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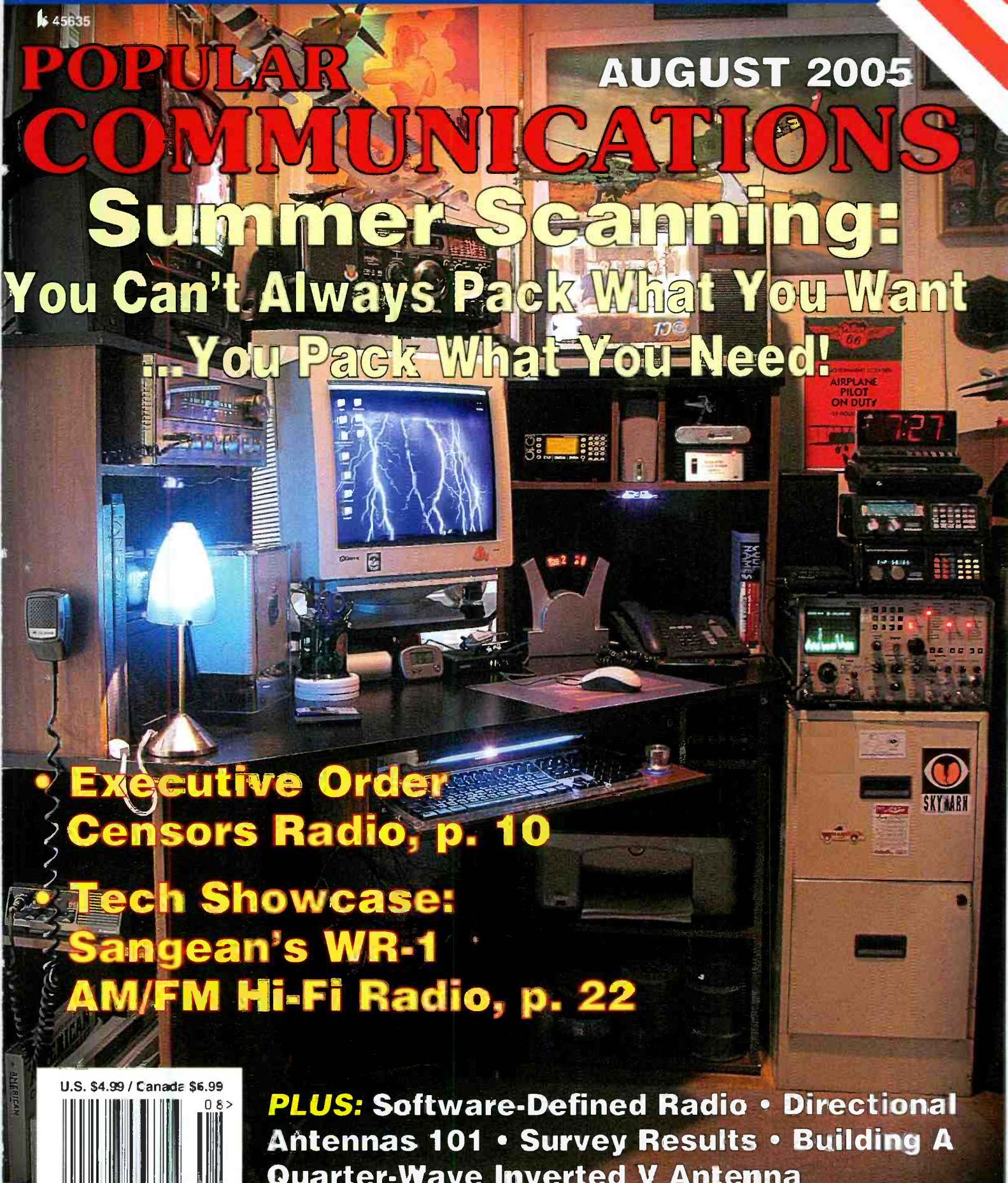


POPULAR COMMUNICATIONS

AUGUST 2005

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• **Executive Order Censors Radio, p. 10**

• **Tech Showcase: Sangean's WR-1 AM/FM Hi-Fi Radio, p. 22**

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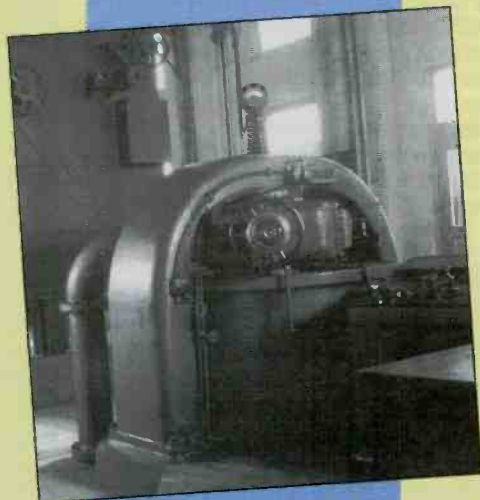
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On The Cover

You certainly can't take all these radios on the road this summer, BUT you *can* maximize your summer vacation monitoring by following Ken Reiss' easy steps for packing your scanner and accessories. Check out this month's ScanTech on page 56 to learn what's important and how to enjoy your summer radio vacation! (Photo by Steve Douglass)

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Faith-Based Radio

I believe. Like TV's Fox Mulder, I also *want* to believe. But Fox wasn't a radio hobbyist. Put your hands on the radio—and this magazine—and please recite with me, "I want to believe our radio hobby is a thriving, energetic entity and that it will be for the foreseeable future." It's *not* wishful thinking.

Now, I don't believe in the Tooth Fairy (but did recently find a quarter under my pillow...maybe it was for helping with the laundry). It's certainly no secret that our hobby is in a state of change. What that means simply is that it's not 1990 and what some folks have called "the good years." Talk to 50 hamfest vendors and you'll get 51 discussions about how show x or y went, both dollar-wise and attendance-wise. Who's right? It depends. Depends on a lot of variables, like the weather, what the vendor is showcasing, how well that particular vendor did last year, publicity, the state of the economy at any given moment in time, weather, what the vendor is showcasing, well, you get the idea.

Fact is any business—and this *is* certainly a business, employing lots of hard-working people—wants to do better. While this might seem like a blinding glimpse of the obvious, I think all too many people think that companies in the "hobby" radio business are somehow different from other businesses in other sectors of the economy. The companies selling golf clubs and golf balls are really no different from antenna manufacturers or power supply dealers. We just sometimes *think* they are.

I'm frequently asked about the state of the radio hobby on a talkshow or when speaking to a radio club. And I'm death on pundits and chat room experts, you know, those who criticize the hobby (a really, really dumb thing to do since they're essentially biting the hand that feeds them, and a lot of other people, too) sitting on the sidelines with more ideas than their radios have channels. These "experts" point to statistics they don't even have in front of them, and that the wind's blowing from the north, and come up with the date for Radio's Obituary.

Don't you believe one word of it! I recently talked with a very enthusiastic group of radio hobbyists, mostly hams, in Massachusetts and told them the same thing. Don't fall into the trap of believing the doomsday messages just because they're repeated so often.

What *is* the state of the hobby then? In a word—or two—darned good. Remember, change is inevitable and those doomsday experts predicted "the end" when public safety organizations moved to higher frequencies. Didn't happen. They predicted "the end" when trunked systems came along. Didn't happen. They predicted "the end" when the Technician class license came along...14 years ago! Didn't happen. (Matter of fact, it served to bolster the hobby, bringing in newcomers who otherwise might not have joined our ranks.)

Now we're entering—well into, actually—the digital "revolution." That, too, was supposed to spell "the end." So, you see, it's important to kick back a moment and think about what is really happening, not just take for gospel what the Internet experts spew forth.

"The companies selling golf clubs and golf balls are really no different from antenna manufacturers or power supply dealers."

But, having said that, I'd be foolish to say things couldn't be better. Many of the reasons are in front of our faces. Case in point: my recent talk at a radio club.

Despite the fact that shortwave listeners are actually growing in numbers and that, according to a just-released paper from Merlin Communications, "...97 percent of business travelers listen to shortwave," the hobby part of the industry does need to be more proactive. Despite the fact that Merlin also points out that one factory in China alone is frantically producing 300,000 shortwave radios each month just to support demand, we still must talk up the hobby and all the fun just waiting for newcomers!

I always have a lot of questions, and so it was again when I asked all 75 attendees at that club gathering to put their hands up high. I then ran down a list of seven items and asked them to put their hands *down* if they haven't participated in them or if the item didn't apply to them. Here are a few of the items and the results of my informal survey:

- *I've shared news, propaganda, or an unusual radio logging with a friend or family member who isn't a radio hobbyist.* A few hands went down.
- *I took a young person, other than a family member, to a hamfest other than my local show.* A lot more hands went down.
- *I've experimented and used a new on-air mode such as PSK31 or digital voice more than once.* Now there were only about a dozen hands left in the air.
- *I wrote to the FCC or filed an official communication with them within the past six months about a radio issue such as BPL.* The rest of the hands went down!

Surprised? I sure was, especially because I had three more easy-to-do items to ask the audience. How proactive are you? Have you...

- Used CB on the road for directions within the past six months?
- Spread the word about any aspect of our hobby by contacting any media, other than a radio publication?
- Wrote to a shortwave broadcaster within the past couple of months asking for a QSL card or telling them what you liked or didn't like about their program?

Sure, there are ups and downs in any business. So it's time to get off the porch and do what needs to be done. Remember your excitement when you heard your first overseas shortwave station, or when you got that first scanner?

I really *do* want to believe. I bet you do too. ■

OUR READERS SPEAK OUT

Each month, we select representative reader letters for "Our Readers Speak Out" column. We reserve the right to condense lengthy letters for space reasons and to edit to conform to style. All letters submitted must be signed and show a return mailing address or valid e-mail address. Upon request, we will withhold a sender's name if the letter is used in "Our Readers Speak Out." Address letters to: Harold Ort, N2RLL, SSB-596, Editor, Popular Communications, 25 Newbridge Road, Hicksville, NY 11801-2909, or send e-mail via the Internet to popularcom@aol.com.

AM Radio Alive And Well?

Dear Editor:

The recent editorial by GT Tyson paints a terrible picture for AM radio, but your readers should know that is not the case everywhere. Here in Chester County, suburban Philadelphia, Pennsylvania, there is an AM station that is well listened to. In fact, I have listened to it for almost 40 years.

WCOJ 1420 AM is the Voice of Chester County, and it is doing quite well. In fact, I started working part-time there a little over two years ago when the owner came in to pick up some new computers at my computer shop. He was immediately looking for some "Board Operators" for Sunday and the Phillies games. I had not done any broadcast work since college days at Valpo Tech, but became interested. The owner was a ham friend that I had known for about 30 some years. He had bought the station about eight to 10 years ago. I have been working Sundays as engineer and producer ever since.

The station has talk radio with real people much of the time and a full staff. I made a suggestion last year about running a computer show and last October it became a reality. I host "Computer Corner," now Saturday mornings, and the station likes the program, and I enjoy doing it.

WCOJ's owner last year decided to buy up some of the stations along Rt. 81 north from Pennsylvania and make them just like WCOJ. His Route 81 Radio is changing the face of AM and local radio is coming back. He has been quite successful.

A few years after Lloyd Roach bought the station, he moved the studios and updated them in some excellent facilities. Yes, we have automation overnight, but that is better than signing off at midnight. The station comes alive weekdays at 5:30 a.m., and it is much better than music all day long.

Gene Mitchell, K3DSM
via e-mail

It's True, But He Just Can't Believe It!

Dear Editor:

I read this three times and still can't believe it (from the May 2005 *Pop'Comm*, Page 19), "...outgoing FCC Chairman Michael Powell said, applauding the company for 'exercising well its custodianship of the public spectrum...'"

Of course, we all have learned that big business is in charge of the public airwaves, but did Powell have to actually say it, out loud, in public? I'm now wondering if, when originally appointed to the FCC, anyone told Michael Powell what the FCC does?

Harvey Caplan
via e-mail

Dear Harvey:

Very good question, indeed. Sometimes it sure seems like he never read the Chairman's job description. Harvey, I read somewhere that he's actually *begun* working on a book. Well, sort of...he's coloring the grass orange, though.

Tom: It Is About Politics

Dear Editor:

I've been reading your recent editorials and couldn't agree with you more about radios not reaching our troops and the FCC's leadership problems. Your detractors, while they profess to be patriotic and well read, are in fact (as demonstrated in their own words) mostly narrow-minded simpletons. Your patriotism and caring about our country and the radio hobby is demonstrated in every issue of *Pop'Comm*. If the knuckle-dragging people can't see that, or the fact that politics is now a big part of our radio hobby, they should, as you've said in the past, give it up and "take up needlepoint." I, for one, am no fool. Thank you for a great magazine!

Sgt. Tom L.
South Carolina

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News, Trends, And Short Takes

Radio Free Europe/Radio Liberty Enters A New Era With A New Symbol

Radio Free Europe/Radio Liberty (RFE/RL) entered a new era when a Torch Aflame symbol replaced the Freedom Bell symbol as RFE/RL's trademark. The new slogan or signature line is "Illuminate Your World," conveying that the news and information RFE/RL brings daily to millions of people around the world helps them understand their environment and gives them the information tools for the political and economic engagement needed to shape their societies.

The Freedom Bell was RFE/RL's logo for more than half a century. It now enters the history books along with the radios of the Cold War days that it symbolized. That history—in the form of truckloads of tapes and documents—was donated to the Hoover Institution archives at Stanford University, California, and is being processed as a record of the ideological fight against Communism in the second half of the 20th century.

CQ Announces 2005 Hall of Fame Inductees

CQ Amateur Radio magazine has announced the induction of 17 new members to its Amateur Radio, Contesting, and DXing Halls of Fame.

The CQ Amateur Radio Hall of Fame recognizes those amateurs who have made significant contributions either to amateur radio or to their professional fields; as well as individuals, whether amateurs or not, who have made significant contributions to amateur radio. This year's 14 inductees are:

Mario Ambrosi, I2MQP—Prominent Italian amateur and author of many radio books.

John Chambers, W6NLZ—With KH6UK, proved the existence of the California-Hawaii VHF/UHF propagation "duct" in 1957.

Ted Cohen, N4XX—Propagation expert, *CQ* author for more than 30 years.

Bob Ferrero, W6RJ—President of Ham Radio Outlet, major supporter of many DXing and contesting activities.

William "Bud" Hargreaves, K4HMY—"Father of the Polycomm," VHF transceiver.

Chod Harris, VP2ML—Noted DXer, writer, and publisher.

Ivan "Sonny" Harrison, W5HBE—Developed the "Carterphone," which led the way for widespread Internet and e-mail access via "dialup" connections.

Edmund Marriner, W6BLZ/W6XM—Author of dozens of construction project articles in *CQ*.

Boris Meshevstev, RV3IZ/EX3TM—Prominent Russian contesting, DXer, and author.

Les Moxon, G6XN—Antenna developer, author.

Lloyd Sigmon, W6LQ—Developed precursor of today's radio traffic reports.

Phillip Smith, IANB—Inventor of the Smith Chart for determining transmission line impedances.

Jonathan Taylor, K1RFD—Developer of Echolink network for linking repeaters and individual amateurs via the Internet.

Thomas, Ralph, W2UK/KH6UK—With W6NLZ, proved the existence of the California-Hawaii VHF/UHF propagation "duct" in 1957.

The CQ Contest Hall of Fame recognizes amateurs who have made outstanding contributions in the world of amateur radio contesting. Two new members are being inducted in 2005:

Jeff Briggs, K1ZM—Holds more than a dozen contesting records, has won more than a dozen contests in his operating class, has operated on 16 contest DXpeditions and in two World Radiosport Team Championships. Also 160-meter expert and author.

Charles "Rusty" Epps, W6OAT—Co-founder of the World Radiosport Team Championship (WRTC), co-creator of the North American Sprint contest and a founding member of the Northern California Contest Club (NCCC). Started the Georgia QSO Party while still in high school.

The CQ DX Hall of Fame recognizes significant contributions to the art of DXing, or contacting hams in faraway places. There is one inductee for 2005:

Masayoshi Ebisawa, JA1DM—Arguably Japan's top DXer, with a total of 382 confirmed entities (#1 ranking in Japan). He is the lead card checker for DXCC in Japan and has written and/or translated several articles about DXing and the ARRL's new "Logbook of the World" system for Japanese ham magazines.

CQ congratulates all of these deserving honorees. Plaques for Contest and DX Hall of Fame inductees were presented at the Dayton Hamvention. Complete details will be in the July 2005 issue of *CQ* magazine.

Sirius Satellite Radio Launches Its First "Podcast" Talk Show

Sirius Satellite Radio plugged into the podcasting trend recently with a four-hour weekday show featuring a selection of the best podcasts. Adam Curry, who is considered the father of podcasting, will host the program, called "Adam Curry Pod Show." The news comes a week after Infinity Broadcasting announced it would launch the first podcasting station online and on one of its AM Talk stations in San Francisco.

Less than a year old, podcasting audio broadcasts that people download for playback on iPods or MP3 players has taken off with thousands of podcasts available. The technology that allows just about anyone to podcast is easy to use and inexpensive. In addition to Infinity and Sirius, several other radio groups have launched podcasting initiatives, mostly offering one-hour versions of morning shows or special programming. Clear Channel is also said to be working on podcasting as part of its Internet and new media strategy.

(Continued on page 70)

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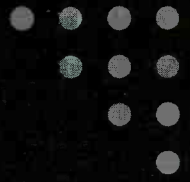
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Pet Trackers On 218 MHz

Here's An Easy, Inexpensive Way To Find Fido—And Even Keep Track Of Grandma Or The Kids!

by Gordon West, WB6NOA

Your beloved dog and cat may send you into sheer panic when they inexplicably pull their disappearing acts. One sailor quit her voyage three days out and came back to port, heartbroken that her pet cat must have slipped overboard. (There's a happy ending, though: Fur Ball was found below decks hiding in foul weather gear!)

At the recent Quartzite Hamfest in Arizona, a couple spent four days out in the desert tracking down their wayward, and sometimes forgetful, pooch. Every RV looks about the same to him, and nobody really suspected the big friendly dog was totally lost. He was not, of course!

Tiny tag transmitters can keep track of everything from pets to your aged grandmother who continuously takes a wrong turn walking around the block. The transmitters are so tiny that wildlife experts easily fly the 1/3-ounce, 1/2-milliwatt "pingers" on everything from eagles to condors and hawks. One-third-ounce transmitters (and that's *including* the 3-volt lithium battery), the size of a nickel, have a line-of-sight range of approximately one mile and a two-block range throughout your neighborhood. But until recently, a tracking system for wildlife was a several-thousand-dollar investment.

Price Comes Way Down!

Not anymore, thanks to a company that ham radio operators know as Comm Spec, short for Communications Specialists, Inc. The company is well known for CTCSS boards, the famous TE-64 encoder/decoder used before VHF ham rigs had built-in tone boards, and is equally familiar in the land mobile radio industry for exotic signaling equipment.

Six years ago, Spence Porter, WA6TPR, owner and manager of Com Spec, began manufacturing Part 15 wildlife radio tags, along with companion hot dual-conversion, battery-operated, ultra-sensitive receivers with gasfets in the front-end that can hear a Ford pickup a block away on 218 MHz (see box)! The receiver is specifically designed for ultra-short pulse reception, featuring a 3-1/2 kHz, 8-pole crystal filter, along with a 2.5-kHz, 455 ceramic filter, with tighter specs than most modern CW-only receivers! The receiver has rock-solid stability covering the 218-MHz vacant band, which is home of their wide variety of 1/3-ounce pingers.

The tiny Comm Spec pet locator transmitters transmit once a second with a 16-millisecond burst. The shorter the burst, the greater the amount of power allowed under Part 15 rules and the FCC averaging of power over 100 milliseconds. The popular channel frequencies I operated during my tests were Channel 10, 218.025 MHz; Channel 20, 218.275 MHz; and Channel 30, 218.525 MHz. The tiny transmitters for cats are attached to a breakaway fluorescent safety collar, and for dogs, the transmitter has a clip to hang onto their dog tags. The transmitter will continuously ping once a second for an entire month before



Here's "Mr. Q" wearing his 1/3-ounce cat radio tag.

the common 3-volt battery becomes depleted. The company can also send you a year's supply of batteries, each marked with an appropriate month so you know when to change out Fido's or Fur Ball's transmitter collar.

Each transmitter is priced under \$50, which makes radio tagging your two cats, dog, and the horse not an overly expensive proposition. While you're at it, don't forget a tag for Grandma if her health condition warrants it. Each tag operates on its own channel, clearly identified on the tag.

The Comm Spec pet and grandma locator receiver has a wonderful sound out of the built-in speaker when you turn it on. A large S-meter lets you see the signal strength of each ping, and the receiver features no AGC, so even the signal strength of a 16-millisecond ping can be seen. Tiny pushbuttons allow you to easily select which channel your pet's signal is received on, and there's a handy spot to write down the pet's name right on the receiver box.

The 30-channel battery-operated receiver is priced under \$200. Keep in mind that this is no ordinary receiver: with 30- and 60-dB selector switch attenuation, plus the hot front-end, the receiver is sensitive enough to pick up your pet blocks away in your neighborhood. The system will also include a highly directional Moxon-design antenna. It has one very sharp major lobe and two very sharp nulls. To get started, direction find with the BNC-mounted Moxon antenna, playing with polarization for center-meter signal strength, and then develop your skills to direction find by also working the nulls. The closer you get to your target (sorry, Fido), the more attenuation you add. You could then switch over to the supplied 218-MHz rubber duck and, with body shielding, walk right up to your pet.

Some radio enthusiasts are not so much into trying to find



The Com Spec receiver with optional Moxon directional antenna.

the activated transmitter, but are still relieved just knowing that the signal was nice and strong, indicating their pet was either onboard the boat or zooming around somewhere hidden in the RV. The little rubber antenna works fine for this type of “monitoring.” But down at the docks, or out in the desert, trying to locate someone or something with the tag sending out the once-a-second pings would require the use of the supplied Moxon antenna, or, if nothing else, body shielding techniques.

Search And Rescue Ops?

For search and rescue operations, a net control operator could tag each individual searcher with a little transmitter, on a specific channel, hung on their belt. He or she could easily go through the channels and see who is at base camp and who is out on the trail. And if a searcher gets lost, the telltale “ping” once a second would allow anyone with the portable receiver to begin closing in on the location.

Other Possibilities!

Since the little tags run continuously for a month, and you may order a year's supply of batteries when you order the system, I could see convalescent homes keeping track of their clients this way. I could see daycare centers with accountability of the kids on the premises want-



The 218-MHz radio tag with battery removed.

ing such tracking capabilities. I would certainly expect skiers to obtain their activated transmitter before going out on the slopes—and in the case of a major avalanche, a ski patrol could check the channels and track down the faint signal of someone buried under the snow.

It's even good for some high-tech toys. If you are into RC flying of boats, planes, and helicopters, the one-third ounce transmitter will give you plenty more radius than what you can actually see when you're running the model at its ultimate range.

Worth The Peace Of Mind

But, of course, keeping track of your pets is the most obvious use. Haven't we all combed the neighborhood, searching for a pet that accidentally went for a ride in the gardener's van or got locked into someone's garage, or looked for the little kitten stuck up on the neighbor's roof. And your pet won't even realize it's wearing the lightweight tag.

Best of all, unlike wildlife service tags and receivers that run well up into the thousands of dollars, the Communications Specialists' transmitters under



You can order a year's supply of inexpensive batteries for the radio tag.

\$50 and their ultra-narrow-band, battery-operated, multi-channel receiver under \$200 is a great way to have peace of mind when traveling with your pets—and just plain fun if you want to try a little T-hunting on non-ham frequencies with fully compliant Part 15 equipment.

For additional technical specifications, check out www.com-spec.com and click on the cat logo, or phone Communications Specialists direct at 800-854-0547 and see all of the technology packed into an SMT board no larger than a nickel, and lighter than a fraction of an ounce. Your pet may someday be saved by their collar.

And don't forget grandma! ■

Technical Specs

Transmitter weight WITH battery	1/3 ounce
Cat collar	safety snap-away
Transmit pulse	16 ms
Transmit power	1/2 milliwatt
FCC type-acceptance	Part 15
Turned-on battery life	30 days with distinctive double-pulse low-battery indication
Longer range family medical tags	available
Receiver	dual-conversion, gasfet front end
Receiver sensitivity	-150 dBm,
Receiver bandwidth	±3.5 kHz
Receiver battery	common 9-volt type
Receiver rubber antenna	0 dB gain
Receiver directional antenna	Moxon rectangle
Operating frequency	Channel 10, 218.025 MHz

When America Censored Radio

Naval Censors Were Assigned To All Commercial And Private Radio Stations—There's Much More To This Story!

by R.B. Sturtevant, KD7KTS

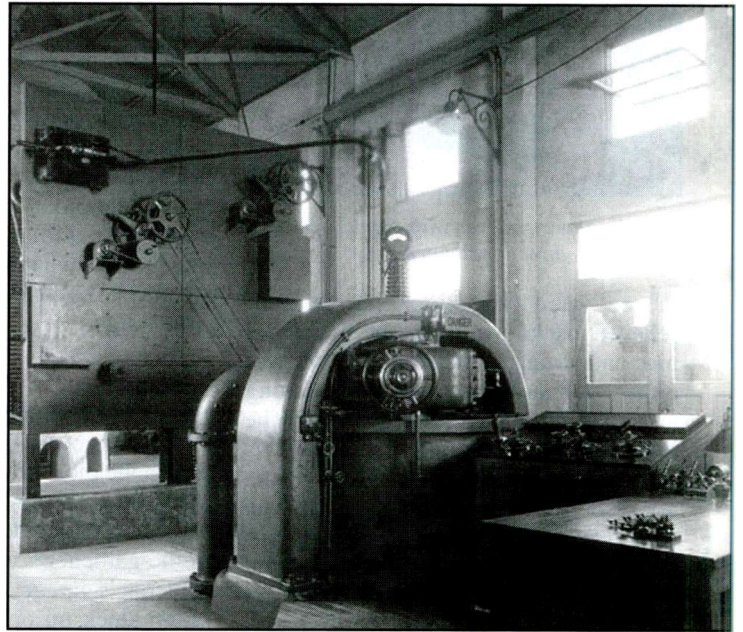
Somebody shot somebody else in Sarajevo and before long everybody was pointing guns at everyone else. I'm not talking about Yugoslavia in 1992, I'm talking about Serbia in June of 1914. And, as Mark Twain said, "History doesn't repeat itself, but it does rhyme." By July of 1914, World War I had broken out when Europe's tangle of alliances fell into play and everyone came down on one side or the other.

One thing was very clear to President Wilson: most Americans felt that the war was Europe's problem and the U.S. should remain neutral. As a neutral power we could sell goods and produce to both sides. That way America would soon become a creditor nation instead of a debtor nation. Business would boom and everyone would be making money. Wilson's job was to keep us out of the war and American troops home.

Radio In Time Of War

To back up this strong stand on neutrality, Wilson issued an Executive Order on August 5, 1914, regarding wireless. The President prohibited "messages to be transmitted or received for delivery of an unneutral nature and from rendering to any one of the belligerents any unneutral service." "Unneutral" was defined as any act that would further the war efforts of one belligerent over another. Enforcement of this proclamation was delegated to the Navy. Most commercial wireless companies were owned by foreign nationals or firms based overseas, so the precaution was justified. This meant, in effect, that Naval censors were assigned to all commercial and private radio stations and required to review all messages sent or received. Nothing could be sent in a cipher or code unless the key was supplied to the censor. No messages were allowed in foreign languages unless a translation was provided. Amateurs were prohibited from communicating with stations in any belligerent nation. In one Naval District, however, amateurs were temporarily taken off the air completely.

The first test to the Executive Order came from the Marconi Wireless Telegraph Company, a British firm. Its American president and general counsel challenged the proclamation on Constitutional grounds almost immediately. On September 2, the Marconi station at Siasconsett, on Nantucket Island, received a message from the British Cruiser *HMS Suffolk* addressed to an individual in New York. The message requested that supplies be delivered at sea off Sandy Hook, New Jersey. Marconi officials forwarded this message without referral to the Navy censors. The censors were ordered to shut down the station on September 24. The shutdown order remained in



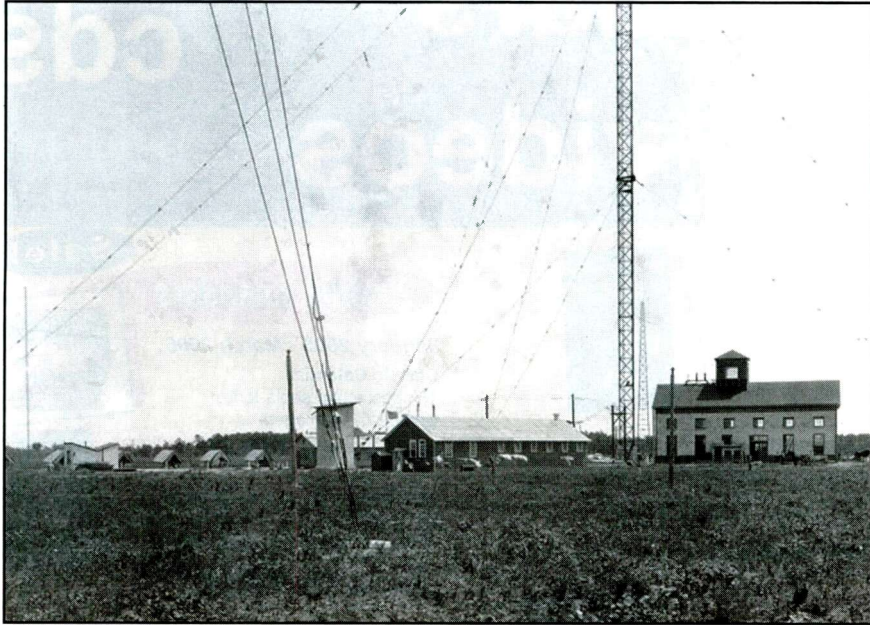
The Sayville Telefunken Radio Transmitter at about the time of the famous spy case. The German Telefunken Company used their inside connection with a similar station located in Nauen, Germany. (Photo Courtesy Friends of Long Island Wireless History)

force until January 1915 when permission was granted to resume business.

The Hostilities Hit Home

With the British fleet successfully blockading German and Austro-Hungarian ports, America's neutrality was working against the Germans. British, French, and Russian ships were carrying hundreds of tons of needed war supplies out of American ports, which German shipping could not reach. To draw ships away from the blockade, Germany ordered unrestricted submarine warfare in the waters around Britain. This allowed German submarine commanders to sink even neutral ships. Berlin also secretly authorized its ambassador in Washington to initiate sabotage operations against "every kind of factory for supplying munitions of war."

The first of these orders was to result in the German's sinking of the British passenger liner *Lusitania* with the loss of 128



Here's the Sayville Telefunken station building around the time of World War I.
(Photo Courtesy Friends of Long Island Wireless History)

American lives. The latter order resulted in the Black Tom Pier explosion in New Jersey, when thousands of tons of munitions went up and a mysterious fire occurred in a Kingsland, New Jersey shell packing plant (both across the river from New York Harbor). There was also an unexplained fire that destroyed the Hercules Powder Company plant in Eddystone, Pennsylvania, as well as many other mysterious events.

Tracking Down A Mystery

In the case of the *Lusitania*, it was obvious that someone had given the German submarine commander the departure time, course, and arrival time of the British liner. But who did it, and how had they gotten the information out of the country with Navy censors reading all messages going overseas? The government had already set up monitoring stations on both coasts and was in hot pursuit of any illegal transmitters. Secret Service investigators turned their attention to the commercial transmitters at Tuckerton, New Jersey, and Sayville, New York. Both stations were owned by Telefunken, a German firm with close ties to the German Admiralty. On the first day of the war, the British ship *HMS Telcon* had cut most of the German undersea cables. The wireless stations were the only way for Germany's Ambassador to communicate with Berlin.

Secret Service agents reviewed the messages from both stations and also

monitored the Tuckerton station's output, comparing it with what was reported as messages sent out. So far nothing seemed out of the ordinary. Checking out the Sayville station's output was more difficult. They had equipment that allowed them to send Morse automatically at high speed, enabling them to send more traffic in a shorter time. The messages, on receipt, were slowed down from 200 or 300 words per minute to speeds that could be transcribed by operators reading at 20 to 30 words per minute. Telefunken had exclusive rights to this record/speedup/slowdown technology.

Chief of Secret Service William Flynn turned to his foremost expert on wireless, Lawrence Krumm, chief radio Inspector for New York. Krumm didn't know what to do about the problem, but he knew who would.

A Radio Amateur Is Called In

An amateur radio operator named Charles Apgar worked for the Marconi Company in their Research and Development Department. He had already made several important inventions including the cardboard cones still used in speakers for radios today. Like any self-respecting radio amateur/design engineer, Apgar had a large, fully equipped ham shack in his home with all the latest gear. He even had a recording device, called an Audion, which he had developed for Marconi to be used to take dictation. Apgar was

experimenting with an Audion to copy radio transmissions using his own equipment at home.

Krumm explained the problem with the Sayville station. He then asked Apgar if he could make recordings of the Sayville station traffic that could be slowed down and turned over to government code experts. On the night of June 7, 1915, Apgar recorded the message traffic from the Sayville station for four hours, beginning at 11 p.m.

By June 21, the recordings were in Washington and the encrypted messages in the hands of Secret Service Chief Flynn. The coded messages were not in a single-message format like "Bertha is engaged to a nice boy," "Send always invoice before shipping knives," or "Myra has diphtheria." Instead they were included in the entire body of the message traffic with only a letter or a space appearing in any one message. The censors had seen all of the messages, but not the order in which they were sent, so no pattern had appeared to them.

The U.S. government ordered the Sayville station shut down immediately and punctuated the order with a contingent of Marines. The station reopened later under stricter supervision. Army intercept stations had been established on the Mexican border to catch any signals from the United States to German agents who were known to be in Mexico. The effort did not bear fruit, but that was probably because any German agents in America or Mexico were lying low.

The British Were Monitoring!

In January 1917, the German Supreme High Command made the decision that all ships, regardless of flag, bound for an English, French, or Russian port would be sunk. This, they knew, would outrage the Americans and bring them into the war on the side of the Allies. They felt, however, that if America were involved in a war with Mexico the U.S. would not be able to send its 210,000-man Army to Europe.

To this end German Foreign Minister Arthur Zimmerman sent a secret message to the President of Mexico. The message promised funds and military advisors to Mexico if Mexico, in return, would invade the southwest United States to reclaim Texas, New Mexico, Arizona, and as much of California as they wanted. The message was sent by cable—one the Germans thought the British had missed. They hadn't. The

NOTICE!

TRAVELLERS intending to embark on the Atlantic voyage are reminded that a state of war exists between Germany and her allies and Great Britain and her allies; that the zone of war includes the waters adjacent to the British Isles; that, in accordance with formal notice given by the Imperial German Government, vessels flying the flag of Great Britain, or of any of her allies, are liable to destruction in those waters and that travellers sailing in the war zone on ships of Great Britain or her allies do so at their own risk.

IMPERIAL GERMAN EMBASSY,
WASHINGTON, D. C., APRIL 22, 1915.

Passengers boarding the Lusitania passed this warning notice.

British were monitoring the cable, broke the coded message, and turned it over to President Wilson.

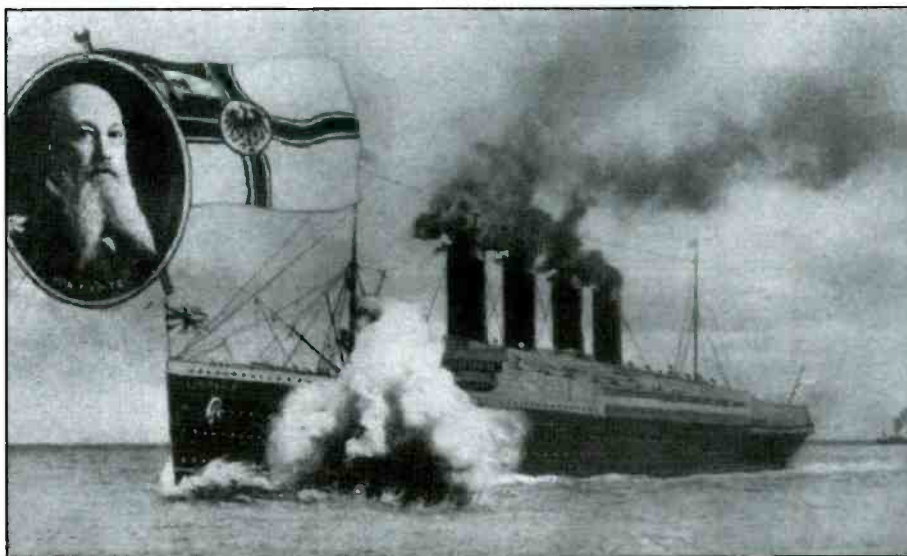
On April 6, 1917, Congress declared war on Germany. Many East Coast amateur radio operators knew about it 12 hours before it happened. They clearly heard a German wireless operator broadcast a warning to all German ships in American ports to avoid confiscation by raising steam and getting into international waters.

On April 18, the Secret Service raided the Sayville station and arrested 19 people as German spies. Tuckerton was raided at the same time and six spies were taken into custody. America never again allowed foreign nations to own large communications facilities inside the country.

It's All About Service

What about Charlie Apgar? The government did not recognize his efforts during the war, probably because such a new way of catching spies would be useless with too much publicity. After the war, however, there was a lot of publicity when the story got out. *The New York World* described Apgar's efforts as "the most valuable service ever rendered by an amateur radio operator to our country."

Twenty-five years later, at age 75, Apgar issued a call to arms for 55,000



(Photo Courtesy Temple University History Department)

ham radio operators to help fight the fifth column's activities "a thousand times more perilous than they were in 1915 before the term was invented." Charlie never bothered to patent his inventions and so could not profit from them finan-

cially. No official government recognition was ever given. But he had the satisfaction of helping his country in a time of great need. And that, after all, is what being an amateur radio operator is all about. ■

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- Illuminates automatically during a power failure
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What A Show!

Despite how close we are to the end of current Solar Cycle 23 and the period of least activity, the Sun continues to spice things up from time to time. We expect this cycle to end sometime during the beginning of 2007, when the Sun's activity will be at the lowest level in its average 11-year cycle. This means that we'll rarely see significant activity, like major flares or coronal mass ejections (CMEs). During the peak years, we see such events several times a day, but now, during the end of the decline in activity, we may see such events only once a month or so.

On May 13, 2005, the Sun really spiced things up by unleashing a long-duration M8-class explosion near sunspot 759, as shown in **Figure 1**. (Visit <http://www.spaceweather.com/glossary/flareclasses.html> for an explanation of how intense an M8-class flare is.) The flare peaked at 1657 UT, and triggered a strong proton event (see **Figure 2**). Associated with this moderately large flare was the expulsion of plasma from the Sun's corona, an atmospheric layer around the Sun (see **Figure 3**). This full-halo CME was directed toward the Earth, impacting our magnetosphere and causing an intense geomagnetic storm between 0600 UT and 0900 UT on May 15, 2005. The solar wind speed increased about 200 kilometers per second, reaching a rate of at least 950 km/s.

