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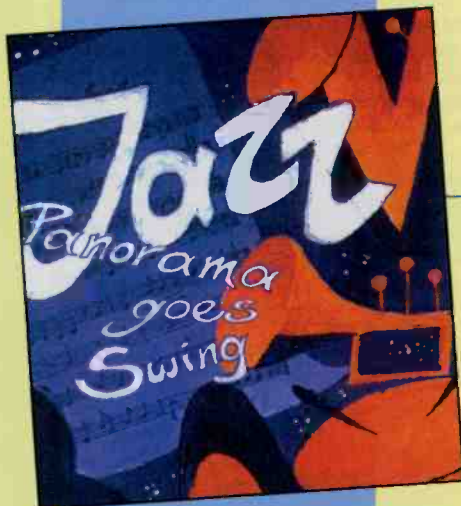
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On The Cover

Ron Lawrence, of Charlotte, North Carolina with just a few of his 400-plus radios. To say Ron "collects" radios is an understatement; his house is a museum of collectables. Read his story—and drool over the photos—beginning on page 8 in the article appropriately titled, "Ron's Radio Heaven." (Photo by Larry Mulvehill)

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Taking A Bite Out Of A Ham

Security at our nation's military installations has certainly changed—of course, for good reason—since 9/11. Frankly, I've seen it go from good to bad to very bad and back to more-or-less good over the course of a military career that spanned over 20 years. But before I digress into a “back in the day” chat with you that would only bore both of us to tears, I think it's important to recognize that our country as a whole has changed dramatically in many ways.

There were times when “security” at our bases meant you could get on the base if you had a good line of BS, with or without an ID card. Of course, that depended on which installation, and if the general-of-the-moment had a wild hair and “security” was going to be “His Thing” that month. But today, security is as tight as a drum, or so one might think. I'm certainly no security expert, but even I can see that it's tighter than ever.

It's the same at some corporate parks and office buildings—or in some cases *better*. As radio enthusiasts, let's face it; we're prone to having our radios with us more than most folks would like. We sometimes—surprise!—even flaunt them. Somewhere deep inside our psyche we believe it's our God-given right to have that handheld scanner or ham gear with us, and turned on, wherever we go—malls, work, train stations, military bases, and so on. While we are most certainly permitted to listen to what we choose, cell phones excluded, of course, there's no universal “right” to play radio wherever we go in our daily lives.

Take, for example, those military installations. Many radio enthusiasts are trekking to our country's installations for airshows this time of year, not to mention our public safety folks and others who are avid spectrum users and are constantly on these bases. Most will either have a mobile or handheld ham radio with wideband receive capability, aka “police” scanner. Then there are the GMRS, FRS, and CB operators who, like most people, will continue driving on the base without thinking twice about any rule that regulates radio operation, either two-way or monitoring.

The same is true of the multitude of off-base government buildings and property. Then there's the “private” property areas, such as inside malls, amusement parks, or anywhere else people come and go, most of us not thinking about the consequences of playing radio.

Our vehicle is probably about average when it comes to its radio profile: an AM/FM antenna that's only up when the radio is on, a short on-glass antenna that's really my ham antenna (it doubles as a scanner antenna), and when necessary I also use a dual-band NMO-mount antenna for a mobile GMRS (or other scanner). At any given time, typically there's only one radio in the vehicle, usually my ICOM IC-2100 2-meter mobile which also tunes 136 to 174 MHz, simply because of security/theft considerations and the fact that my wife isn't a radio nut.

If you're like me, all you want to do is mind your own business, go shopping (not *too* often!) or to the airshow or whatever, and get home safely after having a hotdog or two. That's not a lot to ask. But lately I've heard of instances where ordinary law-abiding folks have been excessively questioned by authorities about their radios, antennas, or both. That makes me wonder about a couple of things. First, with the high visibility of many of our vehicles with all those “strange” antennas, wouldn't you think that our friendly law enforcement folks would put two and two together as they have in years past? Now I realize that the post 9/11 world is “different” than the world was four years ago, from the Patriot Act to airline security to many aspects of our lives we probably don't even realize have changed until a responsible journalist brings them to our attention. But pulling over Joe Six-Pack with the porcupine vehicle is a lot like being overly concerned about the little old lady who somehow scooted past the airline security folks. Yes, it's a concern, but I don't believe it always rises to the level of Red Alert.

However, there's the other side of the radio coin. It *also* occurs to me that many of us still continue to march to a pre-9/11 drumbeat, not always considering our surroundings when going mobile, pedestrian mobile, or bicycle mobile with a two-way radio or scanner. Despite the fact that we're smack in the middle of a wireless revolution with people taking cell phone calls with all kinds of “strange” ring tones at work, in a restaurant, or other public place, most people—other than us—will inevitably find it more distracting to hear a police call come out over the speaker. Remember, it's still a “police” scanner to most people. They're not interested in our explanation that we have a wideband receiver or that because we're licensed amateurs we can automatically crank up the audio.

Fact is, we're living in an age where the radio spectrum is under increasing assault by those with Big Dollars, and ruffle the feathers or abuse the privilege, and you just might see some of that spectrum go the way of manual typewriters. There's certainly nothing wrong with sporting a big, beefy screwdriver antenna and a dozen or so radios in the pickup, but if we don't want to waste our time and that of our fellow public safety pros, perhaps it's time to be just a *little* less visible—to adapt, if you will, without cramping our style.

I'm naturally proud of my radios and antennas, but I'm also learning to adapt to the world around me. That's why the other day when the Ft. Monmouth security police at the main gate asked me, “What's with the antennas?” without thinking about it I automatically answered, “They're ham radio antennas.” Fact is, I knew that if I had answered honestly, “one is a scanner antenna and the other is a ham antenna,” more questions would have followed, because it was the *one* day I had the scanner running. Sometimes saying the right thing, you're in, no questions asked. It was one of those days when I just wanted to go shopping. ■

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.

Gerry, And Homework

Dear Editor:

The February issue of *Pop'Comm* just arrived here at Radio Sweden and I read with interest Gerry's article about the various Kurdish stations. He's really done his homework! Just thought I'd pass along that Radio Sweden is one of the few stations outside of the region with short-wave programs in Kurdish. They are actually relays of the programs produced by our Immigrant Languages Department for Kurds living here, but they are relayed on SW to the Middle East, Saturdays 1600 to 1615/Sundays 1600 to 1630 on 13580 kHz.

We're probably easier to hear than the stations in the region, and listening to our broadcasts might help people get an ear for what Kurdish sounds like (we broadcast in two different dialects, Sorani and Kurmachi).

George Wood
Radio Sweden

Going, And Going, And...

Dear Editor:

I really enjoyed the article on batteries, especially the info on NiMH and how they lose their charge. Every time I pick up my NiMH for my Alinco HT they are too low to do the job. So what good are they? Thanks for the great info. *Pop'Comm* is the best!

Bob Snyder

A Big Shannon Fan

Dear Editor:

I always enjoy reading "Shannon's Broadcast Classics" but the March column was an absolute hoot. Thanks, and keep up the good work.

Victor Commisso
Lebanon, Pennsylvania

Goodbye, Michael

Dear Editor:

You're right—Mr. Powell was no friend to the radio community and I'm also glad he's gone from the FCC. But

like you've observed, the bureaucratic snowball is rolling right over us. Congratulations again for taking a stand on the BPL issue and taking the Commission to task. They should read your April editorial.

Ralph Cecito
Birmingham, Alabama

Broadcasting: Another World

Dear Editor:

I'm a former broadcaster and you might guess that I found Dave Schmidt's "Broadcast Technology" column in the April magazine like a page from my life. Let's just say that when I read about the antics of remote broadcasting it was as if I had written the material. Funny stuff, sometimes so funny and strange it's almost improbable, but such things do happen!

Bob Bradley
Topeka, Kansas

Supports The Troops

Dear Editor:

I read your April article about some of our soldiers in Iraq not having radios and other equipment and am appalled by the situation. I've also read some Internet postings that think you and other media that talk about this issue are wrong. What kind of intelligent person would think that way? I always put my two cents in letting people know that they're hypocrites. Our troops deserve the best and to be equipped properly before going off to war—no excuses anymore. There sure are a lot of people who can quote regulations line by line saying these radios sent from home are "unauthorized" and so on. Really? I served two tours in Vietnam and would use a tin can and string if no radios were available. Secure communications? No, but it's also not secure in a convoy without any ammo. They're unprotected and it's awful, especially when it's our leaders failing to protect the troops. Thank you for letting people know.

George McCombs
(*Pop'Comm* reader since 1982!)
North Carolina

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A publication of



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Offices: 25 Newbridge Road, Hicksville, NY 11801. Telephone (516) 681-2922. FAX (516) 681-2926. Web Site: <http://www.popular-communications.com/> Popular Communications (ISSN-0733-3315) is published monthly by CQ Communications, Inc. Periodical class postage paid at Hicksville, NY and additional offices. Subscription prices (payable in U.S. dollars): Domestic—one year \$28.95, two years \$51.95, three years \$74.95. Canada/Mexico—one year \$38.95, two years \$71.95, three years \$104.95. Foreign Air Post—one year \$48.95, two years \$91.95, three years \$134.95.

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Printed in the United States of America.

Postmaster: Please send change of address to Popular Communications, 25 Newbridge Road, Hicksville, NY 11801.

News, Trends, And Short Takes

Radio Taiwan International To Broadcast Domestic Services

Radio Taiwan International, which recently announced that it was closing five foreign language services for overseas listeners, is to start broadcasting to some of the 600,000 foreign nationals living in Taiwan. Beginning in July, broadcasts will start for Taiwan in English, Japanese, Indonesian, Vietnamese, and Thai. These new services are part of a wider reorganization of public broadcasting in Taiwan, which will also see some frequency reshuffling on the first of July.

