. He describes his job as mostly making viewgraphs.

Will became interested in Ham radio in the summer of 1979, while in graduate school. He was working a summer job on a research platform about 12 miles offshore from Panama City.

Will commented, "We would spend a week working on the platform and then a week on shore. One of the guys working with us was a Texas A&M graduate student who was a very active Ham. He encouraged a couple of us to study code and the theory then tested us. By the time the research project was ended by a late July hurricane, I was a Novice class Ham - KA4LAJ. I thought the license would come in handy when I got my boat and sailed around the world. Still waiting for that."

"I upgraded to General in 1984, became N4QWO, and bought a Kenwood TS-120S. I had fun with that rig but family responsibilities soon led me to sell it and I became inactive for 20 years or so. Last spring I heard that the code requirement had been dropped and decided to try for Extra at the Charlotte Hamfest. I passed and bought a Ten-Tec Argonaut V that went on the air in November last year. I forced myself to work CW and to my surprise found I like it a lot. Since then I've worked 47 states and 45 countries - all on 20 watts or less," he added.

This makes him continuously licensed for 30 years this summer. Will's favorite equipment includes: Ten-Tec Argo V - Great CW and digital mode rig. He likes 40m/30m/20m and CW, PSK-31, and some voice.

"CW or PSK-31 on 30m can be a real haven when the big contests are running. Recently bought a FLEX SDR-1000 and am having fun learning the future of radio. I'm taking an ARRL antenna modeling class on-line and like making my own antennas," he said.

His activities include fun chasing states and slowly collecting DX entities. He joined the FISTS CW club after meeting several members on the air.

Will lost his wife of 15 years to a car accident 11 years ago. His children, son, Aubrey, is 24 and is graduating from UNCG this summer and his daughter, Emma, 22, will graduate from Savannah College of Art and Design this summer.

"I'd like to thank everyone for the welcome I've received and to extend kudos to Chris and the board for making GARA such an exceptional club," he concluded.

Editor's note: *A note of thanks to Will for providing this month's feature article for the Feed Line. Will provided the text and the photos.*

Get Well

This information from Don Harris, W4BUZ on Rusty Hughes, WA4SAD.

"I talked with Rusty on Monday(5/12) and he advised that his doctor has diagnosed his condition as being Lou Gehrig's Disease, otherwise known as ALS."

" He has the two wheelchairs he now needs, one to move around in his home and one that can be carried in a vehicle. He doesn't have the vehicle problem resolved yet," Don said.

Please keep Rusty in those prayers. Rusty is in good sprits. You can call him at 292-0227 and chat with him, or send him E-mail at rdh60@bellsouth.net and chat with him that way.

Wilmington Chosen to To Test Digital TV Switch

Residents of Wilmington, NC are to be lab rats before nationwide transition to digital TV.

The Federal Communications Commission plans to make the greater Wilmington area a digital-TV test market to work out any bugs before the entire nation goes
all digital on Feb. 17.

All four commercial broadcasters in the Wilmington region ˜ with a population of about 400,000 ˜ have agreed to turn off their analog signals and broadcast in digital only starting Sept. 8, 2008. The switch will be preceded by an intensive local consumer education campaign, including TV and radio ads.

"This will help us understand what we need to do to prepare the rest of the country", FCC Chairman Kevin Martin said.

Amateur Operators Aid In Chineese Earthquake Aftermath

Via ARRL

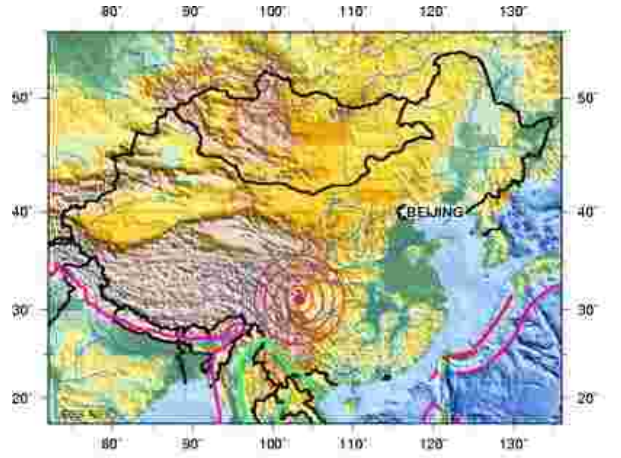
On Monday, May 12 at 0628 UTC, a magnitude 7.8 earthquake hit Sichuan, China. The Chinese Radio Sports Association, the Chinese IARU Member-Society, has designated the following frequencies for emergency services involved in the rescue: 14.270, 7.050 and 7.060 MHz. The ARRL encourages US amateurs to be aware of the emergency operations on those three frequencies.

The CRSA Web site reports the following:

"On the afternoon of May 12, 2008, Wenchuan Area of China's Sichuan province was struck by an earthquake. Communications in some of the surrounding areas are currently cut off, and communications in some other areas are experiencing network congestion because of drastically increased traffic.