By 0608 UTC, the magnetic orientation of the Interplanetary Magnetic Field (IMF) was strongly southward, indicated by a Bz (southward-pointed solar wind measurement) of -42.9. This triggered a G5-level (the most extreme) geomagnetic storm. A

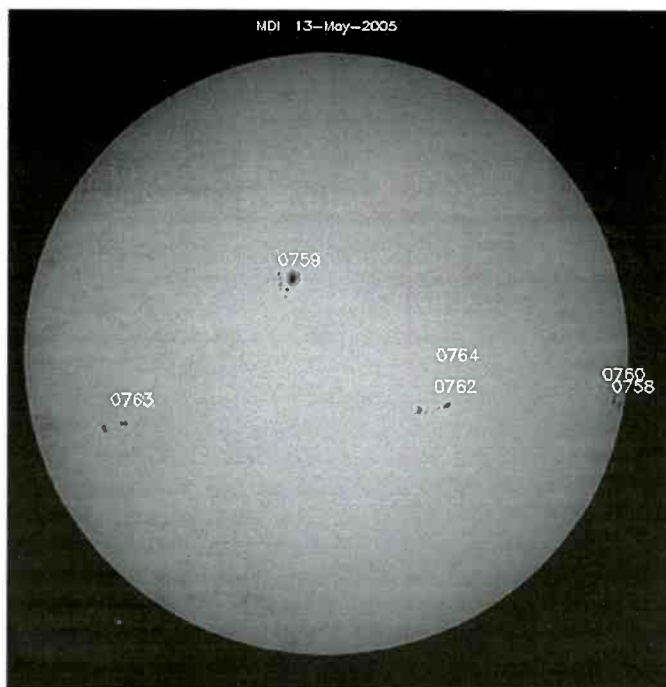


Figure 1. The large sunspot region 759 as seen on Friday May 13, 2005, which unleashed a coronal mass ejection that spawned aurora and a G5-level geomagnetic storm the following day. (Source NOAA)

The Ap Index And Understanding Propagation Terminology

The Ap index, or Planetary A index, is a 24-hour averaging of the Planetary K index. The Planetary K index is an averaging of worldwide readings of Earth's geomagnetic field. High indices ($K_p > 5$ or $A_p > 20$) mean stormy conditions with an active geomagnetic field. The more active, the more unstable propagation is, with possible periods of total propagation fade-out. Especially around the higher latitudes and especially at the Polar Regions, where the geomagnetic field is weak, propagation may disappear completely. Extreme high indices may result in aurora propagation, with strongly degraded long distance propagation at all latitudes. Low indices result in relatively good propagation, especially noticeable around the higher latitudes, when transpolar paths may open up. Maximum K-index is 9, and the A-index can exceed well over 100 during very severe storm conditions, with no maximum.

Classification of A-indices is as follows:

A0-A7 = quiet	A30-A49 = minor storm
A8-A15 = unsettled	A50-A99 = major storm
A16-A29 = active	A100-A400 = severe storm

Solar Flux (SFI): This flux number is obtained from the amount of radiation on the 10.7-cm band (2800 MHz). It is closely related to the amount of ultraviolet radiation, which is needed to create the ionosphere. Solar Flux readings are more descriptive of daily conditions than the Sunspot Number. The higher the Solar Flux (and, therefore, the higher the Sunspot Number), the stronger the ionosphere becomes, supporting refraction of higher frequencies.

Ionosphere: A collection of ionized particles and electrons in the uppermost portion of the Earth's atmosphere, which is formed by the interaction of the solar wind with the very thin air particles that have escaped Earth's gravity. These ions are responsible for the reflection or bending of radio waves occurring between certain critical frequencies, with these critical frequencies varying with the degree of ionization. As a result, radio waves having fre-

quencies higher than the Lowest Usable Frequency (LUF) but lower than the Maximum Usable Frequency (MUF) are propagated over large distances.

Sunspot Number (SSN): Sunspots are magnetic regions on the Sun with magnetic field strengths thousands of times stronger than the Earth's magnetic field. Sunspots appear as dark spots on the surface of the Sun. Temperatures in the dark centers of sunspots drop to about 3700° K (compared to 5700° K for the surrounding photosphere). This difference in temperatures makes the spots appear darker than elsewhere. Sunspots typically last for several days, although very large ones may last for several weeks. They are seen to rotate around the sun, since they are on the surface, and the sun rotates fully every 27.5 days.

Sunspots usually occur in a group, with two sets of spots. One set will have positive or north magnetic field while the other set will have negative or south magnetic field. The field is strongest in the darker parts of the sunspots (called the "umbra"). The field is weaker and more horizontal in the lighter part (the "penumbra").

Galileo made the first European observations of sunspots in 1610. The Chinese and many other early civilizations have records of sunspots. Daily observations were started at the Zurich Observatory in 1749; continuous observations were begun in 1849.

The sunspot number is calculated by first counting the number of sunspot groups and then the number of individual sunspots. The "sunspot number" is then given by the sum of the number of individual sunspots and 10 times the number of groups. Since most sunspot groups have, on average, about 10 spots, this formula for counting sunspots gives reliable numbers even when the observing conditions are less than ideal and small spots are hard to see. Monthly averages (updated monthly) of the sunspot numbers show that the number of sunspots visible on the sun waxes and wanes with an approximate 11-year cycle.

For more information, see <http://prop.hfradio.org>.

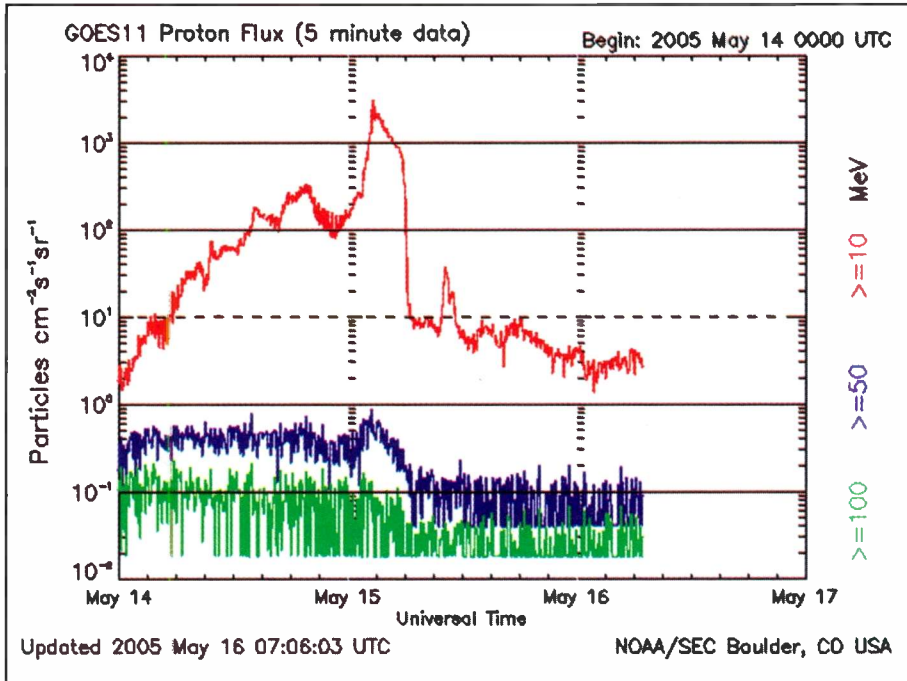


Figure 2. This graph of the level of protons impacting the Earth's protective force field, the magnetosphere, shows the proton storm that occurred because of the M8-class flare of May 13, 2005. (Source NOAA/SEC).

storm of this magnitude is capable of causing widespread voltage control problems in power grid systems, and some grid systems could experience complete collapse or blackouts. Under such conditions HF radio propagation becomes very difficult, if not impossible, in many areas for one to two days, while satellite navigation could be degraded for days. A G5-level storm is associated with a planetary K index (Kp) of 9, which occurred on May 15, 2005 (see Figure 4), and was the fuel that fed a beautiful and bright aurora (see Figure 5). You can visit http://www.sec.noaa.gov/NOAA_scales/ for a look at the NOAA scales used to measure storm levels.

Solar Wind And Coronal Mass Ejections

Space is not a vacuum, at least not in our solar system. The Sun's atmosphere actually extends very far out from it. Space in our solar system is filled with plasma, a low-density gas in which the individual atoms are charged. The temperature of the Sun's atmosphere is so high that its gravity cannot hold on to it. The plasma streams off the Sun in all directions at speeds of about 200 to 400 km/s (about 1 million miles per hour) during typical "quiet" days. This is known as the "solar wind."

When a CME bursts out away from the Sun, its speed ranges from less than 50 to about 2,000 km/s. As the CME moves outward from the Sun, it generates a shock wave that can accelerate particles in interplanetary space to high energies. When a CME or its shock wave passes the Earth, geomagnetic storms are triggered. The majority of major geomagnetic storms are generated by the encounter with both the interplanetary

shock and the CME that drives it. Their ability to disturb the Earth's magnetosphere is a function of their speeds, the strength of their magnetic fields, and the presence of strong southward magnetic field components. During the declining years of a solar cycle, as where we find ourselves this month, we see far less CMEs, since flaring has declined, than during the peak years of the cycle.

The Earth's magnetosphere is formed from two essential ingredients: the Earth's magnetic field (which has much the same form as that of a bar magnet, and is from pole-to-pole), and the solar wind. When the solar wind and magnetic fields combine with the Earth's magnetic field, they alter the shape and intensity of this shield around the Earth. The ionosphere is affected by these changes, either by an increase of ionization or a decrease, or even a depletion, of ionization. Depressions in ionospheric density cause major communications problems because radio frequencies that previously had been refracting off the ionosphere now punch through. The maximum usable frequency (MUF) on a given radio signal path can be decreased by a factor of two during an ionospheric storm event. Storm effects are more pronounced at high latitudes.

During August, we'll see days when coronal holes, not flares or CMEs, dominate space weather. We'll only see occasional, if any, CME activity. Solar activity will be low since we are so near the end of Cycle 23. Major shortwave broadcasters have taken this into consideration and have chosen frequencies that, with

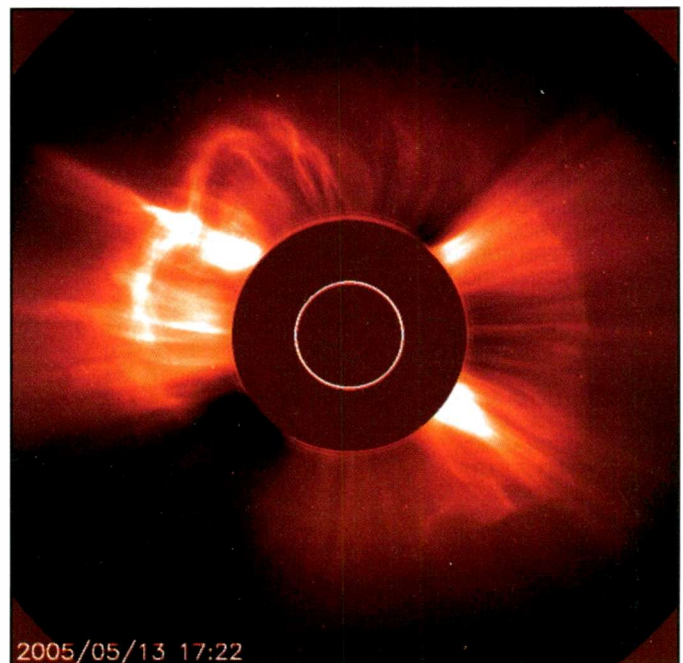


Figure 3. The full-halo coronal mass ejection as seen by the LASCO satellite on May 13, 2005. Eighteen hours later it reached the Earth and produced bright auroras. (Source NOAA/LASCO)

Optimum Working Frequencies (MHz) - For August 2005 - Flux = 77, Created by NW7US

UTC	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
TO/FROM US WEST COAST																								
CARIBBEAN	22	22	21	20	19	17	16	14	13	12	12	11	11	13	15	17	18	19	20	21	21	22	22	22
NORTHERN SOUTH AMERICA	28	28	27	25	23	21	19	18	17	16	15	14	14	15	15	19	21	22	24	25	26	27	28	28
CENTRAL SOUTH AMERICA	28	25	23	21	20	18	17	16	15	14	14	15	15	17	20	23	25	26	27	28	29	30	29	29
SOUTHERN SOUTH AMERICA	25	22	19	18	16	15	15	14	13	13	13	12	12	15	17	20	22	24	25	27	28	28	29	27
WESTERN EUROPE	13	10	9	9	9	13	14	11	10	10	14	15	16	17	18	18	19	19	19	19	18	17	16	15
EASTERN EUROPE	9	9	9	8	12	14	14	10	10	9	9	13	15	16	17	18	18	18	17	16	15	14	10	10
EASTERN NORTH AMERICA	25	25	24	23	21	20	18	16	15	14	13	13	14	17	20	21	23	24	24	25	25	26	26	25
CENTRAL NORTH AMERICA	14	14	14	13	12	12	11	10	9	8	8	7	7	9	10	11	12	13	13	14	14	14	14	14
WESTERN NORTH AMERICA	7	7	7	7	7	6	6	5	5	4	4	4	3	3	5	5	6	6	7	7	7	7	7	7
SOUTHERN NORTH AMERICA	23	23	23	22	21	20	18	16	15	14	13	12	11	12	15	17	19	20	21	22	22	23	23	23
NORTHERN AFRICA	14	13	12	11	11	10	13	11	10	10	13	15	17	18	18	19	19	20	20	20	19	18	17	16
CENTRAL AFRICA	16	15	14	13	13	13	15	13	10	12	14	16	16	17	18	18	18	19	19	19	19	19	19	18
SOUTH AFRICA	17	16	15	14	14	13	14	15	14	13	12	13	17	19	21	22	23	24	24	25	23	21	20	18
MIDDLE EAST	12	11	10	12	15	15	14	10	10	9	9	14	16	17	18	18	19	19	19	18	16	15	13	12
JAPAN	20	20	20	20	20	19	18	17	15	13	12	11	11	10	11	12	11	11	10	13	15	17	18	19
CENTRAL ASIA	20	20	20	20	19	19	18	17	15	13	12	11	11	10	12	15	17	15	14	13	13	14	16	19
INDIA	16	17	17	17	17	16	15	13	10	9	9	9	12	9	9	9	8	8	8	10	13	14	15	16
THAILAND	17	18	20	20	19	19	18	17	15	13	12	11	10	10	14	16	17	17	16	14	14	13	12	14
AUSTRALIA	27	29	30	30	30	29	28	27	24	22	20	19	17	16	15	15	15	14	14	13	15	20	23	25
CHINA	19	20	20	19	19	18	18	17	15	13	11	10	10	13	14	13	12	12	11	10	12	15	17	18
SOUTH PACIFIC	29	30	30	29	29	27	25	22	19	17	16	15	15	14	13	13	12	12	12	20	24	27	28	29
TO/FROM US MIDWEST																								
CARIBBEAN	25	24	24	23	21	19	17	16	15	14	13	12	13	16	18	20	21	22	23	24	24	25	25	25
NORTHERN SOUTH AMERICA	26	25	25	23	21	19	17	16	15	14	13	13	12	15	18	19	21	22	23	24	25	25	25	26
CENTRAL SOUTH AMERICA	28	25	23	21	19	18	17	16	15	14	13	13	15	16	19	21	23	25	26	27	28	29	29	29
SOUTHERN SOUTH AMERICA	25	21	19	18	17	16	15	14	13	13	13	12	14	17	19	22	23	25	26	27	28	28	29	27
WESTERN EUROPE	15	14	12	10	12	12	11	11	10	11	14	16	17	18	19	19	19	19	19	18	18	18	17	16
EASTERN EUROPE	10	9	9	9	8	14	11	10	10	13	15	16	17	18	19	19	19	18	18	17	17	15	14	10
EASTERN NORTH AMERICA	18	18	17	16	15	14	13	12	11	10	9	9	11	13	14	16	16	17	18	18	18	18	18	18
CENTRAL NORTH AMERICA	8	8	8	8	7	7	6	5	5	5	4	4	4	6	6	7	7	8	8	8	8	8	8	8
WESTERN NORTH AMERICA	14	14	14	13	13	12	11	10	9	8	8	7	7	8	10	11	12	13	13	14	14	14	14	14
SOUTHERN NORTH AMERICA	16	16	16	15	15	13	12	11	10	9	9	8	8	10	11	12	13	14	15	15	16	16	16	16
NORTHERN AFRICA	18	17	16	14	14	13	12	11	10	10	13	16	17	18	19	20	20	21	21	21	21	21	20	20
CENTRAL AFRICA	17	16	14	14	13	12	12	11	10	10	14	16	17	18	19	20	20	21	21	21	21	21	20	18
SOUTH AFRICA	17	16	15	14	13	13	13	18	17	16	15	17	20	23	25	26	28	29	27	25	23	21	19	18
MIDDLE EAST	12	11	11	10	13	12	11	11	10	12	15	17	18	18	19	20	20	20	19	18	17	16	14	13
JAPAN	20	20	20	19	18	17	16	13	12	11	11	10	11	14	13	12	11	10	10	14	16	17	18	19
CENTRAL ASIA	20	20	19	19	18	17	16	13	12	11	10	10	13	15	17	18	17	15	14	13	13	13	16	19
INDIA	11	13	14	15	16	15	13	10	10	10	14	15	16	16	15	14	13	11	9	9	9	8	8	8
THAILAND	16	18	19	18	18	17	15	13	11	10	10	13	15	17	17	18	19	17	16	15	14	13	12	14
AUSTRALIA	28	29	30	29	29	28	26	23	21	20	18	17	16	15	16	16	15	14	14	13	16	21	24	26
CHINA	19	19	19	18	18	17	15	14	11	10	10	13	15	17	15	13	12	11	11	10	12	15	17	18
SOUTH PACIFIC	30	30	29	29	28	26	24	19	17	16	15	14	14	13	13	12	12	12	14	22	25	27	28	29
TO/FROM US EAST COAST																								
CARIBBEAN	20	19	19	17	16	14	13	12	11	11	10	10	12	14	15	16	17	18	19	19	20	20	20	20
NORTHERN SOUTH AMERICA	23	22	21	19	18	16	15	14	13	12	12	11	13	15	16	18	19	20	21	22	22	22	23	23
CENTRAL SOUTH AMERICA	27	25	22	21	19	18	16	15	15	14	13	15	18	20	22	24	25	26	27	27	28	28	28	28
SOUTHERN SOUTH AMERICA	24	21	19	18	17	16	15	14	13	13	13	12	16	19	21	23	24	26	27	27	28	28	28	27
WESTERN EUROPE	14	12	11	10	10	9	11	10	9	12	14	16	17	18	19	19	19	19	19	19	18	17	17	16
EASTERN EUROPE	10	9	9	9	11	12	11	10	10	14	16	17	18	19	19	19	19	19	18	17	16	15	13	
EASTERN NORTH AMERICA	9	8	8	7	7	6	6	5	5	4	4	5	6	6	7	8	8	8	8	9	9	9	9	9
CENTRAL NORTH AMERICA	19	19	18	17	16	14	13	12	11	11	10	10	12	14	15	17	17	18	19	19	19	19	19	19
WESTERN NORTH AMERICA	25	25	24	23	22	20	18	17	15	14	13	13	14	17	20	21	23	24	25	25	26	26	26	26
SOUTHERN NORTH AMERICA	20	20	19	18	17	15	14	13	12	11	10	10	11	13	15	16	17	18	19	19	20	20	20	20
NORTHERN AFRICA	19	17	16	15	14	13	13	13	13	14	17	19	21	22	24	24	25	25	25	25	25	24	23	21
CENTRAL AFRICA	17	16	15	14	13	12	14	13	13	14	17	19	21	22	24	24	25	25	25	24	24	22	20	18
SOUTH AFRICA	17	16	15	14	13	13	13	16	15	15	15	19	21	23	25	26	27	28	27	25	23	21	19	18
MIDDLE EAST	16	15	14	13	13	12	11	11	10	13	15	17	18	19	20	21	21	21	21	21	21	20	19	17
JAPAN	20	19	18	17	15	13	12	12	11	10	11	14	15	14	13	12	11	10	10	14	16	17	19	19
CENTRAL ASIA	19	19	18	17	15	13	12	11	10	10	13	16	17	18	19	19	17	16	15	14	13	13	16	19
INDIA	9	9	8	8	13	12	11	10	10	13	16	17	18	18	18	17	17	16	15	14	11	9	9	9
THAILAND	15	18	17	16	13	12	11	10	10	13	15	17	18	19	19	20	20	18	17	15	14	13	13	12
AUSTRALIA	28	29	29	28	27	24	22	20	19	17	16	15	15	17	16	15	15	14	13	13	17	22	25	27
CHINA	18	18	17	16	14	12	11	11	10	11	15	16	18	17	16	14	12	12	11	10	10	14	16	17
SOUTH PACIFIC	29	29	29	28	25	23	21	16	15	14	14	13	13	12	12	12	12	12	18	23	26	27	28	29

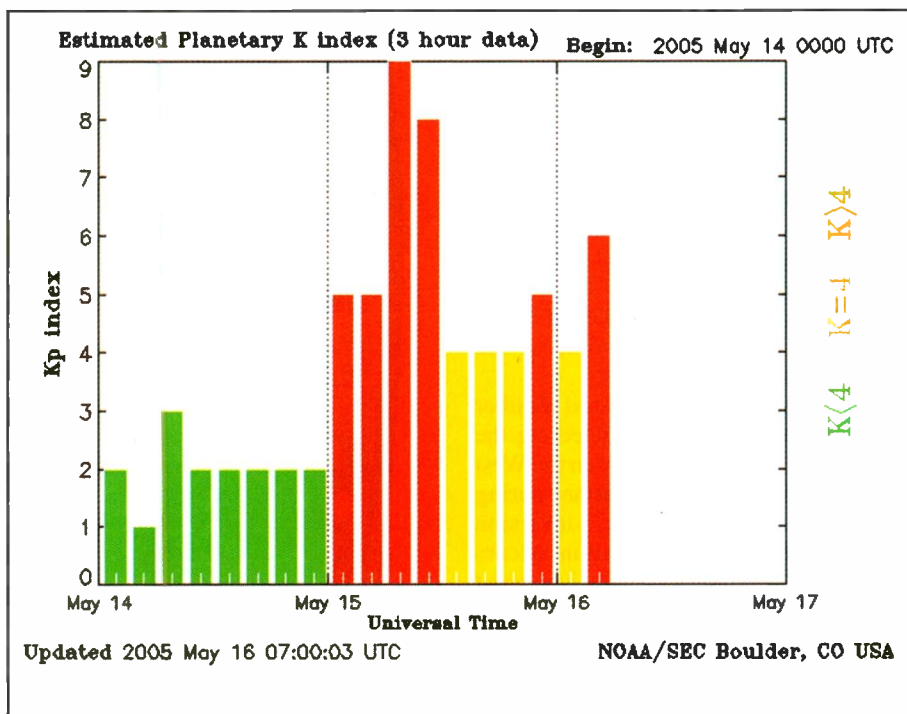


Figure 4. The geomagnetic activity on May 15 reached the highest level, a Kp of 9. The resulting G5-level (extreme) storm triggered aurora around the world and caused a lot of disruption of radio propagation. (Source NOAA/SEC)

the high power and gain of their transmitting facilities, will overcome tough propagation into their target areas. But, there may be days when it will be a challenge to hear the station you're hunting for.

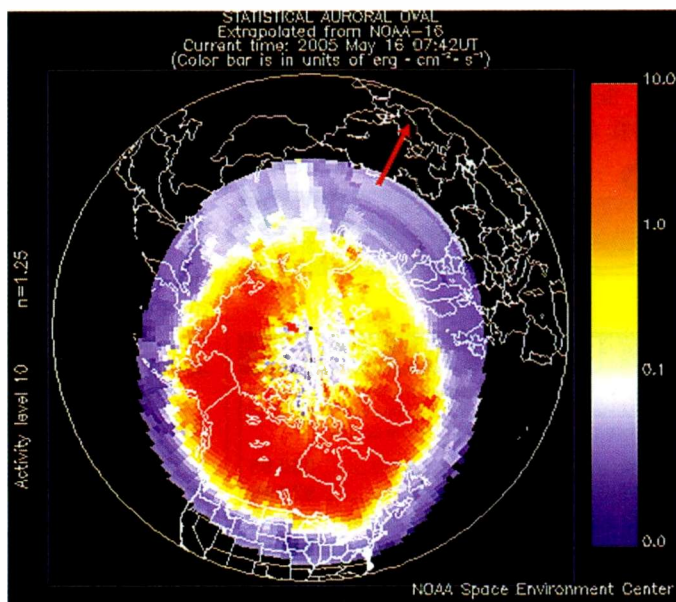
HF Propagation For August

Propagation on the higher frequencies will fluctuate less drastically during August, as the hours of sunlight are quite long and the ionosphere has very little time to recombine during the hours of darkness. Higher HF frequencies are going to be unusable over most paths, but when sporadic-E (Es) openings occur expect good domestic signals. These Es openings will be strong at times, and fairly common, but might be short-lived.

Nineteen and 22 meters will compete with 16 for the best daytime DX band during August. These bands will open for DX just before sunrise and should remain open from all directions throughout the day, with a peak in the afternoon. Nighttime conditions will favor openings from the south and tropical areas. Look for gray-line propagation from Asia, with long-path common from southern Asia, the Middle East, and northeastern Africa as well as from the Indian Ocean region via the North Pole.

The 25- and 31-meter bands have an incredible amount of activity since many broadcasters target their audiences during prime times (morning and early evenings) in their areas of coverage. Expect 11 MHz to be an excellent band for medium distance (500 to 1,500 miles) reception during these daylight hours. Longer distance reception (up to 2,000 to 3,000 miles) should also be possible for an hour or two after local sunrise, and again during the late afternoon and early evening. Heavy

Figure 5. A map showing the Northern Auroral Oval on May 15, 2005. The greater the red, the more intense the aurora activity. The aurora caused by the G5-level storm of May 15 was seen in most of the middle latitude of the United States and many other areas of the world. (Source NOAA/SEC)



congestion will occur here, too, as many international and domestic broadcasters make use of 25 meters.

The backbone of worldwide short-wave broadcasting, 31 and 41 meters, will provide medium distance daytime reception ranging between 400 and 1,200 miles. During August, reception up to 2,500 miles is possible during the hours of darkness, and until two to three hours after local sunrise. Forty-one and 49 meters still should be best for worldwide DX from sunset to sunrise. From early evening into darkness increasingly longer paths develop, up to several thousand miles. As propagation conditions don't change much on the lower HF bands through the solar cycle, a high number of HF broadcasters rely on these bands. International and domestic broadcasts compete with amateurs on the 41-meter band and with each other on both. This makes for a lot of interference, especially during the late afternoon and evening hours, making reception of weak, exotic signals a bit more of a challenge.

Don't expect any improvement in nighttime DX conditions on 41 through 120 meters during August, since we're not yet close enough to the seasonal decrease in the static levels of winter. The 5-, 3-, and 2-MHz shortwave bands are used mostly in designated tropical areas for domestic broadcasting. The entire 4-MHz band is set aside for domestic broadcasting in Asia, and some of this band is used throughout Europe. On all these bands, reception during daylight should be possible from up to 500 miles away. After sunset until about an hour or so after sunrise, reception of signals from 1,000

to a possible 2,000 miles away is possible. There will still be a high level of static during August, so these bands will be a challenge to those looking for long-distance DX of exotic tropical stations. The best time to search for these would be just before sunrise and an hour or so after daylight.

VHF Conditions

Statistical studies show that a sharp increase in *Es* propagation takes place at mid-latitudes during the late spring and into the summer months. During August, short-skip propagation over distances as great as 1,400 miles should be possible about 10 percent of the time on 6 meters. Higher VHF (2-meter) openings may also be possible during periods of intense *Es* ionization.

In addition, conditions for tropospheric ducting begin to form over wide areas of North America and over the Atlantic and Pacific Oceans. Watch for stalled high-pressure cells between your location and the DX. Each summer season in North America, weather systems develop that produce conditions favorable for VHF DX. Stalled high-pressure weather cells, with pressures reaching above 1025

millibars, are known to cause ducting of VHF radio signals. When ducts occur, VHF radio signals may propagate through these ducts far beyond the normal line-of-sight distances.

Tropospheric ducting paths form each year between Hawaii and the U.S. West Coast, and from San Francisco to Los Angeles, Denver to Dallas, Texas to Florida, the Great Lakes to the eastern seaboard, from the Great Lakes to Texas, Nova Scotia to Miami, and from the Midwest to the Southeast.

Advanced visual and infrared weather maps can be a real aid in detecting the undisturbed low clouds between the West Coast and Hawaii or even farther during periods of intense subsidence-inversion band openings. This condition occurs also over the Atlantic. There is a great resource on the Internet that provides a look into current conditions. Bill Hepburn has created forecast maps for the Pacific, Atlantic, and other regions and presents them at http://www.iprimus.ca/~hepburnw/tropo_XXX.html.

Current Cycle 23 Progress

The Royal Observatory of Belgium reports that the monthly mean observed sunspot number for April 2005 is 24.4, with the lowest daily sunspot value recorded on April 24 with a reading of 9. The highest daily sunspot count was 37 on April 30. The 12-month running smoothed sunspot number centered on October is 35.9, down from September's 37.6. A smoothed sunspot count of 15, give or take about 12 points, is expected for August 2005. (You can see that the worst case translates to about 5 as a possible monthly sunspot count. While this is possible, it is unlikely.)

The Dominion Radio Astrophysical Observatory at Penticton, BC, Canada, reports a 10.7-centimeter observed monthly mean solar flux of 85.9 for April 2005, down a bit from March's 90. The 12-month smoothed 10.7-centimeter flux centered on October 2004 is 102.1, down from September's 103.7. The predicted smoothed 10.7-centimeter solar flux for August 2005 is 77, give or take about 16 points.

The observed monthly mean planetary A-Index (*Ap*) for April 2005 is 12, the same as the March index. The 12-month smoothed *Ap* index centered on October 2004 is 13.5, about the same as for both August and July 2004 (13.8). Expect the overall geomagnetic activity to be quiet

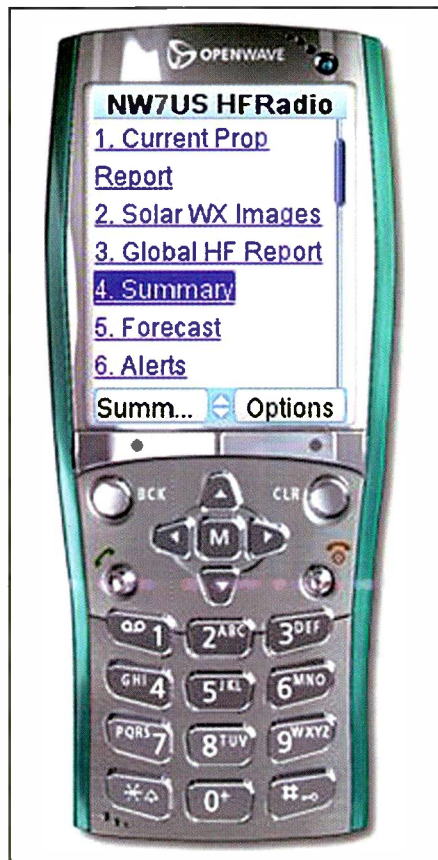


Figure 6. Screenshot from the NW7US Propagation Center for cell phones and other WAP/WML devices, at <http://wap.hfradio.org/>. (Source NW7US/OpenWave Simulator)

to active during most days in August 2005, with some isolated periods of stormy activity.

Join The Fun!

You can join in with others in discussing space weather, propagation, and shortwave or VHF listening at <http://hfradio.org/forums/>. Be sure to check out the latest conditions, as well as the educational resources about propagation, which I have put together for you at <http://prop.hfradio.org/>. I also provide a WAP/WML resource for wireless devices. If you want the latest propagation information like the solar flux, *Ap* reading, and so forth using a cell phone or other WAP device, check out <http://wap.hfradio.org/>, the wireless version of my propagation site (see Figure 6).

Please don't hesitate to write and let me know about any interesting propagation you've noticed. Do you have questions about an aspect of propagation? I look forward to hearing from you. Happy signal hunting!

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Capitol Hill And FCC Actions Affecting Communications

Federal Agents Arrest Alleged California Jammer

FBI special agents, accompanied by representatives of the FCC Los Angeles Office, in May took a Southern California man into custody and confiscated his radio equipment for allegedly interfering with area radio communications. Jack Gerritsen, 68, was arrested at his home in Bell, California, without incident on May 5. He had already been facing \$52,000 in FCC-imposed or proposed forfeitures for alleged interference.

"A criminal complaint filed (May 4) charges Gerritsen with a felony charge of malicious interference with a communications system operated by the United States and a misdemeanor count of transmitting radio signals without a license," according to a statement from the office of Debra W. Yang, U.S. Attorney for the Central District of California. "The two charges carry a potential penalty of 11 years in federal prison." News of the arrest was disseminated to radio amateurs by the American Radio Relay League in its *ARRL Letter* on May 6. "Radio amateurs on the West Coast have been complaining for months about the slow pace of enforcement action in the Gerritsen case," the *ARRL Letter* said. "Los Angeles-area repeater owners have taken to shutting down their machines to avoid the nearly constant barrage of malicious interference attributed to Gerritsen."

The criminal complaint states the FCC investigation determined Gerritsen "transmits his prerecorded political messages and real-time harassment and profanity for hours at a time, often making it impossible for licensed radio operators to use the public frequencies." Bond was set at \$250,000.

The FCC has been investigating multiple incidents of illegal radio transmissions and malicious interference alleged to be caused by Gerritsen over the last four years. Gerritsen is alleged to have interfered with Military Affiliate Radio System (MARS) transmissions. According to the ARRL, a MARS training program in March "had to be cancelled as a result of interference attributed to Gerritsen." The FCC says it has received complaints that he also interfered with local and state police and fire agencies, the American Red Cross, U.S. Coast Guard Auxiliary, and other services. Gerritsen briefly held the amateur radio call sign KG6IRO.

House Resolution Calls For FCC Evaluation Of BPL Interference

A resolution calling for the FCC to perform a thorough analysis of radio interference associated with broadband over power line (BPL) has been introduced in the U.S. House of Representatives by Rep. Michael Ross (D-Arkansas), who is also a licensed radio amateur. Ross, who holds the amateur call sign WD5DVR, is a member of the House Committee on Energy and Commerce and is on subcommittees for Energy and Air Quality and Commerce, Trade and Consumer Protection.

The resolution, designated H. Res. 230, focuses on examining BPL's potential to interfere with public safety radio com-

munications and calls for the FCC to incorporate "extensive public review and comment" and to reconsider and review its new BPL rules. If approved by the House, the non-binding resolution "would express the requests as the 'sense of the House of Representatives,'" the American Radio Relay League said in its *ARRL Letter*. The ARRL represents thousands of amateur radio operators and has been a vocal opponent of BPL.

National Telecommunications and Information Administration studies "have determined that broadband over power line creates a 'high risk' of radio wave interference, and that harmful interference to public safety mobile radio receivers can be expected at distances of 75 meters from the power line where broadband over power line is in operation, and at distances of up to 460 meters from fixed stations, such as VHF police or fire dispatch communications facilities."

The resolution asserts that many public safety and support agencies use 30- to 50-MHz low-band VHF and that more than a dozen states, including California, Connecticut, Florida, Illinois, Indiana, Mississippi, Missouri, Nebraska, North Carolina, South Carolina, Tennessee, West Virginia, and Wyoming, use those frequencies for state police operations. It's the primary public safety radio band in nine states.

The ARRL points out that the resolution "recounts that the FCC has struggled for years to resolve widespread harmful interference to the radio communications of first responders on 800 MHz and 'should not have proceeded with introduction of a technology which appears to have substantial potential to cause destructive interference to police, fire, emergency medical services and other public safety radio systems' without first conducting a comprehensive evaluation." The Association of Public-Safety Communications Officials (APCO) and National Public Safety Telecommunications Council (NPSTC) have called on the FCC to withhold action on BPL until a "conclusive determination" of interference to radio systems below 80 MHz can be determined.

Manufacturing Agreement Signed For RFID

Northstar Network, Ltd., has announced an agreement with Cathexis Innovations, Inc., to manufacture IDBlue, Cathexis' proprietary RFID (radio frequency identification) reader. IDBlue is a handheld RFID pen-like device that reads and writes information stored on RFID tags and transfers it wirelessly to desktop and laptop computers, a PDA, or pocket PC. The small size and weight of IDBlue "make it very ergonomic and convenient to use," officials said.

RFID technology is being eyed for use in a range of industries, from health care and the military to the retail sector. Applications include inventory management, supply chain, maintenance management, and document tracking. RFID technology is also being considered for use at U.S. border checkpoints.

(Continued on page 70)

Sangean's WR-1 AM/FM Hi-Fi Radio

This is one of those reviews that practically writes itself, simply because the product, Sangean's WR-1 AM/FM tabletop radio, is more than a good receiver for AM/FM listening, it's also a great sounding radio! In that regard, then, I suppose my "wrap-up" is a bit misplaced here at the beginning of the review, but bear with me for a moment and read on.

Sangean's website says, "The WR-1 is the culmination of 30 years of experience in the design and manufacture of quality, state-of-the-art radios. This beautifully crafted radio creates the warm rich tones normally found in only the larger, more expensive home stereo systems." I remember the first time I *really* heard deep, rich bass was at an Army Exchange in Europe. The store manager had carefully placed two small name-brand speakers on tall stands in the clothing department with a sign directing folks to the electronics area of the store. As much as I really dislike shopping, I went back to that section time and again just to hear that great audio. Mind you, these were high-end speakers, each costing a couple hundred dollars at the time.

The next time I head audio that good was just a couple of months ago when I first turned on the Sangean WR-1 and tuned it to my favorite FM station for its usual fare of oldies. I've *never* heard the Stones sound like that, especially from a small three-inch speaker sitting on the kitchen table! Outstanding audio, bass response, and fidelity are the hallmarks of this fine receiver from Sangean.

Of course the solid wooden cabinet has a lot to do with the superb audio. Here's an obvious statement: plastic cabinets aren't wooden. But you'd be surprised by how many manufacturers tout their plastic cabinets as sounding just like a good wooden cabinet. Don't you believe it for one minute!

Simple To Operate

There are only three main controls on the Sangean WR-1: Power on/AM/FM, volume, and rotary tuning control. The back of the radio has connections for an



Sangean's WR-1 is an excellent tabletop radio with superb audio!

external wire antenna (it includes a short wire antenna for improved FM reception), headphones (3.5 mm), and line-out for attaching your CD player or other electronic goodie, perhaps your cassette recorder/player.

The WR-1 isn't just another "crank up the volume just to crack the windows" radio, but rather when you *do* crank it up,

you can still hear the lyrics—the three-inch front-firing speaker won't distort the audio. In other words, it doesn't sound like many other similar radios; the WR-1 has a full, rich sound that, frankly, I haven't heard even on those big, beefy boom boxes. Sure, they're loud, but they're also plastic.

Now, while the WR-1 has an "old-fash-



The back of the WR-1 has quality AM external antenna connections (center). Along the bottom is the external/internal antenna switch (left) and connections for REC out, headphones and 12 VDC (adaptor not included). There's even an F-type external antenna terminal for connecting the supplied FM wire antenna for improved FM reception.

ioned" analog tuning dial, this is one radio where some folks perceived "need" for digital tuning readout and even an S-meter should take second place to the great audio; this isn't a DX/communications-type of receiver. I've found that generally we'll leave the radio on one or two FM stations which aren't that difficult to find, even on a crowded New York/New Jersey FM dial. Besides, the analog tuning dial looks "right" on the WR-1.

Interested in nighttime DX? Anyone who has used a basic AM radio after the sun goes down—even without an external antenna—knows that an expensive receiver with lots of bells and whistles isn't always necessary to log those distant stations. Much of my AM DXing back in my early years was done on a portable radio, and yes, with analog tuning and a telescoping whip antenna.

The five-pound Sangean WR-1, which measures 4.5 x 9.5 x 6 inches (HWD) does a fine job of pulling in those distant stations. While sensitivity and selectivity specs weren't listed in the manual, let's just say WTOP, Washington, DC, WGY, Schenectady, NY and WBZ, Boston, MA were loud and clear. Add to that, several stations at

the top end of the dial in the expanded AM band area, that I was able to null out by turning the radio in order to hear others, and you've also got a great-sounding radio for tuning the AM band.

The WR-1's selectivity on FM was above average during my tests. Sure, a very strong local FM on 105.1 will nudge out another, weaker station nearby, but remember, this isn't a DX machine; great audio is what you get, along with good all-around reception. I've cranked up the audio a little bit and put the WR-1 in the living room and the FM sound quality is better—much better, actually—than our TV's audio! It's very rare that I "guarantee" anything, but I can say with certainty that I'd guarantee you'll be pleased with the Sangean WR-1. If you're not, it's likely your ears, because the WR-1 is indeed superb!

For more information on the Sangean WR-1, which has a list price of \$139.50 (typically found for around \$100), visit the Sangean website at www.sangean.com or contact Sangean America, Inc., 51 Troy Ave., S. El Monte, CA 91733; phone: 626-579-1600. Please tell them you read about the WR-1 Hi-Fi in *Popular Communications!* ■

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Good News From The South Pacific!