CQ Introduces The "CQ DX Field Award"

CQ Amateur Radio magazine announces the introduction of a new operating award, the "CQ DX Field Award," recognizing achievements in contacting at least 50 of the world's 324 10x20-degree "grid fields." This is the first of three new programs to be announced by CQ over the next three months, with the goal of revitalizing ham radio's core activity of DXing, or contacting stations in faraway places.

The CQ DX Field Award is based on the Maidenhead Grid Locator system, already popular among VHF DXers and contesters, in which the world is divided, based on latitude and longitude, into 324 10x20-degree "fields" and each field is broken up into 100 1x2-degree "grid squares" or "locators." CQ DX Awards Manager Billy Williams, N4UF, has calculated that there are 177 fields with which the active ham stands a pretty good chance of making a contact, noting that many fields are in Antarctica, the Arctic, or wholly within oceans.

Williams estimates that a ham who has achieved the basic levels of the traditional CQ DX Award program and/or the ARRL's DXCC program—both of which require confirmed contact with at least 100 DX "entities"—will probably also qualify for the basic CQ DX Field Award level of 50 confirmed fields. Endorsements will be issued for each additional 50 fields up to 150, then in increments of 25 fields to a final level of all 324 fields.

Contacts made on or after January 1, 1980 (the year in which the grid system was adopted for amateur radio use), will count toward the new award. Complete details and rules can be found in the April 2005 issue of *CQ* magazine and posted on the magazine's website at <http://www.cq-amateur-radio.com>. In addition, Williams has developed an online cross-reference guide for converting countries to fields. It's accessible at <http://home.earthlink.net/~bfwillia/gridfieldsx.html>.

Italy's Broadcaster RAI To Be Privatized By Year-end

The state-owned radio and television broadcaster RAI will be privatized by the end of this year, according to Italian Economy Minister Domenico Siniscalco, speaking in a parlia-

mentary hearing. He added that the privatization of RAI would help the current restructuring of the broadcaster and shield it from "political interference."

The comments came after Italian media speculation that RAI's planned privatization could be dropped. The government initially had planned the flotation in the first six months of 2005. The law reforming the audiovisual sector in Italy, approved in 2004, opens the way to a partial privatization of RAI, the sale of certain sections of RAI beginning in 2006, and the launch of multiple digital networks in 2007.

AWR's English Service Moves To Regional Model

Adventist World Radio's English language service has been converted from a centralized global service to a local regionalized service. The production of English programs had taken place at AWR's Europe region office in England. Under the new plan, local studios—primarily in Africa and Asia/Pacific—will produce their own English programs in areas where there is a satisfactory level of listener interest. This change is consistent with the rest of AWR's operations, where programs in all other languages are produced locally.

The Finnish Broadcasting Company—YLE Suspending Its DAB Digital Broadcasting Services

The Finnish Broadcasting Company-YLE is suspending its DAB digital broadcasting services as commercial operators have shown no interest in the medium. DAB, Digital Audio Broadcasting, arrived in Finland in 1997 as an energy-efficient means of radio transmission. Many channels can be broadcast within a single matrix and received by a suitable radio. Although enthusiasm has been great in some European countries, for example in the United Kingdom, manufacturers have been reluctant to bring cheap mass-produced sets on the market in other countries. Commercial broadcasters in Finland have shied away from DAB due to the prohibitive costs of setting up a new radio distribution network. YLE has offered listeners all its available channels via DAB in the south of the country, in addition to a few separate outlets including an all-day spoken word service, a classical music channel, and two foreign language services: YLE World and YLE Mondo.

YLE will continue digital radio broadcasts via digital TV and some broadcasts will be made available via the Internet. The company will monitor technological developments to determine what appropriate multimedia distribution technology could compensate for the demise of DAB. If international developments, however, lead to the adoption of DAB as a pan-European distribution standard, YLE says it will retain the means to resume DAB services. ■

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Ron's Radio Heaven

An Exclusive Look Into One Man's Personal Radio "Museum"

by Peter Bertini

We've all dreamed of owning the ultimate ham shack or the ultimate shortwave listening post. Ron Lawrence, a vintage radio enthusiast and historian, had a similar dream, but when his radio collection began to outgrow available space, he took action, and along with family and friends, converted his two-car garage into what he now calls his Radio Heaven. Imagine a mix of old radios, ham gear, and related paper (magazines, old ads, and dealer advertising), along with display cases chock full of vintage tubes, transistor radios, and anything else related to vintage radio and you'll get some idea of what it's all about! In fact, Ron's got 400-plus radios, 37 horn speakers, and 200-plus tubes, and much more. So take a gander with us through Ron's collection through his words and photos.

Q. Ron, what piqued your interest in old radios? How did all of this get started?

A. Well, I bought my first antique radio in 1970 while in high school. My electronics teacher, Rick Bilbor, K4KAV, brought in back issues of *Popular Electronics* for us to read. There was a feature in the July 1969 issue titled "Whatever happened to Atwater Kent?" It didn't mean much to me at the time, but a few weeks later I was at a local flea market with my mom. Sitting on the tailgate of a pickup just inside the gate was a radio. I recognized it as a 1924 AK model 20 battery set from the article. The dealer was asking \$15, but I only had \$10! Of course mom said "I'm not going to give you \$5 to buy an old piece of junk—if you want it, haggle him down to \$10." Well, he took the \$10.



Here's what started it all: Ron's first radio, an AK-20 battery set, along side the issue of *Popular Electronics* given to Ron by his high school electronics teacher in 1969. Both have a place of honor in Radio Heaven.



This Federal model 61 battery set is for all intents and purposes "new"—it's never had tubes installed or been played! The blue ribbon was awarded at the 2003 CC-AWA Annual Conference Old Equipment Contest.

From then on I was hooked—not only on old radios, but I also enjoy haggling with dealers over price.

Q. Most of us can still remember the first radios in our collections, and most of us regret letting them go at some stage during our collecting careers. What happened to the AK 20?

A. I still have the AK 20, and that original issue of *Popular Electronics*. They both have a place of honor in Radio Heaven.

Q. Do you have any advice for new collectors?

A. As with most new collectors, I bought just about every radio I found! That was 35 years ago, and since then I've bought a lot of radios! But, I went a long time before I had to spend more than \$10 on one. Most of the sets I bought early on are now long gone. I think I only have two from the really early days of my hobby. One of the things I try to get across to people about my collection is that you don't have to be rich to have a nice radio collection. You just need to be patient, do a lot of looking, and have some good old-fashioned luck. In 35 years, the most I've spent for a single radio for the collection is \$500, and I don't have it anymore. I sold it to a friend of mine.

Q. What do you find most fascinating about radios?

A. One of the things that makes a radio really interesting to me is if there's a story to go with it, is it historically significant, where it came from or who owned it, or especially if there's a good story about how I got it. Many of the radios in my collection have stories to go with them. One set with a good story is my Federal model 61. I bought it from an old gentleman who



These shelves display Atwater Kent radios dating from 1925 to 1929. The odd boat-funnel shaped objects on the top shelf are in reality early horn speakers and are representative of what would have been used with those early Atwater Kent battery sets.



These Atwater Kent radios date from 1921 to 1925; the large tombstone radios seen on the top shelf are post 1930 vintage.

had found it in the attic of his parent's home. His father was a ham operator back in the 1920s and had bought two Federal 61s in 1925 at a local radio store's going out of business sale thinking he could use the cabinets for something. He built a transmitter in one of them; fortunately for me he stashed the second one in the attic and never got around to doing anything with it. Now fast forward to the mid 1980s when his son, also a ham and well into his 80s, finds the radio, still in the original box in the attic. The box was falling apart so he tossed it in the trash (too bad). He happened to mention to another ham friend who was also a friend of mine that he had found the radio and did my friend know anyone who might be interested in it. Did he ever! Besides the neat story, the Federal is, for all intents and purposes, new—it's never been played or even had any tubes installed in it. It still has the original paper tag seal over the tube island that was put on at the factory. The only thing I've done to it is wax the cabinet several times and redo the white lettering on the front panel. Most of the original white paint had fallen out in the attic heat.

Q. *You've been at this hobby a long time. But how many other folks were collecting old radios when you started in the 1970s?*

A. Not many. One of the things that held back the growth of my radio-collecting hobby is that I had been collecting radios for about six years before I ever knew anyone else collected them. Radio collecting is really a fairly obscure hobby. Our national organization, the AWA (Antique Wireless Association) has about 4,000 members. By contrast, the National Salt Shaker Collectors Club has over 20,000 members.

In the fall of 1976 I finally met another collector who lived in a nearby town. He introduced me to the AWA and to other local collectors. In 1979 a small group of us hosted the first Southeastern AWA Meet in Charlotte. That group has since grown to become the Carolinas Chapter of the AWA (CC-AWA), which now holds four Saturday morning swap meets in four separate locations around the two Carolinas. We also hold our annual conference, "The Spring Meet in the Carolinas," each year in Charlotte. This is a three-day event with three auctions, a giant flea market, radio collecting forums and programs, an Old Equipment Contest, a Friday evening banquet, and a Saturday luncheon.

Q. *Collections seem to gravitate to a specific era, style, or manufacturer as a collector's interests mature. What's your principle collecting interest?*

A. For a long time my dream was to have one of every model of radio Atwater Kent made. I haven't managed to get them all...yet! But I do have examples of most of the battery-era AK radios, and good number of the later AC sets. AKs were high-quality radios, and they were fairly expensive. There was a lot of poverty in the American south before WW II, so these sets are somewhat rare and hard to find locally. As an example, in the county where Charlotte, the largest city in the state, is located, a 1924 survey by the local newspaper showed only 400 radios in the entire county, and at the time there were only three radio stations in the entire state. Any existing radio that was bought in the Charlotte area during the 1920s is very rare. I have two in my collection; these have dealer tags on the lids showing they were bought at a radio store called T.R. Banks on East Trade Street in Charlotte. Compare those 400 radios in 1924 to the fact that there are more than 400 radios in my collection now! For a long time I really wasn't interested in any radio made after 1930.