"Chinese Radio Sports Association therefore calls on its members to take actions to ensure their amateur radio stations to operate properly, and to the extent possible stand by on often used short-wave frequencies. If any radio signal is heard from the disaster area, please do your best to understand what is most needed by people in that area and report it to the local government authority. If people in the surrounding areas need to pass messages to their loved ones over the radio, please help them to get in touch and get the messages across as soon as possible.

"Amateur radio stations in the disaster area and surrounding areas if in working conditions should be used unconditionally to assist the local earthquake disaster relief authorities, and subject to permission by the said authorities, to provide communications services to them. For emergency communications purposes, amateur radio stations may also be used to pass messages for local residents on a temporary basis until local telecommunications services resume. Amateur radio stations of all regions should give way to and stand by for emergency communications."



This map shows the location of the epicenter of the May 12 earthquake that rocked Sichuan, China. [Photo courtesy of USGS]

Hams on the Ground

At 1757 UTC on Monday, May 12, Liu Hu, BG8AAS, of Chengdu, a town in the province of Sichuan, reported that a local UHF repeater survived the disaster. "It keeps functioning from the first minute and more than 200 local radio hams are now on that repeater. A group of hams from Chengdu has headed for Wenchuan, the center of the quake, trying to set up emergency communication services there," he said.

Michael Chen, BD5RV/4, said that Yue Shu, BA8AB, also from Chengdu, Sichuan, was reported to be active on the 40 meter emergency frequency on Monday. "Up to now, there has been no further information available from the center zone of the quake. There are a few radio amateurs there, but all of the communications have been cut out, including Amateur Radio," Chen said.

At 1858 UTC, Liu reported that the local UHF repeater in Chengdu "keeps busy running after the quake. It helps to direct social vehicles to transport the wounded from Dujiangyan, Beichuan and other regions. Another UHF repeater also started working in Mianyan, supported by generators, but they are going to face a shortage of gas." Chen said that damage in Chengdu remains in the lowest level, but the situation is "very very bad in the counties around. A few towns are said to be destroyed completely. More than 7000 died in the town of Beichuan. Casualties in several other towns are still unknown and not counted in the published numbers. It is a long and sad day."

At 0831 UTC on Tuesday, May 13, Chen said that a group of radio amateurs is now transmitting from Wenchuan, the center of quake: "Its signal is reported to be very weak. They tried to keep communication with BY8AA, the Sichuan Radio Orienteering Association in Chengdu, seeking for all resources needed. During a contact finished a few minutes ago, they were asking for raincoats, water, tents and outdoor living facilities." -- Information provided by Michael Ye, BD4AAQ, and Michael Chen, BD5RV/4

Calendar of Upcoming Events

- **May 25-31:** Hurricane Preparedness Week
- **June 7:** Atlanta Hamfest
- **June 14:** Winston-Salem Classic Hamfest - www.w4nc.org
- **June 14:** Knoxville Hamfest, Knoxville, TN- www.w4bbb.org
- **June 28-29:** ARRL Field Day
- **July 12:** Salisbury Firecracker Hamfest
- **July 26:** Western Carolina Hamfest. Waynesville, NC - www.wcars.org/hamfest.html
- **Augist 8:** Tour de Furniture
- **Augist 30-31:** Shelby Hamfest
- **Sept 6 & 7:** Tour to Tanglewood 2008 Bike Ride
- **Sept. 20:** Doggett Picnic, “Doggettville”
- **Sept. 20 & 21:** Virginia Beach Hamfest
- **Oct. 12:** Maysville, NC Hamfest

Ham HISSteria !

NC Hams Win Contest To Name The ARRL HQ Mascot "Snake"

and more ARRL news

With more than 400 votes tallied, the W1HQ snake finally has a name. Sean Kutzko, KX9X, president of The Laird Campbell Memorial HQ Operators Club, announced that the snake not only has a name, but a call sign, as well.

"Members of the club met over lunch to discuss and vote on all the names that were sent in. The winning entry came from Charlie Liberto, W4MEC, of Hendersonville, North Carolina. He, along with former ARRL staffer R. Dean Straw, N6BV, submitted the name Hamaconda. Paul Trotter, AA4ZZ, of Charlotte, North Carolina, submitted H1SS as a name. We liked the idea of the snake having a call sign, so the club decided, out of all the great names and call signs sent in, that Charlie's and Paul's submissions fit our mascot perfectly." Both Liberto and Trotter will receive their choice of an ARRL Handbook, ARRL Antenna Book or ARRL Operating Manual.

Kutzko, the ARRL Contest Branch Manager, was elected as president of the HQ club at the meeting. ARRL Membership Manager Katie Breen, W1KRB, was selected as vice-president. ARRL Lab Manager and W1HQ Trustee Ed Hare, W1RFI, was selected as the club's technical officer, and ARRL MVP Associate/Production Assistant Carol Michaud, KB1QAW, was selected as club secretary.

The W1HQ mascot, Hamaconda, H1SS, gets up close and friendly with ARRL Membership Manager Katie Breen, W1KRB, in the Laird Campbell Memorial HQ Operators Club at ARRL HQ in Newington. [S. Khrystyne Keane, K1SFA, Photo]

Greensboro Amateur Radio Association
P.O. Box 7054
Greensboro, NC 27417

Web:
www.w4gso.org

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June 28 - 29, 2008