For several years now DXers have been hearing reports to the effect that the Papua New Guinea regionals were in a shaky state (deteriorating equipment and insufficient funding). Now comes the good news that these stations are being upgraded (some already have been). Papua New Guinea contains several "radio countries," so the rejuvenation of these stations is especially welcome.

Several new "clandestine" broadcasters have taken to the airwaves recently. **Radio Horyaal** is operating in Somali (and perhaps also Amharic) via a Russian site on **12130** from 1730 to 1800.

Tensae Ethiopia **Voice of Unity** is on the air Sundays from 1500 to 1600 in Amharic on **15560**. Another is **Radio Voice of the ENUF** on Fridays and Sundays from 1700 to 1800 on **12120**. Both of these broadcasts are aired via the Transmitter Documentation Project (TDP), which brokers time on short-wave transmitters in various countries.

Seda-ye-Jambushi Iran e Farda is on the air via Moldova on **7490** from 1600 to 1645. It's an operation of the Iran of Tomorrow Movement, which can be reached at hasteh@sosiran.com or at 17328 Ventura Blvd. #209, Encino, CA 91316. It's quite unlikely anyone in North America will pick this one up, considering the time/frequency pairing.

A new one in Ecuador is **Radio Chaskis** in Otavalo, which has turned up on **4909** (variable) and was in test phase when these words went down. Reports can be e-mailed to radiochaskis@hotmail.com or sent via regular mail to Jiron Roldos Aguilera y Panamericana Norte, Otavalo, Imbabura, Ecuador.

Reader Logs

Remember, your shortwave broadcast station logs are always welcome. But please be sure to double or triple space items, list them by country, and include your last name and state abbreviation after each log. Also much wanted are spare QSLs you don't need returned, station schedules, brochures, pennants, station photos, and anything else you think would be of interest. And how about sending a photo of you at your listening post? Step right up and get your 15 minutes of fame!

Here are this month's logs. All times are in UTC. Double capital letters are language abbreviations (SS = Spanish, RR = Russian, AA = Arabic, etc.). If no language is specified the broadcast is assumed to be in English (EE).

ALASKA—KNLS, **9615** at 1510 with CC songs and presumed religious talks by woman. (DeGennaro, NY)

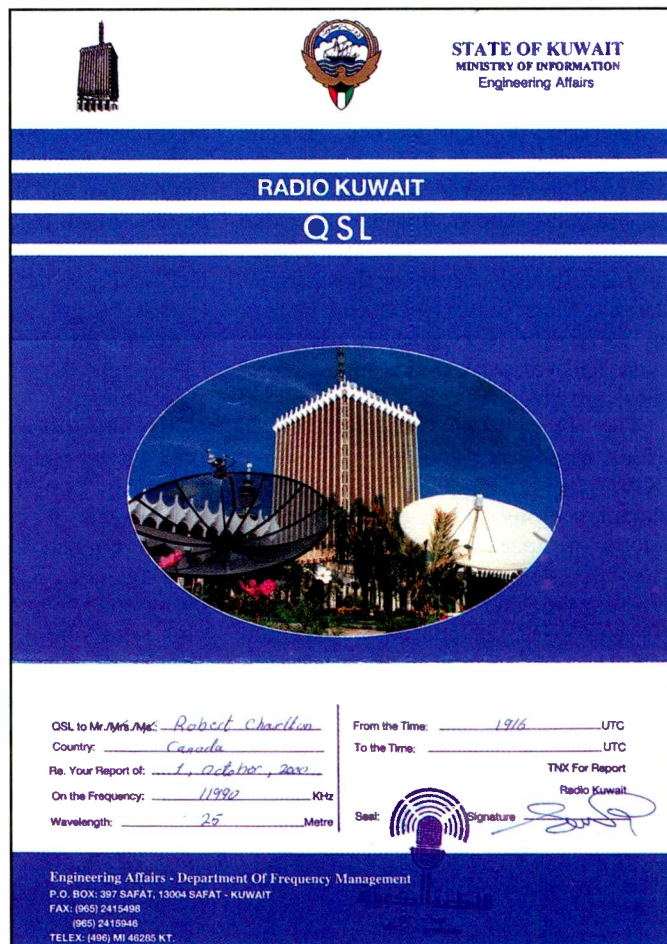
ALBANIA—Radio Tirana, **6115** at 2305 in Albanian to North America. ID at 2309. Also **7160** in Albanian at 0255. (DeGennaro, NY)

ANGOLA—Radio Nacional, **4950** in PP monitored at 0237. (DeGennaro, NY)

ANGUILA—Caribbean Beacon, **11775** at 2035 with Dr. Gene Scott. (Wood, TN)

ARGENTINA—Radio Nacional, **6060** in SS at 0956 and **15345** in SS at 2210. (DeGennaro, NY) Ditto heard at 0130 and 2301. (Charlton, ON)

ARMENIA—Voice of Armenia, **9775** with feature on Armenian genocide. Off at 1845. (Ziegner, MA)



Inside this foldout Radio Kuwait QSL is a schedule and information about Kuwait. (Thanks Robert Charlton)

ASCENSION ISLAND—BBC Relay, **7160** opening at 0300, knocking out Radio Tirana. (DeGennaro, NY) **15190** at 1210. (Northrup, MO) 1645. (Yohnicki, ON) **17830** at 1916. (Charlton, ON)

AUSTRALIA—Radio Australia, **6020** in Pidgin at 0952, **9580** at 1016, **9590** to the Pacific at 1505, **9710** in Pidgin at 1051, **11650** to Pacific at 2120, **11750** to SE Asia at 1541 and **17715** to East Asia and Pacific at 0038. (DeGennaro, NY) 6020 in Pidgin at 1040 and past listed 1100 close, seemingly on Sundays. (Montgomery, PA) 9580 at 1217. (Jeffery, NY) 9590 at 1249. (Charlton, ON) 1330. (Northrup, MO) **9710** at 1600 sign on, **15515** at 0225, **17795** at 0150 and **21740** at 2215. (Yohnicki, ON) **11660** at 1334 and into CC and **11880** at 1749. (Brossell, WI) 21740 at 2200. (Maxant, WV) 2335. (MacKenzie, CA) Voice International, **11840** with ID at 1700 as "The Voice International, Limited" and into news. (Montgomery, PA) **11955** at 0905 with pop song. (Foss, Philippines) HCJB-Australia, **15425** with religious discussion at 1136. (D'Angelo, PA)

AUSTRIA—Radio Austria Int., **9870** with "Report From Austria" at 0045. (Maxant, WV) 2357. Also **13675** via Canada with letters program at 1622. (Charlton, ON) **13730** in GG with jazz at 1626. (DeGennaro, NY)

BELARUS—Radio Belarus, **5970** in Belorussian heard at 0123 with possible interview. (DeGennaro, NY) 0200-0230 sign on with

Help Wanted

We believe the "Global Information Guide" consistently presents more short-wave broadcast loggings than any other monthly SW publication! (This month we processed 588 loggings!)* Why not join your fellow SWLs, let us know what you're hearing, and also become eligible for our monthly shortwave book prize! Send your logs to "Global Information Guide," *Popular Communications*, 25 Newbridge Rd., Hicksville NY 11801-2953. Or e-mail them to Editor Harold Ort at popularcom@aol.com, or to your "GIG" columnist at gdex@genevaonline.com (please see the column text for basic formatting tips.) Come join the party—we look forward to hearing from you!

**Not all logs get used; there are usually a few which are obviously inaccurate, unclear, or lack a time or frequency.*

multi-lingual ID sequence and into EE program with schedule, news heard at 0202. Poor with splatter. Weaker on //7210. Same at 0230 but this is UTC Sunday only, also //7210. (Alexander, PA)

BELGIUM—RTBF, 9970 in FF with soccer coverage at 2045. (DeGennaro, NY)

BOLIVIA—Radio Mallku, Uyuni, 4795 opening at 0955 in SS and QQ. (DeGennaro, NY) 4976 at 1015 with beautiful, very slow flute music. (Wilkner, FL) Radio Santa Cruz, Santa Cruz, 6134.8 in SS at 0953. (DeGennaro, NY) Radio San Miguel, 4899.9v in SS at 0950 with distorted signal, IDs. (Wilkner, FL) 1005 with ballads. Fairly good

Abbreviations Used In This Month's Column

*	— before or after a time (time the station came on or left the air)	LSB	— lower sideband
(l)	— after a frequency (lower sideband)	LV	— La Voz, La Voix
(p)	— presumed	NBC	— National Broadcasting Corporation (Papua New Guinea)
(t)	— tentative	ORTB	— Office de Radiodiffusion et Television du Benin
(u)	— after a frequency (upper sideband)	PBS	— People's Broadcasting Station
v	— variable	PP	— Portuguese
//	— in parallel	PSA	— public service announcement
AA	— Arabic	QQ	— Quechua
ABC	— Australian Broadcasting Corporation	RCI	— Radio Canada International
AFN	— Armed Forces Network	Rdf.	— Radiodifusora, Radiodiffusion
AFRTS	— Armed Forces Radio TV Service	REE	— Radio Exterior de Espana
AIR	— All India Radio	RFA	— Radio Free Asia
Anmt(s)	— announcement(s)	RFE/RL	— Radio Free Europe/Radio Liberty
Anncr	— announcer	RNZI	— Radio New Zealand International
AWR	— Adventist World Radio	RR	— Russian
BSKSA	— Broadcasting Service of Kingdom of Saudi Arabia	RRI	— Radio Republik Indonesia
CC	— Chinese	RTBF	— RTV Belge de la Communate Françoise
Co-chan	— co-channel (same frequency)	Relay	— transmitter site owned/operated by the broadcaster or privately operated for that broadcaster
Comml(s)	— commercial(s)	relay	— transmitter site not owned by the broadcaster
CP	— Bolivia, Bolivian	SCI	— Song of the Coconut Islands (transition melody used by Indonesian stations)
CRI	— China Radio International	s/off	— sign off
DD	— Dutch	s/on	— sign on
DJ	— disc jockey	SIBC	— Solomon Is. Broadcasting Corp.
DW	— Deutsche Welle/Voice of Germany	Sked	— schedule
EE	— English	SLBC	— Sri Lanka Broadcasting Corporation
ECNA	— East Coast of North America	SS	— Spanish
f/by	— followed by	TC	— time check
FEBA	— Far East Broadcasting Association	TOH	— top of the hour
FEBC	— Far East Broadcasting Company	TT	— Turkish
FF	— French	TWR	— Trans World Radio
GBC	— Ghana Broadcasting Corp	Unid	— unidentified
GG	— German	USB	— upper sideband
GMT	— Greenwich Mean Time	UTC	— Coordinated Universal Time (as GMT)
HH	— Hebrew, Hungarian, Hindi	UTE, ute	— utility station
HOA	— Horn of Africa	Vern	— vernacular (local) language
ID	— station identification	(via)	— same as "relay"
II	— Italian, Indonesian	VOAS	— Voice of America
Int	— international	VOIRI	— Voice of Islamic Republic of Iran
IRRS	— Italian Radio Relay Service	WCNA	— West Coast of North America
IS	— interval signal	ZBC	— Zimbabwe Broadcasting Corporation
JJ	— Japanese		
KK	— Korean		



Carmen Miranda had nothing on the lady gracing this Voice of Turkey QSL. (Thanks Robert Charlton)

but unstable, wobbly carrier. (Alexander, PA) Radio Eco, Reyes, **4409.8** in SS at 0020 to 0035 and 0036 to 0055. (Wilkner, FL) Radio Chicha, Tucia, **4763.2** at 1020. "Buenos dias," TC, "atenciones." (Wilkner, FL)

BOTSWANA—VOA Relay, **9775** at 0420. (Brossell, WI) **12080** in FF at 1857 and **13710** in EE at 2028. (Charlton, ON)

BRAZIL—Radio Aparecida, Aparecida, **9630** in PP at 1906. (Charlton, ON) Radio Clube Paranaense, Curitiba, **6040** in PP at 0215. (Charlton, ON) Radio Clube do Para, Belem, **4885** in PP at 0936. (DeGennaro, NY) 0328. (Brossell, WI) 0510. (Jeffery, NY) Radio Difusora, Taubate, **4924.5** with PP interviews at 1001. (DeGennaro, NY) Radio Bandeirantes, Sao Paulo, **9645** with two men in PP at 0054. (DeGennaro, NY) Radio Rural, Santarem, **4765** with music and occasional PP anmts at 0924. (DeGennaro, NY) Radio Senado, Brasilia, **5990** with music at 0956. (DeGennaro, NY) Radio Marumby, Florinapolis, **9665** with PP religious talk at 2320. (DeGennaro, NY) Radio Nacional, Macapa, **4915** with music at 0245. (DeGennaro, NY) PP ID at 0430. (Yohnicki, ON) Radio Cancao Nova, Cachoeira Paulista, **9675** at 2311 with commls and PP anmts. (DeGennaro, NY) Radio Anhanguera, Araguaina, **4905** with PP ID at 2300, music and commls. (DeGennaro, NY) Radio Nova Visao, Santa Maria, **9530** with religious messages in PP at 1040. (DeGennaro, NY) Radio Difusora Roraima, Boa Vista, **4875** with PP music at 0329. (DeGennaro, NY) **4876.4** at 0404 with non-stop soft ballads, PP anmts at 0431 and more continuous music. (D'Angelo, PA) Radio Cultura Ondas Tropicais, Manaus, **4845.2** at 1006 with two men in PP. (DeGennaro, NY) Radio Brazil Central, Goiania, **4985** at 0006 with religious programming. (DeGennaro, NY) Radio Educacao Rural, Tefe, **4925** with anmts, government news in PP at 1016. (DeGennaro, NY) Radio Cultura, Sao Paulo, **17814.9** at 2210 with light jazz, romantic ballads. Weak. Better on //9615. (Alexander, PA) Radio Difusora Amazonas, Manaus, **4805** at 0950 with PP ID and news. (DeGennaro, NY) Radio Nacional Amazonas, **6185** at 0040 blocking Radio Educacion. 11780 in PP at 2141 with ID, frequencies, schedule. (DeGennaro, NY) **11780** with ID at 0128. (Charlton, ON) 0230 with animated sports coverage. (Wood, TN)

BULGARIA—Radio Bulgaria, **7400** with "News Behind the News" at 0009 and **9700** in Bulgarian at 0134 and **15700** at 1245. (Charlton, ON) **7500** in RR at 0405, **9400** in RR at 0416, **11500** in FF at 1700 and **11800** in SS at 2144. (DeGennaro, NY) 11500 in Bulgarian at 0015. (MacKenzie, CA) **11700** in EE at 0220. Wood, TN)

BURKINA FASO—Radio Burkina, **5030** at 0529 sign on with instrumental tune and into Afro-pops and indigenous music. FF talk at 0600. Mixing with co-channel University Network. (Alexander, PA) 2157 in FF. (DeGennaro, NY)

CANADA—RCI, **9515** at 1345. Also **13660** at 1315 and **15460** at 1220. (Northrup, MO) **11905** in PP to Brazil to 2359 close. (DeGennaro, NY) **15180** at 2242 and **17735** in FF at 1907. (Charlton, ON) CBC Northern Quebec Service, **9625** in the Inuit language at 0129.

(Charlton, ON) CHU time station, **7335** at 0144. CFVP Calgary, **6030** relaying local CKMX. Frequency covered by Cuban jammer until 0400. Poor but audible, especially on peaks. (D'Angelo, PA) CFRX, Toronto, **6070** with call-in show at 0600. (Maxant, WV)

CENTRAL AFRICAN REPUBLIC—Radio Centrafrique, **9590** via France in FF at 2140. (Paradis, ME) 2239 with African music and FF talk to 2300 close. (Montgomery, PA) Radio Ndeke Luka, **15470** via Germany, in FF with local music at 1918 and station, frequency info from woman at 1929 sign off. (Yohnicki, ON)

CHILE—Voz Cristiana, **5995** in SS at 0938. (DeGennaro, NY) **11745** at 0147 and **17680** at 2234, both in SS. (Charlton, ON) **15375** in SS at 0018. (Jeffery, NY)

CHINA—China Radio Int., **6005** via Canada at 0128, **6020** at 0136, **9570** at 0120, **9580** via Cuba at 0111, **13630** via Mali at 2021 (Charlton, ON) **6145** at 2312, **7285** at 2141, **9445** in SS at 0040. (DeGennaro, NY) **11850** via French Guiana in SS at 0033. (Jeffery, NY) China National Radio (CPBS), **9440**—Kunming in unid language at 1210, **11620**—Beijing in CC at 0226 and **11750**—Shijiazhuang in CC at 0233. (Jeffery, NY) **9500**—Shijiazhuang in CC heard at 1043. (DeGennaro, NY)

CLANDESTINES—Voice of Iranian Kurdistan (t), **4860** at 0317 with excited talk by man, vocal selection at 0327, more talk, music fanfare and lost after 0328. (D'Angelo, PA) SW Radio Africa, **11770** at 1800 to 1859 close with news about Zimbabwe elections. //12145. Also **15145** at 1600 to 1759 close. "Newsreel" program at 1700. (Alexander, PA) **11845** via Rampisham at 1637. Scheduled for **11705**, **11845**, and **11995** to avoid jamming. Switched to 11705 at 1700. Contact e-mail as talk@swradioafrica.com. (D'Angelo, PA) **15145** at 1600 complaining about Pres. Mugabe and jamming. (Ziegner, MA) 1633 with religious content, IDs. Website as www.swradioafrica.com. (Montgomery, PA) Very strong from 1659 to 1800 close. (Wood, TN) 1750 to close just before 1800 and move to **11770**. (Strawman, IA) Radio Free Asia, **11510** via Kazakhstan in unid language with frequencies given at 1329 and off at 1330. (Brossell, WI) **13625** with Tibetan service at 1123. //11590—Armenia. (D'Angelo, PA) **13670** via Northern Marianas in CC to 1828 close. Also **17565** in CC at 1505. (Yohnicki, ON) Voice of Mesopotamia, **11530** via Moldova at 1350 with Kurdish songs and talk. (Brossell, WI) 1357. (Charlton, ON) Radio Liberty, **9315** via Sri Lanka in unid Asian language at 1300. (Brossell, WI) **15725** via Tajikistan in Farsi at 1410. (Ziegner, MA) Democratic Voice of Burma, **9435** via Germany in presumed Burmese at 0017. (Brossell, WI) Radio Farda, **9805** via Morocco in Farsi at 0100, **9865** via Morocco in Farsi at 0047 and **13870** via Sri Lanka in Farsi at 1651. (DeGennaro, NY) **9960** via Sri Lanka in Farsi at 2020. (Yohnicki, ON) Radio Nacional de la RASD, **4760** in AA at 1955. (Ziegner, MA) 2102. (DeGennaro, NY) 2345 to 0005 close. (D'Angelo, PA) Radio Antarcional, **13800** via Moldova at 1640 in Farsi. (DeGennaro, NY) 1645 in Farsi at 1645. (Wood, TN) Voice of Justice, **9495** at 0130 opening in EE and also giving **11875** (which was very weak). (Alexander, PA) Sound of Hope, Taiwan, **11765** at 1652 in CC with the China Music Jammer in the background. (Montgomery, PA)

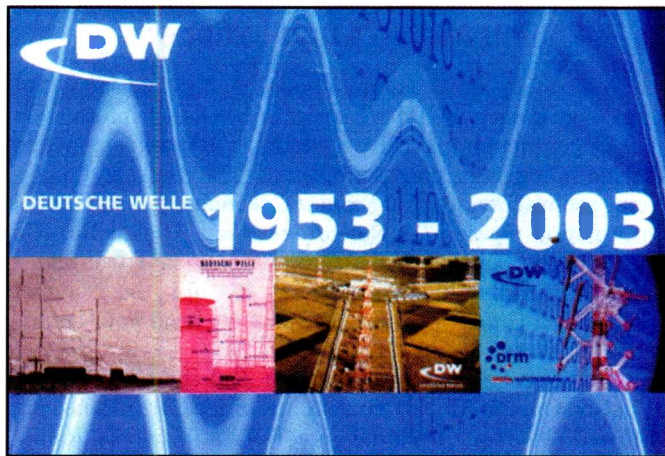
COLOMBIA—La Voz de su Concencia, **5910** at 1052 with older Latin tunes at 1052. 6009.8 with religious message in SS at 0950. (DeGennaro, NY) Radio Lider, **6139.8** at 0210 with phone calls, SS ballads. QRM from Cuba and Turkey after 0256. (Alexander, PA) 1001 with news. (DeGennaro, NY) La Voz de Guaviare, San Jose de Guaviare, **6035** with SS ID at 0945. (DeGennaro, NY) Ecos del Atrato, Quibdo, **5019** with music and SS talk at 1043. (DeGennaro, NY)

CONGO (DEM REP)—Radio Okapi, **11690** via South Africa at 0440 with many "Okapi" jingles. Poor in noise. (Alexander, PA)

COSTA RICA—University Network, **11869** with Dr. Scott at 2042. (Wood, TN)

CROATIA—Voice of Croatia, **7285** via Germany in Croatian at 0129. (Charlton, ON) **9925** via Germany in Croatian at 0040. (DeGennaro, NY)

CUBA—Radio Havana Cuba, **6000** in SS at 0123, **9600** in SS at 0133, **9820** in EE at 0131. (Charlton, ON) 6000 with sign on at 1100. Also **11760** in FF at 2136. (DeGennaro, NY) **7370** in SS at 1215 and **9550** in SS at 1340. (Northrup, MO) 11760 at 2032. (Wood, TN) Radio Rebelde, **5025** in SS at 1046. (DeGennaro, NY)



This Deutsche Welle card marked 50 years of broadcasting. (Thanks Robert Charlton)

CYPRUS—Cyprus Broadcasting Corp. **6180** in Greek at 2230. (Yohnicki, ON) (weekends only—gld)

BBC Relay, **9410** to Western Asia at 0057. (DeGennaro, NY) **15180** in AA at 1723. (Brossell, WI)

DJIBOUTI—RT Djibouti, **4780** at 0300 sign on under the Guatemalan. Music, woman with ID and sign on anmts in apparent Somali, HOA vocals and long talk by man. Gradually picking up strength to dominate the frequency but began to fade by 0400. (D'Angelo, PA) Nice music at 0300 sign on, then possible IS and man with long AA talk. (Montgomery, PA) On with instl music, anmts in vernacular, Koran, HOA music. (Alexander, PA)

ECUADOR—Radio Buen Pastor, Saraguro, **4815** with SS religious message at 0958. (DeGennaro, NY) La Voz del Napo, Tena, **3279** in SS at 1048. (DeGennaro, NY) Radio Quito, 4919 with ID "Radio Quito, La Voz de la Capitol" at 1013. (DeGennaro, NY) 0521 with man anncr in SS. (Jeffery, NY) La Voz de Saquisili, Saquisili, **4900** at 1010 with SS music and talk about local matters. (DeGennaro, NY) HCJB, **9745** in SS at 0114. (Charlton, ON)

EGYPT—Radio Cairo/Egyptian Radio, **7115** in AA at 0122, **9990** in AA at 1843 and **12050** in AA at 1934. (Charlton, ON) 9990 in FF to Europe at 2050. (DeGennaro, NY) 2141 in EE. (Burrow, WA) 2230 beamed to Europe. (Paradis, ME) 12050 in AA at 1744. (Brossell, WI) 1820. (Yohnicki, ON)

ENGLAND—Sudan Radio Service, **11665** via Rampisham at 0324 ending EE talk f/by tribal vocals, health tips at 0329. Pgm ended at 0343 with "Thanks for listening and stay tuned to Sudan Radio Service." Change of language, ID and frequency anmts. (D'Angelo, PA) BBC, **15190** via Antigua at 1651. (Charlton, ON) (No more Antigua, probably French Guiana now.—gld)

EQUATORIAL GUINEA—Radio Africa, **15190** at 1500 with "World of Life" program, ID and Cupertino, CA address at 1655, "Crying Out" program at 1656, address and ID again at sign off (2158). (Alexander, PA) (p) At 1728 with Jack Van Imp and talk about Trilateral Commission and New World Order. (D'Angelo, PA) 2059 with religious program featuring Dr. Edgar Williams. Later Dr. Yoder with "Heralds of Hope." (Wood, TN)

ETHIOPIA—Radio Ethiopia, **7110** at 0259 sign on with Amharic anmts, HOA music. Poor, but weaker on 1/9704.2. (Alexander, PA) 0305 in language. Music, rooster sounds. QRM. (Yohnicki, ON) Radio Fana, **6210** in Amharic at 0350. (Brossell, WI)

FINLAND—YLE/Radio Finland, **15400** in Finnish to North America heard at 1237. (DeGennaro, NY) 1244. (Charlton, ON)

FRANCE—Radio France Int., **3965** in FF at 0407 and **4890**—Gabon in FF at 0402. Also **7270** in FF at 0424. (Brossell, WI) 0515 in FF. (Jeffery, NY) **11600** via China in FF at 1136 and **11705** in FF to Africa at 2128. (DeGennaro, NY) **15605** to Africa at 1641 and **21580** in FF at 1412. (Charlton, ON)

GABON—RTV Gabonaise, **4777** in FF at 0557. (Brossell, WI)

Africa Number One, **9580** in FF at 2030. (Paradis, ME) **15475** in FF at 1853. (Charlton, ON) 1815. Also **17630** in FF heard at 1519. (Yohnicki, ON)

GHANA—GBC/Radio Ghana, **4915** at 2137 with talks in local language. 3 + 1 time pips at 2200, ID and news in EE. (D'Angelo, PA) 2148 with two men in EE. (DeGennaro, NY)

GERMANY—Deutsche Welle, **7130** via Sri Lanka in EE to South Asia at 0022, **9900** (Irkutsk) in GG at 1105 and **11890** (Sri Lanka) in AA at 2103. (DeGennaro, NY) **9395** via Kazakhstan in GG at 1328. Also **11695** at 1753 in unid language. (Brossell, WI) **9735** (ex-Antigua) in GG at 0535. (Maxant, WV) **11690** in GG at 2300 and **17800** (Portugal) at 1912. (Charlton, ON) **11865** via Portugal in AA at 2035. (Jeffery, NY) Deutschlandfunk, **6190** with music and occasional anmts in GG at 0157. (DeGennaro, NY)

GREECE—Voice of Greece, **9375** in Greek at 0024 and **9420** to Australasia at 0034. (DeGennaro, NY) **7475** at 0118, **9420** at 2224 and **25485** (Delano) at 1847, all in Greek. (Charlton, ON) 9420 in EE/GG at 0515. (Maxant, WV) Radiofonikos Makedonias, **7450** in Greek at 2055. (DeGennaro, NY)

GUATEMALA—Radio Verdad, **4052.5** at 1105 with soft religious instls, f/by "Voice of Revival" program giving Box 5, Chiquimula address. Also heard at 0315 in SS with religious music and EE request for reports to Box 5. (D'Angelo, PA) Radio Cultural, Coatan, **4780** at 0249 with Latin vocals, man anncr. Slowly faded under Djibouti. Off at 0320. (D'Angelo, PA) Radio Buenas Nuevas, **4800** with talks and songs in SS at 1204. (Brossell, WI)

GUINEA—RTV Guineenne, **7125** at 0630 with tribal music, ID including the word "National" and more local songs

GUAM—Trans World Radio/KTWR, **9975** in CC at 1346. (Brossell, WI)

HAWAII—AFN/AFRTS, **6350** USB at 1044. (DeGennaro, NY) KWHR, **9930** with "Power of the Gospel" at 1200. "KWHR is now covering Southeast Asia on 9930 kiloHertz." (Brossell, WI) **11565** with DX program monitored at 1023. (Foss, Philippines)

HONDURAS—La Voz Misiones Inter-nacional, **3340** at 0234 with non-stop religious music, man and woman with brief SS anmts, more music, ID at 0301. (D'Angelo, PA)

HUNGARY—Radio Budapest, **9775** heard at 0339 with science report, interview, ID. (Burrow, WA) **9870** in HH monitored at 0150. (Charlton, ON)

ICELAND—AFN/AFRTS, **9980** USB, with news at 1039 but fading rapidly. (DeGennaro, NY)

INDIA—All India Radio, **4860**—Delhi, in HH at 1250 and **5010**—Thiruvananthapuram in Hindi at 1253. (Strawman, IA) **7410**—Delhi with news, comment at 2200. (Paradis, ME) **9425**—Bangalore in HH at 1350 and **9830**—Panaji (Goa) in presumed Hindi at 1335. (Brossell, WI) 9425 with EE anncr and long talks at 1642, also **13770**—Bangalore excellent in HH at 1723. (Montgomery, PA) 9425 in HH at 0015, **10330**—Bangalore in HH at 0116. Also **11715**—Panaji (Goa) with EE to Australasia at 2131. (DeGennaro, NY) 9445—Bangalore at 2103 with news, ID. **9950**—Delhi with EE talks. ID at 2225. (Yohnicki, ON) 10330—Bangalore in HH with US music at 0100. (Maxant, WV) **13605**—Bangalore at 1944 with EE, frequencies, ID and sign off. (Charlton, ON)

INDONESIA—(Note: all in II) RRI-Pontianak (Kalimantan), **3976** at 1150 with pop music, troubled by ham QRM. (Strawman, IA) 1441 with woman vocal, drums, chimes and strings. (Foss, Philippines) RRI-Serui (Papua) **4605** at 1040 with music similar to Makassar-**4750**. (Wilkner, FL) RRI-FakFak (Papua) with soft ballads at 1307. Also RRI-Wamena (Papua) **4870** at 1310. (Brossell, WI) Voice of Indonesia, **9525** in CC with woman and ID and language change at 1130. (DeGennaro, NY)

IRAN—VOIRI, **7205** at 2025 with ID, times and frequencies, request for comments. (Paradis, ME) **9950** at 0133 in AA under China Radio Int. (Charlton, ON) **9610/9940** at 1604 with anti-U.S. interview, ID. (Burrow, WA) **9925** at 2000 with U.S.-accented anncr and remarks such as "cool." (Ziegner, MA) **9905** in SS to South America at 0036, **9935** in AA at 0101 and **15150** to Mideast in AA at 1116. (DeGennaro, NY) **11950** in unid Asian language at 1341. (Brossell, WI)

ISRAEL—Kol Israel, **6280//7545** at 0437 with sports report, other news, close of EE at 0444 and into another language. (Burrow, WA) 7545 in HH at 0002. (Charlton, ON) 7545 in FF to Europe at 0455. **9345** in HH at 0053, **11585** in HH at 2053 and **11605** to Europe at 2058. (DeGennaro, NY) 9345 at 0100–0230 music and DJ in EE/HH. (Maxant, WV) Galei Zahal, **6973** at 2245 with music. (Paradis, ME) 0054 in HH with conversation between several people. (DeGennaro, NY)

ITALY—RAI Int., **6110** in II at 0136, **7295** to North Africa at 2137, **9840** at 0054 with ID, schedule and into SS for South America, **11680** in FF at 1542 and **11880** in PP to East Africa at 2059. (DeGennaro, NY) **7230** in EE at 0445. (Burrow, WA) **9760** at 1805 with bird IS, ID in II and into GG talks. (Brossell, WI) **11800** in II at 0235. Also **11875** at 2044 with news, ID. (Wood, TN) 0055 with bird IS, chimes, news. (Maxant, WV) 0116 in II, 11880 ending news at 2035. Also **21520** in II at 1409. (Charlton, ON) IRRS, **13840** at 1105 with program about WWII, “Words of Life” program at 1130, IRRS ID at 1200. **15725** with Radio Mi Amigo relay at 1105. (Alexander, PA)

JAPAN—Radio Japan/NHK, **6145** (via Canada—gld) at 0014, **11895** via French Guiana in JJ to 2257 close, **17605** via Bonaire in JJ at 2305 and **21630** in JJ at 1641. (Charlton, ON) **9605** in CC at 1345. (Brossell, WI) **9660** via French Guiana in SS at 0422 and **15220** via Ascension at 2203 in JJ. (DeGennaro, NY) **11705** via Canada in JJ at 1325. (Northrup, MO) 17605 via Bonaire in JJ at 2350. **17810** in CC at 2345. //13630. (Mackenzie, CA)

JORDAN—Radio Jordan, **11690** with lady DJ and AA pops at 1522. (DeGennaro, NY) 1614 relaying 96.3 FM in EE, (Burrow, WA)

KUWAIT—Radio Kuwait, **9855** in AA at 1856. (Charlton, ON) 2205. (Yohnicki, ON) 2306. (DeGennaro, NY)

LATVIA—Storsender from R&R Mediservice, Germany, via Riga on **9290** at 1345 with rock, GG ID at 1357 and off heard at 1400. (Brossell, WI)

LIBERIA—ELWA, **4760** at 2244 with EE religious talk and vocals. ID and closedown anmts at 2300 f/by orchestral national anthem. Poor with heavy CODAR QRM. (D’Angelo, PA)

LIBYA—Radio Jamahiriya/Voice of Africa, **11635** in AA at 2104 and **21570** in AA at 1417. (Charlton, ON) **15205** at 1930 in AA. (Yohnicki, ON) 1820 in AA, FF, EE. (Ziegner, MA) **15220** in AA mon-

This Month's Book Winner

To show our appreciation for your loggings and support of this column, each month we select one “Global Information Guide” contributor to receive a free book. Readers are invited to send in loggings, photos, copies of QSL cards, and monitoring room photos to me at *Popular Communications*, “Global Information Guide,” 25 Newbridge Road, Hicksville, NY 11801, or by e-mail to popularcom@aol.com. The e-mail’s subject line should indicate that it’s for the “Global Information Guide” column. So come on, send your contribution in today!

Our book winner this month is **Robert Charlton** of Windsor, Ontario. Bob receives a copy of Joe Carr’s *Receiving Antenna Handbook* from the good folks at Universal Radio, 6830 Americana Parkway, Reynoldsburg OH 43068. You can write them at that address to request a copy of their super catalog, e-mail them at dx@universal-radio.com, or give them a jingle at 614-866-4267.

itored at 1725. (Brossell, WI) 1728 with Voice of Africa broadcast in EE. (Montgomery, PA)

LITHUANIA—Radio Vilnius, **7325** in LL at 0115. (Charlton, ON) **9875** at 0048 with EE discussion, ID at 0050. (DeGennaro, NY)

MADAGASCAR—Radio Netherlands Relay, **7120** at 2031. (DeGennaro, NY) **9895** in SS at 0209, ID at 0210. (Charlton, ON) **11655** in EE at 2010. (Wood, TN)

MALAYSIA—Radio Malaysia, **7295** at 1549 with Western pops and DJ, time pips and news at 1600. (Burrow, WA)

MALI—RTV Malienne, **4783** at 0600 with “Ici Bamako” and news in FF. (Brossell, WI)

MAURITANIA—Radio Mauritania, **4845** at 0003 with three-way conversation in AA. (DeGennaro, NY) 0403 running late. Man in AA, music and suddenly off at 0410. (D’Angelo, PA)

MEXICO—Radio Educacion, **6185** in SS monitored at 0347. (Brossell, WI) 0855 with local ballads, SS anmts. Mixing with the Brazilian. (Alexander, PA) 1026 with salsa and meringue music. (DeGennaro, NY)

MONACO—Radio Monte Carlo, **6080** via Canada in AA heard at 0405 with presumed news, frequent IDs. (DeGennaro, NY)

MONGOLIA—Voice of Mongolia, **12085** at 1015 with talk and IS. Very noisy. (Ziegner, MA)

MOROCCO—RTV Marocaine, **15335** in AA with news at 1130. (DeGennaro, NY) **15345** in AA at 1631. (Charlton, ON) 1733. (Brossell, WI) 1945. (Paradis, ME) 2030. (Yohnicki, ON) VOA Relay, **15410** at 2130. (Wood, TN) **17895** to 1800 close. (D’Angelo, PA) 17640 at 1645. (Charlton, ON)

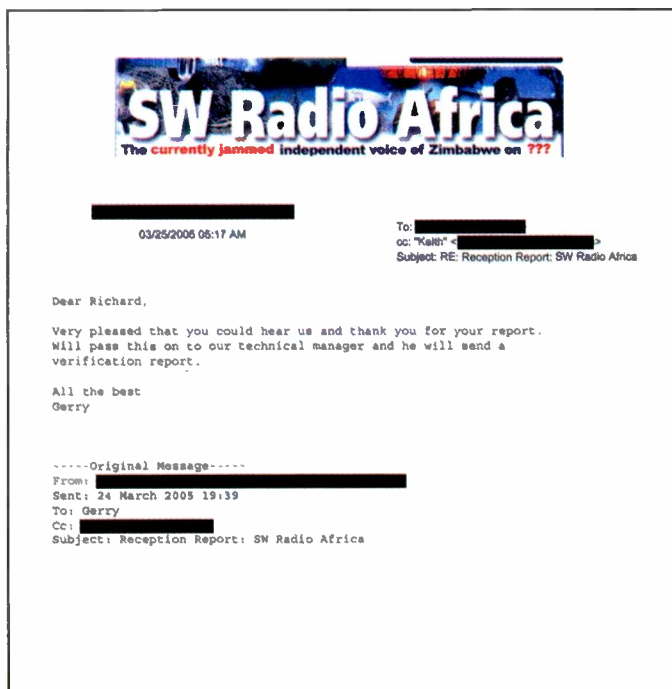
NETHERLANDS—Radio Netherland, **7125** at 0430 in unid. Language to 0500 close. (Yohnicki, ON) **9795** via Singapore in unid language at 1101. **9895** in DD at 1519 and **13700** in DD at 1521. (DeGennaro, NY)

NETHERLANDS ANTILLES—Radio Netherland Relay, Bonaire, **6165** with news items at 0119. (Charlton, ON) **9790** in EE to Australia at 1039. (DeGennaro, NY)

NEW ZEALAND—Radio New Zealand Int., **9870** at 1343 on bio-waste hazards in the Pacific. (Brossell, WI) **9885** with news at 0903. (Jeffery, NY) 1030 with news. (DeGennaro, NY) **15720** at 0002. (MacKenzie, CA) 0217 talking about sleep disorders. (Montgomery, PA) 0226. (Yohnicki, ON) **17675** monitored at 2307. (Charlton, ON) 2326 interviewing Prime Minister Helen Clarke. (Foss, Philippines)

NIGERIA—Voice of Nigeria, **7255** with 2200 sign on in local language. (DeGennaro, NY) Radio Nigeria, Kaduna, **4770** with music program at 2220, ID at 2222. (Montgomery, PA) 2252 with religious program. (DeGennaro, NY) News in EE at 0602. (Brossell, WI)

NORTH KOREA—Voice of Korea, **7570//9335** at 1537 with song by army choir praising Kim Jung Il. (Burrow, WA) **11710** at 1650 with



Much in the news is SW Radio Africa beaming into Zimbabwe and being jammed by the Mugabe government. (Thanks Rich D’Angelo)

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vocals to 1657, dead air to 1700, IS and ID into national anthem at 1701. (Strawman, IA)

NORTHERN MARIANAS—KFBS, 11580 with talks in CC at 1331. (Brossell, WI)

PAKISTAN—Radio Pakistan, 11570 at 1603 with news in EE, tentative ID at 1610, off abruptly at 1615. (Burrow, WA)

PARAGUAY—Radio Nacional, 9737 at 2337 with music, commls, anmts in SS. (DeGennaro, NY) 0215 with local SS ballads, anmts, ID. (Alexander, PA)

PAPUA NEW GUINEA—Radio Bougainville, Rabaul, 3325 on upcoming local elections at 1034. (Foss, Philippines) Radio West New Britain, Kimbe, 3235 with long talk at 1105. (Wilkner, FL) 1037. (Foss, Philippines) Radio Simbu, Kundiawa, 3355 with country tune at 1033. (Foss, Philippines) Radio East New Britain, Rabaul, 3385 at 1047 with EE talk, island vocals, ID and pops. (D'Angelo, PA) Radio Manus, Lorengau, (Admiralty Is.) 3315 with news at 1105. Into music at 1117. (Wilkner, FL) 1106 with news, ID at 1110, island music, program previews, more island vocals. (D'Angelo, PA) Radio New Ireland, Kavieng, 3905 at 1058 with man in EE and Pidgin. Substantial ham QRM. (D'Angelo, PA) NBC, 4890 with regional news heard at 1005. (DeGennaro, NY) 1029 with Sunday morning church broadcast. (Montgomery, PA)

PERU—Radio Municipal, Pano, 3172.7 at 0950 with ID, lots of music. (Wilkner, FL) Radio La Hora, Cusco, 4855.6 in QQ at 1010. (DeGennaro, NY) La Voz de la Selva, Iquitos, 4824.4 in SS at 1005 with commercials and music. (DeGennaro, NY) Radio Altura, Cerro de Pasco, 5014 with religious speaker at 1037. (DeGennaro, NY) Radio Cultural Anuata, Huanta, 4955 with hymns and religious messages at 1021. (DeGennaro, NY) Radio Huanta 2000, Huanta, 4746.8 at 1000 with OA music, SS anmts, IDs. (Alexander, PA) 4747 with music at 0959. (DeGennaro, NY)

The clandestine Voice of Iranian Kurdistan (4860) confirmed Rich D'Angelo's reception via e-mail. →

The screenshot shows an email from "Dangl Kurdistan Iran" dated 02/15/2005 03:00 AM. The subject is "dear richard". The body of the email contains the following text:

dear richard

Thank you verymuch for your related.