Beneath the flaking paint is a zinc-metal cabinet, proving this particular Radiola 1300 is rare example of an early military version that was marketed for home use. Within a month, consumer versions were housed in a painted brass enclosure.

Q. Can you offer any insight on how collecting has changed in the nearly 40 years you've been in the hobby, and when solid-state radios started becoming collectable?

A. When I first joined the AWA and started getting to know other, more experienced collectors, I found that almost every one of them collected early radios. Cathedrals were talked about as the next phase of collecting coming up in the "future"—most serious collectors couldn't have cared less about AC-powered radios, and no one bought transistor radios back then.

Q. Looking at your collection, most of the radios appear to be in very fine original condition. What, if any, cabinet or electrical restoration has been done to them?

A. There are several schools of thought or philosophies regarding this facet of collecting. Some collectors wouldn't have a radio unless it shines like a new penny, with a slick refinished cabinet and completely rebuilt chassis. Then there are those who wouldn't have a radio that didn't play. Then there are guys, like me, who want a radio to be as original as possible. I consider the radios in my collection to be historical artifacts. I've been collecting for 35 years, and I've never refinished or recapped a radio. Normally I wouldn't consider a radio that's been refinished. With a few exceptions radios in my collection are original and unrestored, except where the set was so rare and an example was unlikely to be found in presentable, original condition.

A good example is my Radiola AA1300/AR1400. The original finish on the two cabinets is OD [olive drab] green, and about half of the paint on the 1300 is flaking off. Because of that, most folks think it's a military radio when they first see it. And actually it was; in 1920 RCA was a marketing agent for GE, Westinghouse, and Wireless Specialty. Westinghouse had just introduced its first receiver for home use, the RA/DA, beating GE. GE wanted to get something on the market fast, so they took the AA1300/AR1400 that was being sold to commercial and military users, and put it out for consumers.

I'm fairly sure that my 1300/1400 is a pre-broadcast version of the set, which makes it very rare. Will I ever touch-up the flaking paint? No way! The zinc cabinet is what makes it rare since the later (by maybe a month) sets that were sold to the public had cabinets made of sheet brass. If it was repainted it would be just another green 1300/1400 pair. To me, originality is most important!

Q. Do you do anything to the cabinets, such as cleaning or waxing?

A. I've learned to carefully clean and preserve an original finish on wood cabinet radios. And I don't buy radios that need major cabinet repair or refinishing. I'd rather bide my time and look for a set with a decent presentable original finish. My AK model 447 is a good example of a set that most folks would think needed to be refinished. When I bought it, it was almost solid black; it had been stored in a basement with a coal bin for many years. When I got it home I used 0000 steel wool, dipped in Go-Jo cream hand cleaner/degreaser, and gently rubbed the cabinet down on the dining room table. Wow! The black crud melted away, and in less than an hour I had a beautifully cleaned AK-



Here's Ron, KC4YOY, at the controls of his vintage ham station. The receiver is a first-generation HRO, built in 1934. The transmitter is a Clough-Brengle model 4581, also built in 1934. To the right of the receiver is a Millen VariArm VCO. The Millen VariArm was an early transmitter accessory that permitted the amateur to change transmitter frequencies at will.

447 with a nearly perfect original finish. A couple good coats of paste wax followed, and now, more than 25 years later, it still looks just as nice. We call this "The Treatment." The AK-447 is a prized piece of my collection that I call "Radio Heaven."

Q. Getting back to Radio Heaven, what's the story behind the name, and the ambitious undertaking it refers to?

A. The name "Radio Heaven" came from my good friend Gerald Cromer, who with his wife Betty, were the first visitors to the newly completed display room for the first open house on the Friday evening of the 1990 AWA meet. A group of friends, my wife, along with my parents, worked for 10 long, hard consecutive weekends to convert my former garage into a finished display room in time for the AWA meet. When Gerald walked in he looked around the room and said, "Wow, this must be Radio Heaven." And so the name stuck.

Q. Tell us about the vintage 1930s-era ham station on display in Radio Heaven.

A. When I first got involved with the AWA I soon found out that I was one of very few collectors at the time who weren't ham radio operators. It wasn't until 1990 when the FCC



Ron's favorite radio—and the star of Radio Heaven—is this 1922 Leutz model L. It is one of five or six that are known to exist, and one of two that were built at the EIS (Experimenters Information Service) shop. C. R. Leutz started the EIS Company to market his Super-Het radio kits. This particular set was a kit prototype that was later sold to Clemson Agricultural College for use in its physics lab.



In this area are the larger radio tubes in the collection. The large board in the background is a special early classroom radio trainer.

approved the new No Code license that I decided to get my ham license. My ham ticket—I'm KC4YOY on the airwaves—led to my latest collecting interest: early amateur gear. I've found most of the newer and younger hams had no idea what came before their pocket-size HTs. The concept of having a desk full of radio equipment with tubes and wires is totally foreign to them. So far I've have early ham gear for a '20s-era station with a spark transmitter. There's also an early 1930s station with a two-tube transmitter that was built from a 1929 *QST* article; a three-tube receiver that uses plug-in coils to change bands accompanies it. I have a mid '30s station with a first generation National HRC receiver and a 1934 Clough-Brengle transmitter that was built originally for the Civilian Conservation Corps.—and it is one of only two known to exist.

Q. *Radio Heaven is indeed heavenly, but it's starting to look a little crowded in there!*

A. As you can see from the photos, my display room is full. I don't do much buying anymore; there's almost no room to put anything else. Most of my collecting now involves vintage tubes and paper related to early radio. I'm always on the lookout for early home-brewed amateur gear.

Actually most of my hobby time nowadays is administrative. I am president of the Carolinas Chapter of the AWA and also Chairman of our annual conference held each year in Charlotte. Over the years our local group has done many displays of antique radios at various hamfests, local events, and also in local museums. I currently have radios displayed at the Discovery Place

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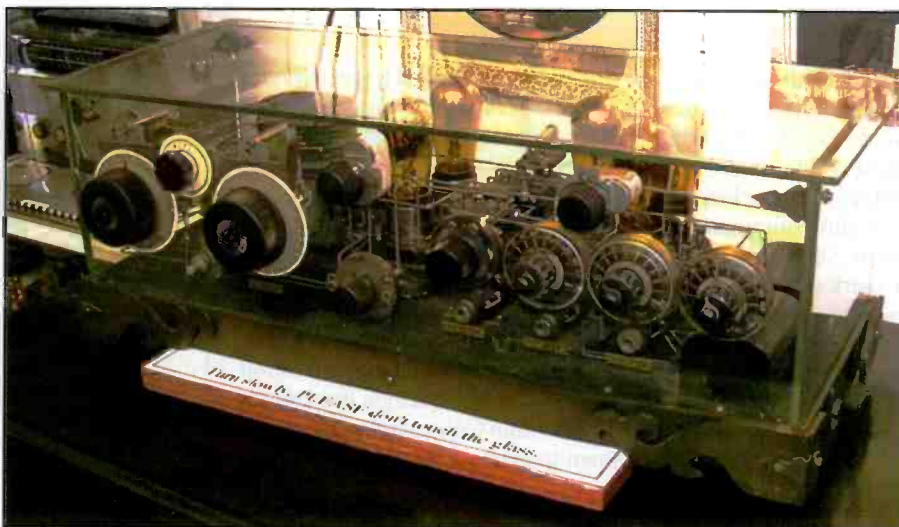
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Ron's display room has numerous wall display cases for his collection of very early vacuum tubes. This case highlights the smaller tubes in the collection.



Early radio set builders loved to show off their skills! They'd often build a set in a glass case to highlight the set's intricate and detailed inner workings and their craftsmanship!

Science Museum and at the Levine Museum of the New South, both located in Charlotte, North Carolina.

A Special Thanks!

Ron, thanks for letting us share your story with our readers! Ron Lawrence and

his wife of more than 30 years, Belinda, and their four cats live in Union County, North Carolina, about 20 miles east of Charlotte. Ron is employed by PCA International in Mathews, North Carolina, as an electronics technician, repairing the photographic equipment used in Wal-Mart's portrait studios all over the world.

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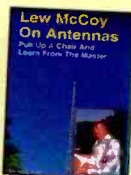
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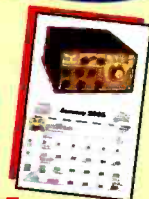
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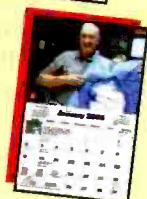
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The 18th Annual Winter SWL Fest

It's The Radio Place To Be!

by Rich Arland, K7SZ

One sure sign that spring is just around the corner is the Winter SWL Fest, which is held annually at Kulpville, Pennsylvania, a few miles north of Philadelphia. In 1988, a group of about 40 SWL/ham radio DXers got together at the Beautiful and Historic Fiesta Motor Inn (featuring the Pink and Purple Poncho Villa Room), near Willow Grove, Pennsylvania, to “just talk radio.” This most historic event has blossomed into a world-class affair, attracting DXers and SW radio broadcast personalities from all over the world.

To underscore that last statement, this year's special guests included Ian McFarland, from Radio Canada International (RCI) and Radio Japan, and Bob Zanotti, HB9ASQ, one of “The Two Bobs,” from Swiss Radio International (SRI). Thanks to the efforts of these two icons of international SW broadcasting, those of us who regularly listened to shortwave over the years were treated to thousands of hours of quality programming, with the emphasis on SWLing and DXing. These two gentlemen gave us an extremely nostalgic look back at the halcyon years of SW broadcasting by outlining their respective, highly colorful careers. They then switched gears and gave us a look into the *future* of shortwave broadcasting. In this day and age, when many SW outlets are drastically curtailing their programming or shutting down entirely, opting for audio streaming over the Internet or satellite broadcasting, Bob and Ian provide a glimmer of hope about the future of SW broadcasting with their inside look at the business facet of SW broadcasting.

Will Digital Radio Mondiale Be The Salvation Of International SW Broadcasting?

Both Ian and Bob agreed that DRM was only the latest in a long list of panaceas for salvaging the industry. It will be at least 10 years before implementation of DRM by mainstream SW outlets becomes a reality. Currently the HF spectrum allows first, second, and third world countries a way to get their collective messages out in a very cost-effective way using the long-established AM mode on shortwave. There are literally millions of SW radios throughout the world capable of receiving these AM transmissions, whereas Internet and satellite broadcasting (those modes which are now in vogue with station managers and owners) will not reach the majority of the target audience, especially in third world nations. So in a nutshell: International SW Broadcasting is *NOT* dead! Thank God!



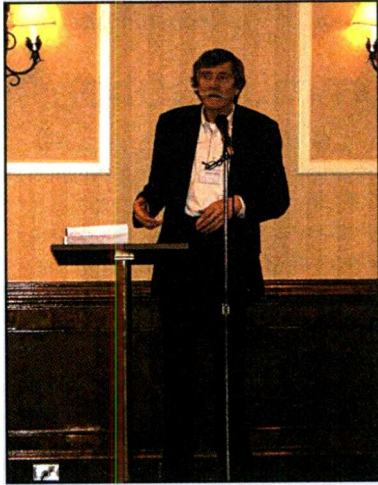
Bob Zanotti, HB9ASQ (left), from Swiss Radio International, and Ian McFarland (right), of Radio Canada International and Radio Japan, took the Winterfest SWL Fest attendees on a trip down memory lane in a two-hour-long forum about the history and future of international shortwave broadcasting. Between these two icons of SW broadcasting, avid SWLs around the world have been treated to thousands of hours of extremely high-quality programming centered on SW radio and the radio hobby. Long-time SW listeners might remember Bob Zanotti as being one half of “The Two Bobs” from SRI’s “Swiss Shortwave Merry-Go-Round,” a long running radio show which aired for 24 years! Check out Bob’s website at <http://www.switzerlandin-sound.com/index2.html>.

Other Winterfest News

Frans Vossen of Radio Vlaanderen International, the SW outlet of Belgium, not only attended and addressed the group during the Saturday evening banquet, he also won a load of door prizes! Well done, Frans!

A.J. Janitschek of Radio Free Asia entertained the audience by recounting recent activities at his station and exhibiting his extensive QSL collection.

Joe Buch, a long-time Fest attendee and forum presenter, gave us an in-depth look at Broadband over Power Line (BPL), one of my favorite topics. Although billed as a cost-effective way to provide broadband Internet connectivity outside major urban areas, BPL is suffering some significant setbacks during the testing phase in several areas of the country. As many of you know, BPL generates significant noise and interference on the HF spectrum, which severely degrades international SW broadcasting as well as commercial/military and amateur radio communications. In talking with Joe, he provided some insight



Frans Vossen of Radio Vlaanderen International, the SW outlet of Belgium, addressed the group during the Saturday evening banquet. Frans told of his station's format changes, which spelled the end of traditional shortwave broadcasting from Belgium. The annual Winter SWL Fest in Kulpville, Pennsylvania, each year brings together top SW DXers, ham radio operators, and International SW broadcasters for a weekend of "just talzing about radio."

power companies. And *keep it civil!* It won't be long until the message gets across that BPL is "bad technology in search of a home." Now that we no longer have certain people in charge of the FCC, *maybe* we can make some headway in burying this overrated, underdeveloped technology at long last.

This year's fest also included many interesting forums presented by experts in their respective fields, including "Pirate and Clandestine Radio" by George Zeller and "Digital Radio Mondiale" by Kim Elliot, "The Great Outer Banks DXpedition" by Harold "Dr. DX" Cones, "The Continuing Decline and Future (?) of VOA" by Dan Robinson, "Finding, Fixing and Enjoying Classic Receivers" by Kevin Carey, and "QRP/SWLing Using the Elecraft KX-1" by some dude named Arland. There was also an amateur radio licensing exam session. The usual nighttime DXing sessions were held using antennas placed on the roof of the motel by none other than Fearless Ed Mauger.

The Fest culminated in a Saturday evening banquet complete with awards ceremonies and the dispensing of door prizes. Guess who won the Coveted Barto Bag (box)? None other than George Zeller, Mr. Pirate Radio, himself! (Actually, I think the "fix was in" as George seems to "win" this prize each year! I could be wrong, but if one were to know such things...) Top prizes this year included several high-end SW receivers, including an ICOM R-75, which I can highly recommend from first-hand experience!

Allegedly "*The Voice of Poncho Villa*" was heard by some around midnight on Saturday evening/Sunday morning. However, if one were to know such things...one might want to listen around 6935 kHz next year at this time.

Richard Cuff and John Figliozzi, the fest coordinators, are already planning the 19th Annual Winter SWL Fest, set for March 3-4, 2006. Don't forget to mark your calendars, and remember that pre-registration assures us all of a great fest with lots of first-class door prizes. ■

into how to fight BPL legally. Joe's research has led to one very basic chink in the BPL armor: interference reports. In those areas that are currently undergoing BPL testing, when the local commercial/military users, SWLs, and hams take up arms (in the form of pen and paper, deluging the participating power companies with hundreds or possibly thousands of interference reports on an on-going basis), inevitably the power companies fold up their BPL tents and steal off into the night.

Why? Simply, the majority of power companies spend hundreds of thousands of dollars each year to maintain a very positive public image in the minds of the citizens in their service areas. Many of these power companies have vested interests in nuclear and/or coal-powered electric generation stations, both of which are "hot button topics" for environmentalists. They don't need a media black eye in the form of BPL interference reports from long-time customers. Ergo, fire up the old word processor, those of you in the BPL testing areas, and start an interference report writing campaign (be sure it addresses legitimate and valid incursions on the HF spectrum by BPL) to your local

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Capitol Hill And FCC Actions Affecting Communications

Amateurs' DXpedition Request Denied

A request by four radio amateurs to visit a rare DX island location has been denied by the U.S. Fish and Wildlife Service (FWS). Access to Desecheo Island, bearing the amateur prefix of KP5, was denied to members of the South West Ohio DX Association. U.S. Rep. Mike Turner, an Ohio Republican, had acted on the amateurs' behalf. Well known DXer and contestor Harry Flasher, AC8G, was one of the amateurs seeking access. He had visited Desecheo Island in the 1980s. Located about 14 miles off Puerto Rico, the island was once used for military maneuvers and is now "closed to all public entry for safety reasons due to unexploded ordinance in the area," as the FWS informed Turner. Amateur radio permits have not been issued since 1993. In previous denials, the FWS also cited dangers in the area associated with Caribbean drug trafficking. Access has also been denied to Navassa Island (KPI). According to the American Radio Relay League's ARRL Letter, the SWODXA had requested permission to use a small landing beach that, the DX group believes, is far away from potential contact with unexploded artillery shells. The ARRL Letter reported that Ohio Section Manager Joe Phillips, K8QOE, said "the group has not given up its attempts to gain permission to land on and operate from Desecheo Island."

National Response Plan Gets High Praise

Prior to his departure as FCC chairman, Michael Powell lauded the Department of Homeland Security's announcement of the completion of the National Response Plan. Partnerships were developed between federal departments and agencies, including the FCC, and state, local, and tribal officials, the private sector, and emergency management national associations. "The plan helps protect Americans by providing a comprehensive approach on how all elements of incident management, from the top of the federal government to the local EMS responder on the scene, coordinate in times of emergency," Powell's statement said. The FCC will "maintain its ongoing relationships with Federal, state, local and tribal organizations to help make sure that essential emergency personnel have reliable communications services available to them both during and after an incident."

FCC Fines Restaurateur For 2-meter Operation

A New Jersey restaurant and its owner are being fined \$10,000 by the FCC for alleged unlicensed operation on 145-MHz spectrum allocated for use by radio amateurs. The action was taken against owner Pang Cheng and Best Wok restaurant in Westville. In 2001 and 2003, the FCC warned the restaurant that operation of transmitting equipment without a license violated the Communications Act and could lead to penalties. FCC agents from Philadelphia tracked the 2-meter signal in 2003 to the restaurant and inspected the equipment, used to communi-

cate between the restaurant and a vehicle, the commission said. The operation was on 145.8376 MHz. Restaurant manager Sae C. Hauwo told the FCC that Best Wok had stopped using the long-range cordless telephone after an FCC warning notice in 2001. But, according to the commission, the manager admitted that the restaurant resumed using the long-range cordless telephone after another communication system did not provide sufficient coverage.

Tsunami Relief Efforts Commended

The work of the public safety officials in Indonesia, Sri Lanka, India, Thailand, Somalia, the Maldives, Malaysia, Myanmar, Tanzania, Bangladesh, Kenya, and Seychelles following the earthquake and tsunamis that struck the region has been praised by the Association of Public-Safety Communications Officials. "APCO International is deeply saddened by the destruction that has resulted from these natural disasters and thanks the public safety personnel who have been called upon to help restore order and safety in these communities," APCO International President Greg Ballentine said. "It is important during these times that we acknowledge the public safety personnel who are willing to risk their own lives to protect the lives of others." APCO International represents public safety professionals in countries around the world, including Malaysia, India, and Indonesia. "This is one of the worst natural disasters we have seen in our time," Ballentine said. "We must fulfill our duty as public safety professionals to provide assistance to those in need."