We were happy .when saw yourletter.Ok we would like to give you more information about ourself,and we would like more acquainted with you too.

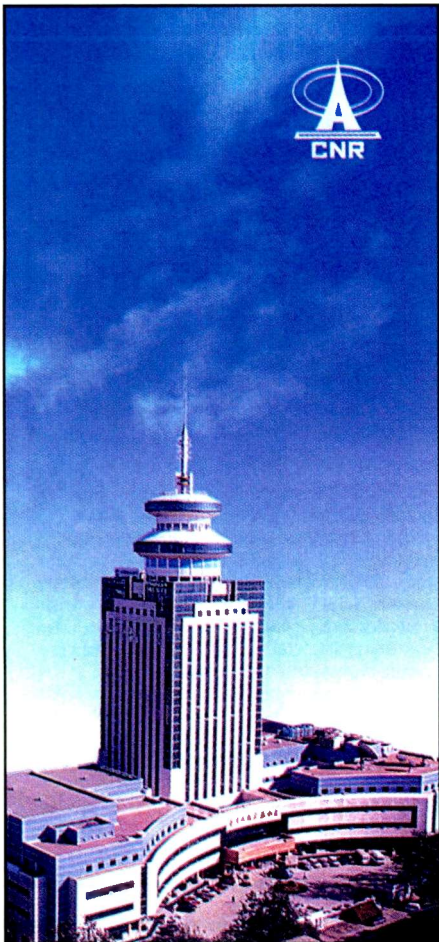
But do you know every think about us,about our party,our politics,our nation and etc? Please can you tell us,how do you acquainted with oursturation.

By the way you can this way hear ourstation too.

1.www.rdkl.com
2.satellite:hotbird 13 east
freq:12596 GHz
ant:vertical
symbolrate:27500
fec:3/4
channal:GBTS1

thak you
rdk_iran

At the bottom of the email, there is a banner for "Radio Kurdistan" with the text "سینا ناوینی حیزبی دیموکراتی کوردستان ایران" (Sina Navini Hizbi Demokratî Kurdistanî Iran).



This ultra modern building houses China National Radio. (Thanks Rich D'Angelo)

PIRATES—The Crystal Ship, **6854.2** at 0027 with mostly rock, children chanting a la KJES. Belfast address. Also **6881.5** at 0101 with "The Poet" bashing Republicans. Gone by 0110. (Zeller, OH) **6857** at 0004 sign on with foghorn IS, pops, anmts by man. (Wood, TN) WHYP (p) **6925** at 2312. No clear ID noted but there was mention of their standard cast members and a long discourse by Uncle Shelkstein. (Wood, TN) Sunshine Radio (plus Grasscutter Radio) **6925 USB** at 2230 sign on with rock, the usual young boy anncr giving the IDs. An apparent break at 2315 and then anncd as a joint broadcast with the Grasscutter guy apparently providing the transmitter. Second half was rock just like the first half. (Zeller, OH) Radio Copycat, **6925 USB** at 2246 with rock. The station name apparently refers to the format of playing the same songs other pirates recently played. No address anncd. (Zeller, OH) Voice of NOAA, **6925 USB** at 2217 with mainly a relay of NOAA weather radio for New Jersey and Kansas City. Claimed to be the official shortwave voice of NOAA Weather Radio. (Zeller, OH) Radio Free Euphoria, **6925 USB** at 2158 sign on and Captain Ganja with Gregorian chants at open, then rock, sketches and parodies. (Zeller, OH) Ground Zero Radio, **6925 USB** at 0018 sign

on and Dave Gunn and Texas Pete with trumpet fanfare and into rock. Anncd as test for a new antenna and wanted reports to the Elkhorn address. **6926** (earlier) with fanfare at sign on and mostly classical music. (Zeller, OH) 0109 mentioning new antenna system. Played "Ride of the Valkyries." (Wood, TN) XERV Relay, **6925** at 2352 including some old Vietnam War pirate radio sound bites, anncd as "The Voice of Rock from San Diego." (Zeller, OH) Undercover Radio, **6925 USB** heard on various dates at 2011, 0005 and 0134 with Dr. Benway host "broadcasting from the middle of nowhere." E-mail address as undercover-radio@mail.com. (Zeller, OH) Take It Easy Radio, **6925 USB** at 0222 with rock. Gave takeiteasyradio@yahoo.com for reports. (Zeller, OH) WMPR, **6955** at 0047 with electronic techno. ID as "W-M-P-R-6-9-5-5." (Wood, TN)

PHILIPPINES—Radio Veritas Asia, **11705** in Tagalog to Mideast at 1526. (DeGennaro, NY) FEBC, **9405** in CC at 1329 and **9430** in CC at 1349. (Brossell, WI) **15450** in CC at 0838. (Foss, Philippines) VOA Relay, **9760** at 1340 and **12040** in CC heard at 1336. (Brossell, WI) **17820** monitored at 2340. (MacKenzie, CA)

PORTUGAL—RDP Int., **9410** at 0110, **15540** and **21555** at 1413. (Charlton, ON) 9410 at 0030, **9715** at 0110 and **11630** with futbol at 2114. (DeGennaro, NY) 11630 monitored at 0040. (MacKenzie, CA) (all broadcasts in PP—gld)

ROMANIA—Radio Romania Int., **6125/9514** at 0248 with ID at 0430. (Burrow, WA) **6040** at 0146, **9610** at 2321, **9690** at 0117, **9745** in SS at 0005, **11740** in Romanian at 1534, **15250** in FF at 1123. (DeGennaro, NY) **9615** at 0125. (Charlton, ON)

RUSSIA—Voice of Russia, **7150**-Armavir in RR at 0242, **7250**-Moscow at 0105, **7320**-St. Petersburg in FF at 2043, **9665**-Moldova at 0419, **9830**-Armavir in SS at 0054, **9880**-Armavir at 0400 and **11510**-Armavir at 1706. (DeGennaro, NY) **7180**-Moldova at 0200. (Charlton, ON) **12070** (Moscow) at 2015. (Montgomery, PA)

RWANDA—Deutsche Welle Relay, **11945** in GG at 2050. (Jeffery, NY) **15205** at 2127. (MacKenzie, CA) **15275** in GG at 2206. (DeGennaro, NY) **15410** in FF at 1734. (Brossell, WI) **17860** in GG at 2246, **17800** at 1915 and 17860 in GG at 1922. (Charlton, ON)

SAO TOME—VOA Relay, **4960** at 0309 with VOA News format. (Montgomery, PA) 0330 with discussion.. Parallel to VOA-Botswana, **4930**. Also **6105** heard at 0615. (Brossell, WI)

SAUDI ARABIA—BSKSA, **9555** in AA heard at 2152 and **11820** with Holy Koran service at 2057. (Chandler, ON) **9870** in AA at 1802. (Brossell, WI) 2000. Also **21600** in AA at 1405. (Yohnicki, ON) 11820 heard at 2040. (Wood, TN) 2151 to 2300 close, //11915. (D'Angelo, PA)

SERBIA/MONTENEGRO—Int. Radio of Serbia-Montenegro, **7115** at 0125. (Charlton, ON) **9580** with music, ID and

schedule heard at 0026. (DeGennaro, NY)

SINGAPORE—Mediacorp Radio, **6150** with call-in advice program, news at 1530 with numerous "News Radio 9-3-8" and "Mediacorp Radio" IDs. (Burrow, WA) Radio Netherland, **9795** via Kranji at 1112 with features in Indonesian, phone calls and SS segments translated into II. (D'Angelo, PA) BBC Relay, **15285** in CC at 1411. (Brossell, WI)

SLOVAKIA—Radio Slovakia Int., **7120** at 0120 "You are listening to Radio Slovakia International from Bratislava." (Charlton, ON) **5930** in EE at 0130, **7230** in SS at 0254, **9440** in EE at 0100, **9535** in SS at 0431, **11600** in SS at 1535 and **11610** in SS at 2107. (DeGennaro, NY)

SOUTH AFRICA—Channel Africa, **7240** with news at 0505. (Burrow, WA) **11820** in EE at 0600. (Maxant, WV) **15285** at 1715. (Charlton, ON) 1726. (Brossell, WI) **17770** with interview at 1535. (Yohnicki, ON) **17780** with African Reggae at 1515. (Foss, Philippines) Radio Sondergrense, **3320** with two men in Afrikaans at 0214. (DeGennaro, NY) 0220 with local and North American music. (Yohnicki, ON) ID at 0400 and presumed news in Afrikaans. (Brossell, WI) Adventist World Radio, **15255** in unid language at 1940 and **15295** with religious program in EE at 2052. (Yohnicki, ON) BBC Relay, **3255** with African news at 0410. (Brossell, WI) Radio Okapi, **11690** via Meyerton at 0400 sign on with brief highlife music, man in FF talk, IDs, opening anmts and into news. (D'Angelo, PA)

SOUTH KOREA—KBS World Radio, **9560** heard at 0214 with business news, weather. (Charlton, ON) **15210** in FF at 0849. (Foss, Philippines)

SPAIN—Radio Exterior de Espana, **3350** via Costa Rica in SS at 0217, **6155** in FF to Europe at 2317, **15110** in SS to fisherman at 2118 and **15290** in EE at 2034. (DeGennaro, NY) **9535** in SS at 0112, **12035** in AA at 2014, **17850** via Costa Rica in SS at 0015 and **21570** in SS at 1411. (Charlton, ON) **15170** in SS at 1320. (Northrup, MO)

SRI LANKA—Sri Lanka Broadcasting Corp., **9770** with re-broadcast of a church service at 0105. (DeGennaro, NY) VOA Relay, **11905** in unid language at 1830. (Paradis, ME) DW Relay, **11890** in AA heard at 2040. (Jeffery, NY)

SURINAME—Radio Apinte, **4990** with ID, news at 1000. (DeGennaro, NY) 0324 with non-stop easy listening pop vocals. Woman with ID in DD at 0400 and more music. (D'Angelo, PA)

SYRIA—Radio Damascus, **12085** in AA at 2058 and **13610** with Mideast music at 2040. (Charlton, ON)

SWAZILAND—Trans World Radio, **3240** in unid African dialect at 0316. Also **4775** with ID at 0356; into GG at 0400. (Brossell, WI) 3240 at 0338, listed in Nda language. Off at 0345. (D'Angelo, PA) 4775 with talk in EE and religious music at 0500. (Burrow, WA)

SWEDEN—Radio Sweden, **6010** via

Canada in Swedish at 0215. (Charlton, ON) 0141 in EE. Also **13580** in unid language at 1614. (DeGennaro, NY)

TAJIKISTAN—Voice of Russia relay, **11500** with talks in Hindi heard at 1324. (Brossell, WI)

TAIWAN—Radio Taiwan Int., **9680** via Florida inn EE at 0208. (Charlton, ON) CBS, **11665** in CC at 1320. (Brossell, WI) WYFR via Taiwan, **9280** in CC heard at 1318. Just like Chicken Man, they are everywhere! (Brossell, WI)

THAILAND—Radio Thailand, **5800** via Greenville in Thai at 0124. (DeGennaro, NY) 0131. (Chandler, ON)

TUNISIA—RTV Tunisienne, **7225** in AA at 2030. (Paradis, ME) 2200. Also **9720** at 0413, **11730** at 1531 and **15450** at 1243. (DeGennaro, NY) 9720 at 0215. (Charlton, ON) **12005** at 1746. (Brossell, WI) 1815. Also **17735** heard at 1430. (Yohnicki, ON)

TURKEY—Voice of Turkey, **6140** heard at 0256 sign on and into EE programming at 0300, //7270. (Alexander, PA) **7240** at 0402 with schedule, news. ID 0416. (Burrow, WA) **7300** in TT at 0120. (Charlton, ON) **9460** in TT at 0448, **13655** in TT at 1514 and **15350** at 1232. (DeGennaro, NY) **15195** with "Outlook" program monitored at 1343. (Foss, Philippines)

UGANDA—Radio Uganda, **4976** in unid African dialect heard at 0311. (Brossell, WI)

UKRAINE—Radio Ukraine Int., **7440** at 2358 with EE ID at 0000. (DeGennaro, NY) 0140. And **7545** in UU at 0001. (Chandler, ON) 7440 at 0431 in EE. (Burrow, WA)

UNITED ARAB EMIRATES—FEBA via UAE, **12025** in unid Asian language at 1338. (Brossell, WI)

UNITED STATES—Radio Solh, **15265** to Afghanistan in Dari heard at 1310. (Ziegner, MA) AFN/AFRTS, (p) **12133.5** at 1715. (Montgomery, PA)

VANUATU (t) **7260** at 0606 with Polynesian vocals competing with ham operators, possible ID at 0612 and more music until talk at 0630. (Burrow, WA)

VATICAN—Vatican Radio, **7305** at 0305, //7360. (MacKenzie, CA) 0229 with IS and FF ID. Also **9865** at 0157. (Charlton, ON) 7305 in PP at 0048, **7335** in Swedish or Norwegian at 0506. (DeGennaro, NY) **9605** at 0242 in FF and into EE at 0250. Closed at 0318. (Wood, TN) **11625** with news heard at 2000. (Paradis, ME)

VIETNAM—Voice of Vietnam, **6165** in listed Hmong at 1301, mixing with VOA-Philippines. (Strawman, IA) **6175** via Canada at 0108. (Charlton, ON) **9840**- Son Toy in EE to North America at 1020. (DeGennaro, NY)

VENZUELA—Radio Amazonas, Puerto Ayacucho, **4939.9** in SS at 1022. (DeGennaro, NY) Observatorio Naval Cagical, **5000** at 1032 with time anmts. (DeGennaro, NY) Radio Nacional via Cuba, **13680** in SS at 2010. (Yohnicki, ON) 2025. (Charlton, ON)

ZAMBIA—Radio Zambia, **4910** at 0329 with ID at 0331 and talks in African dialect. (Brossell, WI) 2138 in unid language. Phone

call in EE passed up, as they had no translator. (DeGennaro, NY) ZNBC/Radio 2, **6165** at 0242 sign on with Fish Eagle IS, anthem at 0250 and into Afro-pops. Weak under a strong Radio Netherland. (Alexander, PA) The Voice-Zambia, **6065** at 0515 on tennis in Zambia. (Maxant, WV)

And, once again order is restored! Huzzahs to the following who did the good thing this time: Robert Charlton, Windsor, ON; Rich D'Angelo, Wyomissing, PA; George Zeller, Cleveland, OH; Robert Brossell, Pewaukee, WI; Robert Montgomery, Levittown, PA; Michael Yohnicki, London, ON; Dave Jeffery, Niagara Falls, NY; Joe Wood, Greenback, TN; Jerry Strawman, Des Moines, IA; Charles Maxant, Hinton, WV; Stewart MacKenzie, Huntington Beach, CA; Mark Northrup, Gladstone, MO; Ray Paradis, Pittsfield, ME; Brian Alexander, Mechanicsburg, PA; Marty Foss, Guinayangan, Philippines; Tricia Ziegner, Westford, MA; Bruce Burrow, Snoqualmie, WA, Ciro DeGennaro, Fuera Bush, NY and Robert Wilkner, Pompano Beach, FL.

Thanks to each one of you—and until next month, good listening! ■

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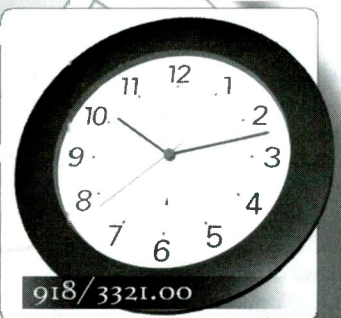
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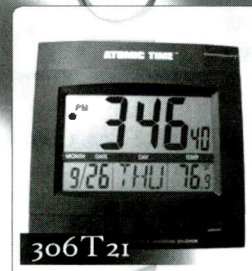
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Survey Results: What You're Telling Us

Lots Of Questions, Few Surprises by Harold Ort, N2RLL, SSB-596

We've compiled quite a number of your survey cards this month, so let's get right to the business of letting you know the results. Our winner of the one-year gift subscription to *Popular Communications* is Robert Kissel of Swartz Creek, Michigan. Congratulations, Robert! Have you sent in your survey card? It's the only way you're entered in our quick pick random drawing for the free one-year gift subscription to your favorite radio magazine!

As radio users we're all familiar with the various ways to stay in touch on the road: CB, ham (VHF/UHF), ham HF, FRS (Family Radio Service), or GMRS (General Mobile Radio Service). What do you think most *Pop'Comm* readers chose as their favorite mobile transceiver? CB or ham VHF/UHF? The surprising answer is that 45 percent of you use that trusty mobile CB on the road, while 47 percent use ham VHF/UHF radio. Less than 1 percent use FRS and GMRS, while about 2 percent reported using amateur HF gear while traveling.

So when *do* you use FRS? Many of you—46 percent—reported using this low-power line-of-sight radio tool for staying in touch on family outings and at the park. About 20 percent of you said that FRS is your choice for staying in touch around the home, while less than 2 percent said you use it at the mall. And for some, FRS just isn't used at all—at least by about 27 percent of our readers.

What Do You Depend On When Traveling?

Once again, that trusty mobile CB gets high marks, with about 49 percent of you telling us you regularly depend on it for highway and travel information. About 30 percent reported using their ham VHF/UHF rigs for information.

But what about the old standby, AM/FM radio? About 22 percent of you enjoy listening to the classic AM/FM broadcast bands. A relatively small number (less than 1 percent) use either GMRS or those electric highway alert signs for information.

Every time I'm at a hamfest or talking with a group of radio enthusiasts, the benefits and usefulness of CB inevitably works its way into our conversations. So we asked you more about CB and learned that—as expected, frankly—you think CB is still a useful radio tool. About 46 percent of you rate CB as “very useful” for travel directions, 23 percent said it was useful helping you stay awake on long trips, and 20 percent said it helped you keep track of police radar traps. About 7 percent said it was not very useful.

We also asked if you keep a mobile CB in your vehicle all the time. Your responses were pretty much evenly divided, with 49 percent saying yes, and 45 percent reporting no. About 4 percent of you reported not using CB at all. Of course, there are a few reasons why that's true, including the offensive language sometimes found on CB. In fact, about 43 percent of you said you don't use CB on the road for that very reason, while the high noise level was given as a reason by 12 percent. The limited range received an almost insignificant 1-percent vote.

More than 58 percent of respondents said the main reason they use CB on the road is to get reliable highway information, while about 12 percent said it's because no license is required to use CB.

The fact is whatever you choose as your mobile rig, you've got to know its limitations and strong points. Sometimes we all need to be reminded that frequently the simplest forms of communication—that which much of America already has at its disposal—are sometimes the most useful. We'd like to know about your on-the-road experiences with two-way radio? Do you have a photo of your mobile installation? Remember, it doesn't have to be a multi-million dollar mobile setup or even look like one! It's important to you, so it's important to share with our readers.

Mobile Antennas And Mobile Scanning

Mention antennas, as we did in one survey, and you'll likely get, well, a lot of different opinions. We got 145 responses and our readers' favorite antenna (about 39 percent) for mobile use is the famous magnet-mount used for scanning and hamming. Next on down the line, about 12 percent of you reported using a ham-only mobile antenna, while nearly the same number of you said you use a full-length, bumper-mount CB whip antenna!

Most of you aren't drilling holes in that shiny new—or used—car; less than 1 percent of you said you use a fender-mount CB whip or roof-mounted scanner antenna. Trunk or hatch-mount antennas got about 5 percent of your vote, while 2 percent of you said you use a screwdriver-type ham-only antenna. Few of you (about 1 percent) reported using a glass-mounted or luggage rack/mirror-mount antenna.

Mobile scanning is done by more than 46 percent of you, while about 22 percent don't use a mobile scanner. Why? Less than 1 percent of you reported it was because of local laws or mounting problems, but about 10 percent said it was because of not having enough room for the scanner. All that room is apparently taken up by a mobile CB or ham transceiver. (Perhaps it's also possible that your mobile ham transceiver also has wideband coverage, which some of you find adequate when mobiling.)

Your Main Interest

Take a guess. What would you think is the main radio interest of *Pop'Comm* readers? You're correct if you said *scanning*. About 45 percent of our readers say it's the most important part of their monitoring hobby. But not far behind, with about 30 percent of you reporting it as your favorite, is shortwave listening. AM/FM listening/DXing got about 18 percent of your vote. Very few of you reported that you're more active as a ham and don't do much monitoring.

That's it for now, but remember to send in those monthly survey cards. We'll report back to you again next month! ■

Popular Communications August Survey Questions

In the past six months I've purchased a new shortwave receiver:

- Yes1
No2
Not interested in shortwave3

My new shortwave receiver (mark all that are appropriate):

- Was an excellent investment4
Outperforms my old receiver5
Isn't the performer I expected6
Is difficult to operate7
Is easy to operate8

I have the following number of shortwave receivers:

- One9
Two10
Three11
Four12
More than four13

Most of my shortwave listening is done:

- At home after hours14
At home at various times15
On the road because I travel a lot for pleasure16
On the road because my work requires that I travel17

My new receiver cost:

- Under \$20018
\$200-\$50019
\$500-\$80020
\$800-\$100021
More than \$100022

I'm a ham and my HF transceiver doubles as my shortwave receiver:

- Yes23
No24
I would use it as a shortwave receiver but it's too complicated25

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Getting Started in DXing – Top DXers share experiences with equipment, antennas, op skills and QSLing.

Getting Started in Packet – De-mystify packet. Info on making contacts, bulletin boards, networks, satellites.

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Directional Antennas 101

There's been a pretty good run of favorable propagation lately, so I trust you've been able to add many new stations to your AM logbook this year, perhaps because of the classic auroral conditions and some very good long-range Trans-Atlantic reception conditions in late March that went well into the Midwestern United States. I also hope FM DXers are having a good season; there have already been some very early tropo openings noted in the east (WCEI 96.7 in Easton, Maryland, audible east of Scranton, Pennsylvania, on a car radio many times in the morning!). These are the things that continue to keep my interest in this fascinating hobby, and I hope it's the same for you!

This month I'm going to give you some insight into why some AM stations have more than one tower and why you can't hear them even though they're only a short distance from you. Our topic: the directional antenna system!

As the AM band started to fill up with stations, a need arose for a way to direct a station's signal so it would not cause interference to other stations nearby. The directional antenna system, designed in the 1930s, was the answer, and it was used first by WSUN 620 kHz in St. Petersburg, Florida. This huge two-tower system was set up partially to keep most of their signal on land and is still in use today, taking up enough property that an interstate highway now goes between the two towers!

As time progressed, fancier directional antenna systems were designed, using three, four, and even five towers, with KFXR-1190 in Dallas, Texas, having a 12-tower antenna system to direct its signal during the night. But their signal obviously goes even further; antenna systems designed with off-set towers produce different patterns during the day to protect a share time operation in another market. There are even stations operating with a separate daytime directional system, a separate nighttime directional system, and a separate pattern for critical hour operations (defined as two hours after sunrise to two hours before sunset). And then there's diplexing, where two or three signals are radiated out of the same

antenna system, operating with directional patterns!

The first step in designing a directional antenna system is for the station to hire a consulting engineer who is familiar with the FCC rules and regulations, and who can find an acceptable frequency in the area. Other stations also must be taken

into consideration, including stations on a desired frequency and second and third adjacent frequencies. A specific "footprint," or antenna pattern, can then be developed, based on tower spacing and height and the amount of power fed into the system. For example, a two-tower antenna system fed with equal amounts

Call Changes And Station News

Call Letter Changes

630	KPLY	Reno, NV	was KPTT
960	WPLY	Mount Pocono, PA	was WILT
1370	WZTA	Vero Beach, FL	was WAXE
1330	WBHV	Somerset, PA	was WYSN
1440	WDXQ	Cochran, GA	was WVMG
1700	KKLF	Sherman, TX	was KTBK (now simulcast KLIF-570)
1440	WGLD	Red Lion, PA	was WTHM
1220	WHKZ	Cleveland, OH	was WHK
1420	WHK	Cleveland, OH	was WRMR (WHK returns to its original spot!)
93.1	WSJQ	Wildwood Crest, NJ	was WDOX
90.7	WLGY	Nanty Glo, PA	new station on the air

Station News

860 CBRB Baniff, AB, is a 40-watt station that has lost its transmitter site, ordered vacated by the CP Railroad. They will move the station to FM at 96.3 with 1180 watts ERP. Many of these 40-watt stations operated along the railroad right-of-way and were actually heard quite frequently on Monday mornings in the early and mid 1960s throughout North America.

950 WPEN Philadelphia, PA, currently operating with 5000 watts non-directional day and 5000 watts direction night. The latest change they wish to make is now 5000 watts daytime from their current location and switch to 21,000 watts night, diplexed on the antenna system on WWDB-860 and adding two additional towers! The FCC has granted this construction permit.

1090 WILD Boston, MA, has made an application to diplex its signal into one of the towers of WXKS-1430; when approved, WILD will operate 4600 watts daytime only and 1900 watts during critical hours.

1160 WYLL Chicago, IL, is now operating with a new six-tower antenna system with 50,000 watts day and night. The pattern of the station puts PLENTY of signal toward Norway!

1270 CJTN Trenton, ON, is now gone, replaced by CJTN-FM 107.1.

1440 WGLD Red Lion, PA, was sold and taken off the air while the tower of co-owned WSOX-96.1 was being replaced.

1510 CKOT Tilsonburg, ON, has applied to go to 104.7. This will end one of Canada's last remaining daytime stations.

1570 WSCO Appleton, WI, has been granted a construction permit to increase its daytime power and diplex its night signal into the existing six-tower array of WHBY-1150. When all is said and done, WSCO will operate with 2400 watts during the day from the WSCO site and with 246 watts nights from the WHPY site.

1590 WCBG Chambersburg, PA, is now silent.

of power would develop a "Figure 8" pattern. What happens then if the power is reduced in one tower and increased in the other? The pattern would appear as a bigger signal area in the direction desired, while the back part would be "tucked" in. The *side* of the pattern would also be changed when the power was adjusted, which must also be determined by the tower spacing. Now think of doing this with *more* than two towers, and the fun is only starting!

Great Examples Of Antenna Patterns

Many factors have to be taken into consideration when a pattern is designed. In order to protect other stations, under FCC rules and regulations only so much signal can be allowed to go in an area. Night directional patterns must be designed to provide a specific amount of ground wave signal reduction, while also having the proper angle for a skywave signal. This is why many stations reduce power at night.

Although rare, a few stations actually *increase* power at night. In the 1970s, WHOT-1330 Campbell/Youngstown, Ohio, maintained a six-tower directional system for their daytime facilities. At night, it switched to a five-tower system 11 miles south of the daytime location, and the power increased to 1000 watts. The night signal was directed in a northerly direction, straight at Erie, Pennsylvania, which also had a station on the same frequency. How was it configured so the station wouldn't cause willful interference? The design and height of the towers were determined to have so much skywave that WHOT's signal actually went *over* Erie and never caused any interference! WHOT for many years had one of the biggest engineering files on hand at the FCC offices in Washington, and it proved that this system would indeed work.

In order for WAMS-1380 in Wilmington, Delaware, to get a power increase in the 1960s, a way had to be designed for the station to protect WBNX in New York and WAWZ in New Jersey. A fifth tower was added to its four-tower system, and it was set up to be changed from one pattern for WBNX and one pattern for WAWZ when these stations operated during a share time agreement during the day. I was working there as a DJ in 1971 and, as I remember, on Sunday the pattern had to be changed *12 times* between 9 a.m. and sunset. The WAWZ transmitter was actually closer to Wilmington, so the WAMS signal had to be drastically altered when WAWZ was on, causing WAMS to lose its audience just a few miles away. The share time agreement ended during the early 1980s, and WAMS returned to a day and night pattern operation. It was interesting to find out that WAMS had to protect stations in St. Albans, Vermont; Brantford, Ontario; St. Louis and Atlanta at night. The system, which was set up in the mid 1940s, remained the same until the station was shut down in 1992.

Other Factors

There are additional factors that come into play in the setup of a directional antenna system. Stations which operate on the lower end of the dial generally need taller towers and much greater distance between them to obtain the proper signal direction, while stations at the high end of the dial can have shorter, closer together to obtain a pattern.

A groundwave signal at a lower frequency travels further than one at the high end of the dial, so a station operating at 540 kHz with 1000 watts would have three to four times more cov-

erage than a 1000-watt station at 1550 kHz. Ground conductivity plays a factor in directional systems, with the best conductivity being in the Midwest. For example, KFYZ-550 in South Dakota still has one of the best daytime signals in the United States. How many of you can hear KFYZ at your location?

Construction

Once the FCC gives the green light to all the paper work, the actual building of the approved antenna system can start. A location has to be found for the towers in an area where the signal is to be directed from. The consulting engineer determines what the required spacing is for the tower bases and how high they must be. Once the antenna system is in place, equipment is added that controls the amount of signal that can be fed into the towers, with the main unit called a "Phasing System." Antenna Tuning Units are placed at the base of the towers.

Lines for transmission and for measuring how much signal is actually being fed into the antenna are generally installed in the ground. The information can be read back in the transmitter room. At the same time, electrical, control, and communications lines are put in place. In some operations, though, especially in earlier systems, many of the lines were put above ground so they could be better maintained.

Once all the lines are in place and the transmitter is working, the consulting engineer comes along and does his magic to make the system work. This includes setting the power levels to the individual towers and making sure that the readings match what the license specifies. Once the antenna pattern is "set," the engineer does a Signal Proof of Performance Measurement, a simple test to determine if the signal is radiating properly in a specific direction. This could mean taking eight to 10 to 12 radial measurements, some from as far as 50 miles from the station, to prove that the antenna system is operating properly. Once the "proof" is done, the data is compiled and checked against the actual signal at a predetermined distance from the station. This information is submitted to the FCC and, barring any problems, the station gets a license for operation.

Thanks, Bill

So the next time you're tuning across the radio dial, pause for a moment and think of what goes into those directional antenna systems; it's a lot of hard work and perseverance!

My thanks to Bill Sitzman of Independent Broadcast Consultants of Trumansburg, New York, who helped with information on this column. Bill has been involved in the radio business since the mid 1950s and has designed over 150 directional antenna systems and has worked for over 500 stations. Many thanks, Bill!

Broadcast Loggings

560 WNSR Brentwood, TN—Heard at 1907 with sports news and ads for sports bars and golf courses. Good signal at times (5 over S9) into deep fades. "...Sports Radio 560, WNSR." (IEN-GA)

590 WMBS Uniontown, PA—Heard at 2253, "Twilight Time" and other classics. Semi-dominant signal in a sea of others, mixed in with "The Dave Ramsey Show" on WVLK in Lexington, KY. "The Music of Your Life—WMBS." (IEN-GA)

740 CHWO Toronto, ON—Heard at 2032 with Big Band,

Swing and Jazz! Good signal that would slowly fade almost under KRMG in Tulsa, OK, and then rise again. "...your favorites, AM 740, Toronto." (IEN-GA)

760 WCHP Champlain, NY—Heard at 0615 with station ID at sign-on. (CA-ME)

900 WLSI Pikeville, KY—Heard at 0115 with country music. Decent, semi-dominant signal in a mix of others. "900, WLSI, Pikeville." (IEN-GA)

1150 WDEL Wilmington, DE—Heard at 0158, "Art Bell on Coast to Coast AM" and an ad for a 5K Race along the Delaware River in downtown Wilmington. Weak signal mixed with a few others. "WDEL...5K for The United Way." (IEN-GA)

1150 WIMA Lima, OH—Heard at 0200 DX Test with Morse code, sweep tones and mentions of station conducting a DX Test. Weak signal mixed with a few others. However, the Morse code and sweep tones came through the mix quite nice. "WIMA, Lima." (IEN-GA)

1230 WESX, Salem, MA—Heard at 2015 with station ID and advertising. (CA-ME)

1230 WOIC Columbia, SC—Heard at 1730 with ad for Plex Indoor Sports in Columbia and Love Chevrolet. Dominant signal in a mix of others. "1230, WOIC, Columbia." (IEN-GA)

1250 WEAE Pittsburgh, PA—Heard at 0000, TOH ID and then the sports news of the day. Decent signal on top of a few others with slight fading. "This is WEAE, Pittsburgh's ESPN Radio 1250." (IEN-GA)

1290 WCHK Canton, GA—Heard at 1420 with bluegrass music. Decent, steady signal with Rush Limbaugh buried way underneath. "The New WCHK, The Best Bluegrass and Classic Country." (IEN-GA)

1300 WMTM, Moultrie, GA—Heard at 2030 station ID with advertising. (CA-ME)

1300 WPNH, Plymouth, NH—Heard at 0600 station ID with "Music of Your Life" promo. (CA-ME)

1300 WNQM Nashville, TN—Heard at 2300, Spanish music and TOH ID. News in Spanish. Good signal with brief fades. "AM 1300, WNQM, Nashville, Tennessee, Radio Vida." (IEN-GA)

1540 WTBI Pickens, SC—Heard at 0800 with religious programming and then TOH ID. Good signal with slight fading. "AM 1540, WTBI, Pickens." (IEN-GA)

1580 WTCL Chattahoochee, FL—Heard at 2000 with gospel music. Good signal in the mix with slight fading. "...AM 1580, WTCL, Chattahoochee." (IEN-GA)

1600 WXYM Saltville, VA—Heard at 0803 with TOH ID. Signal was buried in the mix along with some preachin' from somewhere. "Classic Country, AM 1600, WXYM, Saltville." (IEN-GA)

1600 WFIS Fountain Inn, SC—Heard at 2305, Atlanta Braves Baseball, "The 10th Inning Show" and Neal Boortz Promo at 2309. Weak signal with heavy fades. "...Atlanta Braves Baseball on WFIS" and "Neal Boortz...on AM 1600, WFIS." (IEN-GA)

1620 WHLY South Bend, IN—Heard at 2327, oldies buried in the mix, and one-quarter signal drop. "WHLY, AM 1620." (IEN-GA)

1700 KKLK Sherman, TX—Heard at 0745 with traffic report for the Dallas area. Good signal with slight fading. "TalkRadio KKLK." (IEN-GA)

Loggings this month have been brought to you by Ira Elbert New (IEN-GA), Watkinsville, Georgia, using his 2002 Nissan car radio and a Drake R8B with a 135-foot north/south longwire; Charles Ames (CA-ME), Grand Isle, Maine, with a GE Superadio and Sony ICF7700, and a RadioShack Loop (Part No. 15-1853). Many thanks!

So Many Stations...

If you've ever wondered just how many radio stations there are on the air, here's a count: 9,614 FM stations, 5,008 AM stations, 4,793 low-power TV and FM stations. Regarding all of those stations, where are *YOUR* broadcast loggings and questions? Send them directly to me at TheRadioColumn@aol.com or by regular mail to *Popular Communications*, c/o "Broadcast Technology," 25 Newbridge Road, Hicksville, NY 11801.

Next time we'll feature information on restricted radiation, a system that was used in many universities for their own "on-campus" stations and services. We'll also feature some of the communications I have received from readers. As always, your input is welcomed, whether loggings or suggestions for an item in the column. ■

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Tap into secret Shortwave Signals

Turn mysterious signals into exciting text messages with the MFJ MultiReader™!

Plug this self-contained MFJ MultiReader™ into your shortwave receiver's earphone jack.

Then watch mysterious chirps, whistles and buzzing sounds of RTTY, ASCII, CW and AMTOR (FEC) turn into exciting text messages as they scroll across an easy-to-read LCD display.

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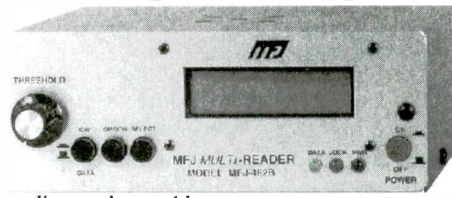
Eavesdrop on the World

Eavesdrop on the world's press agencies transmitting *unedited* late breaking news in English -- China News in Taiwan, Tanjug Press in Serbia, Iraqi News in Iraq -- all on RTTY.

Copy RTTY weather stations from Antarctica, Mali, Congo and many others. Listen to military RTTY passing traffic from Panama, Cyprus, Peru, Capetown, London and others. Listen to hams, diplomatic, research, commercial and maritime RTTY.

Listen to maritime users, diplomats and amateurs send and receive *error-free* messages using various forms of TOR (Telex-Over-Radio).

Monitor Morse code from hams, military, commercial, aeronautical, diplomatic, maritime



-- all over the world --
Australia, Russia, Japan, etc. MFJ-462B
Printer Monitors
24 Hours a Day

MFJ's exclusive TelePrinterPort™ lets you monitor any station 24 hours a day by printing transmissions on an Epson compatible printer. **Printer cable, MFJ-5412, \$9.95.**

MFJ MessageSaver™
You can save several pages of text in an 8K of memory for re-reading or later review.

High Performance Modem
MFJ's high performance PhaseLockLoop™ modem consistently gives you solid copy -- even with weak signals buried in noise. New threshold control minimizes noise interference --

greatly improves copy on CW and other modes.

Easy to use, tune and read

It's easy to use -- just push a button to select modes and features from a menu.

It's easy to tune -- a precision tuning indicator makes tuning your receiver easy for best copy.

It's easy to read -- the 2 line 16 character LCD display with contrast adjustment is mounted on a brushed aluminum front panel for easy reading.

Copies most standard shifts and speeds. Has MFJ AutoTrak™ Morse code speed tracking.

Use 12 VDC or use 110 VAC with MFJ-1312B AC adapter, \$12.95. 5 1/4"Wx2 1/2"Hx5 1/4"D inches.

No Matter What™ Warranty

You get MFJ's famous one year *No Matter What™* limited warranty. That means we will repair or replace your MFJ MultiReader™ (at our option) *no matter what* for one full year.

Try it for 30 Days

If you're not completely satisfied, simply return it within 30 days for a prompt and courteous refund (less shipping). Customer must retain dated proof-of-purchase direct from MFJ.

Super Active Antenna

"World Radio TV Handbook" says MFJ-1024 is a "first-rate easy-to-operate active antenna...quiet...excellent dynamic range... good gain... low noise... broad frequency coverage." Mount it outdoors away from electrical noise for maximum signal, minimum noise. Covers 50 KHz-30 MHz.

Receives strong, clear signals from all over the world. 20 dB attenuator, gain control, ON LED.

Switch two receivers and auxiliary or active antenna. 6x3x5 in. Remote has 54" whip, 50 feet

coax. 3x2x4 inches. 12 VDC or 110 VAC with MFJ-1312, \$12.95.

Indoor Active Antenna

Rival outside long wires with this *tuned* indoor active antenna. "World Radio TV Handbook" says MFJ-1020C is a "fine value... fair price... best offering to date... performs very well indeed."

Tuned circuitry minimizes intermod, improves selectivity, reduces noise outside tuned band. Use as a preselector with external antenna. Covers 0.3-30 MHz. Tune, Band, Gain, On/Off/Bypass Controls. Detachable telescoping whip. 5x2x6 in. Use 9 volt battery, 9-18 VDC or 110 VAC with MFJ-1312, \$12.95.