Morse Requirement For Amateurs Under FCC Review

Possible changes to the current Morse code requirement for radio amateur licensing are under review by the FCC as it develops a Notice of Proposed Rule Making (NPRM) that may be announced by mid-year. Eighteen petitions have been filed seeking changes to Part 97, the FCC's rules regarding amateur radio. The petitions range from eliminating the code requirement entirely to making it even more stringent than the current five words-per-minute for some license classes. The Commission is reviewing thousands of comments contained in the 18 petitions. Once the NPRM is released to the public, another period of comment would be established. A Report and Order to implement any changes would not likely come until late 2006 or 2007.

Army Awards Harris Corp. Contract For Military Radios

The Harris Corp. announced it has been awarded a U.S. Army contract to provide radio equipment as part of the service's Matrix remote munitions control system. According to a statement from Harris, Matrix is "a portable, battery-operated munitions control system that allows soldiers to identify an appro-

appropriate target and select a proper defensive attack from a remote location." The company said Matrix is "ideal for firebase security, landing-zone security and both infrastructure and check-point protection." Harris RF Communications is a worldwide supplier of voice and data communications products, systems, and networks to military, government, and commercial organizations.

Fine Against Florida CBer Reduced

The FCC has reduced its fine, from \$10,000 to \$550, against a Jacksonville, Florida, man for operating a Citizens Band radio station without authorization. In a petition to the commission, Tommie Salter did "not contest the violations found in the Forfeiture Order," the FCC said, but sought a reduction in the amount of the fine because he is "retired and living on Social Security and fixed retirement benefits." Copies of tax returns were submitted to support Salter's claims. The FCC responded that it believes "that payment of a \$10,000 forfeiture would pose a financial hardship" and that it found "a reduction of the forfeiture to \$550 is warranted based on his inability to pay."



Following complaints of interference last year, the FCC had directed Salter to restrict his hours of operation to midnight to 6 a.m. On August 10, agents from the commission's Tampa office located the source of a CB signal to Salter's residence at 9:59 a.m. and subsequently "observed that Mr. Salter was operating a CB transmitter that was not FCC-certificated for CB radio use." The initial fine was announced last year.

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Looking At The Far Side Of The Sun

Using a technique called, “helioseismic holography,” scientists are able to “see” the far side of the Sun! This method of seeing the opposite side of the Sun is the result of many years of analysis and modeling. In 1962, observers noticed patches on the surface of the Sun that oscillate up and down with a typical period of about five minutes. For a number of years, until 1970, these waves were a mystery.

In 1970, scientists identified the mysterious source of these oscillations and confirmed their discovery by 1975. These five-minute-long surface oscillations are due to sound waves generated and trapped inside the Sun. They refract away from the Sun’s hot core and reflect back and forth between different parts of the photosphere. Pressure fluctuations in the turbulent convective motions of the Sun’s interior cause the sound waves. The pressure fluctuations are about the size of California and are like bubbles, called “solar granulation.”

The photosphere is the visible surface of the Sun. Since the Sun is a ball of gas, this is not a solid surface but actually a layer about 100 kilometers thick. This layer is sort of like one of the layers in our own atmosphere (the troposphere, for instance). The photosphere is very thin compared to the 700,000-kilome-

ter radius of the Sun.

A number of features can be observed in the photosphere with a simple telescope. (Note: never look directly at the Sun, including through a telescope. You should also use a good filter to reduce the intensity of sunlight to safely observable levels, as reflected sunlight may also cause damage to your eye). These photospheric features include dark sunspots, bright faculae, and granules. The flow of material in the photosphere may also be measured using the Doppler effect. These measurements reveal additional features, such as the “supergranules” as well as large-scale flows and a pattern of waves and oscillations. These large-scale patterns contain the helioseismic information that reveals what is on the far side of the Sun. The study of this phenomenon is “helioseismology.”

After many years of careful observation and analysis, today’s helioseismologists use these sound waves, and the modes of vibration they produce, to probe the interior of the Sun the same way that geologists use seismic waves from earthquakes to probe the inside of the Earth. This technique of seeing the far side of the Sun using helioseismic information results in the holography that gives propagation forecasters and scientists a view of

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 frequencies 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>.

Optimum Working Frequencies (MHz) - For June 2005 - Flux = 80, SSN = 22- 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	21	20	18	16	15	14	13	12	12	12	14	16	17	18	19	20	20	21	21	22	22		
NORTHERN SOUTH AMERICA	29	28	28	26	24	22	20	18	17	16	15	14	14	17	19	21	23	24	26	27	27	28	28	29		
CENTRAL SOUTH AMERICA	27	24	22	20	19	17	16	15	15	14	13	17	17	18	21	23	24	25	27	28	28	29	29	28		
SOUTHERN SOUTH AMERICA	23	16	15	14	14	13	13	12	12	12	12	12	12	16	18	20	22	24	25	26	27	28	29	28		
WESTERN EUROPE	13	12	11	11	10	10	14	13	12	11	11	12	15	17	18	19	20	20	20	20	19	18	17	16		
EASTERN EUROPE	9	9	9	9	12	15	14	13	12	11	10	10	13	16	17	18	19	19	18	17	16	14	10	10		
EASTERN NORTH AMERICA	25	25	25	25	24	23	22	20	18	17	15	15	16	18	20	21	22	23	24	24	25	25	25	25		
CENTRAL NORTH AMERICA	14	14	14	14	14	13	13	12	11	10	9	9	9	10	11	12	12	13	13	14	14	14	14	14		
WESTERN NORTH AMERICA	7	7	7	7	7	7	7	7	7	6	5	5	4	4	5	6	6	6	7	7	7	7	7	7		
SOUTHERN NORTH AMERICA	23	23	23	23	22	22	20	18	17	15	14	13	13	14	15	17	18	19	20	21	22	22	22	23		
NORTHERN AFRICA	17	16	14	13	13	13	14	14	13	12	11	13	15	17	18	19	20	20	21	21	20	20	20	19		
CENTRAL AFRICA	18	16	15	14	14	15	14	13	12	11	11	12	15	17	18	19	20	20	21	21	21	21	21	19		
SOUTH AFRICA	15	14	13	13	13	12	14	13	18	17	17	17	18	20	21	22	22	23	23	23	21	19	18	16		
MIDDLE EAST	15	14	14	14	15	16	14	13	12	11	10	10	14	16	18	19	19	20	20	20	19	19	19	17		
JAPAN	19	20	20	21	20	20	20	19	18	17	16	15	13	13	13	15	14	14	14	15	16	17	18	19		
CENTRAL ASIA	20	21	21	21	20	20	19	18	17	15	14	13	13	13	13	15	16	17	15	14	14	15	17	19		
INDIA	18	18	19	19	18	17	16	13	12	11	11	10	10	10	9	9	9	8	8	11	14	16	17	17		
THAILAND	17	19	20	21	20	20	19	18	17	16	14	13	12	12	13	15	17	18	16	15	14	13	13	15		
AUSTRALIA	29	30	30	30	30	30	29	28	25	22	20	19	17	16	15	15	14	13	13	13	16	22	26	28		
CHINA	18	19	19	20	20	20	19	18	16	15	14	13	12	11	13	15	16	15	15	15	15	16	17	18		
SOUTH PACIFIC	29	29	29	28	27	26	23	16	15	14	14	13	13	12	12	12	12	12	12	20	24	26	27	28		
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 MIDWEST																										
CARIBBEAN	25	25	24	24	22	20	18	17	16	14	14	13	15	17	18	20	21	22	23	23	24	24	24	25		
NORTHERN SOUTH AMERICA	26	26	26	23	21	20	18	17	15	15	14	13	14	16	19	20	22	23	24	24	25	26	26	26		
CENTRAL SOUTH AMERICA	27	24	22	20	19	17	16	15	15	14	13	16	17	20	22	23	25	26	27	28	28	29	29	28		
SOUTHERN SOUTH AMERICA	22	16	15	14	14	13	13	12	12	12	12	12	13	18	20	22	23	25	26	27	28	28	27	25		
WESTERN EUROPE	15	14	13	12	11	10	13	13	12	12	14	16	17	18	19	19	20	20	20	20	20	19	18	17		
EASTERN EUROPE	10	10	9	9	9	14	13	12	12	11	13	15	17	18	19	20	20	19	18	17	16	14	11			
EASTERN NORTH AMERICA	18	18	18	18	17	16	14	13	12	11	11	11	12	13	14	15	16	17	17	18	18	18	18	18		
CENTRAL NORTH AMERICA	8	8	8	8	8	8	7	6	6	5	5	5	5	6	6	7	7	8	8	8	8	8	8	8		
WESTERN NORTH AMERICA	14	14	14	14	14	13	13	12	11	10	9	9	9	9	10	11	12	12	13	13	14	14	14	14		
SOUTHERN NORTH AMERICA	16	16	16	16	15	15	13	12	11	10	10	9	9	10	11	12	13	14	14	15	15	16	16	16		
NORTHERN AFRICA	20	19	18	16	15	15	15	15	15	15	15	16	17	18	19	19	20	20	20	20	20	20	20	20		
CENTRAL AFRICA	18	16	15	14	14	14	15	14	14	15	16	17	18	19	19	20	20	20	21	21	21	21	21	19		
SOUTH AFRICA	14	14	13	13	12	12	12	20	18	17	17	19	21	23	24	26	27	27	25	20	18	17	16	15		
MIDDLE EAST	15	14	13	13	14	15	14	13	12	12	14	16	17	18	19	20	20	21	21	20	20	19	18	16		
JAPAN	19	20	20	20	20	19	18	17	16	14	13	12	12	14	16	15	14	14	14	15	16	17	18	19		
CENTRAL ASIA	20	21	20	20	19	19	18	16	15	14	13	12	12	15	16	18	18	17	16	15	14	15	17	19		
INDIA	13	15	16	17	17	15	14	13	12	11	10	13	15	17	17	16	14	12	10	9	9	9	8	8		
THAILAND	17	18	20	20	19	18	16	15	14	13	12	11	13	15	17	18	19	18	17	16	15	14	13	15		
AUSTRALIA	29	30	30	30	29	29	28	26	24	21	19	18	17	16	15	14	13	13	13	12	17	23	26	28		
CHINA	18	19	20	20	19	18	16	15	13	12	12	11	13	15	17	17	16	14	13	13	13	15	17	18		
SOUTH PACIFIC	29	29	29	28	27	25	21	15	15	14	13	13	13	12	12	12	12	12	12	21	25	27	28	29		
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 EAST COAST																										
CARIBBEAN	20	20	19	18	16	15	14	13	12	11	11	11	13	14	15	16	17	18	19	19	19	20	20	20		
NORTHERN SOUTH AMERICA	23	23	22	20	18	17	15	14	13	13	12	12	14	16	17	19	20	21	21	22	23	23	23	23		
CENTRAL SOUTH AMERICA	26	24	22	20	19	17	16	15	14	14	13	16	19	21	23	24	25	26	27	28	28	28	29	28		
SOUTHERN SOUTH AMERICA	20	16	15	14	14	13	13	12	12	12	12	12	18	20	22	23	25	26	27	28	28	28	27	24		
WESTERN EUROPE	17	16	14	13	12	12	13	13	13	14	15	16	17	18	18	19	19	19	19	19	19	19	18	18		
EASTERN EUROPE	12	11	11	10	10	13	14	13	13	15	16	17	18	19	19	20	20	20	19	18	17	16	13			
EASTERN NORTH AMERICA	9	9	8	8	8	7	6	6	5	5	5	5	6	6	7	7	8	8	8	8	9	9	9	9		
CENTRAL NORTH AMERICA	19	19	19	18	18	17	15	14	13	12	11	11	13	14	15	16	17	18	18	19	19	19	19	19		
WESTERN NORTH AMERICA	26	25	25	25	24	23	22	20	18	17	15	15	16	18	20	21	22	23	24	24	25	25	25	26		
SOUTHERN NORTH AMERICA	20	20	20	19	18	17	15	14	13	12	11	11	12	13	15	16	17	18	18	19	19	20	20	20		
NORTHERN AFRICA	21	19	17	16	15	14	14	15	15	16	18	19	21	22	23	24	24	25	25	25	25	25	24	23		
CENTRAL AFRICA	18	16	15	14	13	13	15	15	15	16	18	19	21	22	23	24	24	25	25	25	24	24	21	19		
SOUTH AFRICA	14	14	13	13	12	12	12	17	16	16	17	19	21	23	24	26	27	27	25	20	18	17	16	15		
MIDDLE EAST	18	17	16	15	15	15	14	14	14	14	16	17	18	19	19	20	20	21	21	21	21	21	21	20		
JAPAN	19	20	20	19	18	16	15	14	13	13	15	16	17	17	15	14	14	14	15	16	17	18	19	19		
CENTRAL ASIA	20	20	19	19	18	16	15	14	13	12	13	15	17	18	19	19	19	18	16	15	15	15	17	19		
INDIA	9	9	9	8	14	15	14	13	12	13	15	17	18	19	19	19	19	18	17	16	15	11	10	9		
THAILAND	16	18	19	18	16	15	14	13	12	12	15	16	18	19	19	20	20	19	18	16	15	14	14	14		
AUSTRALIA	29	30	29	29	29	27	24	22	20	19	17	16	15	14	14	13	13	12	12	18	24	26	28	18		
CHINA	18	19	19	18	17	15	14	13	12	12	14	16	17	18	18	17	16	15	13	12	12	14	16	17		
SOUTH PACIFIC	28	28	28	27	25	23	18	15	14	14	13	13	12	12	12	12	12	12	12	22	24	26	27	28		