Compact Active Antenna

Plug this compact MFJ all band active antenna into your receiver and you'll hear strong, clear signals from all over the world, 300 KHz to 200 MHz including low, medium, shortwave and VHF bands. Detachable 20" telescoping antenna. 9V battery or 110 VAC MFJ-1312B, \$12.95. 3 1/8"x1 1/4"x4 in.

Eliminate power line noise!

MFJ-1026
\$179⁹⁵

Completely eliminate power line noise, lightning crashes and interference *before they get into your receiver!* Works on all modes -- SSB, AM, CW, FM, data -- and on all shortwave bands. Plugs between main external antenna and receiver. Built-in active antenna picks up power line noise and cancels undesirable noise from main antenna. Also makes excellent active antenna.

MFJ Antenna Matcher

Matches your antenna to your receiver so you get maximum signal and minimum loss. MFJ-959C
\$99⁹⁵

Preamp with gain control boosts weak stations 10 times. 20 dB attenuator prevents overload. Select 2 antennas and 2 receivers. 1.6-30 MHz. 9x2x6 in. Use 9-18 VDC or 110 VAC with MFJ-1312, \$12.95.

High-Gain Preselector

High-gain, high-Q receiver preselector covers 1.8-54 MHz. Boost weak signals 10 times with low noise dual gate MOSFET. Reject out-of-band signals and images with high-Q tuned circuits. Push buttons let you select 2 antennas and 2 receivers. Dual coax and phono connectors. Use 9-18 VDC or 110 VAC with MFJ-1312, \$12.95.

Dual Tunable Audio Filter

Two separately tunable filters let you peak desired signals and notch out interference at the same time. You can peak, notch, low or high pass signals to eliminate heterodynes and interference. Plugs between radio and speaker or phones. 10x2x6 inches. MFJ-752C
\$99⁹⁵

MFJ Shortwave Headphones

MFJ-392B
\$199⁹⁵
New!

Perfect for shortwave radio listening for all modes -- SSB, FM, AM, data and CW. Superb padded headband and ear cushioned design makes listening extremely comfortable as you listen to stations all over the world! High-performance driver unit reproduces enhanced communication sound. Weighs 8 ounces, 9 ft. cord. Handles 450 mW. Frequency response is 100-24,000 Hz.

High-Q Passive Preselector

High-Q passive LC preselector boosts your favorite stations while rejecting images, intermod and phantom signals. 1.5-30 MHz. Preselector bypass and receiver grounded positions. Tiny 2x3x4 in. MFJ-956
\$49⁹⁵

Super Passive Preselector

Improves any receiver! Suppresses strong out-of-band signals that cause intermod, blocking, cross modulation and phantom signals. Unique Hi-Q series tuned circuit adds super sharp front-end selectivity with excellent stopband attenuation and very low passband attenuation and very low passband loss. Air variable capacitor with vernier. 1.6-33 MHz. MFJ-1046
\$99⁹⁵

MFJ Shortwave Speaker

This MFJ **ClearTone™** restores the broadcast quality sound of shortwave listening. Makes copying easier, enhances speech, improves intelligibility, reduces noise, static, hum. 3 in. speaker handles 8 Watts. 8 Ohm impedance. 6 foot cord. MFJ-281
\$12⁹⁵

MFJ All Band Doublet

102 ft. all band doublet covers .5 to 60 MHz. Super strong custom fiberglass center insulator provides stress relief for ladder line (100 ft.). Authentic glazed ceramic end insulators and heavy duty 14 gauge 7-strand copper wire. MFJ-1777
\$49⁹⁵
Ship Code A

MFJ Antenna Switches

MFJ-1704
\$69⁹⁵

MFJ-1702C
\$24⁹⁵

MFJ-1704 heavy duty antenna switch lets you select 4 antennas or ground them for static and lightning protection. Unused antennas automatically grounded. Replaceable lightning surge protection. Good to 500 MHz. 60 dB isolation at 30 MHz. MFJ-1702C for 2 antennas.

Morse Code Reader

Place this pocket-sized MFJ-461
\$79⁹⁵
New! MFJ Morse Code Reader near your receiver's speaker. Then watch CW turn into solid text messages on LCD. Eavesdrop on Morse Code QSOs from hams all over the world!

MFJ 24/12 Hour Station Clock

MFJ-108B, \$19.95.
Dual 24/12 hour clock. Read UTC/local time **at-a-glance.** High-contrast 5/8" LCD, brushed aluminum frame. Batteries included. 4 1/2"Wx1Dx2H inches.

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World News, Commentary, Music, Sports, And Drama At Your Fingertips

This listing is designed to help you hear more shortwave broadcasting stations. The list includes a variety of stations, including international broadcasters beaming programs to North America, others to other parts of the world, as well as local and regional shortwave stations. Many of the transmissions listed here are not in English. Your ability to receive these stations will depend on time of day, time of year, your geographic location, highly variable propagation conditions, and the receiving equipment used.

AA, FF, SS, GG, etc. are abbreviations for languages (Arabic, French, Spanish, German). Times given are in UTC, which is five hours ahead of EST, i.e. 0000 UTC equals 7 p.m. EST, 6 p.m. CST, 4 p.m. PST.

UTC	Freq.	Station/Country	Notes	UTC	Freq.	Station/Country	Notes
0000	9745	Radio Romania Int.	SS	0230	11750	China National Radio, Network 1	CC
0000	9580	Int. Radio of Serbia & Montenegro		0230	7160	Radio Tirana, Albania	Albanian
0000	7545	Radio Ukraine Int.	Ukrainian	0230	4800	Radio Buenas Nuevas, Guatemala	SS
0000	11500	Radio Bulgaria	BB	0300	4990	Radio Apinte, Surinam	DD
0000	9435	Democratic Voice of Burma, via Germany	Burmese	0300	4910	ZNBC/Radio Zambia	unid
0030	9875	Radio Vilnius, Lithuania		0300	4976	Radio Uganda	unid
0030	11850	China Radio Int., via French Guiana	SS	0300	4780	Radio Cultural Coatan, Guatemala	SS
0030	11630	RDP Int., Portugal	PP	0300	4780	RTV Djibouti	FF
0030	9410	BBC Relay, Cyprus		0300	7110	Radio Ethiopia	Amharic
0030	9925	Voice of Croatia	Croatian	0300	4860	Voice of Iranian Kurdistan	Kurdish
0030	9870	Radio Austria Int.		0300	4950	Radio Nacional, Angola	PP
0100	7230	Radio Slovakia Int.		0330	9775	Radio Budapest, Hungary	
0100	5890	Radio Thailand, via USA		0330	11655	Sudan Radio Service, via England	
0100	6175	Voice of Vietnam, via Canada		0330	4052.5	Radio Verdad, Guatemala	SS
0100	6165	Radio Nederland Relay, Bonaire		0330	4885	Radio Clube do Para, Brazil	PP
0100	6973	Galei Zahal, Israel	HH	0330	5025	Radio Rebelde, Cuba	SS
0100	9345	Kol Israel	HH/EE	0330	9575	Radio Medi-Un, Morocco	AA
0100	10330	All India Radio	HH	0400	9880	Voice of Russia via Armavir	
0100	9935	Voice of Islamic Republic of Iran	AA	0400	11690	Radio Okapi, Congo, via South Africa	FF
0100	4900	Radio San Miguel, Bolivia	SS	0400	3255	BBC Relay, South Africa	
0100	7345	Radio Prague, Czech Republic		0400	7190	RT Tunisienne, Tunisia	AA
0100	9580	China Radio Int., via Cuba		0400	6080	Radio Monte Carlo, Monaco, via Canada	AA
0100	7475	Voice of Greece	Greek	0400	4845	Radio Mauritanie, Mauritania	AA
0130	6010	Radio Sweden, via Canada		0400	9775	VOA Relay, Botswana	
0130	9745	HCJB, Ecuador	SS	0400	4890	Radio France Int. Relay, Gabon	
0130	9870	Radio Budapest, Hungary	HH	0400	6940	Radio Fana, Ethiopia	Amharic
0130	9820	Radio Havana Cuba		0400	9515	Radio Sultanate of Oman	AA
0130	7285	Voice of Croatia, via Germany	Croatian	0430	9460	Voice of Turkey	TT
0130	9495	Voice of Justice, Iran (anti-US)		0430	7440	Radio Ukraine Int.	
0130	11745	Voz Cristiana, Chile	SS	0430	11690	Radio Okapi, Congo (DR), via South Africa	vern
0130	9625	CBC Northern Service, Canada	various	0430	5985	RTV Congolaise, Congo (Rep)	FF
0200	7180	Voice of Russia, via Moldova		0500	4775	Trans World Radio, Swaziland	
0200	9560	KBS World Radio, South Korea		0500	6065	Christian Voice, Zambia	
0200	3320	Radio Sondergrense, South Africa	Afrikaans	0500	7335	Vatican Radio	unid
0200	9737	Radio Nacional, Paraguay	SS	0500	4770	Radio Nigeria	
0200	15720	Radio New Zealand Int.		0500	7255	Voice of Nigeria	
0200	6190	Deutschlandfunk, Germany	GG	0500	4919	Radio Quito, Ecuador	SS; irr.
0200	3340	Ra Voz de Misiones Internacional, Honduras	SS/EE	0530	4777	RTV Gabonaise, Gabon	FF
0200	11700	Radio Bulgaria		0530	5030	RTV Burkina, Burkina Faso	FF
0200	5970	Radio Belarus, Belarus		0600	6104	VOA Relay, Sao Tome	
0230	9605	Vatican Radio	FF/EE	0600	4783	RTV Malienne, Mali	FF
0230	11800	RAI Int., Italy		0600	4760	ELWA, Liberia	
0230	6009	La Voz de tu Concencia, Colombia	SS	0600	4915	Ghana Broadcasting Corp/Radio Ghana	
				0600	6070	CFRX, Canada	relay CFRB

UTC	Freq.	Station/Country	Notes	UTC	Freq.	Station/Country	Notes
0630	7125	RTV Guineenne, Guinea	FF	1600	13675	Radio Austria Int.	
0730	6185	Radio Educacion, Mexico	SS	1630	11765	Sound of Hope, Taiwan	CC
0800	7260	Radio Vanuatu		1630	21630	Radio Japan/NHK	JJ
0900	9885	Radio New Zealand Int.		1630	15475	Africa Number One, Gabon	FF
0930	4805	Radio Difusora da Amazonas, Brazil	PP	1630	15190	BBC via French Guiana	
0930	6135	Radio Santa Cruz, Bolivia	SS	1630	13800	Radio Anternacional (cland) via Moldova	Farsi
1000	4939	Radio Amazonas, Venezuela	SS	1630	13870	Radio Farda, USA to Iran	Farsi
1000	4747	Radio Huanta 2000, Peru	SS	1700	15285	Channel Africa, South Africa	
1000	4815	Radio El Buen Pastor, Ecuador	SS	1700	12133.5	AFN/AFRTS, Florida	
1000	4855	Radio La Hora, Peru	SS	1730	12005	RT Tunisienne, Tunisia	AA
1000	6140	Radio Lider, Colombia	SS	1730	11695	Deutsche Welle Relay, Sri Lanka	unid
1030	3279	La Voz del Napo/Radio Maria, Ecuador	SS	1800	11630	Voice of Russia	
1030	4955	Radio Cultural Amuata, Peru	SS	1800	9870	Broadcasting Service of Kingdom of Saudi Arabia	AA
1030	6350	AFN/AFRTS, Hawaii	USB				AA
1030	9530	Radio Nova Viisao, Brazil	PP	1800	12050	Radio Cairo, Egypt	AA
1030	5019	Ecos del Atrato, Colombia	SS	1800	15205	Radio Jamahiriya/Voice of Africa, Libya, via France	AA, EE, etc.
1030	11955	Voice International, Australia					Greek
1030	9500	China National Radio - Network 1	CC	1800	15485	Voice of Greece, via USA	unid
1100	12085	Voice of Mongolia		1830	11905	Voice of America Relay, Sri Lanka	FF
1100	3315	Radio Manus, Admiralty Is., Papua New Guinea		1830	12080	VOA Relay, Botswana	
1100	13840	Italian Radio Relay Service, Italy		1830	9775	Voice of Armenia	AA
1100	9525	Voice of Indonesia	CC	1900	9855	Radio Kuwait	AA
1100	11590	Radio Free Asia, via Armenia	Tibetan	1900	15345	RTV Marocaine, Morocco	AA
1100	9980	AFN/AFRTS, Iceland	USB	1900	17860	Deutsche Welle Relay, Rwanda	
1130	4890	NBC, Papua New Guinea		1900	17830	BBC Relay, Ascension Is.	
1130	3325	Radio Bougainville, Papua New Guinea		1900	17680	Voz Cristiana, Chile	SS
1130	15425	HCJB-Australia		1900	15470	Radio Ndeke Luka, Cent. Af. Rep., via Germany	FF
1200	15515	Radio France Int. Relay, French Guiana	SS				FF
1200	11565	KWHR/World Harvest Radio, Hawaii		1900	17735	Radio Canada Int.	
1200	9440	China Radio Int.	unid	1930	13605	All India Radio	
1230	15400	YLE/Radio Finland Int.	Finnish	2000	13680	Radio Nacional de Venezuela, via Cuba	SS
1230	4870	Radio Republic Indonesia-Wamena	II	2000	11655	Radio Nederland Relay, Madagascar	
1300	15170	Radio Exterior de Espana Relay, Costa Rica	SS	2000	9925	Voice of Islamic Republic of Iran	
1300	9280	WYFR/Family Radio, via Taiwan	CC	2000	12070	Voice of Russia	
1300	11665	CBS, Taiwan	CC	2030	13610	Radio Damascus, Syria	
1300	9405	FEBC Int., Philippines	CC	2030	11820	Broadcasting Service of Kingdom of Saudi Arabia	AA
1300	9395	Deutsche Welle, via Kazakhstan	GG				AA
1300	9315	Radio Liberty, USA, via Sri Lanka	unid	2030	11865	Deutsche Welle, Germany, via Portugal	AA
1330	12025	Far East Broadcasting Assn., via UAE	unid	2030	11585	Kol Israel	HH
1330	9290	Radio Storsender, Germany, via Latvia	GG	2030	11870	University Network, Costa Rica	
1330	9760	VOA Relay, Philippines		2030	9970	RTBF, Belgium	FF
1330	11580	Adventist World Radio/KFBS, No. Marianas	CC	2030	11775	University Network, Anguilla	
1330	9975	Trans World Radio, Guam	CC	2100	11880	RAI Int., Italy	PP
1330	9430	FEBC Int., Philippines	CC	2100	15190	Radio Africa, Equatorial Guinea	
1330	11530	Voice of Mesopotamia via Moldova	Kurdish	2130	15410	VOA Relay, Morocco	
1330	11510	Radio Free Asia, via Kazakhstan	unid	2130	11715	All India Radio, Panaji (Goa)	
1400	15285	BBC Relay, Singapore	CC	2200	15275	Deutsche Welle Relay, Rwanda	GG
1400	21580	Radio France Int.	FF	2200	11780	Radio Nacional Amazonia, Brazil	PP
1400	21555	RDP Int., Portugal	PP	2200	21740	Radio Australia	
1400	21745	Radio Prague, Czech Republic		2230	9990	Radio Cairo, Egypt	
1500	17780	Channel Africa, South Africa		2230	9630	Radio Aparecida, Brazil	PP
1500	11705	Radio Veritas Asia, Philippines		2230	17815	Radio Cultura Sao Paulo, Brazil	PP
1500	9895	Radio Nederland	DD	2230	6180	Cyprus Bc. Corp.	Greek; wknds
1500	17630	Africa Number One, Gabon	FF	2230	9590	Radio Centrafrique, Cent. Af. Rep., via France	FF
1500	9615	KNLS, Alaska	CC	2300	6145	China Radio Int., via Canada	
1600	11690	Radio Jordan		2300	15345	Radio Nacional, Argentina	SS
1600	15145	SW Radio Africa, to Zimbabwe via England		2330	7300	Voice of Turkey	TT
				2330	17605	Radio Japan/NHK, via Bonaire	JJ
				2330	7460	Radio Nacional de la RASD (cland)	AA/SS

New, Interesting, And Useful Communications Products

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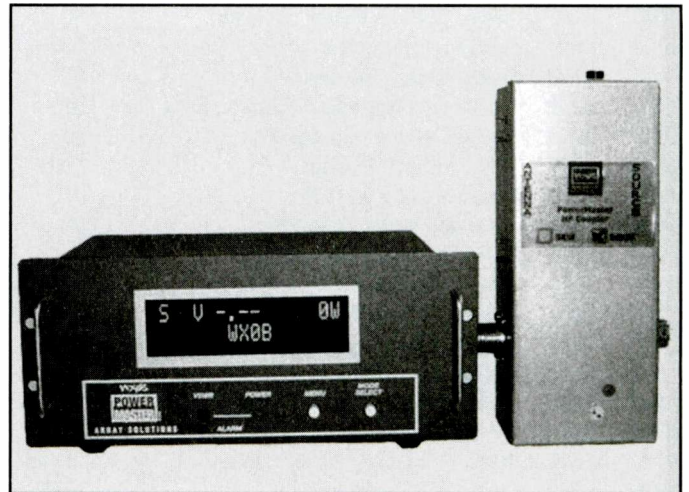
Otter Products, LLC, has announced its fully redesigned OtterBox, which is more rugged than the original, yet still waterproof, crushproof, and dustproof, and ideal for protecting any valuable. The new OtterBox line is available in a variety of sizes for protecting anything from radios and batteries, sunglasses, and credit cards to digital cameras, small power tools and electronic equipment. According to OtterBox, "Easy-open latches provide effortless entry yet secure closing, and customized silicone gaskets create a watertight seal. Special locking features add extra security."

Smaller cases include a coin slot vacuum release for airtight protection and a high-quality rope lanyard; medium cases include a high-quality rope lanyard and an added belt clip for convenience; large cases include a purge valve to keep the box airtight, reinforced carrying handle for secure grip, and Pick-n-Pluck foam to allow customization of the case to fit equipment. The OtterBoxes are appropriate for camping, hunting, fishing, hiking, kayaking, boating, canoeing, skiing, or vacations, and each case comes with an unconditional lifetime guarantee.

Otter Products also has a complete line of rugged cases for technology devices, including the Tablet PC, Apple iPod, and two other models of handheld computer cases. For more information or to order an OtterBox, visit www.otterbox.com or call 888-695-8820.



The new OtterBox waterproof, crushproof container is ideal for your radio gear.



Array Solutions' new PowerMaster wattmeter is available in either 3-kW or 10-kW models.

PowerMaster Wattmeter From Array Solutions

Array Solutions' latest product, the PowerMaster wattmeter, offers updated software features and an RS232 port that allows real-time data updates to a PC, providing an optimized, computer-enhanced, and feature-rich power monitoring environment for the user. Other features of the PowerMaster include a large vacuum fluorescent display (VFD), separate sensor, several modes of operation, and alarm functions to aid the user in monitoring their amplifier or exciter for maximum safe performance. There are two versions of the software, with introductory prices set at \$350 and \$450 for the 3-kW and 10-KW versions, respectively. Array Solutions will also customize for commercial and military customers.

For more information on the new PowerMaster wattmeter, contact Array Solutions, 350 Gloria Rd., Sunnyvale, TX 75182. Phone 972-203 2008 or FAX them at 972-203 8811. You can also visit Array Solutions on the Web at www.array-solutions.com or e-mail them at info@arraysolutions.com.

New Uniden Scanner, The BR330T

Uniden has just released information on its new TrunkTracker III scanner that includes a combination of the analog trunking features present in the BC246T and the race track features of the SC230, plus extended frequency coverage. Major features include .1 MHz- to 1.3-GHz range, excluding cellular, to cover AM broadcast, FM broadcast, and TV broadcast as well as all scanning bands; scans Motorola,



The latest scanner from Uniden, the BR330T, is loaded with new features, including close call RF capture technology.

EDACS, and LTR analog trunking systems; 2,500 dynamically allocated channels; close call RF capture technology, which quickly detects and tunes to nearby transmissions; fire tone-out operation, which can operate in a standby mode and respond when a fire tone-out is issued; and extended quick-key operation, allowing systems to be assigned to any of 100 quick keys for rapid selection.

For more information on Uniden's new BR330T scanner, visit the company's website at www.uniden.com.

New AOR ARD9000 Makes Digital Voice More Affordable

Now available from AOR USA, Inc., is its new ARD9000 digital voice modem designed to make digital voice HF contacts easier and more affordable. According to AOR, the ARD9000 is "a more compact and economical unit designed exclusively for digital voice. As with our ARD9800 fast digital modem, it works with ANY existing transceiver without requiring any modifications." Using the open G4GUO protocol, the ARD9000 and ARD9800 units are compatible with each other and both automatically detect digital signals and decode them while allowing analog signals to pass through. With both units, full analog capabilities are maintained while enabling digital contacts. Background static and noise are virtually nonexistent in the digital mode, providing telephone-like audio quality.

Growing numbers of ham radio operators in the U.S., Japan, and Europe already enjoy high-quality digital audio and have reported numerous successful trans-Pacific and trans-Atlantic digital voice contacts. Operators of ARD9000 and ARD98000 units can arrange digital QSOs through links found on several independent websites or through hot links on the AOR website, www.aor.com.

The manufacturer's suggested retail price for the ARD9000 is \$339; dealers are free to set their own prices and often discount from the MSRP. Special discounts are available for volume purchases made through ham radio clubs. Contact AOR for details. ■



The ARD9000 digital voice modem from AOR is more affordable than the company's ARD9800 unit, putting digital voice comms within the reach of more hams.

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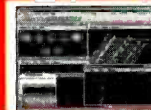
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Are YOU Ready? Packing A "Utility" Kit Is About More Than Your Radios!

As I write this column, hurricane season is almost upon us. Last year we witnessed an unusually high number of destructive hurricanes. Damage in south Florida alone was in the billions of dollars! From the information I just received by way of a local meteorologist friend of mine, this year has been predicted to be as bad, possibly worse in both the number of hurricanes that will be spawned and the ferocity and intensity of these storms. Whether or not they will impact the eastern seaboard of the United States is anyone's guess; however, my money is on the fact that with more numerous, and more severe, hurricanes the chances of the southeastern sections of our country getting pummeled again are very good. And for those of you living in other areas of the country, there is the possibility of tornadoes, fires, even earthquakes.

Each year we are treated to vivid images presented on local and national news channels regarding the devastation caused by natural or manmade disasters. We're shown video of vast expanses of mass destruction along with the homeless and displaced survivors, victims of mother nature, wandering around with blank expressions on their faces or sobbing uncontrollably as they survey damage. With a little pre-planning, however, it is entirely possible to "weather the storm," or whatever else has been thrown at you, with minimal impact on your and on your family's well being.

Boy Scouts Have An Excellent Point!

The Boy Scouts have a motto: "Be Prepared." I was a Boy Scout for many years. I was even an assistant Scout Master for a while. To me, the Boy Scout motto, along with their goal of always trying to do good in the world, is not only exemplary, but also has direct and lasting applications in today's world.

Be Prepared: good idea so let's do it ourselves. Let's start by compiling a list of the various disaster scenarios that could possibly impact your local area. If you live on the eastern seaboard of the United States, hurricanes would definitely be high on the list; if you're in the great plains, tornadoes have a place on your list. Do you live within 30 miles of a nuclear power plant? Well, what are you waiting for? Write that down! Is your home near a major body of water, an inland waterway, or major river that could possibly flood? Is your area prone to fires? Put it down! Do you have any industrial waste sites or waste producing facilities near your home? List it!

Your part of the country may even be at risk of an earthquake. Of course, if you live on the West Coast, you could already be all too familiar with the aftereffects of these destructive forces, but they don't only happen in California. An earthquake is an earthquake, and once you have been through one of these intense shows of Nature's power, you are not soon to forget the experience.

In 1964, while in college in central Washington, I witnessed the Alaskan earthquake first hand. Even though we were some 1,500 miles south of the epicenter in Alaska, it was an impres-



What's in your bag? The American Red Cross recommends packing these items and, of course, an extra set or two of batteries for that small portable radio.

sive event. I watched people unable to walk due to the undulating ground, clutching desperately at anything that would give them support. The doors in my dorm room swung wildly, as if some unseen poltergeist were throwing a tantrum. And then there was the sound: nothing! It was absolutely quite except for the excited shouting and screaming of people caught unaware. Add to this memory the several major quakes I experienced while stationed in Japan, and I have absolutely no desire to be anywhere near the epicenter of an earthquake, regardless of where it is! Earthquake: put it down!

Forest Or Brush Fires

While no area of the country is immune, it seems that the West Coast, especially in and around southern California, spawns these highly destructive fires each year, resulting in hundreds of millions (if not billions) of dollars in damage to our natural resources, not to mention the loss of life and property.

The Pacific Northwest is no stranger to forest fires either. Having lived in eastern Washington for over 20 years, I was brought up in forest fire country. During my last year in college, I was on the fire line helping fight a portion of the Sundance fire that devastated hundreds of thousands of acres or prime forest in northern Idaho. After almost 48 hours fighting the fire I had a

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RSGB, 1st Ed., 1992. 233 pages.
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whole new appreciation for the fire-fighting crews, including the Smoke Jumpers out of Montana who do this kind of work for a living. It was extremely physically exhausting, unbelievably tough, and highly psychologically draining work. One minute you're working your butt off trying to stabilize a fire line, only to look up and watch the fire crown several miles away, jumping from tree top to tree top, to outdistance your fire line by many miles in only a few seconds. Then you pack up, move forward, and try to re-establish a fire line to contain the ever-advancing wall of flame. After nearly 48 hours on the line, I came away with a whole new definition of the word "exhausted." Forest/wild fires: put it down!

Watery Destruction

Although we briefly touched on flooding earlier, it's worth a second look, especially in light of the events several years ago in the mid west, where massive flooding displaced tens of thousands of people and caused billions in damage. Floods are relatively predictable: that is, they tend to happen when there is an overabundance of rain, snow runoff, storm surge, etc. Just because you know that a flood is imminent doesn't lessen the impact, however, nor should it be cause for inaction. Where I live, in northeastern Pennsylvania, flooding of the Susquehanna River is a relatively common event. Thankfully, in my particular area, we have reinforced dykes that take the brunt of surge and keep the water from inundating south Wilkes-Barre. Other areas along the river aren't so lucky. Even if you *think* the flooding won't impact your particular area, it never hurts to be prepared to evacuate, should that option be ordered by the local EMA folks. Put it down!

Manmade Dangers

Nuclear power plants carry their own unique brand of hazard. Release of radiation into the surrounding atmosphere is always a possibility, even though most utility companies that incorporate nuclear power into their energy generating schemes take their responsibilities seriously. The utility that serves my area, Pennsylvania Power and Light (PP&L), operates several nuclear power generating plants, called steam electric stations (SES). Here a nuclear reactor generates steam, which spins a turbine that generates electricity—*tremendous* amounts of



Here's a look inside a Florida Red Cross shelter during last year's Hurricane Charley.

electricity. Hollywood sensationalism aside, the SESs do have the potential to dump nuclear material into the surrounding environment.

In the case of our local Susquehanna Steam Electric Station (SSES), also known as the Berwick Nuclear Power Plant, PP&L does a stellar job of keeping the plant clean, updating internal plant security to incorporate the latest detection systems designed to sound the alarm and contain any release of nuclear matter within the confines of the plant.

PP&L also prides itself in working with the local ARES/RACES Emergency Communications (EmComm) groups to ensure that the local populace is informed and protected should an event occur at the SSES plant. They also spend hundreds of millions of dollars each year to upgrade the hardware associated with nuclear power generation. In short, PP&L is, hands down, very conscientious and dedicated to providing nuclear energy safely to the residents of Pennsylvania. In talking to one of the Federal Emergency



If this happens to you—and you don't have to live in Tornado Alley—are you ready to evacuate to a shelter? Is your "Go Bag" packed with the essentials?

Management Agency (FEMA) inspectors during the last SSES radiological drill, involving hundreds of FEMA, county Emergency Management Agency, and EmComm personnel, I was told that our local SSES plant in Berwick was one of the top three nuclear power generating stations in the United States, all thanks to the efforts of PP&L.

While this knowledge certainly makes me sleep a good deal better at night, nevertheless, sometimes things happen and a radiological event occurs. I put it down, how about you?

We've covered quite a few "heavy" topics. I'm sure, though, depending upon your location and circumstances, that you have one or more additional items to add to your list of possible emergency scenarios. If you think a possible event is of significant importance to you, by all means, include it on your list of scenarios.

Having A Plan

The object here is to start formulating a plan to help you and your family through a disaster rather than becoming part of the disaster. The one thing that happens during a disaster is that the rulebook is thrown out the window. Therefore, any pre-disaster planning you do will be time well spent. In short, you don't want to become part of an already overloaded disaster relief operation. By planning and assembling a basic "disaster kit" you and your family can be much better prepared for what lies ahead.

We've been talking in generalities so far. It is not the purpose of this series of columns to be event-specific, since many of you reading this will have variations in whatever events you may face one day. What has worked for me in the past may or may not work for you under your circumstances. Therefore, I have been intentionally vague.

Works For Me, But For You...

In the past I have dwelt on my "Jump Kit," or "Go Bag," which is what I have assembled to deal with EmComm activation since both my wife, the Beautiful and Talented Patricia, KB3MCT, and I volunteer our services to our local Luzerne County ARES group. Since not everyone who reads this column is a radio amateur or CB/REACT operator, nor necessarily affiliated with their local EMS/EMA organizations, a Jump Kit/Go-Bag is not what they really need to cope with a dis-

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aster scenario. In the next series of columns, we will look at a general “utility” kit designed for *anyone* in a disaster zone. This “utility” kit is intended to be kept close at hand and be instantaneously available should the need arise. People living in southern California have a well-established practice of having an “earthquake kit” available in the event of “the Big One.”

What does this utility kit contain? Essentially all the things one might need to hike out of an affected area that has sustained enough significant damage to disrupt the normal modes of transportation. I’m talking a short duration situation here, not a protracted “survival in the wild” type scenario. The idea is to get out of the immediate area to a safer environment as quickly as possible.

The utility kit should include an LED flashlight (or two, perhaps one being a headlamp), hiking shoes/boots, knapsack, extra heavy socks, underwear, long pants, long sleeved shirt, spare glasses (including sun glasses), gloves, windbreaker and/or raingear, foodstuffs

(power bars, bottled water, etc.), walkman-type AM/FM “sports” receiver/tape player, headphones, compass/GPS unit, personal hygiene items (soap, washcloth, toothbrush, toothpaste, mouthwash, razor w/ blades), personal medications, cell phone, spare batteries for GPS/sports radio/LED flashlight(s), and possibly a CB handheld or GMRS/FRS handheld radio. A scanner would be a handy addition, but only if the user knew the necessary frequencies to listen to and kept these current in the scanner.

The most important thing is water. Medical problems aside, you can live up to four weeks without food, but only about five to seven days without water. Your body needs water to function, and when you don’t receive adequate rehydration you quickly become disoriented, which impacts your ability to make logical life-safety decisions. Therefore, several 20-ounce bottles of water should be included in the utility kit.

While the contents of this utility kit seem rather large, this all fits into a backpack/day pack. The idea is to have everything self-contained and within easy reach, thereby allowing quick access to the kit and ensuring your survival during and immediately after the disaster event.

Life In The Shelter

If you have never been “relocated” (just another word for evacuated) from a disaster area, then you have no knowledge of how things really are in a shelter. First, it’s crowded. Hundreds of people, all just like you, displaced from their homes and possibly their families, are quartered in places like school gymnasiums, church halls, and airplane hangars. Second, there is only a handful of disaster relief staff on hand to handle queries and perform emergency shelter assignments, like providing meals, bedding, even simply answering health/morale/welfare questions.

Then there is also a limited amount of information coming in relative to the disaster in progress. Trying to get word *out* of the shelter to your family in the immediate locale, or possibly well outside the disaster area, is frequently nearly impossible. Why? Simply put, more important communications are being conducted, and while you might think that your message deserves equal importance to those of the incident commander and/or shelter managers, it just ain’t so. The disaster

communications system is prioritized and health/morale/welfare messages are the lowest priority on the list.

Then there is boredom. Hour upon hour of waiting for news, listening to the gossip (commonly called “rumors and propaganda”), and trying to make the best of a bad situation. No, shelters aren’t any fun at all, but they sure beat being out and about in a disaster situation on your own. Therefore, it might not be a bad idea to include an electronic game or two in your utility kit. It certainly helps to pass the time waiting to return to your home.

Remember The Boy Scouts

So, loyal readers, your assignment for this month is to develop a list of possible disaster scenarios that might force you to relocate, develop a list for your utility pack, and start ticking off the items as you procure them. First on that list should be some type of bag, day/backpack, etc., to hold all the items. Remember, weight is the big limiting factor and you have to be physically able to shoulder your kit and move about with it should the need arise.

Finally, set up a plan to contact your family members should you be separated when the disaster occurs. GMRS/FRS radios are great for keeping in touch over short ranges, and CB walkie-talkies are designed for slightly greater distances. Obviously, if you and several members of your family are ham radio operators, then 2-meter or 70-centimeter handhelds working through a repeater (provided it is still on the air) are great assets. If all else fails, list at least two rendezvous places to meet should something occur. If, after a specific time, at the first rendezvous point not everyone shows up, move to the second and wait a pre-arranged time. Then it’s off to the shelter.

Above all else, don’t panic! You need your wits about you at all times in situations like these. Prior planning for events like the ones we have discussed this month make your reactions to an incident much more predictable and smart decisions easier to make.

That’s all for this month. Remember, “Homeland Security” is not just about terror attacks and “things that go bump in the night.” It’s about your ability to function in a situation that is way outside the ordinary. Always remember our motto: “Preparedness is not optional.” ■

Radio Fun And Going Back In Time

Q. How was radio used in Cold War spying?

A. The STASI (East German Secret Police) worked very closely with the Soviets at their huge spy base in Cuba. They also used illegally obtained Western technology to build a system that connected them to Moscow and proceeded to do a lot of spying in West Germany. One agent would listen to STASI broadcasts once a week. His wife stole government documents, which would be micro-photographed and sent to an East German address under the stamp. The agent had a burst transmitter that he used to contact his control agent, providing a full page of information in a three- or five-second transmission. He only used it to tell his control agent that he had left something in a dead drop. His name was Gunter Guillaume, and he worked his way up to being one of West German Chancellor Willi Brandt's most trusted assistants. That was before the Federal Counterespionage Agency found out he was also Agent 37 of the STASI Wednesday night broadcasts.

Q. World War I frontline troops buried their antennas in the ground to use the ground wave effect rather than erecting a conventional antenna which would draw artillery fire. Didn't that mean the enemy could listen in more easily?

A. It certainly did. With trenches only a few hundred feet apart and most of the telephones and telegraph equipment using a ground return, listening in was easy. By mid-1915, the Allies thought they had a terrible problem with espionage. The Germans would ambush even the most carefully planned patrols. When new troops came into the lines they were often met with shouts of "Hello!" from the Axis lines. A Scottish unit even heard its regimental march being played by the Germans.

When they finally figured out that the Germans were simply burying antennas on the Axis side of the line and were listening in, the British got mad. Then they got even. The British started listening themselves, of course. But they also developed the Fullerphone, a low-power telegraph system that used a constant DC current that could not be picked up by induction. Anyone with another set and who was on the wire, up to 30 miles away, could hear clearly. But anyone not hooked to the wire only had 2 μ A of signal to pick up through the ground return—not much good at a hundred yards. British signals were safer. Major Fuller, who invented it, was given the Princess Mary Medal for achievement and rose to the rank of Major General. The Fullerphone was used with great success in both World Wars I and II.

Q. What were some of the problems with the first mobile police radios?

A. In the early days of police radio (1920s) the tubes were so fragile that extensive cushioning was required. Automobile electrical systems were also far too low pow-

ered to run a receiver (all police calls were one way). It was necessary to put a 6-volt battery on the running board of the police car, and the battery could still only last four hours.

Q. What happened on Easter Sunday 1964 that changed modern music forever?

A. Radio Caroline went on the air. A radio station built aboard a ship anchored off the southern coast of England began broadcasting rock and roll. Ronan O'Rahilly was a club owner who had started recording groups like the Rolling Stones and the Animals. Unable to get his records played on the government-owned BBC, he had a ship outfitted with two 10-kW transmitters and put rock 'n' roll on the British airwaves all day long every day. Legal and financial problems forced them off the air in March of 1968, but when they went dark rock 'n' roll in the UK was there to stay.

Looking Back...

Five Years Ago In Pop'Comm

The talk of the radio hobby community in August 2000 was the new C. Crane CCR recorder, which recorded in stereo or mono on a digital hard drive! And while BPL (Broadband Over Powerlines) wasn't in our radio vocabulary yet as an interference generator, *other* forms of RFI were, from fish tank heaters to doorbell transformers. An easy cure? Not for BPL, but in our "Ham Discoveries" column Kirk helped us cure some age-old RFI problems. Cobra had just debuted their new 148 NW ST mobile CB, offering AM and single sideband with a cool "Nightwatch" front panel.

Ten Years Ago In Pop'Comm

Pagers: They've mostly been replaced with cell phones and PDAs that are light years beyond them, but a scant 10 years ago pagers were still a hot item. Tom Kneitel's timely article, in August 1995, was titled, "Decoding Non-Voice Pager Messages." Cobra's latest base CB was its new 2010, a full-featured AM/SSB transceiver that included NOAA weather reception.

Twenty Years Ago In Pop'Comm

Looming large on the cover of our August 1985 *Pop'Comm* was a superb photo of lower New York City; standing tall was the World Trade Center. Times were certainly different then, and so were the cell phones. New was the GE MINI which was really anything but "mini," weighing in at nearly two pounds and standing over eight inches tall! And for those of you still wondering what Alice Brannigan looks (or should we say looked—it was a while ago!) like, check out page 22 of that issue. Yaesu had also recently introduced its new FRG 8800, which covered 150 kHz through 29.99 MHz.

Working With The Aluma Towers: Expert Tips To Get Your Antennas Up High!

When out-of-town hams stop by my house for a quick visit on a business trip or vacation, the comments about my two antenna towers are always the same: “They are shiny!” Yes, they’re made of aluminum.

“Yikes, aluminum? Won’t they crease and fold over with just a little bit of wind?” is usually the next comment. And yes, leaving an aluminum tower cranked up with a big antenna on the top is definitely not a good idea without a good three-point guy line system. And even cranking it *down* with all guy lines attached and snug is no assurance that an aluminum tower can survive a small tornado. My steel crank-up took a freak California tornado hit and bent beyond repair. Luckily, the twin long-boomer survived. But my aluminum tower tore loose from a very sturdy fascia and stud upper mounting and twisted itself beyond recognition during the F1 incident. Luckily, it came down so gently it didn’t blow through the roof!

A self-supporting steel tower can hold a huge number of antennas, and this just might be a great way to go for a radio operator who wants to put it up, never mess with it, and have it stay up after a pretty hefty blow. But for the radio enthusiast looking for a fast way to crank up a moderate antenna system, and who will regularly be “upping and downing” the tower to add and subtract more antennas, an upper-braced aluminum tower has some real advantages because of its light weight.

My Choice

And that’s what I now have in place, aluminum towers from Aluma Tower Company that allow me to regularly crank up and down easily for testing various types of antenna systems. Aluminum towers are also a natural for emergency communicators as they may be easily transported on a tower trailer and quickly erected at the emergency site. This is exactly where many Alumna towers ended up, standing tall after they went up on portable trailers after the three hurricanes roared through Florida last year.

Aluma towers are composed of two-, three-, and four-section crank-ups and must have the lower section building-bracketed or guyed. They are not designed to be free standing. In high wind areas the upper section should be guyed, too. All structural units are Tungsten-enert gas-welded, a process which produces a joint stronger than the members themselves. Aluma Tower Company has conducted many tests of aluminum versus steel under exposure to the elements of wind, weight, fire, and cold.

“One favorable factor in our aluminum tower is its strength. Our towers ‘bridge-type’ welded construction creates an almost indestructible tower, made to stand up in high winds, under heavy loads for many years. Our lightweight and superior strength are unequaled,” says Ted Gottry, vice president of Aluma Tower Company. He encourages radio enthusiasts to e-mail him at www.ted@alumatower.com for descriptions of the strength tests between aluminum and steel.



I supported the tower with guy ropes and the reinforced fascia.

Again, keep in mind that the aluminum towers, unlike steel, are not meant for free standing applications. But if you’re looking for a lightweight tower that will go up without major modifications to your backyard and upper support on the house, the aluminum crank-up should be a consideration.

Aluma offers 20 tower types, from 35 feet to 100 feet, in standard, heavy, and extra heavy-duty configurations. They may be nested as low as 12 feet on some models, with nesting at 20 and 25 feet most common on other models. Various size masts and mast wall thicknesses may be ordered to your specifications. Aluma also offers tilt over towers, plus towers for comm vans and trailers, and individual tower replacement sections for any Aluma tower with minor damage caused by hurricane winds. To see all the Aluma tower specs, log on to their webpage at www.alumatower.com.

Using A Rotator

If you plan to use a big rotator like the Tailtwister, go for the *extra heavy-duty* models T40XHD, T75XHD. However, if



The worm gear crank assembly is easy to turn, but very slow in raising and lowering the tower.

you're using a modest rotator like the Yaesu 800 series, you can go with the less expensive heavy-duty models. The standard telescoping towers come complete with a 1-1/2-inch-diameter x .125 wall x 5-foot-long mast, guy ears on each section, heavy-duty building bracket and tilt base (heavier duty options are available). The crank worm gear assembly is all in place, including the pulleys, so there is no hard work in getting the tower assembled when you're ready to raise it up in place. The hard work comes before that.

The Hard Work!

Getting the tower out of the expertly constructed, protective wood crate is a job! Wear protective lenses, hard hat, safety shoes, and bring your pry bar. When the truck delivers the tower, you have plenty of uncrating to do. Incidentally, because the aluminum towers are so lightweight, getting them off the truck is a three-man deal; if it were a steel tower, you would need a 10-man crew!

After you extract the Aluma tower from the protective crate, two people can easily carry it to the backyard. My 60-foot, heavy-duty, three-section tower weighs in at 190 pounds, and my new two-section, heavy-duty, 40-foot tower weighs in at less than 85. That's the beauty of aluminum: getting it to the backyard and ultimately putting it in the air is a snap.

Each tower comes with a well-illustrated guide on how to safely get it up in the air, with particular attention paid to the



The simple Aluma base mount.

hazards of overhead power lines. The Aluma instructions are crystal-clear that the tower needs to have a building upper support, and they even include a heavy aluminum upper support bracket to bolster your connection to your home or office structure near the roofline. The higher up your upper support, the sturdier your installation.

Safety Is Paramount!

Did I mention safety? I'm going to mention it again.

CAUTION: Even though I had specific plans for raising the tower with specific "positions" for a group of hams that gathered for the raising, I overlooked one significant safety consideration. We got the hard hats, the safety glasses, the right tools and protective footwear, and we had all of the ropes in place, but after the successful raising, a friendly neighbor (also a ham) who is an expert contractor informed me of a major error in our operation: **TOO MANY PEOPLE ON THE ROOF ALL IN ONE AREA!** Luckily, no one went crashing through the shingles, but it was something I never thought about in the many tower-raising "parties" I've attended. *Always* minimize the number of people on



Here's the hard work: getting the towers out of the crates!



← Don Arnold, WD4FSY, cracks open the crate to get at the tower.

the roof, and tell them to not stand all together in one spot, lest they find themselves in the bedroom below!

Mounting The Tower

The tower is mounted on a concrete pad that will suit the size of the outside tower section being installed. If the pad is already in place from an older tower, you may find bolts that will work with the supplied base plate. If you're pouring your own pad, they give instructions about setting up a threaded rod that is bent for anchors. I spent more time beefing up my upper supports than I did worrying about the concrete pad. Since these towers are NOT designed to be free-standing, you must pay particular attention to your upper support bracket and make sure you are not relying on a fascia board that may be infested with termites and would rip out in a heavy breeze.

I added pulleys to the top of one of the masts for an easy way to bring my aluminum beams in place. Since these towers are so lightweight, another method is to lay the aluminum tower partway over, attach the antenna system, and pull the tower up in place. With my double stack of weak signal beams, I made sure to have plenty of upper support to the beams and mast as it was going into place. Everything worked well, other than the fact that I needed to shave a little bit of aluminum off a couple of protrusions on my extra-large rotator (it was a hair too fat for the upper section). But Aluma told me ahead of time this might be a problem, so it was no big deal to do the work on the ground before everything went up in place.

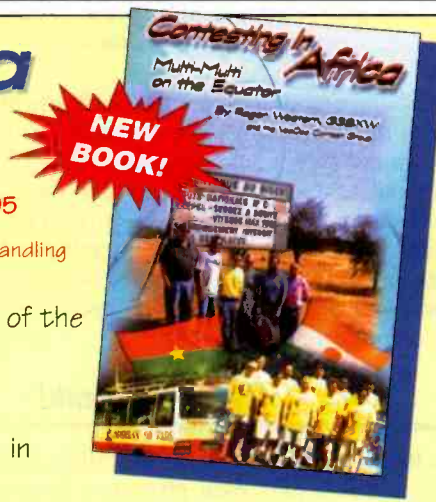
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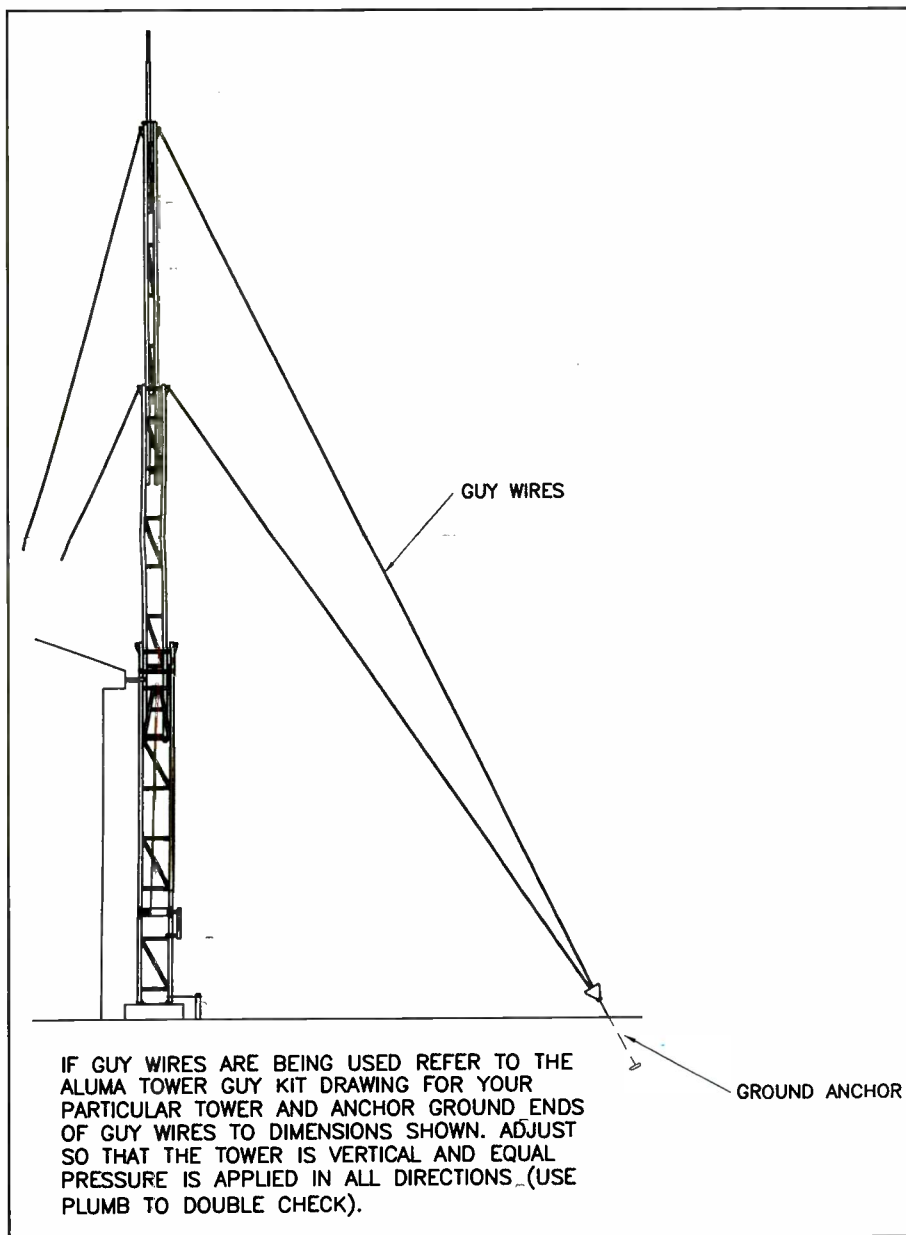
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Taken directly from the manual, this simple illustration shows a fully extended tower, attached to the fascia and properly guyed.

Although the tower base offers a two-point pin laydown feature, we could not take advantage of this because the flat part of the tower was up against the upper brace. But since the tower and the associated antennas were relatively light, our antenna party volunteers were able to simply lift the tower into place onto the concrete pad and bolts. I purposely enlarged the holes in the tower base to easily slip over the bolts without binding.

The worm gear crank will give you a workout. It's not heavy to turn, but a lot of cranking just barely gets the tower going up or down at a snail's pace. Aluma Tower has an optional electric hoist that

raises the tower one foot every four seconds. Again, the worm gear makes cranking up and down a breeze, but the process goes very slowly! They do have a drill adapter that will power the winch with a reversible half-inch drill motor.

When lowering the Aluma tower, you may be surprised to find that it somehow "gets stuck" and won't go any lower. Don't panic—this is a built-in safety feature! You will need to raise the tower about a foot and then pull down on the safety stop line. This will disengage, from the inner tower section, a pair of "drop stops" that would keep the tower from a catastrophic rapid lowering in the unlike-

ly event of the heavy stainless steel cable failure or pulley failure. Actually, the way the pulleys are arranged, the failure of a pulley would only cause the tower to drop down by about a foot. Slight pressure on the safety line with one hand allows you to easily crank the tower down with the other hand—that's right, just one handed up and down cranking, thanks to the terrific worm gear assembly.

Because the aluminum towers are so lightweight, they may be transported horizontally on the roof of an emergency comm RV, emergency comm van, or on the roof of a cargo trailer. "Towers, available to 100 feet are transported in a horizontal position, and when at the selected site, they are easily tilted to their vertical position and erected to the desired height," says Gottry. "We have a unique sliding track design which allows our Alumna towers to be centered front to back over the vehicle, yet enables the operator to move the tower from the horizontal to the vertical position with a minimum amount of effort," adds Gottry, pointing out that many of his towers saw emergency action after the three Florida hurricanes.

"We also offer trailer-tower units which allow for the tower to be towed horizontally, and easily tilted to vertical position and cranked to the desired height," says Gottry.

Win-Win Against Wind

The main features of the Alumna towers are how lightweight they are to work with and erect and their near-steel-strength when properly mounted with an upper support and/or guy lines. I repeat, these towers are not designed for base-only mounting—they must have upper support or guys.

If you're like me and regularly change antenna configurations on your tower and are constantly cranking your tower up and down, aluminum is a great way to go. But don't let how lightweight these antennas are fool you, because when properly mounted to your home or office, and cranked nearly all the way down in a major windstorm, they will survive the blow and be ready for an immediate one-person crank-up as soon as the dust clears!

I'm always interested in your antenna and tower experiences. Got any photos? Send them to me directly at "Radio Resources," *Popular Communications*, 25 Newbridge Rd., Hicksville, NY 11801. See you again next month! ■

Summer Vacation Scanning!

Well, it's that season again—warm weather, outdoor fun and sun, and family trips. Scanning might not be your primary focus during these months, but whatever it is, don't leave your scanner behind. There's plenty of good listening even in unfamiliar cities and towns.

Of course, the first step is to get to where you're going. If you're driving, there should be lots of scanning opportunities on the way, but don't leave your scanner in your luggage even if you're flying. You can't listen in the plane (and even if you did you wouldn't hear much—you're in an aluminum can, remember?), but you can listen on the ground, so keep it handy. There should be lots of time for scanning between changing planes, waiting for security and waiting after security, waiting for your luggage to return, and did I mention waiting? Your scanner can help pass the time. I'd probably recommend headphones if you're going to be listening at the airport. With the heightened security, you won't want to call attention to yourself.

Getting Equipped

We'll focus mainly on driving as that takes a bit more preparation, but most of what's suggested here applies to any other form of transportation, too. Putting in a permanent mobile installation is beyond the scope of this article, but for right now I'm assuming that you want to do something temporary to take on your trip.

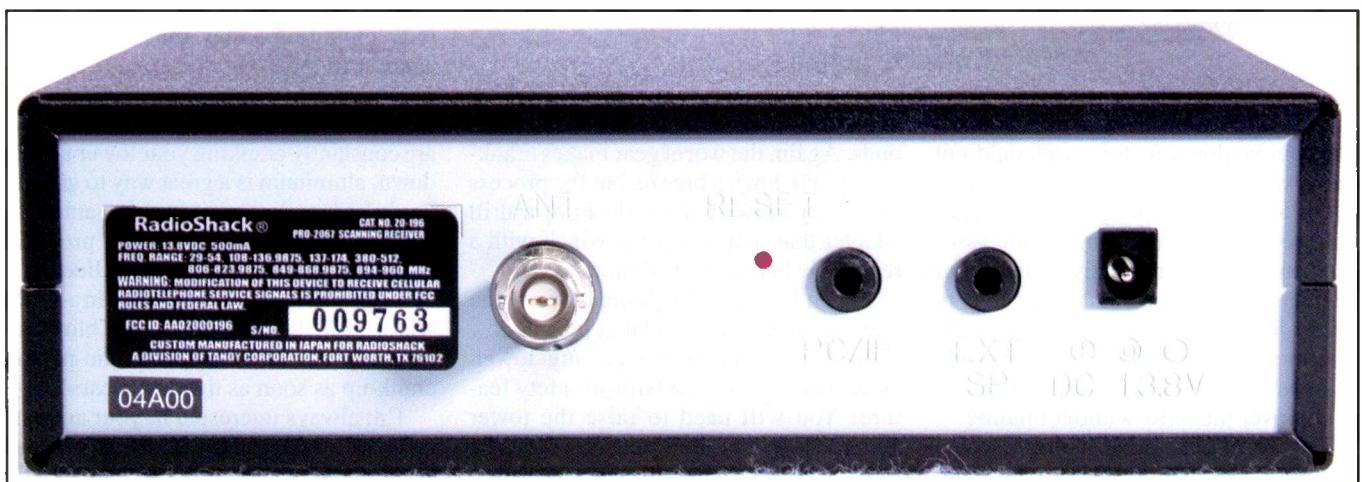
There are about as many variations on mobile equipment as there are mobile scanning enthusiasts. Simple installations like using a handheld in the car may turn out to be the perfect traveling arrangement for you. Let's face it, it's supposed to be a *vacation*, and hopefully you'll have other things to focus on besides the radio most of the time. Still, having a scanner in the car can be helpful for those long drive times, and in places where you might encounter traffic. Having a handheld can also

prove convenient for times when you'd like to scan in the hotel room or around the campfire at night. It'll keep your mind off the coyotes.

You can install a small base unit or mobile scanner in your car on a temporary basis. Just a simple cigarette lighter plug is about all you need for power (make sure the adapter you get is compatible both with the voltage and current of your radio) and, of course, watch the polarity. Most car cigarette lighters use a positive center (negative ground) and most scanners are wired that way, too; but, once in a while, you come across one that doesn't work as expected. This is a good way to ruin a radio if you're not careful. It's been my experience that the radio will fail in order to protect the fuse, so due caution is in order.

As far as antennas go, the sky's pretty much the limit. The metal body of the car makes a great ground plane, so any quarter-wave whip or gain antenna on a magnetic mount should provide reception for several miles. You can also compromise by using rubber duck antennas for handhelds and, if necessary, suction cups mounted on the inside of the glass. They don't work as well as an external antenna, but something is better than nothing. If you're going to use an "internal" antenna, I have found that longer tends to be better. Those quarter-wave telescoping antennas work quite well, or there are a number of other antennas that offer some gain on the higher frequencies. One that is long enough so it sticks up above the dashboard or window when the radio is sitting where you intend to use it can improve reception considerably. Glass passes the radio signal much better than metal.

You can also use the same method that car manufacturers use to keep from having to "spoil the lines" of the car with the likes of an antenna: the old wire on the windshield trick. Solder one end of the wire to an appropriate connector for your radio, and then run the other end from where the radio will sit up, then run it around the edges of the front or back window. You can build



Most base scanners made in the last few years use an external power supply that just happens to match what most cars use in their electrical system. It's very easy to find the right plug and adapt that base unit for mobile use for a vacation. The input should say DC and is 12V or 13.8V for most cars sold in North America. Check your car owner's manual and your scanner manual if you're not sure.

a dipole this way, too, by hooking a second wire to the other side of the connector. My experience has been that this is probably not necessary, though, and it makes the installation harder.

Try to make the wire an even multiple of a quarter-wave for maximum effectiveness on the frequencies you're interested in monitoring. If you divide 2832 by the frequency in MHz, you'll get the quarter-wavelength in inches. You can then multiply that number by 2 or 4 or 8 to give you a long enough wire to make it from the radio in the console to the front or rear windshield (or a side window that won't be going up and down on the trip). A small thin wire works best as it's the easiest to hide, but you will probably want it insulated, at least until you get up as high as the glass. After that, it really makes no difference. Stripping off the insulation makes it a bit less visible and won't affect performance.

As long as you don't pick up too much engine or computer noise from your car's electronics, this antenna will work fine, and it may even outperform many stock antennas for handhelds because of the increased exposure to the signal through the glass. Unfortunately, some of them also pick up more noise than signal. At that point you'll have to get a bit more serious and consider coax-fed antennas mounted magnetically or permanently on the roof or rear of the vehicle.

What To Listen To

This is where things tend to get a bit complicated for vacation scanning. You're likely to be driving through areas that you're unfamiliar with and don't have detailed frequency information available to you. Or perhaps you're flying into an area and want to concentrate on that city's system. Programming your radio in advance is very helpful and will allow you to make the most of the time you have available, but is not completely necessary.

Excellent resources like *Monitor America* and *Police Call* (available at RadioShack) can help considerably. The guides will probably give you much more information than you can deal with effectively anyway. Concentrate on the big ones like state highway patrols or police, major metro area police dispatch, fire alarm frequencies, etc. Pick out the services you're most interested in and punch those into your scanner. I try to keep each geographic area in its own bank. It can



A handy angle connector like this one allows the radio to sit flat on a console and still get the antenna above the dashboard. Some Velcro can help hold it in place if necessary.

also be fun to plug in the itinerant frequencies if you have room. These are used by lots of businesses all over the country. If you have a spare bank, the Family Radio Service (FRS) and Multi-Use Radio Service (MURS) frequencies (see "Chart") can be entertaining, too.

Also, keep your schedule in mind. If you're likely to be traveling at times when the noise from the radio would disturb others, you're not likely to listen at those times. If you're in a resort or other area with lots of other things to do, again, you won't be listening as much during those times. Think about when during the trip you might be able to listen without getting into trouble with family members or otherwise taking away from the vacation. Remember, you're supposed to be having fun. A pair of headphones might be a good accessory to bring along!

When it comes to taking that radio on your vacation, a computer programmable radio comes in extremely handy. All you have to do is hook up the computer, back up the current data (if your radio has that option) and then download the new stuff for the area you're traveling through. If you make the same trips on any kind of regular basis, this is worth its weight in gold. It's very quick and easy to connect the computer and download a new frequency file. Four hundred channels can be programmed in just a few minutes, and most of that involves getting the thing connected and starting the download soft-

Chart Of FRS, MURS, And Weather Frequencies

Here's a handy chart of the FRS frequencies. Remember that Channels 1 through 7 are also part of the GMR where higher power is allowed. You can hear anything on these frequencies. You might also recognize some of them as past frequencies of the month.

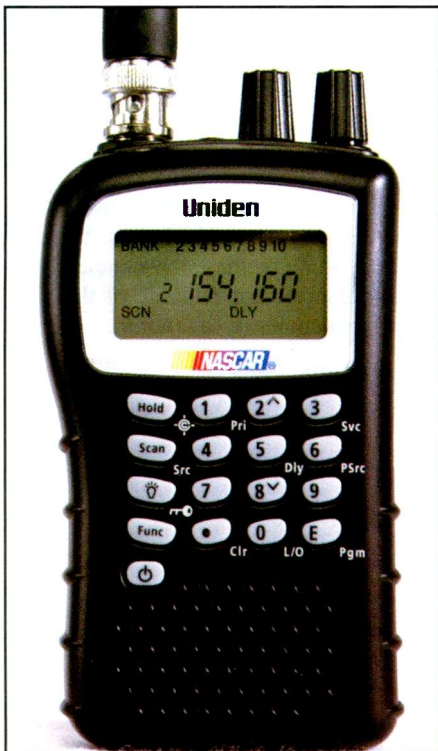
1	462.5625
2	462.5875
3	462.6125
4	462.6375
5	462.6625
6	462.6875
7	462.7125
8	467.5625
9	467.5875
10	467.6125
11	467.6375
12	467.6625
13	467.6875
14	467.7125

And here's an equally handy table of the Multi Use Radio Frequencies

VHF	UHF
151.6250	462.5750
151.7150	464.5000
151.8350	467.8125
151.9550	467.9250
154.6000	469.5500
151.6550	462.6250
151.7750	464.5500
151.8950	467.8500
154.5150	467.9250
151.6850	462.6750
151.8050	464.8250
151.9250	467.8750
154.5700	469.2625
	464.3250
	467.7625
	467.9000
	469.5000

Don't forget the weather! Here are NOAA weather channels. Most, but not all, areas are covered by one or more of these. My advice is to put them in a bank and scan for the strongest signal, not necessarily the first one you find!

1	162.550
2	162.400
3	162.475
4	162.425
5	162.450
6	162.500
7	162.525



This new BC-92 from Uniden features "close capture" technology which holds promise for scanning in areas you're unfamiliar with. Stay tuned for a full review soon!

ware. Many newer scanners and ham transceivers (which have broadband receive capabilities) offer this feature. You'll need to check with the manufacturer or dealer about software and cabling for your particular radio.

Finally, I'd dedicate at least one bank on the scanner, if not more, to the destination. I'm assuming you'll be spending a big part of your trip in one spot where you'll have a chance to learn a little

Frequency Of The Month

Each month we ask our readers to let us know what they're hearing on our "Frequency Of The Month." Give it a listen and report your findings to me here at "ScanTech." We'll pick a name at random from the entries we receive and give the lucky winner a free one-year gift subscription, or extension, to *Pop'Comm*.

Our frequency this month is **856.5875**. This is likely to be part of a trunked system, so you may not realize that you're listening to traffic on that channel if you have a trunk tracker. Just let me know what you hear, or what system you think it is if it's trunked.

about local frequency usage, etc. You'll also have some quiet time, so if you have to, reprogramming the radio a bit is not out of the question. You might want to do this as you learn more about what's used in the area, or because you've just filled up the available banks with frequencies for listening en route. Don't forget to reprogram it for the trip home before it's too late!

It's worth leaving all your banks on for a little while when you get to the destination. If you're in or near any fairly large size metropolitan area, lots of frequencies are likely in use. In fact, if you're in a major metro area, there are probably very few *unused* frequencies. You might find something you hadn't expected on one of those frequencies you used someplace else along the way. I've found some very interesting listening quite by accident.

I have also forgotten to reprogram my scanner before I left and thought I'd take the time to do it once I got to the destination. Once I got there, I found that listening to the same frequencies I had at home was more than adequate to keep me guessing as to what I was hearing. So don't hesitate to bring the scanner even if you don't want to reprogram it!

You can also search for frequencies using the scanner's search modes if you're so inclined. It's helpful to have ranges pre-programmed into the scanner if you have that option, or take along a reference page or two regarding the expected ranges. If nothing else, you'll get a feel for how much two-way radio traffic is around you waiting to be captured.

Computer-Controlled Mobile Scanning

Okay, you have to be pretty dedicated, and probably traveling alone to get away with this trick, but I do know of a couple of people who actually run computer control systems in their cars while

on vacation. One person, we'll call him John (because that's his real name, and he'd probably appreciate that more than other things we could call him), hooks his PRO-2006 to vehicle power and then uses a laptop on an adapter sitting on the passenger seat. He says he really doesn't use the computer to look at the display much (good idea while driving), but rather to switch banks in and out of service as he travels from county to county and state to state. He also logs all of the activity along the route so he can see what frequencies were active and fine tune the system after he's done with the trip. He makes the same trip several times a year, so hopefully it's getting better and better as time goes on.

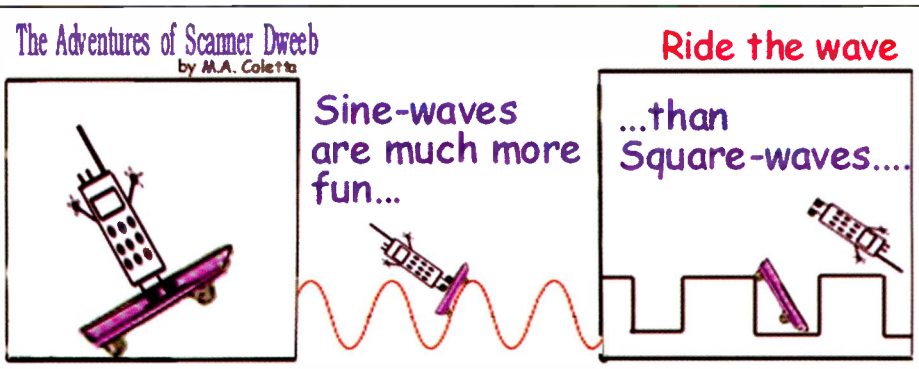
Scanner Laws!

You'll need to do a bit of research before your trip to make sure you're not opening a can of worms by carrying your scanner in the car. Some states prohibit any kind of public safety receiver in the car, while others have virtually no restrictions. Some of the states that have restrictions also have exemptions for amateur operators and others, so you'll want to look into the situation before you find yourself on the wrong end of an innocent traffic stop. If in doubt, pack the scanner away in the trunk and don't use it until you get to your destination.

Share What You Find!

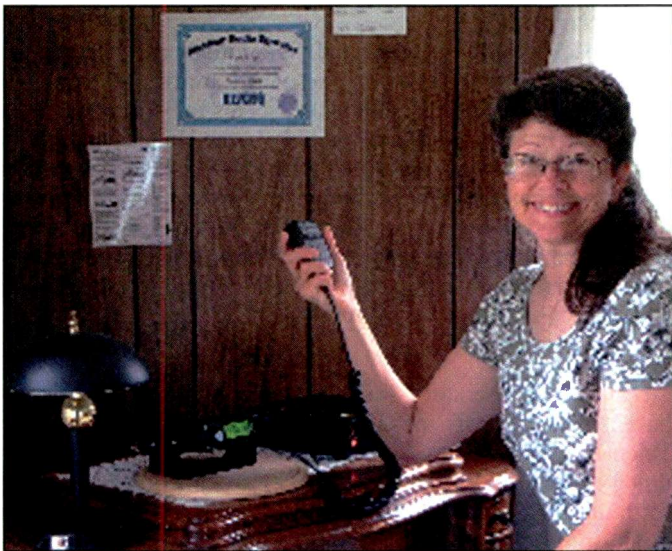
If you take a trip and find some cool new frequencies, send them in! E-mail suggestions and questions to radio-ken@earthlink.net, or via official federal mail to Ken Reiss, 9051 Watson Rd. #309, St. Louis, MO 63126.

As always, I welcome your input or any questions you may have regarding scanning. Until next time, good listening—and have a safe, fun vacation this summer! ■



Our August Winner: Congratulations To Ginger Snaps, KE7CYQ, Of Oregon!

Editor's Note: It has been a couple of months since we last had a "V.I.P. Spotlight" in Pop'Comm. The reason for this is simple: lack of submissions—with a good photograph of the writer using his or her radio equipment. Remember, this is your magazine, and the "V.I.P. Spotlight," like loggings and letters to our columnists are important parts of Pop'Comm. Have you sent in your write-up?



Ginger Snaps, KE7CYQ, at her radio post in Port Orford, Oregon.

Pop'Comm reader Ginger Snaps of Port Orford, Oregon, tells us,

Yes, my name really is Ginger Snaps, and last Saturday I met a frog. But the unique thing about this frog was how I got there in the first place.

About six months ago, a gentleman came to our church and spoke on ham radio, their operators, and the importance they'd been to our communities. Then he shared information about "nets" and how they are set up. They need volunteers, and I was among those who accepted this challenge. I purchased the book *Now You're Talking* to study for the Technician license. And, as with any studying, most of us need an Elmer!

I have my very own "Elmer," too! An Elmer, by the way, is an amateur radio operator who becomes a question and answer person. Solar flares, sunspots, wavelengths—I'd ask, and he'd answer!

I was well on my way to get my Technician class license! I took the test and passed it! So I got the next book for General class license, studied, took that test along with the Morse code, 5 wpm. I could hardly settle down for it. Okay, I thought—girl, SETTLE DOWN! Take the test, hand it in—wait! And after much, anxiety, I passed! Oh, the excitement!

I got to volunteer for my very first community service as a ham, helping with a bicycle run. The net control operator put me on duty with Loren Chase, AIØM, and off we went to check on Point #3 in the bicycle run. That's where I got to meet this sweet girl who was help-

ing her grandma (a Kiwanis Club Member). She—not grandma—helped chase cows off the road for the bicyclists, and when my partner Loren sent me off ahead to get some grub, this young lady had found a frog! She wanted "the radio lady" to get back soon to see it; that was the message over the radio.

I also got to see a real twin-lead J-pole antenna being used for our Net that day. It's so wonderfully simple! Wow, I sure had fun that Saturday, and I love this new world and the wonderful people I've met—and will meet—on my new adventure."

Popular Communications invites you to submit, in about 300 words, how you got started in the communications hobby. Entries should be typewritten, or otherwise easily readable. If possible, your photo should be included.

Each month, we'll select one entry and publish it here. All submissions become the property of *Popular Communications*, and none will be acknowledged or returned. Entries will be selected taking into consideration the story they relate, and if it is especially interesting, unusual or even humorous. We reserve the right to edit all submitted material for length, grammar, and style.

The person whose entry is selected will receive a one-year gift subscription (or one-year subscription extension) to *Popular Communications*. Address all entries to: "V.I.P. Spotlight," *Popular Communications*, 25 Newbridge Road, Hicksville, NY 11801 or e-mail your entry to popularcom@aol.com

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These 15 month calendars (January '05 through March '06) include dates of important Ham Radio events such as major contests and other operating events, meteor showers, phases of the moon, and other astronomical information, plus important and popular holidays. Great to look at, and truly useful!

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It's A Digital World!

Revolutions happen in Bolivia, and they certainly happen in ham radio (although perhaps not as frequently)! Although I can't remember each and every one, a few come to mind. There was the transition from spark to CW. Crystal detectors gave way to regenerative receivers which, in turn, stepped aside for superhets. AM was largely replaced by SSB. Homebrew gear was replaced by factory-made hardware. The list goes on.

Most of these "has been" technologies are still around (although spark is somewhat dangerous to modern circuitry, computers in particular), and peacefully coexist with the current state of the art. I hope that will be the case with the Next Big Thing, which we've already started exploiting.

What's That? Why, Digital, Of Course!

We hams have been easing into that realm for years now, but the pace is quickening and it's now time to at least familiarize yourself with what's to come—and what's already here!

Strictly speaking, classic RTTY is a digital mode, but there's no doubt that PSK31 (and its newest variants), RTTY's likely successor, is full-blown digital goodness. It, like most digital modes, is made possible by affordable, powerful personal computers. If you don't have at least one PC in your shack, you are the odd man out.

"Digital radio" encompasses a huge array of modes and technologies, but this month's column focuses on the most common and most accessible HF digital modes. Check them out here in brief and then get online to gather more information. And if you're stuck with indoor or otherwise compromised antennas, low power, etc, some of the new digital modes will amaze you with their performance. Let's get started!

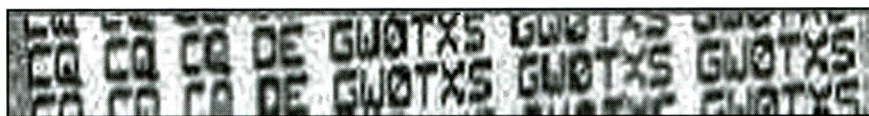
The Gear

If you happen to have one sitting around collecting dust (or you're a real masochist), you can use a dedicated terminal or a fancier multimode communications processor, such as AEA's classic PK-232 to access some digital modes. But if you want ease and comfort, a Windows PC with a sound card interface will get you darn near everything that's available, except for some of the proprietary TOR modes (or the TOR modes that require fast, back-and-forth T/R switching).

The Modes

RTTY

Also known as Baudot, RTTY, short for Radioteletype, is the granddaddy of all digital modes (after Morse code, of course). RTTY is an FSK (frequency-shift keying) mode that uses a five-tone digital code to represent letters, numbers, etc. There's no error-correction, making RTTY "real radio" that depends on RF power and a little help from the ionosphere for



This is GWØTXS calling CQ using Feldhell, the HF-specific version of Hellschreiber, as received by an SWL in the Netherlands. The pixels were literally "painted" onto the screen, sort of like visual Morse code. The slant is caused by minor timing variations in the sound card DSP used to receive the signal. See text for more information.

success. It's used in HF digital contests, by old-timers, and by die-hards everywhere.

HF Packet Radio

HF packet radio is a 300-baud digital mode that uses AFSK (audio-frequency-shift keying) to squawk traffic and data over relatively long distances. HF packet seems to be more popular in Europe, but has faded considerably in the United States. Ten years ago an army of ops armed with PK-232s and Kantronics TNCs were chirping and warbling away on HF packet, but now it's mostly a has-been mode. And I for one say good riddance! HF packet has never been a favorite of mine, and its overall performance is somewhat dismal. In the immortal words of Tony Soprano: "Fuhgettaboutit."

TOR

Ham radio operators—and commercial shortwave users—have plenty of TOR modes to choose from. TOR, short for Teleprinter Over Radio, is an error-correcting digital mode technology that uses FSK or AFSK to chirp-chirp data back and forth until it's been correctly received (unlike RTTY, which is a one-shot deal), or to transmit extra, redundant information with each transmission (a technique known as FEC, or Forward Error Correction). AMTOR, the first TOR mode used by hams, got the ball rolling but isn't used much (or at all) nowadays. The commercial version of AMTOR is called SITOR-B. PACTOR is an FSK/AFSK mode that's sort of like a combination of packet and AMTOR. PACTOR uses data compression and can transfer 8-bit binary data, making it much more usable in today's computer-dominated environment.

G-TOR is an FSK/AFSK mode that offers fast data transfer speeds, the ability to handle atmospheric noise and generally crappy conditions, and the ability to adjust its baud rate to accommodate changing conditions.

PACTOR II and PACTOR III use more advanced PSK modulation (Phase Shift Keying) made possible by computers and DSP (digital signal processing). PACTOR II is an improvement over the original PACTOR and is largely compatible with it, as they both share the same protocols. PACTOR III is somewhat restricted in the United States and is largely proprietary.

CLOVER is a proprietary mode developed by RTTY mainstay Hal Communications. It's an error-correcting PSK mode that's well suited to the vagaries of HF operation. CLOVER adapts its data rate and modulation modes to accommodate varying conditions.

PSK31

This DSP-based "keyboard-to-keyboard" mode kicked the

digital revolution into high gear. PSK31 and its newer, faster cousin, PSK63, use microscopic amounts of spectrum space and are incredibly efficient (think excellent performance with low power). PSK31 is probably the most popular HF digital mode worldwide.

MT63

This "wideband" HF digital mode occupies 1 kHz of spectrum space and uses a complex set of 64 modulated tones to produce an aggressive, error-correcting, DSP-based mode that offers excellent performance in poor conditions (but probably shouldn't be used during crowded band conditions). A relatively fast PC is required for MT63.

THROB

This interesting and somewhat experimental DSP-based digital mode uses MFSK (Multiple Frequency Shift Keying) and nine audio tones to work its magic. It's a bit slower than PSK31, and uses a bit more bandwidth (144 Hz), but shares a handy waterfall visual display.

Hellschreiber

Think of Hellschreiber ("light writing" in German) as a sort of digital fax mode for HF. It uses a single audio tone

that's keyed on and off in a particular fashion to "paint" characters on the screen at about 35 wpm. Taking up a reasonable 75 Hz of bandwidth, received characters are actually "painted" onto the screen instead of being decoded and displayed! As with other "fuzzy" modes such as Morse code, the "analog signal processor" between your ears can assist the DSP in your PC!

The More, The Merrier

There are other HF digital modes out there, including several for slow-scan TV, GPS, APRS, etc., and new modes are being developed and enhanced every month. The bottom line is, it's time to check this stuff out and get started! Rather than providing a limiting set of specific Web links, I'd suggest doing a simple Google search. This will point you to hours of interesting reading on the topics I briefly touched on this month—and also to tons of mostly free software! This stuff is definitely fun!

As always, please send your QSL cards, questions, and letters to me at "Ham Discoveries," *Popular Communications*, 25 Newbridge Rd., Hicksville, NY 11801. ■

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Back To Basics—Part VII

Shortwave Antennas: The Quarter-Wave Inverted V

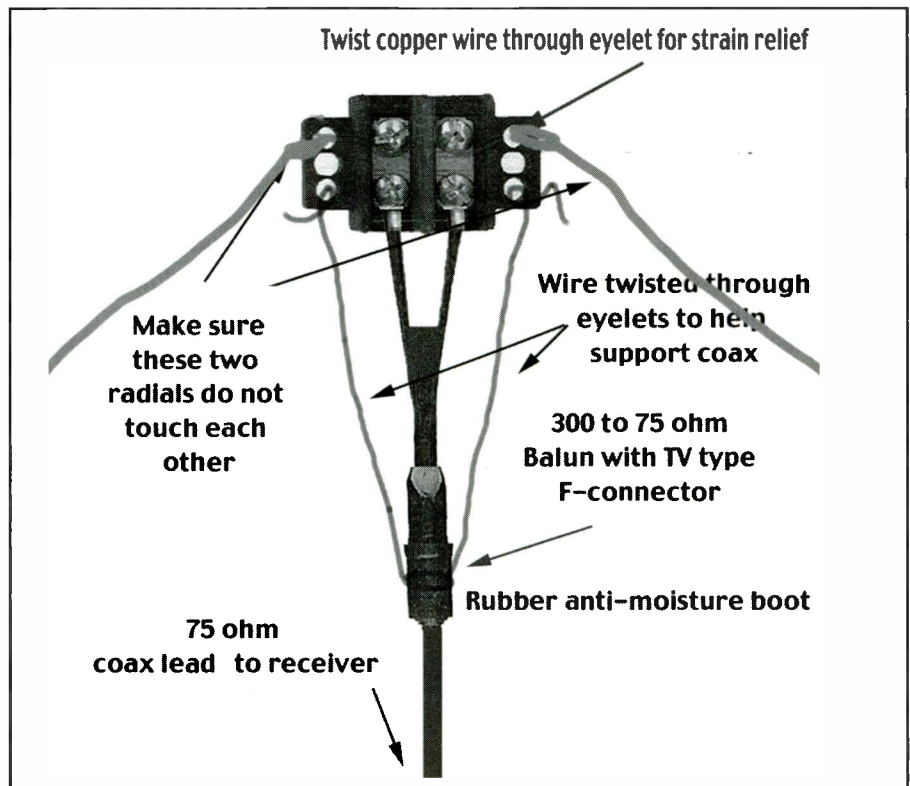
Last month I detailed how to build a basic shortwave antenna for utility monitoring use. This month we'll take a look at a space-saving antenna that's also a great performer. It's called the Inverted V, for obvious reasons. It's a simple antenna to build, composed of two elements attached at a single center point with each element guyed at lower points near the earth.