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- Built-in flashlight and emergency siren
- Inputs for AC adaptor and earphones

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- Built-in Cell Phone Charger
- Built-in flashlight and emergency siren
- Inputs for AC adaptor and earphones
- Rugged splash-proof ABS body

Dimensions: 6.7"L x 6.5"H x 2.5"W Weight: 11lbs. 5oz.
Power Source: Hand-Crank Power Generator with rechargeable battery pack, 3 AA batteries (not included) or AC adaptor (not included)



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what is coming around to the visible side. The apparatus that has been created to view the far side of the Sun is the Michelson-Doppler Imager (MDI). Using the MDI, we can detect the progress of old activity, and detect new activity before it arrives, a full week or so before a group of sunspots rotate around to the Earth-facing side.

You can see the latest helioseismic image on my Propagation Resource Center page at <http://prop.hfradio.org/>.

From there, click on the "Visual Space Weather" link, and then look about halfway down that page. For a detailed look at how helioseismology works, check out http://science.msfc.nasa.gov/ssl/pad/solar/p_modes.htm.

HF Propagation For June

June is a month of typical summertime radio propagation on the shortwave (HF) bands. Solar absorption is expected to be

at seasonally high levels, resulting in generally weaker signals during the hours of daylight when compared to reception during the winter and spring months. Nighttime usable frequencies to most parts of the world are higher than at any other time of the year, while the daytime usable frequencies are generally lower than those during winter.

At the highest end of the HF spectrum, propagation from DX locations east and west is rare. North and south paths will be hot, especially around sunrise and sunset. Nineteen and 16 meters will be the most reliable daytime DX bands, while 19 and 22 may offer some nighttime openings during periods with higher flux levels.

Twenty-five and 31 meters will be fairly good in the evenings and mornings. At night, those paths that remain open will be marginal. The most reliable band for both daytime and nighttime should be a toss-up between these two bands.

Forty-one and 49 meters should offer good DX conditions during the night, despite higher static. Look for Europe and Africa as early as sunset. After midnight, start looking south and west for the Pacific, South America, and Asia. Short-skip should be possible out to about 750 miles during the daytime.

Expect some openings on 75 and 90, similar to how 40 meters will be acting. Fairly frequent short-skip openings up to 1,000 miles are possible during darkness, but expect very few daytime openings with all the static and absorption. Mediumwave and 120-meter propagation is rough in the summer due to the high static and higher overall absorption caused by the short nights and higher D-layer ionization.

Watch for solar coronal holes to cause degradation of HF propagation. These coronal holes spew out huge clouds of solar plasma toward Earth. This causes geomagnetic disturbances that in turn cause the ionosphere to lose its ability to refract HF radio waves. At least one week of poor propagation is expected during June because of coronal hole activity.

Thunderstorm noise and other natural static noise increase considerably during June and the summer months, masking exotic DX signals. This can make catching weak DX signals a true challenge.

VHF Conditions

The summertime sporadic-E (Es) season for the Northern Hemisphere begins in force in May, with June seeing strong

When Disaster Strikes...



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and frequent *Es* openings. Within the normal *E*-layer of the ionosphere, regions of abnormally intense ionization are formed. Through June, you can expect to see 20 to 24 days with some *Es* activity. Usually these openings are single-hop events with paths up to 1,000 miles, but double-hop is possible during June. Look for *Es* on lower VHF frequencies throughout the day but especially in the afternoon.

A seasonal decline in trans-equatorial (TE) propagation occurs by June, though an occasional opening may still be possible on the low VHF bands toward South America from the southern tier states and the Caribbean. The best time to check for TE openings is between 9 and 11 p.m. local daylight time. These TE openings will be north-south paths that cross the geomagnetic equator at an approximate right angle.

It might be possible to catch a tropospheric ducting event. Watch for high-pressure weather systems, where ducting is most likely to develop. If the weather forecast maps show mean-sea-level atmospheric pressure in millibars, look for tropospheric possibilities when a stalled high-pressure cell in your area reaches 1025 millibars over the path you're interested in. Of course, it is most likely to occur when this high-pressure cell develops over moist air. This is why the path between Hawaii and the West Coast has made communications possible on VHF with as little as 5 watts, over a path of 2,500 miles.

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

If you know that conditions are favorable for tropospheric ducting in your area, try tuning around the 162-MHz weather channels to see if you can hear stations way beyond your normal line-of-sight reception. It's possible to hear stations over 800 miles away. Amateur radio repeaters are another source of DX that you might hear from the other end of the duct.

These openings can last for several days, and signals will remain stable and strong for long periods during the open-

ing. The duct may, however, move slowly, causing you to hear one signal well for a few hours, then have it fade out and another station take its place, from another area altogether.

Current Cycle 23 Progress

The Royal Observatory of Belgium reports that the monthly mean observed sunspot number for February 2005 is 29.1, continuing the downward trend. The lowest daily sunspot value during February, recorded on February 28, was 7. The highest daily sunspot count was 56 on February 12.

Each solar cycle is based on the monthly smoothed sunspot number, which is calculated by creating a 12-month running average of the monthly mean sunspot number. The 12-month running smoothed sunspot number centered on August is 39.3, down from July's 40.2. A smoothed sunspot count of 17, give or take about 12 points, is expected for June by the Solar Influences Data analysis Center (SIDC).

The Dominion Radio Astrophysical Observatory at Penticton, BC, Canada, reports a 10.7-centimeter observed monthly mean solar flux of 97.3 for February 2005, down from January's 102.4. The 12-month smoothed 10.7-centimeter flux centered on August 2004 is 105. The predicted smoothed 10.7-centimeter solar flux for May 2005 is about 80, give or take about 16 points.