Construction techniques and materials are the same as in last month's random length center-fed dipole antenna, with a few exceptions. This time you'll need a tall vertical pole and a structure (possibly a tripod) that you can mount on a high point, such as the roof of your house, and plenty of guy wire to support the antenna mast. (See "Parts List.")

Concerning support, metal guy wire works well and lasts longer, but nylon guy ropes are non-conducting and won't inject unwanted directional capabilities into an antenna that's designed to be omni-directional. Unfortunately metal guy wires can work just like elements in a beam antenna (depending on spacing) and can make your antenna heavily weighted (electronically) in one or more directions, defeating the purpose of having an omni-directional antenna in the first place. On the other hand, drawbacks to nylon guy wires are that they can stretch considerably, requiring occasional tightening, and become brittle as they age (due to UV light) and can snap in high winds.

Using our handy formula for a half-wave dipole (468 divided by the frequency) we can calculate the length of each element of our dipole. However, to build our space saver antenna we'll only use enough wire to build one element (making a quarter-wave resonant dipole), cutting it in half to make the two antenna elements.

As an example, let's take 468 and divide it by my favorite MILCOM frequency of 8.992 MHz, which gives us the length of a half-wave dipole element of approximately 52 feet. Then we'll cut that element in half, giving us two 26-foot-long antenna elements.



Construction is a bit more complicated because of the mast and guying installation, but basically it's the same as in last month's column. For those of you who just subscribed or missed the last issue of *Pop'Comm*, it's repeated here, with a few necessary changes.

Construction

Locate a structure, tree, or pole to which you can attach the end of your antenna. Ideally your anchor point should be at least 12 to 20 feet above ground, such as on the peak of a roof or in a tall tree. Mine is in a tall tree, about 70 feet away from the house. If you have a small yard and are on good terms with your neighbors, maybe if you ask them politely they might allow you attach the guy wire or antenna element to their roof, or you could erect a guyed-down antenna mast somewhere in the yard or attached to a fence.

Note: Wherever you erect your antenna, always remember SAFETY FIRST. Don't kill yourself climbing on a roof or up a tree. Use ladders and the proper climbing equipment. Do not attach your antenna to electrical wires or to a utility pole. Make sure to watch for power lines or your first antenna project could be your last.

With your location established, using the insulators, attach one of your guy wires (with plenty of excess) to each antenna element. Also attach two more guy wires to the antenna mast at a 90-degree angle away from the antenna elements (see accompanying illustration).

Attach your copper wire antenna element to the dual-row barrier strip, as shown in the illustration. This center point is where you will attach your Balun and feedline. At the center point attach both copper wires to each side of the dual-row barrier strip, which will serve

as the solder-less connection point for your antenna's feedline.

On the two open screw terminals on the barrier strip, attach your 300- to 75-ohm Balun and then attach your coaxial cable (with attached F connector) to the Balun, run it into your radio room and connect it to the supplied external antenna jack on the back of your receiver. Ideally, you should do all of your construction on the ground (with the wires stretched out) as it makes construction much easier.

Erect antenna support and pole on the roof or other structure. Leave plenty of slack to tighten down each guy wire after the antenna has been attached to pole and erected. Run the coax into your rig and connect it with the appropriate connectors. Use cable ties to secure coax runs to the mast or, better yet, consider metal hose clamps that are much stronger and last longer. Do not over-tighten, thereby crushing and damaging your coax. Now enjoy!

The Inverted V is not only a very good space-saving antenna, it can also pick up both horizontally and vertically polarized signals (such as CB radio) with equal effectiveness. How's your antenna construction project coming along? Got photos and a short article? I'll run it here in your "Utility" column – but you've got to send it to me first! Regular U.S. mail

reaches me at *Popular Communications*, "Utility Communications Digest," 25 Newbridge Rd., Hicksville, NY 11801, or e-mail me at webbfeat@gmail.com.

eBay Stealth Plane Debacle Update

You might recall that last month I also wrote about a secret derivative of the now-defunct Northrop Grumman YF-23 Black Widow stealth aircraft, which lost out to Lockheed's F-22 in the Advanced Tactical Fighter competition, but has been possibly resurrected to compete in a medium stealth bomber competition. You'll also then recall that it was "accidentally" revealed eBay.

While military project security agencies are still scrambling to find out how a model of a secret aircraft prototype ended up on eBay, it was revealed in the May 16 issue of *Aviation Week & Space Technology Magazine* that Northrop Grumman has submitted three design proposals for a next generation long-range strike aircraft that could be operational by 2018, one of which is the bomber version of an F-23—just like the model that was posted for sale on eBay. The two other proposals were a stealthy manned high-altitude, half-size B-2-like flying wing design and an unmanned

bomber version with even longer range and endurance. The F-23 derivative looks much like the YF-23, except it's much longer and includes a V-tail design and dual cockpits for a pilot and a weapons system operator.

Dispatches

Got a suggestion, gripe, or comment on an article? Heck, we'll even accept compliments! Send your mail to me at the new e-mail address above. Now here's a note from *Pop'Comm* reader Frank.

First of all, I've been a scanner/shortwave listener for 25 years. I've enjoyed your columns in *Pop'Comm* and *Monitoring Times*. I am a real big MilCom listener. I have a BC780XLT, PRO-2006, and PRO-43. I just read your "Back To Basics" Part V column in *Pop'Comm* on shortwave receivers.

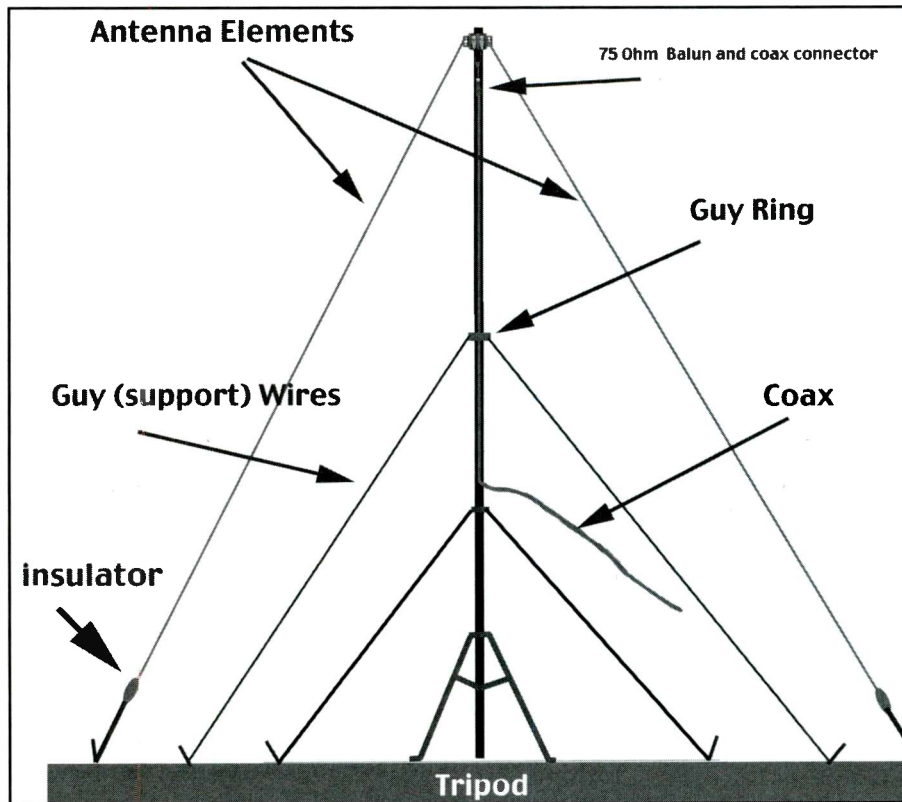
I've had big-time desktop receivers in the past (ICOM R71A, Kenwood R-5000, Drake R8, and Yaesu FRG-100). Unfortunately, I've sold them over the years. Currently, I'm using a Sony 2010 for utility listening. A Sony 2010? Yes, I have to say it does a great job, even with a 20-foot wire clipped to the whip antenna. I've heard ham radio operators from Australia, Russia, South Africa, and even Japan from my location in Northeast Ohio.

I am able to pull in every weak SSB signal that the desktops did with a long-wire. I also use the Sony 2010 as a MW DX receiver. And the best part is that it's portable! Yes, I know it doesn't have passband tuning or a notch filter, but I rarely used those functions with my desktops. I do want to get a tabletop again someday, but the 2010 does the job for chasing the UTEs.

Lastly, I really liked that military surplus UHF military Yagi antenna that you found at a flea market several issues ago in *Pop'Comm*. I keep looking for one at hamfests and on the Internet. Let me know if you have a source for one. I'm currently using a discone, Scantenna, and Grove Scanner Beam along with handheld rubber ducks.

BTW, I've been hearing some FLTSATCOMs in the 260-MHz NFM range in the past few weeks just using my PRO-43 and a 220-MHz rubber duck antenna. Who said you need a directional antenna with a preamp? I've heard several Spanish and Eastern European language two-way conversations. What are these doing on the SATCOM channels? Anyway, keep up the good work.

Frank, I found a good source of surplus radio antennas to be Fair Radio Sales at <http://www.fairradio.com/>; they occasionally have the AS-1405/PRC-4 1 (the antenna I think you are referring to) in stock. Another good place to buy, sell, and trade surplus gear is to subscribe to one



The quarter-wave Inverted V antenna.

Parts List

- 1 60 to 70 feet of bare copper wire (any gauge), except easily broken thin wire or wire too stiff to work with.
 - 2 300- to 75-ohm Baluns (RadioShack part #15-1143 or equivalent).*
 - 2 Mini egg standoff insulators (RadioShack part # 963-0673 or equivalent).
 - 1 50 to 100 feet of RG-6 or RGU 75 coax with cable TV-type F connector installed on one end and the proper connector for your radio on the other.
 - 1 Dual-row barrier strip (RadioShack part # 274-656 or equivalent).
 - 1 Some kind of support rope (nylon) or standard guy wire.
 - 1 Support mast (at least 20 feet tall unless you are mounting antenna on roof)
 - 1 Support structure (some kind of antenna tripod or straps to mount your antenna mast to). You might consider RadioShack Antenna Tripod # 15-517 or one of their other TV antenna mast mounting kits, such as the vent pipe mount (#15-889) or Universal Mast Anchor Mount (#15-888). There will not be a lot of wind loading with this antenna so support does not need to be massive.
 - 1 1 1/4 guy ring and collar (RadioShack #15-835 or equivalent).
- Several Cable ties (preferably black since white cable ties become brittle faster).

**Note: some radios have 50- to 75-ohm coaxial inputs and some have 300-ohm screw-type antenna terminals on the back. If yours has the standard 50-239 (CB-type) connector you only need one Balun.*

of the many military surplus radio collectors' e-mail forums, such as MIL-SURPLUS, which you can sign up for at <http://www.qth.net>.

From another reader we received information about the navy's shutting down of ELF (extremely low frequency) transmitting facilities. Dennis Dean of Bay City, Michigan, sent us in a clipping from the *Bay City Times* announcing the U.S. Navy has shut down one of its ELF sites near Wasau, Wisconsin. According to the article:

With terrorism the new global threat, a net-

work of radio antennas that let the Navy securely communicate with submarines at sea has become another Cold War relic.

The two huge transmitters in the Chequamegon National Forest near Clam Lake and in Upper Michigan's Escanaba State Forest have stirred up controversy since their inception. Environmentalists say the radio waves emitted from the array could cause health and damage to the environment. Demonstrations at the sites have led to hundreds of environmental protestors being arrested, some for trespassing and sawing down antenna posts.

The array that is comprised of an antenna strung on 600 40-foot poles across a dozen

miles of forest has been turned off but not dismantled. According to Steve Davis, spokesman for the Navy's Space and Navy Warfare Systems Command in San Diego, "The government has not yet determined the cost of dismantling the array, which could take up to three years."

In The Wings

Next month we will conclude our "Back To Basics" series with a look at other easy HF antenna construction projects that you can build yourself with minimal expense and effort. I hope you have enjoyed our look at the makings of good Utility Monitoring techniques, equipment, and fundamentals.

Also next month we will give you an exclusive look inside the Amarillo V-22 Osprey plant, which coincidentally just happens to be located in my city. We'll take a close look at the Osprey and how you can monitor flight test operations. But now it's on to...

Reader Logs

I know that summer is in full swing and undoubtedly (as you should) you and yours are out enjoying it, but please still take time to monitor the utility bands and send us your loggings!

Please note the e-mail address change listed at the top of this column title page. A change in my address was necessitated by the huge amount of SPAM that was clogging my old e-mail address, causing many logging submissions to end up in the junk file. And when you submit your catches, please remember to format them as shown.

0000: (Frequency MHz): STATION, Anytown, USA, summary of traffic heard in MODE at 0000Z. (monitor/sometimes location)

4724.0: ALLEYCAT (E-8 JSTARS) with track reports to TOMMY 01 (ground party) at 0112. (MC)

5142.6: CG 47318 position report to Group St. Petersburg at 2306. (MC)

5732.0: CG 1700 (HC-130, CGAS Clearwater) airborne with 9 POV en route Comalapa, El Salvador, requests guard from CAMSLANT at 1400. (MC)

6761.0: HOIST 35 (KC-10A) clg DEUCE 98 (KC-10A) at 2359. (MC)

7360.0: CGOOPS (1/131st Avn Operations, AL NG Birmingham AL): 1245 USB/ALE sounding. Also sounding on 08040.0. (RP)

7650.0: T2Z238 (2/238th Avn, In NG,



Want to know what aviation wonders are hidden in this hangar? Next month we'll take you inside the MV-22 Bell Helicopter Osprey Plant located in Amarillo, Texas. Included in our report will be exclusive photos and frequencies so you can monitor Osprey test flight operations. (Photo By Steve Douglass)

Shelbyville IN): 1959 USB/ALE sounding. (RP)

7657.0: PANTHER wkg CG 6518 who reports they are en route Guantanamo Bay at 1733. (MC)

7720.0: OMEGA (unidentified Mexican military): 0150 USB/ALE TO ALFA (unidentified Mexican military). (RP)

7777.0: RM3 (HQs Mexican Army 3rd Military Region, Mazatlan): 0310 USB/ALE TO CAMALEON3 (unidentified Mexican Army). (RP)

8040.0: CGOTAC (prob 1/131st Avn entity, AL NG Birmingham AL): 1702 USB/ALE sounding. (RP)

8056.0: CLS (probably Sabre AAF, Ft Campbell KY): 1316 USB/ALE sounding. (RP)

8056.0: 855730 (unidentified aircraft): 1848 USB/ALE TO CLS (probably Sabre AAF, Ft Campbell KY). (RP)

8260.0: Shore station wkg tug SEA ANGELES who is looking to rdvu with other vessels near Grand Isle, LA at 2153. (MC)

8912.0: CG 1503 (HC-130) with 19 POB departed Opa-Locka en route CGAS Cape Cod requests guard from CAMSLANT at 2205. (MC)

9145.0: 852290 (unidentified aircraft): 1641 USB/ALE TO CLS (probably Sabre AAF, Ft Campbell KY). (RP)

9145.0: HTR (probably Hunter AAF, Savannah GA): 1853 USB/ALE TO 814382 (unidentified aircraft). (RP)

9022.0: NIGHTSTAR ALPHA (E-8 JSTARS) clg NIGHTSTAR BRAVO. MUSTANG SOUTH answers and authenticates and they go back to primary at 1433. (MC)

10242.0: 52A (US Army UH-60) position report to PANTHER at 2348. (MC)

11175.0: KING 22 (HC-130, 102 RQS/106 RQW) p/p via Offutt HF-GCS to RESCUE OPS. Gives status report on water rescue operation in NY/NJ area. Reports JOLLYs (HH-60) were rescuing 4 people & a dog from an island. There was a police boat with 3 police onboard en route to a house to rescue people including disabled child trapped there by rising water. Police boat is now DIW and JOLLYs will rescue police then proceed to rescue survivors from house at 1702. (MC)

11232.0: CANFORCE 4416 (CC-150) p/p via TRENTON MILITARY to Wing Ops Trenton at 0015. (MC)

13257.0: RESCUE 342 p/p via TRENTON MILITARY to RCC Trenton at 2348. (MC)

13927.0: EVAC 623506 (KC-135R) p/p via AFAIRE Maine. EVAC 506 is diverted to Kelly Field, TX per TACC to

pickup a 14 person aero medical team and fly them to Elmendorf AFB. There is a very sick 9 month old child that needs a Medevac to Kelly Field. Mission is later cancelled. Heard at 2352. (MC)

13927.0: GOOSE 72 (MC-130) p/p via AFAIRE Maine to SANDCASTLE OPS at Duke Field to check on status of their tanker JAKE 14 at 2357. (MC)

13927.0: SHARK 31 p/p via AFAIYD Ohio with several morale p/p to Alabama. States they are on their way back to Puerto Rico from Central America at 0013. (MC)

14757.0: T16CAV (prob 16th Cavalry): 2017 USB/ALE sounding. (RP)

15016.0: RANGER 71 (KC-130T, VMGR-234) p/p via Ascension HF-GCS to Fort Worth Base Ops to pass ETA at 2124. (MC)

17458.5: HQ703N (Army National Guard Readiness Center, Crystal City, VA): 1930 USB/ALE TO O100RN (National Guard, Oregon). (RP)

This month's star contributors are Mark Cleary (MC) and Ron Perron (RP). As always, a hearty thanks. ■

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Butane Soldering Made Easy, And More SG-8 Signal Generator Mods!

In the July “Wireless Connection” we took our first look at soldering basics. That column pretty much covered what soldering tools are needed on the bench, but what about soldering in the field? How many times have you needed to solder a coax connector in your vehicle, or worse, on a roof or tower? I’ve tried portable irons that used rechargeable batteries with mixed results. Batteries are limited in amount of practical heat energy they can deliver in a small handheld iron. And, they have to be recharged, and that takes time and requires a nearby power source. Running extension cords is cumbersome, assuming there’s even an electrical outlet within reach!

Two of the most useful soldering implements in my mobile tool arsenal are my portable butane gas soldering irons, shown



Photo A. The Weller Portasol PSI-100K portable butane soldering tool kit (upper unit) and the Master Appliance Ultratorch UT-100Si soldering tool kit (lower unit) are my personal units and have undergone two or three years of field testing. Both do the job.



Photo B. Here’s a better view of both irons (Weller, top; Master Appliance, lower) out of their carrying kit cases. Both irons feature piezo ignition, variable heat settings, and fuel level viewing windows.

in **Photos A and B**. These have undergone several years of in-the-field hands on evaluation in my real job!

The iron in the red carrying case is a Weller Portasol Super Pro model PSI-100. These irons are usually kitted with companion carrying cases, and the kits offer a variety of optional tips for soldering, using a blowtorch, cutting, or heat shrinking, etc. The PSI-100 has a smaller brother, the PPK-1 Pro Piezo, which has a maximum 25-watt power equivalent, compared to the impressive 125-watt rating of the PSI-100.

My needs gravitate to irons that handle larger jobs. The larger *high-wattage* irons are not the best choice for pc board repairs because their heat output can’t be throttled back or regulated finely enough for most delicate soldering tasks. The soldering tips can reach 930 degrees F when set for maximum output! But they’re what the doc ordered when dealing with soldering a pesky UHF PL-259 in the middle of nowhere.

Unless you’re using the blowtorch feature—something I’ve needed on occasion to thaw frozen padlocks at remote mountaintop radio sites—the soldering tips don’t use an open flame. Instead heat is produced by catalytic combustion assemblies that are built into the tips. Instead of a blue open flame, the combustion chambers show a bright orange glow. These irons feature piezo electric ignition and use readily available butane cigarette lighter fuel.

My other iron is a Master Appliance Ultratorch model UT-100Si. It’s also shown in and out of its carrying case in **Photos A and B**. On the surface, both the Ultratorch and Portasol irons have nearly the same specifications, but in practice I prefer the UT-100Si by a small margin. The Ultratorch did better on larger soldering jobs, and its piezo ignition system has worked flawlessly. Ignition becomes more problematic as the temperature drops for these irons, so it’s best to store them in a warm area before attempting to use one in a New England winter. One nitpick: the Weller Portasol discharges a stream of very hot gases from a port on the soldering tip that must be directed away from your fingers to avoid burns.

Operating Time

Both irons feature windows for viewing the remaining fuel level and feature fully adjustable settings to regulate the butane burn rate and iron temperature. Some manufacturers claim an optimistic two-hour operating time. Typical operating time, in my experience, has been less, but the fuel is dirt cheap, and refilling these irons is both quick and easy. The irons are easily overfilled, however, and this condition manifests itself as sputtering and flameout as excess liquid butane is purged in the first few minutes of operation after a refill.

Some Disadvantages

I use butane irons both professionally and at home, and there have been problems with various models throughout the years.

Photo C. This SG-8 Heathkit signal generator has been modified to provide a counter output for its companion VIZ brand 60-MHz frequency counter. Both items were purchased for less than \$15. These earlier SG-8 modifications were presented in our November 2002 "Wireless Connection" column. Note that the counter is counting well over its rated 60-MHz maximum advertised frequency rating. The SG-8 was set at 30 percent modulation at about 70 MHz using a Tektronix 465 100-MHz oscilloscope.

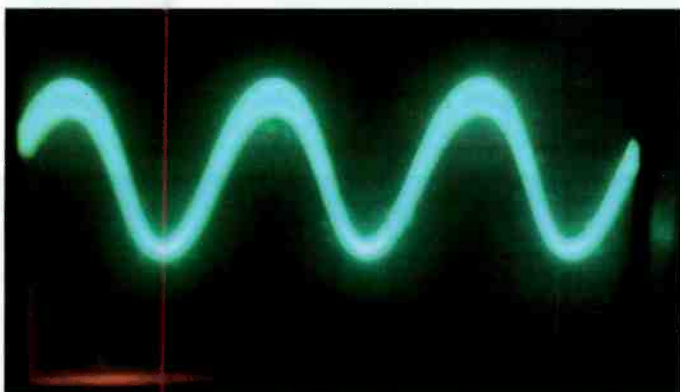


Photo D. What looks like a fuzzy, out-of-focus shot of an AC sine wave is really a composite signal comprised of a high level 400-Hz AC wave-form with a residual RF signal riding on the wave. What should be seen is only the RF carrier; the high level 400-Hz signal is being passed through the RF oscillator tube, which works as an audio cathode follower. Back when the unit was designed, this flaw was probably not discovered at the factory, or wasn't considered an issue at the time.

had for less than \$20. They're simple, stable, easy to use and maintain, and they do the job. Our November 2002 column featured some restoration hints and easy modifications for the SG-8, including a means to hook up an inexpensive external frequency counter to permit more precise frequency setting. **Photo C** shows my SG-8 generator paired with an inexpensive vintage 60-MHz VIZ service shop counter. I have about \$15 invested in the pair.

Improving The SG-8 RF Signal Generator

There was one unsolved problem that baffled me concerning the SG-8. For some odd reason, my frequency counters had

Here's a short list of problems experienced with a variety of different brands and models:

Fuel leakage: The fuel slowly leaks out of the fuel reservoir, and when you go to use the iron it's empty! This problem usually shows early in the warranty period.

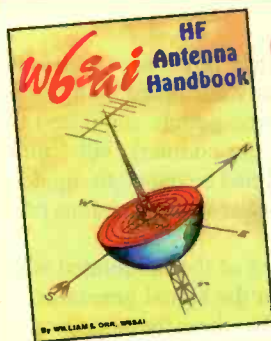
Piezo ignition failure: Unfortunately, while the piezo ignition is a vast improvement over the flints used on early irons, I've had a few piezo ignition-type irons go back after a few days use, and a few that were defective right out of the box. Again, the failures usually showed well within the warranty periods.

Cold weather: These irons don't like cold winters any more than I do, and they can be very cantankerous as the mercury dips! Keep 'em warm until they're ready to be used; or keep them in an inner pocket (off, please!) if working outdoors.

Revisiting Heathkit's SG-8 Signal Generator

Heathkit must have sold many thousands of their oh-so-popular SG-8 RF signal generator kits since their introduction back in the late 1950s! Beginners are drawn to the SG-8 for several reasons. For starters, they're commonly available and can be

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Photo E. The maximum AM modulation percentage was at best a few percent on the lower three ranges (A, B, and C) on the author's SG-8.



Photo F. The problem shown in Photo D can be partially alleviated by making the AM modulation level settable by the operator. Rerouting the audio path to do so simply involves moving the connections for a .01 capacitor under the SG-8 chassis.

trouble reading the generator frequency much above 20 MHz, and it was something I had erroneously attributed being somehow related to low signal levels. Some people suggested that the AM modulation was confusing the counters, but I didn't fully buy into that theory. Recently I had a chance to dig deeper into these issues while trying to answer some questions posed by a new SG-8 owner.

Photo D, an oscilloscope snapshot of the modulated waveform, shows what I discovered when the signal generator was set for Internal Modulation on the higher three frequency ranges. The RF output contained large amounts of superimposed 400-Hz audio. Why was this happening? Well, since the audio is injected in the RF oscillator tube grid, the RF oscillator stage was also acting as an audio cathode follower amplifier and directly passing 400-Hz audio signal to the RF output port as well! No wonder the frequency counter was confused!

Another Problem

Photo E shows how the modulated waveforms appeared on the lower two frequency ranges (A and B). The modulation percentage was extremely low, perhaps 4 or 5 percent at



Photo G. Adding a 200- μ H to 2.5- μ H RF choke between ground and the frequency counter BNC fitting effectively removes any residual audio signals from the RF output.

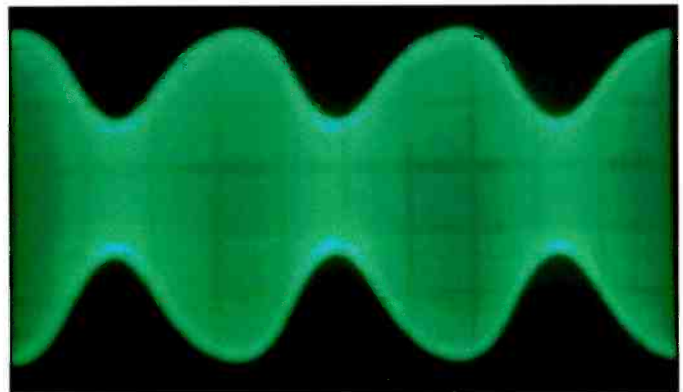


Photo H. Here's what the SG-8 modulator is capable of, once the simple modifications detailed in the text have been performed! The modulation depth can easily be set for at least 30 or 40 percent modulation, with a reasonably linear and symmetrical pattern, over all the signal generator's frequency ranges.

best. Band C wasn't quite as bad, but it also needed some improvement.

I chose a three-prong attack to solve each of these problems. The easiest to implement, and the one that would solve most of the issues, was to make the AF IN-OUT control on the SG-8 front panel also control the modulation level for the internal 400-Hz internal AF signal. As designed, the generator modulation is not adjustable, and the 400-Hz modulating tone can only be turned on or off.

Here's how to modify your generator. Refer to the schematic for your SG-8 generator and locate the .01- μ Fd disc ceramic capacitor that goes between pin 5 of the 6C4 audio oscillator tube and a 33k resistor. The .01 capacitor lead associated with the 33k resistor goes to the terminal strip on the bottom of the SG-8 chassis. Remove the .01 disc ceramic capacitor. Now, add a new .01- μ Fd 630-volt Mylar capacitor between the terminal strip lug and the center arm of the AF IN-OUT pot. **Photo F** will help guide you here. The AF pot now will allow you to vary the modulation level on your SG-8.

If the displayed counter frequency becomes erratic or unstable on the higher frequency ranges, simply turn the unit's AF gain control level down until the counter stabilizes and displays the correct frequency (it should be reasonably close to SG-8 dial markings).

Eliminating Audio Feedthrough

If your SG-8 has the external connector installed, as suggested in our November 2002 column, here's another trick that'll improve the counter stability at higher modulation percentages. This modification involves adding a 200- μ H to 2.5- μ H RF choke between the counter BNC connector and ground. The choke is transparent to RF signals, which pass unimpeded to the counter, while it appears to be a dead short to audio signals so they aren't seen by the frequency counter. **Photo G** shows how I installed the RF choke. A comparison of **Photo D** (before modification) and **Photo H** (after modification) shows the improvement made in eliminating audio signals on the SG-8's counter output.

Improved Modulation Depth

Solving the low modulation depth observed on the lower three ranges (A, B, and C) required some old-fashioned cut-and-try empirical experimentation to find a cure. The solution was to add loading resistors across a section of the three oscillator coils used on the A, B, and C frequency ranges. A 1500-

ohm 1/2-watt resistor worked best for all three coils in my generator. A picture is worth a thousand words, and **Photo G** shows how these resistors were installed. On each coil, I connected a 1500-ohm resistor between the center tap winding (the common buss line connection for all three coils near the chassis) and the outer winding terminal (the only terminal at the outside end of each of these three coils). Again, contrast the improvement in modulation percentage between **Photos E** and **H**.

If you're going to try this modification, it would be helpful to have a good lab-grade 100-MHz oscilloscope on hand to see what the modifications are doing to the RF signal and modulated RF waveform. Too low a resistance will cause loss of oscillation at band edges on some ranges, so expect to handpick a final value that works best in the instrument you have. Too much resistance, and you start sacrificing the maximum modulation level. A good starting point is 1500 ohms, but don't be surprised to find that values between 1000 and 3300 ohms might work better in different units. Don't expect to do much better than 30 or 40 percent modulation on these generators, and don't expect to see a perfectly symmetrical waveform.

Drop A Line

That's a wrap for this month. Please be sure to keep your letters and suggestions coming. Send your comments and questions to me at "The Wireless Connection," *Popular Communications*, 25 Newbridge Rd., Hicksville, NY. I'd love to hear from you! ■



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INFOCENTRAL (from page 5)

Podcasts are online programs that may include music or unscripted discussions hosted by amateurs on various topics like pop culture, sports, or politics, then uploaded onto the Internet. They're a recent phenomenon and are becoming increasingly popular with iPod users, as they can be heard on the portable digital devices, as well as over a computer.

Podcasting enables anyone to create and/or host his or her own programming and make it available for others to download to a computer or portable media player. In less than six months, more than six million people have listened to podcasts.

Satellite DMB Launched

South Korea has begun satellite digital multimedia broadcasting (DMB) service, enabling users to watch television on their mobile phones. TU Media, which has test-run broadcasts since April broadcasts from its broadcast center in Seongsu-dong, Seoul. Subscribers need a special DMB cell phone for the service, which costs W13,000 (U.S. \$13) a month.

Satellite DMB offers eight TV channels airing music, news, movies, sports, drama, and game programs, and 20 radio channels, including foreign language courses and music programs. TU Media is negotiating with broadcasters like KBS, MBC, and SBS in the hopes of re-transmitting terrestrial channels for DMB.

Australia Asks For Public Comment On BPL Interference

The Australian Communications Authority (ACA) has called for public comment on possible ways to manage interference from Broadband over Power Line (BPL) communications. BPL communications is an emerging technology that uses electricity networks to transmit data, voice, and video. Releasing a discussion paper on the issue, ACA Acting Chairman Dr. Bob Horton said the challenge for the ACA was to establish arrangements that did not unnecessarily inhibit BPL deployments, but protected radio communications services from unacceptable interference.

Taliban Return To Afghani Airwaves

The Taliban organization reactivated

its Radio Shariat Zhagh (Voice of Shari'ah) broadcasting recently through a mobile facility. After a six-month break, Radio Shariat Zhagh resumed broadcasts for one hour from 0600 to 0700 local time in the Dari and Pashto languages. It will also broadcast for one hour in the evening from 1800 to 1900 local time and will carry the message of Amir al-Momenin Mullah Omar. Shariat Zhagh broadcasts from an unidentified location within Afghanistan. The station broadcasts anti-U.S. and anti-government propaganda as well as Islamic hymns. Three other radio stations are expected begin broadcasting in the near future.

RFI, Deutsche Welle To Broadcast Jointly To Middle East And CIS Countries

Radio France International, which broadcasts to French-speaking persons abroad, and German radio Deutsche Welle are joining forces to broadcast programs to the Arab world and to the countries of the CIS (Commonwealth of Independent States). The two radio stations have been cooperating since January 2003 to produce European programs and assess potential FM frequencies to be operated jointly, particularly in the Balkans.

RFI will help develop Deutsche Welle's programs in Arabic. Through its Arab-language subsidiary, RMC-Moyen-Orient, RFI is able to broadcast to the Middle East on mediumwave frequencies and in FM (10 radio relays). Both stations are studying the terms under which some of Deutsche Welle's programs will be broadcast in Arabic on the audio-channels of RMC-MO, thereby gaining greater exposure. Deutsche Welle and RFI plan to operate jointly shortwave and mediumwave frequencies in Moscow, Saint-Petersburg, and in the CIS in order to allow RFI to broadcast—alongside Deutsche Welle programs in Russian and German—its own programs in Russian and French.

Virgin Radio Tests Shortwave Digital System

National music broadcaster Virgin Radio has appeared on shortwave to Europe using the Digital Radio Mondiale (DRM) system. The transmissions are beamed towards the UK and brokered by transmission operator VT Merlin. They broadcast from a facility in Moosbrunn, Austria. Three frequencies are scheduled: 9720 kHz from 0500 to 0900 UTC, 9815 kHz from 0900 to 1400, and 9705 kHz from 1500 to 1700 UTC. ■

WASHINGTON BEAT (from page 21)

FCC Cites Arkansas Man For VHF Marine Radio Operations

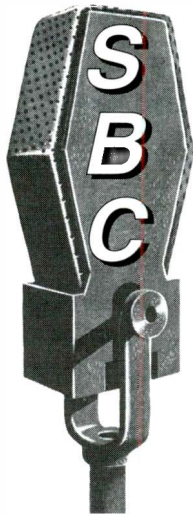
The Federal Communications Commission has issued a Notice of Apparent Liability for Forfeiture to Scottie E. Kennedy of Greenbrier, Arkansas for "operating a transmitter on 157.025 MHz (VHF marine channel 80) without a license." The allegation is in conjunction with radio operations along the Arkansas River.

In March 2004, the FCC's New Orleans Office of the Enforcement Bureau received a complaint about the misuse of VHF marine radios. The office contacted several employees of the Arkansas Game and Fish Commission who "stated they had been trying unsuccessfully to stem the use of VHF marine radios by area hunters. Despite their efforts to educate hunters that such use of VHF marine radios is illegal, the employees stated hunters continued to use marine frequencies for hunting activities."

On opening day of deer hunting season in November 2004, according to the FCC, "agents from the New Orleans Office used radio direction finding techniques to determine that the source of a signal on 157.025 MHz was coming from a 1988 tan Chevrolet pickup truck in Faulkner County, Arkansas. The driver of the vehicle was observed talking into a radio microphone." The agents identified the operator as Kennedy, and Commission records showed no authorization for him to operate on the frequency.

In December, the FCC issued a warning letter to Kennedy citing the alleged illegal operation. In his reply, Kennedy admitted operating without a license "to talk to his 'hunting buddies.'" He also said he had his radio for "approximately two and a half years." The Commission has directed Kennedy to pay \$10,000 for his "willful violation." He was given 30 days to pay or to file a written statement seeking reduction or cancellation of the proposed forfeiture. ■

Broadcasting On The Citizens Band?



“Ever heard of CB broadcasting?” a short e-mail from a *Pop Comm* subscriber asked me. No, I hadn’t, but I knew that, legally, any term that links “broadcast” to point-to-point “Citizens Band Radio” is a real oxymoron. It wasn’t a week after I responded to this e-mail, however, that two more came my way from other “Shannon” readers. Like the first, both of these communiqués suggested “CB Broadcasting” might make for an interesting column, especially for (as one e-mailer poignantly put it) the “probably hundreds of broadcasting professionals who got their start playing announcer on the Citizens Band.”

This threw me for a loop, as my earliest recollections of CB are pretty vague, though they do go back to my mid-1970s’ early childhood and a brief stint with what my radio-nut father tells me was 1976 Lafayette 23-channel Telsat model 1023 base station, which he bought rather impulsively with some tax refund money actually earmarked for a new freezer. Mom didn’t say much about the CB, but she must have communicated her displeasure somehow, because Dad soon traded that and a scary-looking (14.5-dB gain) “Moonraker” antenna to an eccentric widower in our church for a huge, supermarket-type freezer the guy had inexplicably acquired. Mom said she was even happier to see the giant aerial off of our roof than she was to get that freezer. Of course, my father’s memory of CB antics remained sufficiently thawed over the ensuing decades so that he could provide me with more than enough reference material for this column.

“Princess, I’ve Got An Old Article You’ll Need... Somewhere Around Here”

Typically, Dad gives me information in dribs and drabs. “Makes a body have to think for herself and then put two and two together,” he used to say. True to form, he quickly sent me a couple of yellowed pages roughly torn long ago from a June 1965 *Popular Science* piece called “Getting the Most Out of CB Radio.” “Can’t find the rest of it,” he scribbled on an accompanying Post-It note, “but what’s there should get you started. And, after that,” Dad promised, “I’ll shoot you some ‘intell’ on CB’s highly intriguing ‘broadcasting’ angle.” When my father teases that something on the way is “highly intriguing,” it usually means he needs a little more time to hone his story. In any event, just as calculated, he had my attention, and I immediately delved into the 1965 Citizens Band details.

The crux of the piece noted that updated FCC rules for CB had gone into effect on April 26 of that year strictly prohibiting CBers from making a hobby of chatting or “hamming” on their transceivers. When, shortly after Labor Day 1958, the Citizens Band was carved out of some old 11-meter (around 27

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One of America’s two most popular \$10 CB transceivers, the Lafayette HA-70 100-miliwatt walkie-talkie, circa 1965; the other was Radio Shack’s Space Patrol unit. Both were typically equipped with Channel 14 crystals and probably sparked many future broadcast careers.

MHz) amateur radio spectrum and authorized as the “Class D,” license exam-free, two-way wireless communication service, the government tried making it clear that the 10 original (soon to be 23) CB channels were only meant for local, point-to-point messaging between units owned by one licensee. In other words, *no talking on your CB to your neighbor on his rig!*

Oklahoma City-based International Crystal Manufacturing Company was an early maker of CB sets. Its 1959, advertising explained that Citizens Band could be used “for business (office-to-truck communication), on the farm (from the farm home to the field), ship-to-shore or base camp to the scene of the hunt, and in the home.” The latter seemed like overkill, as it suggested CBing “from the kitchen to the den, workshop, or sick-room... saving [CB owners] many steps.” An age requirement accompanied legitimate Citizens Band users. One had to be 18 to key the mic on a licensed transmitter. *Popular Science* indicated that “in addition to the licensed CB’ers, there [were] countless others who owned license-free CB walkie-talkies. But bear in mind the following,” the publication warned, “if a walkie-talkie is used to communicate with a licensed CB set, it must also be licensed and its user must be over 18 and obey all of the full-power [typically 5-watts] CB rules and regulations.”

Communication between units belonging to different licensees was restricted to Channels 9 through 14 and Channel 23. “Some observers question the ability of the FCC to enforce these rules,” the magazine article admitted, but it praised the regs for “going a long way toward keeping the CB channels open for legitimate, necessary communication.”

In retrospect, we know that policing the “hamming/hobby” aspect of CB content wasn’t one of the Commission’s success stories. Red Sovine’s classic country music saga of a disabled boy nicknamed Teddy Bear who used a CB to coax truckers to give him rides in their 18-wheelers serves as an example of some of the more innocent incidences of plain old—technically forbidden—“jawboning” on 27 megs. Even the fact that Teddy Bear and thousands of other CBers possessed nomenclature handles further demonstrate a hobby angle to what was supposed to be purely utilitarian, matter-of-fact two-way radio service. The FCC likened it to a school bus driver using his assigned bus as a weekend “camper” and piling family and friends inside for a vacation. Many traditional amateur radio licensees were also unhappy with this style of CB. Some viewed it as draining away electronics buffs who would otherwise have been motivated (by the incentive of being able to freely “ham”) to take the Morse code and technical exam required for becoming an official amateur station operator. But others recognized CB as a potential stepping-stone on which serious electronics hounds could initially tread before jumping to the amateur bands.

In any event, by the mid-1970s, both the ham legion and the Commission gave up trying to retain CB as a utility service. (In time, government radio regulators again embraced CB’s original “personal communications-only” spirit by establishing the unlicensed, short-range Family Radio Service, or FRS.) Admittedly, the FCC was gratified with the excellent public service work, such as roadside coffee breaks and other emergency/highway assistance, offered by organized Citizens Band groups like REACT. FCC officials took the good with the bad and eventually decided it would be wasting time prosecuting all but the most egregious cases of CB misuse; for example, prostitution solicitation and drug dealing via most of the 23 and subsequent 40 channels.

Illegitimate And Unnecessary Communication To The Max

Now here’s where my father’s epic comes in. He traveled a lot on business for several years in the mid-1960s. To avoid getting entangled in the stereotypical “sales rep away from home” dangers, he vowed to stay clear of bars, nightclubs, and all females whom my mother referred to as “suspiciously friendly women.” Instead, while on the road, Dad would usually call a local radio station and arrange for the nickel tour. Often, it would be with the chief engineer (CE) who became fascinated with father’s tales about the rich range of broadcast operations in other parts of the country. When making subsequent trips on a particular route, Dad would have already struck up enough camaraderie with certain broadcast techs along the way to be welcomed back whenever he returned to their respective towns. On one such stopover, the CE of a Class “IV” AM facility responded heartily to Dad’s call.

“Glad to hear from you, Sid,” the technician enthusiastically told him. “Affirmative about tonight. Around seven would be a great time for you to arrive at this 10-20 and pay me a visit. Got a strange ‘CB broadcaster’ case you can help investigate.”

My father couldn’t quite remember what station this “exciting account of radio history” is related to, but he recalled that it happened somewhere in a Mountain Time zone community of maybe 15,000 residents. Anyway, that evening, when he arrived at the operation’s little cinderblock studio/transmitter site, the CE briefed him on “the mystery of the musical CB signal.” A few weeks earlier, some local CBers alerted the engineer—who moonlighted as an auxiliary policeman—that his station was sometimes interfering with Citizens Band Channel 14.

“I did the math for every possible harmonic from our faithful old GATES BC-1T transmitter,” the tech told Dad, “and there ain’t no way in Sam Houston’s Hideaway that its 1340 kilocycles could cross up around 27 megs! Equally strange, is the fact that the so-called interference only happens after dark, when we throttle back from a kilowatt to 250 watts.”

The situation was sufficiently alarming for the station manager to authorize the purchase of an EICO 5-watt model 722 under-dashboard mounted CB transceiver that the CE quickly built to get to the bottom of the issue before local CBers had a chance to file a formal FCC complaint. “Don’t need anybody from the Friendly Candy Company snooping around here, if you catch my drift,” the tech grouched. “If the Feds have to make the trek out this way, sure as Great Sam Houston’s Holster they’ll find some little thing to get overly upset about. And the general manager wouldn’t like none of that!”

This episode occurred during the summer, enabling the CE to park his car close to the screened window of the station’s modest engineering shack, where he and my Dad chatted radio while keeping an ear out for any suspicious activity on Channel 14. In the adjacent studio, a cub DJ spun “chicken rock” (so-named because the pop format was “afraid” to include any heavy rock ‘n’ roll tunes) records and took phone requests from a predominantly teen audience. The AM ran five-minute, half-hourly local newscasts and easy-country music during the daytime.

A CB Pirate Sails Into The Air

Dad recalls being deep in conversation about the station’s newly installed CBS Laboratories Volumax audio processor when the Rolling Stones’ *Satisfaction* blasted out of the CB speaker. “What the Sam Houston?” the tech shouted as he and my father instinctively ran to the car. Seconds later, they sped off towards a signal they hoped to pinpoint by listening for its greatest strength. The Stones’ record ended. There were a few seconds of blank carrier silence before another of the day’s high-energy hits burst forth.

When that selection faded, a kid’s voice was heard to say something like, “Here at super K-Radio, we only play the real rock that groovy young America demands! We never play old lady music like this garbage...” And with that pledge, sounds of the CE’s own station were heard as the pirate CB “broadcaster” apparently held his microphone up to the speaker of an AM radio. While the music played, the boy laughed in the background and pronounced judgments like “What a load of s—t!” And whenever the real station DJ came on, the pirate mimicked him unmercifully, imbuing every sentence with “s—t.”

“Oh @#\$\$%&! , he actually said the ‘S’ word!” the tech hyper-ventilated. “Excuse my French, Sid,” he yelled, “but whoever is responsible for this is going too far—and could get me in mighty hot water if the Candy Company comes to town. Mighty hot H₂O, indeed!”

At that, he spun the station’s combination official mobile

news unit into stuntman U-turn mode and screeched to halt in front of a payphone. "Gotta call my announcer to tell him to broadcast a message to that menacing megacycle miscreant!" But the phone line was perpetually busied by all of those youthful record requests and dedications. "Don't that beat Happy Sam Houston!" the aggravated CE bellowed as he slammed down the phone handset, jumped into the car, and high-tailed it to the studio/transmitter building. "Sid, wait here. I'll be right back as soon as I talk to our station announcer," he instructed. "Want him to send a little message to the CB rock 'n' roller kid?"

Back on the road to town, the engineer and my father monitored 1340 kc and Channel 14. They discovered a pattern in which the pirate would play a couple of high-energy rock records and then criticize more sedate audio snagged from the local station. It was during the latter that the professional announcer ad-libbed a statement from notes scribbled by the CE.

"This is a message to the immature youngster who is breaking Federal Communications Commission rules and regulations by illegally using Citizens Band frequencies to broadcast music, rebroadcast a federally licensed standard radio station, and utter extremely obscene obscenities over public American airwaves," the jock enunciated as if delivering an NBC newscast. "We have been officially notified that you have improperly triangulated our federal 1340 signal and are saying erroneous, exaggerated, and *erogenous* things about us. If this does not cease and *insist* immediately, you will be *persecuted* by numerous authorities to the *first intent* of the law!"

"Huh?" was the confused response of the surprised pirate who'd simulcast the ominous sounding warning before quickly turning down the volume on his AM radio. "Oh, yeah, big shot announcer. What I want to say is, what I really want to say to you and that s—ty station is..."

Transfixed on every confrontational word, Dad and the engineer had pulled to the side of the road to be sure to hear what came next. A moment later, though, that carrier on CB Channel 14 went completely dead.

The Kid Should Have Gotten The Message

"A dozen cinnamon donuts for Ol' Sam Houston says he'll be back on tonight," the chief promised my father. Sure enough, about a half-hour later, and above some distant and occasional whistle-laden, more traditional two-way CB chatter, Channel 14 sprang back to life locally. A strong carrier there featured what was likely some cheap, battery-powered tape recorder's looped playback of the Kingsmen's *Louie, Louie*. Wowing and fluttering, the selection aired over and over with only a station slogan—"Super K-Radio Plays Groovy Gasser Real Rock Hits!"—separating the end of one run from the beginning of the next play.

"Oh, sweet sister of Sam Houston! It's that terrible rock song about s-e-x," exclaimed the CE. "That kid could be headed straight for a federal correctional facility if Friendly Candy gets wind of this filthy trespassing on the U.S. public's airwaves!"

"A Lou-way, Loo-way. Ah yeah, we gotta go now. Every night at ten, ... (unintelligible lyric)...her again," oozed out of the EICO transceiver's five-inch permanent magnet speaker. "Sid, I'm very sorry to have involved you in this investigation," the tech admitted while rubbing his forehead in search of some headache relief. "This music is just despicably disgusting and



This four-channel Gates Dynamote mini-control board is identical to the one our "CB broadcaster" used. It hails from the mid-1960s, was state of the art, and ran about \$600. How would a kid get something like this brand new? Gates maintained an office/showroom at 800 Second Avenue in New York, where our pirate's millionaire father probably bought it for him on a business trip. By the way, Gates also operated such facilities in Los Angeles and...Houston!

no decent religious man need be exposed to it—especially one with a loyal wife waiting at home."

"Heard worse when I was in the Navy," Dad noted. Then he listened to the CE's straightforward plan to sink the pirate's airborne ship. An accessory signal strength meter wired into the EICO's circuitry gave the proposal teeth. *Louie, Louie* played on, sounding increasingly fatigued as the recorder's batteries lost stamina, but each wobbly stanza gave my father and his host additional opportunity to track the notorious Super K-Radio. They had just taken a left turn into the community's newest and most upscale development when the "S" meter really stood at attention. "See that?" The CE pointed, "That CB has got to be transmitting from somewhere around here."

From the deepening, ever-slower tone of the music and illicit station ID announcements, both Dad and the engineer knew they didn't have long before the music conked out and the kid would probably cut the carrier. "Get a load of what's on top of that tree house in the big oak in that huge home's backyard," my father gestured.

"Ah ha," the tech nodded, "a genuine three-element 11-meter beam antenna that I'd swear on Sam Houston's Shootin' Iron is probably related to our suspect." The mobile news cruiser pulled in the driveway. Its headlights bounced off a picture window, where a woman's red head soon appeared from slightly pulled back drapes. Dad spotted the momentary image of a teen peek through some basement curtains. This visage cautiously returned for another fast look. The engineer switched the ignition key to "accessory" and reduced the EICO's AF gain a bit. "Get ready, Sid," he instructed, "The next few seconds could tell the story."

"There went the cellar lights," Dad pointed as its small windows became dark, "...and off goes the CB carrier."

"Great Sam Houston's Ghost!" shouted the technician, "That's our boy!"

Gotcha!


Even my gregarious father soon felt rather uncomfortable standing at the front door, as his compatriot pressed firmly and

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MEETS ALL FCC REQUIREMENTS

International Crystal Manufacturing Company was an early player in the CB game. A graphic depicting farm wife-to-farmer communications explained the CB story to late 1950s citizens seeking a way to enjoy two-way radio ties without having to take an amateur radio examination. By the way, ICM's "Citizen Bander" transceiver appears to require variable tuning—as opposed to getting click-tuned to individually numbered channels—over the (then) "new band of frequencies in the 27 megacycle range set aside by the FCC for citizens radio service." The transmit switch was on the front panel, not on the mic!

continuously on the doorbell button. Dad tells me he was almost at the point of volunteering to go back to the car when a disheveled, though attractive 40-something woman in a fancy bathrobe, opened the door enough to take up the length of its safety chain. Her speech was noticeably slurred. "What's this about, gentleman? Are you with the police?" she asked through several attempts to clearly pronounce every word. Dad could tell by her slightly squinting eyes that she wasn't really grasping the engineer's rather detailed account of the CB "broadcast" incident. She excused herself for a minute, walked slowly to a wall-mounted intercom system in the spacious front hallway, and called for someone named Roberto.

"Roberto?" the tech whispered to Dad, "That must be the kid's name." But, it wasn't. Turned out that Roberto was a grandfatherly gent who served as sort of a family butler.

"These men are here because of something about radio," the woman told him. "Could you talk to them? Maybe it has to do with Frederic." Roberto nodded knowingly. "I'm afraid I'm not feeling too well," she mumbled, "but I'll send him downstairs. I'm going up to take a hot bath."

"Very good, madam," Roberto quietly replied, unfastening the door chain. He invited Dad and the engineer to sit on one of three plush sofas in the adjoining living room. "Now, how can I be of service?"

Again, the tech stated his case, but my father perceived it was steeped in far too much microvolt minutia and megacycle detail. "What my colleague is saying," Dad tried tactfully to interject, "is that his radio station is being rebroadcast and criticized by some local young man on a CB radio that our tracking equipment indicates transmits from this neighborhood."

"Ah, I see," Roberto indicated, "and you believe it might be Master Frederic?" "Who?" queried the engineer while reaching for a small notepad and pencil in his shirt pocket.

Roberto got on the intercom and requested young Frederic's presence in the formal living room. "Presently, if you please, young man," he enunciated. While they waited for this appearance, the old gentleman admitted that Frederic dabbled in electronics and had often been indulged with expensive radio gear from his father, who, due to business commitments, was seldom at home. "Madam had this house built and moved us here primarily to provide Frederic with a more wholesome life than he received in the family's Manhattan and London apartments. I believe that a great aunt of hers lived in this community, and years ago on a childhood visit, Madam had been impressed with the quaint surroundings."

That's The CB Pirate?

Roberto glanced upstairs. "If you'll excuse me for one moment, gentlemen." He was hardly out of sight when the engineer leaned towards my father and, with a cupped hand directing a whisper towards my Dad, speculated, "The old squire is going to get the kid. I bet on the Bible of Sam Houston's Sunday School teacher that this Frederic is one of those *Rebel Without A Cause* James Dean punk types. You know, bad language, bad manners, and no respect for anybody, especially the FCC!"

Footsteps, muffled by rich stairway carpet, alerted both the tech and my Dad to stand. "Gentlemen," Roberto announced as he and his charge descended into view, may I introduce you to Master Frederic?"

"Sweet Step-Sister of Sam Houston's Siblings!" the engineer said to himself. Dad was surprised by the kid, too. At maybe four feet, eleven inches, undeniably pudgy and thickly bespectacled, Frederic sure didn't look like any anti-social juvenile delinquent. He struck them as being a garden-variety nerd.

Roberto completed the introductions and encouraged a silent Frederic to shake hands with his uninvited guests. "They're interested in your radio pursuits." "Hmmm," Frederic nodded. "I saw your station call letters on your car. Hmmm," the kid went again as if considering his options. Well, would you like to see my station?"

"After you, gentlemen," Roberto gestured as they followed Frederic down the basement stairs. There in one corner was a professionally built broadcast studio. It featured a sizable sound lock window through which two QRK-brand 12-inch turntables with Gray Research viscous-damped tone arms, an Altec model 639 mic on an Atlas boom, and Gates Dynamote 70 control board could be clearly seen. There was even an RCA On-Air light above the door! The only non-professional piece was a \$10 Archer tape recorder with three-inch reels.

"Great Ghost of Sam Houston! Look at this operation!" exclaimed the technician as Frederic motioned for the group to step inside.

The youngster demonstrated how everything worked and showed them hundreds of 45-rpm singles and dozens of albums neatly stored in custom-built shelving spanning an entire wall. You could tell he was proud of the set-up, but only rather hesitantly got around to unveiling some jerry-rigged circuitry covered by a blue bed sheet on a workbench at the far end of the finished basement. Along the floor, a single audio cable ran to it from a quarter-inch hole in the studio wall. "Gee, guess I shouldn't have hooked up the studio to this," he seemed to apol-

ogize, sounding like Jerry Mathers' in *Leave It To Beaver*. Magician-like, Frederic yanked the sheet. Underneath were electronic guts and sundry circuit boards carefully screwed down to a couple of nicely varnished 1-by-10 pine boards. "This is most of a Lafayette HA-300 walkie-talkie," he began. "It's only rated at 2 watts, so I bridged the output to the linear amplifier here."

"Is that your creation, son," the engineer wanted to know.

"Yes, sir, I built it in school. I'm in the radio club—well, actually, I'm the only member, but my science teacher, Mr. Wernet, helped me with the linear's circuit design. Mr. Wernet guesses that it's capable of about 80 watts. Oh, and the amp's output is fed into this coax connected to a Hy-Gain brand beam antenna on top of my tree house. It's got 9-dB gain. The receiver section of the HA-300 is cut out of the circuitry, so I couldn't try hearing from anyone to see how far the signal goes, but a couple of times I gave my address and last week got this QSL."

Dad read it over the engineer's shoulder. He remembers the card saying something like, "Got you loud & clear. S-9 all the way!!!" The tech marveled that it had come from an equally amazed CBER on the other side of the United States. Thinking as quickly as a veteran neighborhood cop, he then used the QSL as documentation for a stern lecture delivered to Frederic about Citizens Band rules, general interference, foul language on public airwaves, unlicensed operation, and how *unfriendly* that Friendly Candy Company could be—even to kids.

As the session intensified, Dad and Roberto stepped out of the "radio" studio. My father politely suggested that his friend was a bit over zealous and that he felt rather awkward being in a stranger's home as an accomplice to someone scolding a youngster.

"No need to apologize, sir," Roberto insisted quietly. "I'm sure Madam and Fredric's father would do the same if they had time and had investigated the particular governmental radio regulations. And, perhaps Master Fred could make things right by doing some community service work at your associate's broadcast station?"

This was a remedy that the CE offered Frederic after reading him the full Riot Act. The boy would be eligible for the opportunity to work at the station *if*—only if—he first promised to dismantle the illicit CB rig and vowed never again to "broadcast" in the 27-megacycle range. A "clean language" requirement was also thrown into the plea bargain. "You mean you'd actually let me work at your station? Everyday after school and all weekend long? And during vacations, too? Would this possibly ever include being on the air, maybe to run the church service tapes and maybe read a weather forecast early Sunday mornings or something like that to start out?"

"That is a potential course of action *if* one were to obey all company, local, state, and federal regulations in the broadcast communications sector," the CE nodded.

"Hmmm," Frederic considered as he stroked his chin. "Hmmm," he mumbled while walking back over to the workbench. "Hmmm," he repeated while looking at an assortment of hand tools neatly pegged on the workbench wall.

"It's alright, Madam," Roberto gently assured Frederic's startled mother, who by this time had daintily run from her bedroom to the top of the basement stairs. "Master Freddy was just showing us his workshop acumen."

"I really want the job and this proves I'm serious," the kid said as he *again* slammed a five-pound sledgehammer onto



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mashed wiring, solder, and colorful electronic shards that had been his illicit CB broadcast transmission rig. "I'd say as serious as Ol' Sam Houston's Sidekick," grinned the tech. Roberto and Dad couldn't help but smile, too.

On the drive back to the station, the engineer talked non-stop about how bright Fred must be to have "devised a grounded-grid multi-element pi-network, TVI-suppressed linear" or some such lingo. "He might just turn out to be a fine broadcast technician and all-around good radio station person. Wouldn't have to worry the Candy Company about that young fellow."

Yes, But What Finally Happened In This Slice Of Radio History?

By now my father really had me going. "You can't leave me in such suspense," I practically screamed. But he claimed that was just pretty much all he knew. "Dad, so you're saying you never went back that way again to visit the engineer at that little AM?"

"Well, now I did stop by once more," he admitted almost as if it had been a secret mission. "Happened through the area about a year later, but the CE wasn't around. Frederic was there, though, running the board during a remote broadcast from some local fair. The kid remembered me and seemed pleased to show off an automation unit he designed and built with the chief engineer. I think they were planning to use it for late evening music programming."

"Dad, that's the whole story? You mean that's all you've got to show about how 'CB broadcasting' can lead to a real radio career?" I demanded.

"Hmmm," he winked. "There is one other thing that could give you some closure here." Dad pulled a late-1980s *Broadcasting Yearbook* off a shelf. "Hmmm, I believe it's in here somewhere. Hmmm, here it is in the group ownership station listing section. See?" It was an entry for a trio of then-recently constructed FMs in three different communities within a 50-mile radius of approximately where my father recalled the small AM being located.

"That's it?" I asked a bit skeptically. "The stations' president, general manager, and chief engineer has the first name Fred? Dad, you said you don't recall his last name, so how can you be certain it's the same guy?"

"Look at the corporate name," he gently instructed while moving my finger to the head of the listing.

"Oh, I get it, Dad!" And he smiled approvingly as I put two and two together. "Who else, but somebody positively influenced by your engineer friend would call their company *Great Sam Houston Communications*."

And so ends another day of broadcast history at *Pop'Comm*... ■

Software-Defined Radio—Part III

How To Build An SDR, The Hardware Component



Over the past two columns I've introduced you to a revolution currently taking place in digital radio technology that is in every way just as important as the invention of the Super-Heterodyne radio. Frankly, you can throw in the invention of Radioteletype, FM radio, TV, and even single-sideband into that statement as well. The revolution I'm talking about is Software-Defined Radio (SDR), the development of which the U.S. military is currently underwriting through an investment of \$25 billion through the JTRS (Joint Tactical Radio System) initiative.

To understand why the military is so excited about this new technology, consider that a standard SDR literally represents a single black box of radio equipment that's about the size of a bar fridge. This black box not only replaces a truckload of transceivers, but you don't have to patch together different equipment into a working system. This one black box is able to support multiple modes (up to 33 waveforms including several cell phone modes) of transmission and reception over a frequency range of 2 MHz to 55 GHz. The beauty of such a system, other than its small size and ease of integration into complex operating environments, is that you can re-define its features and functions simply by re-writing the software code placed into it.

The bottom line is that the actual *hardware* component of the radio system remains constant and relatively unchanging over time, thus reducing costs and maintenance. Meanwhile, the actual circuitry, which exists in virtual form within the software component of the radio, can be constantly updated and refined.

You can see then why the military would find SDR so desirable. Because one SDR can manage multiple waveforms over an extremely wide band of frequencies, the need for rooms full

of multiple radios in racks is eliminated. The hardware component, being small and needing only the occasional upgrade, could be installed in a semi-permanent way in tight, highly protected areas of ships, planes, or vehicles. Think of what this would mean for submarines, tanks, or troop carriers where space is at a premium.

While the military may be getting the best toys first, that doesn't mean that the civilian sector is going to have to wait indefinitely for this new technology to become declassified. The fact is that the hardware components of SDR technology are already available in "off-the-shelf" commercial products that can be used by the radio monitoring hobbyist and radio amateur operator with relative ease. More importantly, there's an active group of people who are working together to develop non-profit hardware and software SDR technology. Further ensuring that SDR technology will be accessible is that the development platform is LINUX based.

So far this work has created affordable hardware technology, along with free software available for download on the Internet. Welcome to radio in the 21st Century, where circuits are built using computer keyboards rather than soldering irons.

This month I am going to outline the hardware requirement for creating a homebrew SDR, which will lead us into setting up the software component next month. Now, I must warn you that getting into SDR at the hobby level is not cheap, but you'll find that the equipment that exists today is well built and supported and comes fully warranted. This technology also has crossover capability into a wide range of electronic test equipment, such as multimeters and oscilloscopes. So whatever investment you do make will pay off as you build up your experimenter's toolbox, not to mention your technical knowledge.

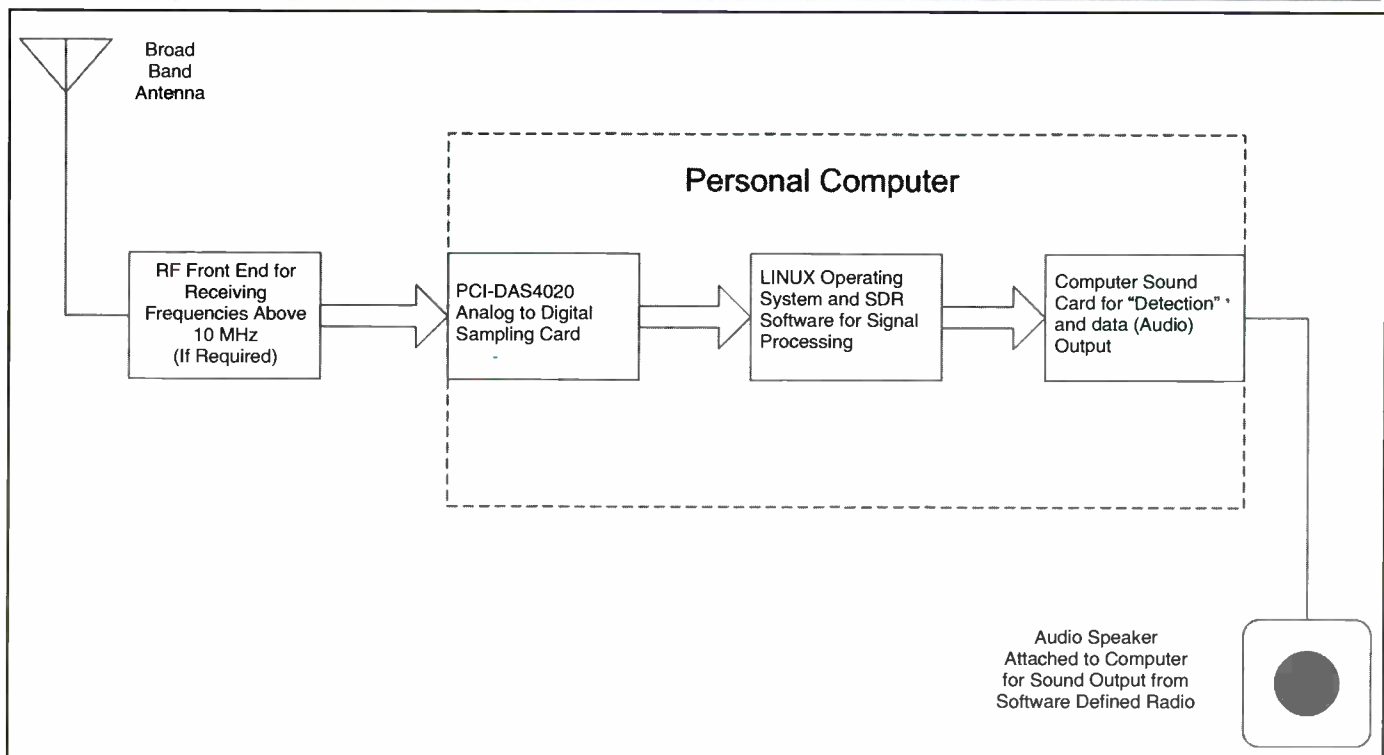
Before delving into the hardware, however, let's take a quick look at some more of the theory behind SDRs (for additional information, refer to last month's column). Keep in mind that while the theoretical background for an SDR is rather complicated, the actual construction and operation of one is not.

Digitally Sampling RF Signals

What makes an SDR special is rather than having to tune through each RF frequency one at a time (as you have to with a conventional Superhet radio), the SDR can tune and process multiple frequencies at once, gathering the intelligence off each frequency even while using multiple modes of communication.

What's the difference between sampling and tuning, detecting and processing? First let's look at the difference between making a digital sampling and an analog recording. We'll start with one of the most common forms of digital sampling: the creation and use of a music CD.

When you play a music CD in a CD player it produces an electronic signal. However, rather than being the complex sine



This block diagram illustrates the essential components of a Software-Defined Radio (SDR). The RF front-end converts selected frequencies in 10-MHz bandwidths, which the analog-to-digital sampling card can process (if you're monitoring frequencies between 0 and 10 MHz you don't need the RF front-end at all). The sampled information is then processed by computer, which creates the virtual electronic circuits using the SDR software. This processed information is sent to the computer's sound card, which converts it to an audio output (if required) heard over a loudspeaker plugged into that card.

wave of an analog device like an old-style LP or 45 record, the signal is represented by a series of zeros (0s) and ones (1s). The digital audio file that has been placed on the CD was created through "sampling" an analog sound signal by using computer hardware and software to convert each sample into those sequences of digital numbers (0s and 1s to be precise).

There are two important components to this sampling: the sample rate (the number of times a sample takes place over a fixed period of time) and the bit depth used in that sample (the amount of information captured in each sample). With some digital recording software you can control the sample rate and the bit depth, so it's important to understand what these components are and how they're used.

The sample rate determines the highest frequency that can be captured from the analog signal. As a rule of thumb, the highest frequency that can be preserved when making a digital recording from an analog source is always less than half the sampling rate. Therefore, the 44.1-kHz sample rate used by CD audio can capture frequencies up to about 20 kHz. If you sampled at 32 kHz, the upper audio range is reduced to rough 16 kHz. If you went all the way down to 4 kHz, the upper

audio range would be about 2 kHz. The sine wave is actually still there because it's sound that's being moved through the computer circuits. However, rather than the actual sounds, it is a numeric representation of the sine wave using the 0s and 1s to represent it.

This leads us to the next question: How can you sample something like radio frequencies? It's all very well and good to talk about sampling frequencies in the range of 2 to 20 kHz, but how do you do that when you're talking about frequencies in the megahertz and gigahertz? If you go back to the figures for CD audio sampling, you'll see that a 44.1-kHz sample rate allows you record up to 20 kHz. This follows from a mathematical formula, known as the Nyquist Rate Equation, a foundation for the theoretical basis of digital sampling.

Developed in 1927 by the Swedish-born electrical engineer Harry Nyquist during studies he was conducting on analog-to-digital conversion techniques, this formula states that in order to be able to sample a given signal, the sample rate must be twice as fast as the bandwidth of that signal. Put simply, if you want to be able to sample signals up to 1 MHz, your sample rate would have to be 2 MHz.

Likewise if you wanted to monitor up to 2 MHz, you'd have to sample at a rate of 4 MHz. As you can see, as the frequency you want to monitor goes up, the sample rate required keeps doubling. We'll see in the next section that this has a tremendous impact upon the amount of data you're asking the computer to process. Things are made even more complicated because of the presence of harmonics and other phenomena in a sampled signal, so you begin to run into some real problems with the sample itself.

The best way to explain what happens in an SDR when sampling occurs is through the example of another method of analog-to-digital sampling: the motion picture camera. When you make a movie you're not making a record of every moment that takes place before a camera. Rather, the motion picture camera takes a series of samples, in the form of discrete pictures, of the events that are happening before the lens. When the film is developed and played back through a projector, our brains are able to make the sampled images move as if an uninterrupted flow of events were taking place in front of our eyes.

However, not everything that is photographed using a motion picture camera

will present itself as flowing smoothly through time. A good example of this can be seen in a Western, where the spokes of a wagon wheel appear to be going backwards. This is because the sampling rate of the motion picture camera is too slow to capture the true position of the spokes on the wheel. Such sampling phenomena are experienced with an SDR in the form of phantom signals, distortion, and “dead signal holes” in certain ranges of frequencies. Fortunately, with proper filtering, the use of a proper sampling rate, and other techniques, these problems can be eliminated.

So, how do we use this theory to actually build an SDR? It’s actually fairly straightforward, using off-the-shelf equipment, as we’ll see now.

Basic Equipment Set-Up

To put together a true SDR, you’ll need four basic components:

- Broadband antenna with coax lead to computer
- High-speed data acquisition card
- High-speed PC using the LINUX operating system
- High-performance sound card

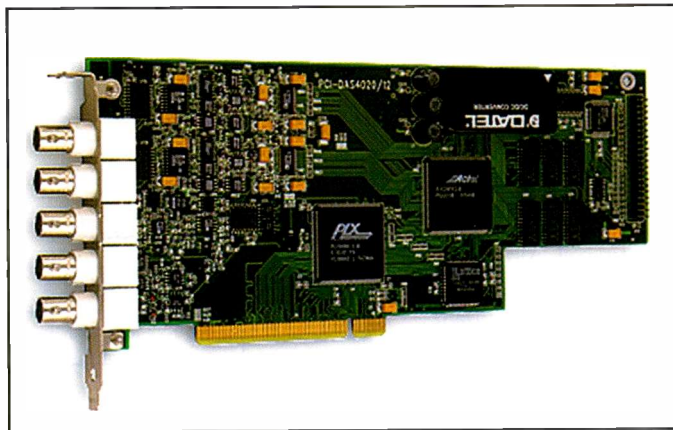
Frankly the antenna does not have to be special; most people simply use either a long wire or dipole antenna for frequencies below 30 MHz, or a discone antenna for those above the HF band. The coax lead-in from the antenna is attached directly to the data acquisition card, which I will get to next.

The data acquisition card, or DAC, is essential for the success of the project. It’s built into a computer card that’s plugged into an open accessory slot on your computer’s motherboard. Fortunately today’s computer equipment is “plug-and-play,” and all you need to do is put the card in and turn the computer on. The DAC and the computer will then have a little chat, get to know each other, and do the entire configuration themselves. Next, you simply hook up the antenna’s coax directly to the DAC using the coax connector in the card itself. Now all you have to do is run the software that defines the radio, and then detect your signal via the computer’s sound card.

The key thing to understand is that the purpose of the DAC is to take samples of the voltages generated in your antenna when radio waves pass through it. The card then converts the voltage information into a digital form, which the computer can process. You must realize, however, that sampling the information contained in RF frequencies is going to produce a lot of data for your computer to detect. Let me give you an example.

One of the most popular DACs in use for SDR today is the PCI-DAS4020 made by Measurement Computing of Middleboro, Massachusetts (www.measurementcomputing.com). It costs \$1,300 from the manufacturer, and while that may seem a bit steep, consider that you get a lifetime warranty with unlimited technical support, plus other benefits. Also consider that you can purchase software from third party vendors that will allow you to use this DAC to turn your computer into an oscilloscope, a multi-meter, a spectrum analyzer, a strip chart, and many other data recording devices. Frankly, if you’re a serious electronic or computer experimenter, this rather modest investment gives you lots in return.

Measurement Computing’s DAC is capable of an analog-to-digital sampling at a rate of 20 MHz, with each sample 12 bits



This is Measurement Computing’s PCI-DAS4020 ultra high-speed analog-to-digital converter that makes a PC-based SDR possible. It has four analog inputs that you can hook up directly to an antenna for reception between 0 to 10 MHz, or you can put an RF front-end between the card and the antenna to receive other frequencies in 10 MHz bandwidths. The card is 100-percent plug-and-play and comes with an impressive support and warranty package. (Photo courtesy Measurement Computing)

long. Doing the math, you find that the board can produce 40 MB of data per second! Consider for a moment that in the early 1980s the average PC hard drive held a total of 20 MB of data; today we’re asking a computer to process twice as much in one second! Fortunately the CPUs in today’s PCs can process that amount of information with little problem, and the coupling of these DACs to a good PC has made SDRs possible.

Using the Nyquist rate equation, we see that since the total bandwidth that can be sampled is equal to one-half the sampling rate, the upper frequency limit of the PCI-DAS4020 is about 10 MHz. Now if the frequencies you want to listen to are all located below 500 kHz, the broadcast band and the lower end of the shortwave radio bands, then this setup is perfect! However, what if you want to listen to frequencies above 10 MHz? How could you use an SDR to listen to broadcast FM, scan public service bands, or watch television?

Well, the answer to that question is also fairly straightforward. You need to build a converter that will take a 10-MHz block of frequencies in the range you want to monitor and convert them down to the 0- to 10-MHz range. This is an old technique that used to allow ham radio operators to listen to VHF and UHF stations over their conventional HF monitoring radios.

So, in reality, what you find with most experimental SDR radio designs today is that they’re a mix of a Superhet RF front-end with an IF bandwidth of 6 to 10 MHz. If you want to keep your costs to a minimum, you can use the DAC by itself if you simply want to listen to conventional BCB and shortwave stations. Next month I’ll introduce you to some additional core SDR equipment that you can either build or purchase.

The bottom line with SDR is that this is now *the* radio technology of our age—everything that came before is obsolete.

Coming Next Month

Now that we’ve talked about capturing signals, how does the computer detect them so we can listen to the information being

transmitted? This brings us to the software that processes the digital information captured by the DAC, after which it is sent to the computer's soundcard to get the audio out to the speakers. Obviously SDR is not limited to audio output alone. If you are going to be viewing video information, you would need a special video tuner card, which I'll discuss in the next column as well.

Due to its relative complexity I'm going to examine the actual installation and setup of the software for SDR in full detail next month. There's no off-the-shelf software available at this time to help you create a SDR using the Microsoft Windows operating system (at least that I know of). If you're going to create an SDR you are going to have to work within the LINX operating system, and that requires some special installation techniques. However, on the plus side, most of the software that is available is free, so you can take some solace in that.

As always, I'm interested in any pictures you may have of your own computer-assisted monitoring station or stories about how you have built and run it. You can contact me via e-mail with any submissions or questions at carm_popcomm@hotmail.com. While I can't answer general questions on computers, I'll be more than happy to help you with any issues raised in the columns. You can also write to me at "Computer-Assisted Radio Monitoring," PMB 121 - 1623 Military Rd., Niagara Falls, NY 14304-1745. Also, on my personal webpage (www3.sympatico.ca/joe_in_ey) you'll find a list of the columns I've done over the past two years, along with a summary of the content, and instructions on how to purchase back issues of *Popular Communications*. Remember that I cannot release previously published material as *Pop'Comm* owns the copyright.

Please also remember our troops overseas and give them your support. While the "Any Service Person" mail program has been suspended for security reasons, you should visit the U.S. Department of Defense's official webpage, "Defend America." They have a section, found at http://www.defendamerica.mil/support_troops.html, which provides an amazingly wide range of practical and useful ways that you can directly help. Please take some time to check out the resources suggested on that webpage and put them to use.

See you again next month! ■

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Playing On The Roof

There was a day when I'd have given anything for a pair of walkie-talkies. Of course, I didn't have much to give; I was only about eight years old, and the transistor did not exist, commercially, as we know it. Walkie-talkies were huge, green, surplus, heavy, expensive, and didn't work all that well unless you were pretty well qualified to make them work and keep them working.

Today, we have come so far as to have some company register "Push-to-Talk" as a service-mark or trade-mark or some such thing. And yet, walkie-talkies have all but been replaced by cell phones and other personal communication devices.

High atop one of the two tallest buildings in Arlington, Virginia, however, my un-named "Push-to-Talk" telephone-and-walkie-talkie combination device will not function at all, even though I can see Toledo and Rio de Janeiro on a clear day. You see, these lovely little devices are, shall we say, not very immune to RF interference. What I mean to say is that they are completely useless, even though I could wave my arms and use semaphore or hold up letters like Vanna White far more effectively than trying to communicate with these little \$50/month beauties.

So on a recent venture with my boss to install and aim a pair of microwave dishes—with one of us having to wiggle the dish and the other having to watch a television picture or a spectrum analyzer or a signal strength meter—our "coupla bucks a day" was for naught. Back we went to the office to dig up our old VHF walkie-talkies, which just happen to share a common frequency with just about every other pair of walkie-talkies in the entire Washington, D.C.-area.

Of course, the NiCd batteries have been on continuous charge since about 1978 and have virtually no useful life left in them at all, so the first stop was to get some new NiCds (for the price of a couple of months' worth of cell phone service). Of course, they were uncharged and the clerk told us they had to be charged overnight before use. We nodded our heads and set off, plugging the chargers into our DC-AC inverters in the truck and hoping that a half-hour would be close enough to "overnight" to get us through the job of aiming the antennas. It was not.

I took an extension cord onto the roof, and the boss kept his charger plugged in down below, in the microwave room. There were warnings somewhere on a decal telling us explicitly NOT to operate the units while they were plugged into the chargers. Hey! WE are professionals! WE can yank plugs out of the wall by their cords! It's YOU who shouldn't do that! Same with operating a walkie-talkie on its charger.

The first thing I noticed (I got mine plugged in and working first, out on the roof) was that there were a whole lot of people *other than my boss* using this frequency in the greater metropolitan D.C. area, and since we were higher than anything but the Washington Monument, we could hear (and be heard by) all of them. In fact, I don't doubt that we could eas-

"There were warnings somewhere on a decal telling us explicitly NOT to operate the units while they were plugged into the chargers."

ily reach some people in Baltimore, or Cleveland, or San Francisco. In fact, judging from the languages and dialects being spoken, I'd hazard a guess that some early springtime ducting of the atmospheric layers was taking place, because it seemed that no one was speaking English but the two of us.

So as my boss began to tell me, "Okay, start to swing to the right...now back...a little more...further...further...okay, now back to the left...more...more...more...okay, now lock it down and let's do the vertical." I heard a couple of other people making some sort of mechanical adjustments, too. Maybe it wasn't microwave dish antennas, or maybe it was. But whatever it was, it occurred to me that they could use some help.

Now because my boss was inside the microwave equipment room, I could hear him, but not many of the other people out around the horizon could. And he could hear me clearly, as well.

As I "helped" so many others adjust whatever it was that they were adjusting, whether they were backing up a trailer, or aligning a steel beam, or who knows, it wasn't too hard for me to pick up on their accent or dialect and answer in place of their partner, while all the time my boss kept saying, "Bill, what in the @\$! are you talking about? And who are you talking to?"

Finally, he came up onto the roof with me and listened to what I was doing. He just sat down alongside me and shook his head (as so many have done before him).

Soon, his evil twin took over and he joined into a little "direction" and "guidance" conversation of his own. For a while, he thought he could see the people he was talking to, across the Potomac River at a loading dock, but when he got out his binoculars, he realized it wasn't them.

We've never gone back to do it again, but we do talk about it from time to time. I think by now those NiCd batteries are kaput, and it's not likely we'll get more for a while—not until a real need arises, or until some day when we're *really* bored again. ■

Editor's Note: To Bill's Boss's boss—This is purely a work of fiction. It never happened. Really. They'd never do anything like this. Honest. And that business about them going fishing when they were supposed to be up at the transmitter site on the mountain? Same thing.

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