The observed monthly mean planetary A-Index (Ap) for February 2005 is 11, down nicely from January's 22. The 12-month smoothed Ap index centered on August 2004 is 13.8, the same as for July. Expect the overall geomagnetic activity to be quiet to active during most days in June, with some isolated periods of storm level activity.

I'd Like To Hear From You

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, which I have recently updated to include solar images, graphs, and other visual resources that you can view on newer cell phones. If you have a cell phone that can browse the Internet and want the latest propagation information like the solar flux, Ap reading, and so forth, check out <http://wap.hfradio.org/>, the wireless version of my propagation site.

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

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Bushcomm's BBA-100S HF Antenna

From the land Down Under—Perth, Australia, to be exact—comes an absolutely *superior* antenna that I've had the pleasure to use for a few months now at my home QTH. The 66-foot-long Bushcomm BBA-100S is a shorter version of the BBA-100, which is 90 feet long.

If you're a ham, the specs on the BBA-100S are pretty straightforward. It covers 3.5 to 30 MHz *without* a tuner, and you can kick up the power to 300 watts PEP. I've seen a lot of wire antennas in many configurations, from simple dipoles claiming wild specs to vertical antennas with exotic looks and equally exotic specs. Some work, some don't. Many of these antennas you can make at home in an afternoon with a soldering iron and some wire or tubing and get good results. But when an antenna comes my way that stands out from the crowd, it's time to tell the radio world. Such is the case with the Bushcomm BBA-100S HF antenna, sold exclusively in the United States by Array Solutions (www.arrayolutions.com). Jay Terleski of Array Solutions has been *very* patient with me doing this review, but as I told Jay, giving a product a fair, long-term examination is well worth the time and effort. So let's look at the BBA-100S to see what it can do for you, whether you're a ham or hardcore SWL or DXer.

Built To Last

The BBA-100S is a unique antenna with stainless construction throughout. Connections, balun, and spacing elements are all solid and well made. You see it right away! Opening the box is like opening a much-wanted gift during the holidays; you instantly feel like you're in for a treat and really have something worth your hard-earned money.

Out of the box you can be up and running with the antenna in less than an hour, provided you've planned your installation. My weakness as a radio nut is that I always *think* I've got what I need, but then reality sets in. This time it was the coax. Simply *being sure* you have enough of the right thing doesn't work.



The box arrived intact and the antenna was well protected from the rigors of transit with ample bubble wrap.

Plan, plan, plan! Use your measuring tape and some rope; plan where the center SO-239 connector will end up if you mount the BBA-100S between support x and y. You'll want enough slack in the coax—preferably RG58U or equivalent (*NOT* the heavy and hard-to-work-with RG8U)—so the antenna isn't pulled to the side. It's supposed to hang freely between two tall supports that are at least 25 to 30 feet above ground. I put mine between two wooden 2 x 2 poles; one was attached to the far end of the shed and the other at the opposite end of our yard.



The BBA-100S antenna out of the box and ready for an easy afternoon's hoisting.



Carefully untape each roll of wire and extend the antenna. The entire process takes a few minutes, but it must be done with care and planning to ensure the wires uncoil easily.

That's no small task in my neck of the woods, but this shorter version antenna just fits.

Besides the coax, you'll need to plan how much nylon rope you'll need. Don't get the cheap stuff; you're hanging an antenna that weighs about 10 pounds. It's not that it's heavy or cumbersome, but you do *need* relatively strong rope!

The antenna comes completely assembled, so there's no soldering, cutting, measuring, or fiddling around. The well-written, one-page instructions are correct about warning you to unpack and unfold the antenna carefully. Wait for a good "antenna day" (now is a good time of year to get this antenna and hoist it up). Unroll the antenna very slowly in your yard. The antenna is actually three parallel *stainless steel* wires spaced apart and held together by six small diameter white plastic tubes made of UV resistant fiberglass (it's about 4 feet, 3 inches wide). At each end is a very sturdy black egg-type insulator. Following the directions very carefully, step by step, after you've opened

the antenna out on the lawn, you'll remove the masking tape holding the wires and spread it out further, working your way along each end and finally removing the small plastic wire twists until the antenna is spread out to its full length.

I threaded the rope through a stainless steel eye hook fastened near the top of each 2 x 2 post, brought the rope down each post to a marine-grade cleat, wrapping the near-ground-level rope around the cleat. This way I can service the antenna or lower it during extreme weather, which happened twice within the past six months!

As always, I recommend having a friend help you install the antenna. That extra muscle and set of eyes always helps, even on calm, sunny days. Why struggle with a long pole with an antenna and rope dangling from the entire assembly when you can work smarter and easier with some help?

The Real Test

The past few months I've been doing more listening than talking on the air (can you imagine that?). My favorite area of the world to tune is Papua New Guinea and parts of Africa. Signals from Port Moresby on 4980 were consistently solid. Signals from Nigeria on 4770 were equally good. I found the noise level to be particularly low across the board, with the exception being near the 3-MHz end of the spectrum. Chalk it up to living in the 21st Century, with all kinds of devices all around us from computer monitors to leaky powerline insulators. Lucky for us our receivers and ham transceivers are equipped with DSP and outstanding noise filters. But a good deal of the credit for elimination of noise and unwanted signals also clearly goes to the BBA-100S. I've used lots of other antennas and this is the first one that has provided consistent, better-than-expected signal delivery *with* a reduced noise level to boot. I can't get that with my homebrew dipole or commercially made G5RV!

On the air on 20, 40 and 75 meters, my signal reports were better than I've experienced in a long, long time. I've also spoken with folks in the military who use this antenna and they're equally pleased (and these guys are pickier than most hams—



Here you see the antenna unfolded with the six fiberglass spacers and eight taped coils.



Once you've completely unfolded the antenna to its entire length, connect your coax to the balun, properly sealing it from Mother Nature, of course. Next, connect the rope of your choice (but don't skimp) to the provided egg insulators and hoist away!



Here's a simple contraption I made from a four-by-two-foot peg board. If you need a way to store the antenna in the event of extreme weather, or to transport it should you move, this is an easy method. Trust me, you're never in a million years going to be able to simply lower this antenna and wind it on a large mailing tube or spool! Using pliers and an Xacto knife, I notched out three grooves on each long side of the board. (I used a peg board because it's light and the holes are made to order!). Working with one end of the antenna, fasten the egg insulator to the top center through one of the holes using a heavy duty cable tie or twine. Then get your antenna helper to stand in front of you, gently pulling the antenna away from you so you're able to "wind" the entire antenna over the board, carefully nudging the three antenna wires into the grooves with each turn of the board. When you get to the far end, simply attach the other egg insulator with a cable tie or twine. This took me all of 10 minutes to do and saved a lot of headaches. But you really do need that helper to hold the wires straight out away from you as you "wind" the antenna onto the board.

they have to be!). My SWR at 14.300 was 1.6:1; at 28.460 it was about 1.5:1. One of my contacts on 20 meters, using the PSK31 mode and the SkySweep program from Computer-Aided Technologies, was with Jean, F8RZ. Jean reported "...several answers [to his CQ call]...and it is a bit late for the 20-meter band I think, but the copy looks very good." What more can I say?

Then there was Dave in Beerse, Belgium, OO4DSQ, telling me my signal was a solid 599. His was also excellent with the BBA-100S antenna.

A Solid Performer

Bushcomm's been around for 15 years and makes a complete line of antennas for practically any HF installation. But if you're looking for an excellent broadband HF antenna, at \$350 from Array Solutions, you'll really be pleased with the BBA-100S (or the larger BBA-100). Just because it's "broadbanded" doesn't mean it's a compromise antenna, far from it. I've used it as a primary HF ham antenna and for extended shortwave listening/DXing as well. It's built like a tank and works extremely well!

For more information, contact Array Solutions at www.arrayolutions.com or write them at 350 Gloria Road, Sunnyvale, TX 75182 or phone 972-203-2008. Array Solutions also has higher power models using their own high-power baluns. Please tell them you read about the Bushcomm BBA-100S in *Popular Communications!* ■



The BBA-100S up and ready to go!

Radio Fun And Going Back In Time

Q. Who discovered the ionosphere and when?

A. In 1899 Marconi began a series of experimental demonstrations for the British Army and Navy as well as the Post Office. One of the official observers was Admiral Sir Henry Jackson who represented the Admiralty. Jackson, himself a wireless inventor, recognized that something was working on the signals after they were transmitted, because their range was longer than the Earth's curvature would allow. In 1902 Jackson wrote an influential paper suggesting that electro-magnetic waves, which were known to move in straight lines, were moving up and being reflected by something in the upper atmosphere. That same year Englishman Oliver Heaviside and American Arthur Kennelly developed the hypothesis that an ionized layer was reflecting the waves back to Earth. It was not until experiments in the 1920s that the theory was proved undoubtedly true. Marconi, more interested in the practical than the theoretical, left this research to others.

Q. Are our troops in Iraq getting radio *a la* "Good Morning Vietnam"?

A. Yes they are. In December 2003 American Forces Network-Iraq went on the air with six hours of live radio. Produced by the troops and for the troops, Freedom Radio blared forth at 107.7 FM. Through satellite uplinks the radio station developed service in other major troop concentrations like Mosul, Tikrit, Balad, and Kirkuk. By January of 2005 Radio Freedom was billing itself as "the most heavily armed station on the air." Yes, the staff did carry weapons like everyone else in America's military in the area. With an estimated audience of 100,000, the station got commanders' information to the troops, including how to stay safe and what progress is being made in the country like building schools and helping the local communities. Produced mostly by young GIs, the station is putting out 16 hours a day of locally produced programming. The staff writes the one-liners and announcements are all delivered live. There are two newscasts daily. The "mix" runs from Country and Western to Rap, Hip Hop, and Classic Rock. Service members can make requests by phone and e-mail. Some e-mails have even come from the States. Anyone who doesn't like the programming should remember, they *are* the most heavily armed station on the air!

Q. What was the first major battle in which radio intercepts played a role?

A. In August 1914 the German 8th Army was in Eastern Prussia (now northern Poland) with two Russian armies moving toward it. The German commander was frantically trying to get permission for a general evacuation. Berlin felt he had lost his nerve and sent Generals Von Hindenberg and Ludendorff to replace him. Meanwhile German Intercept Operators were doing what they had been doing since 1909: monitoring foreign radio traffic. Russian radio traffic was in a shambles. Poor training and lax discipline was rampant. Sending stations would call receiving stations and ask what codes they had before trans-

mitting coding messages. All inquiries were made in plain language and coded messages left place and personnel names in plain language. German interceptors listened in disbelief as the commander of the Russian 1st Army sent a detailed plan of his future troop movements and intentions to the commander of the Russian 2nd Army in plain language. The commander of the Russian 2nd Army replied with his intentions and his belief that the Germans were in retreat, also in plain language. The Germans were able to see that the two Russian armies were moving too far apart to support each other. They sent screening forces toward the Russian 1st, but surrounded and cut off the Russian 2nd. The Battle of Tannenburg, as it was to be called, lasted from August 26 to 30 with 13,000 German casualties. Russian losses were 30,000 casualties, with 95,000 captured and less than 10,000 troops returning home. More than 500 Russian artillery pieces and tons of war supplies were taken or destroyed by the Germans. The battle completely demoralized the entire Russian Army and was their greatest defeat of World War I. ■

Looking Back...

Five Years Ago In Pop'Comm

New on the radio market was the ICOM IC-R3 handheld wideband receiver, featuring a color display, lithium ion battery, and coverage from 0.5 to 2450 MHz, less cellular, of course. And AOR's new entry was the AR8200 Mark II B with 1,000 memories and a host of features including computer control and programming. Up front, we spoke out about the NAB (National Association of Broadcasters) attitude toward LPFM (Low-Power FM) and how money talks. Some things never change!

Ten Years Ago In Pop'Comm

New at RadioShack was the PRO-2035 scanner that scanned its 1,000-channels at 50 channels per second; they called it HyperScan. Back then, Mitsubishi International said of its new AT-1000 "transportable cellular" that it was "the smallest, lightest transportable cellphone available." It weighed 26.5 ounces and measured 8.3 x 3.7 x 1.6 inches. MSRP was \$249.

And where is Lindsay Osbourne today? Photographed for our "Pirates Den" column at the controls of Radio Unicorn as an "intern," she was a mere 10 years old in June 1995.

Twenty Years Ago In Pop'Comm

It seems like yesterday, but new at the time was Kenwood's R-2000 receiver, covering 150 kHz to 30 MHz. Vietnam "more than a decade after the war" was a listening target in an article in the June 1985 *Pop'Comm*. And they're still around today: numbers stations on shortwave and, yes, UFOs and government aircraft "black projects." It was hot then, and it's still hot 20 years later!

Are You Ready To Deploy In An Emergency?

As radio hobbyists involved with emergency communications (EmComm), we need to be ready to deploy in support of our served agencies (Red Cross, County EMA, Salvation Army, etc.) at a moment's notice. Fifteen to 20 years ago it was a simple matter of grabbing your trusty 2-meter HT and a couple of spare battery packs and walking out the door. *Not any more!*

The EmComm scene has changed dramatically in the last several years since 9/11. The cataclysmic loss of communications, including cell phones, Public Service Radio repeaters, and telephone service, coupled with the staggering influx of dead and injured victims after the attack left professional emergency responders shaking their collective heads in dismay. The huge flood of injured victims into an emergency medical system that was grossly overextended caught EMS responders and local hospital emergency rooms totally unprepared. Had it not been for the ARES/RACES emergency communications volunteers coming to the forefront and furnishing critical command and control communications during the first few hours and days after the attacks, recovery from the terrorist's bloodshed would have taken much longer.

The Anatomy Of A Disaster

Regardless of whether emergency situations are manmade or natural disasters, terrorist acts, or acts of God, there are certain similarities in all of them, total chaos being one. Conversely, while one disaster will mimic another, no two are exactly the same. This is one area where realistic training comes into play. All too often disaster responders are trained to handle one or two specific types of real-world scenarios that are unique to their particular area or local threat (for example, flooding, nuclear power plant, and earthquake). Training scenarios are done "by the book." The reality is that when things go terribly wrong, the first thing to go out the window is that proverbial "book."

Training is great. But realistic training—where the responders are forced to think outside the box, come up with solutions to problems encountered in the training scenario, and are graded on their traits and actions—is the best situation. Unfortunately, large-scale realistic training scenarios are extremely expensive to stage, highly time consuming, and once a first responder/volunteer is committed, it is difficult to release him/her from the scenario to take care of the day-to-day situations which occur in their respective lives. After all, "It's only training."

Terrorism Is Unique

On the other side of the ledger, the disaster doesn't care. It happens, or is caused to happen, and emergency responders must cope to the best of their abilities with each situation they



Here's what I carry for radio gear in my Jump-Kit/Go-Bag. Front row (L-R): FT-817/LDG Z-11 auto tuner in a Mt. Ops Tac-Pack, HF Packer amp sitting atop a Mirage BD-35 VHF/UHF amp (center), a small set of keyer paddles (blue) mic, RadioShack HTX-420 dualband VHF/UHF HT, 200-channel RadioShack scanner, dipole antenna (in the yellow/black camping clothes line dispensers) along with 50 feet of 300-ohm ladder line, which allows me to use the 40-meter dipole antenna as a multiband antenna via the Z-11 tuner and a 4:1 internal balun. Back row ((L-R)) Ventenna HF vertical, (black bag), HF coil-loaded portable antenna (Red Mt. Ops bag), 3A switching AC power supply and 15-feet of AC line cord, plastic box of RF connectors, assorted odds/ends to make everything work together, and tool kit (gray plastic box on the extreme right side). Tools are a must in the event you have to repair antennas/feedlines, or possibly kluge together some power connectors in a pinch. Everything fits inside the blue portable soft-sided cooler that sits dead center in the middle of the mess! Personal items fit into a small soft-sided suitcase which stays in my truck. The radio gear lives in the house, unless I am called out for a drill or emergency situation. This keeps it safe from prying eyes and possible theft from my vehicle.

encounter. In the case of terrorism, it takes very little work on the part of the terrorist to create utter havoc and widespread devastation on a grand scale.

Terrorism is unique in that it is extremely difficult to predict, counter, and prevent. If your Intel is really, *really* good, then you have some chance to interdict and either prevent or minimize the evil deed. All the good Intel in the world is useless, though, unless the people receiving the Intel are prepared to act swiftly in the face of threat. The effort and involvement on the part of the counter-terrorism groups is colossal, while the efforts of the terrorists are relatively small by comparison. In short, to prevent terrorism you have to expand massive amounts of money and manpower along with thousands of hours sifting through intelligence reports, including COMINT (Communications Intel. such as radio, cell phone, and Internet



David R. Hassall, WA5DJJ, of Las Cruces, New Mexico, furnished the following photos of his FT-817 portable EmComm Jump-Kit. Dave uses a plastic tool box from a major home improvement center. Notice how things just "fit together" to make a nice rugged, portable Jump-Kit. Dave, like me, favors the Yaesu FT-817 QRP transceiver as the prime mover for his EmComm gear. The toolbox shows all the "stuff" that goes inside to complete his RF gear for emergency communications work.

traffic), HUMINT (Human Intel, such as reports and third-hand information), and OPINT (Operations Intel, such as minutiae ferreted out from the smallest of details that, when viewed in total with other snippets of information, form "the big picture" of how, when, where, why, and who is going to perform a terrorist act). This is all *before* any form of interdiction can take place. And, God help you if you're wrong!

As I have indicated previously in "Homeland Security," the counter-terrorism community has to be right 100 percent of the time. The "bad guys" only have to get it right once! All this means that, sooner or later, America will be a victim of more terrorist activity, whether it's here at home or against American interests elsewhere in the world. The bad guys will definitely strike again. When they do, it's up to us, the emergency response volunteers, EmComm folks in particular, to be ready to respond and do the job we're trained to do: provide a continuity of communications for command and control purposes in the support of disaster relief efforts.

Our Mandate

EmComm exists to provide critical communications links and channels when the normal ones are either degraded or totally nonexistent immediately following a disaster. As amateur radio operators, we are unique in the world of

emergency communications. Our seemingly unlimited range of frequencies, from HF through microwaves, coupled with our sophisticated equipment that is capable of being both mode and frequency agile, allows us extreme versatility in providing short-range tactical and long-haul communications in support of disaster relief efforts.

Once these critical links have been established, EmComm volunteers might well find themselves relegated to trafficking Health and Welfare messages to and from the disaster site. While certainly not as glamorous as "shadowing" one of the incident commanders, H&W messages are critical in bringing news of loved ones trapped by the disaster to their families outside the disaster area. Our gear and span of frequencies allows us to provide digital error-free communications as well as traditional analog voice comms. We are an Incident Commander's salvation, when it comes to communications.

Whatever our task, whatever served agency we support, we must, and I cannot emphasize this enough, we *must* act in a professional manner and do what is asked of us in our respective areas of expertise. Here is where EmComm training (like that offered by the ARRL) is of paramount importance. Not only does this preparation help train inexperienced radio communicators, it gets each participant fully involved with all aspects of disaster mitigation. Once you've completed this EmComm training you will

have a much better understanding of how the disaster relief efforts progress and how you, as an EmComm volunteer, fit into the overall picture. The one thing that must be emphasized is that the EmComm volunteer is not alone: he or she is part of a team that functions as a support group for the entire disaster response force.

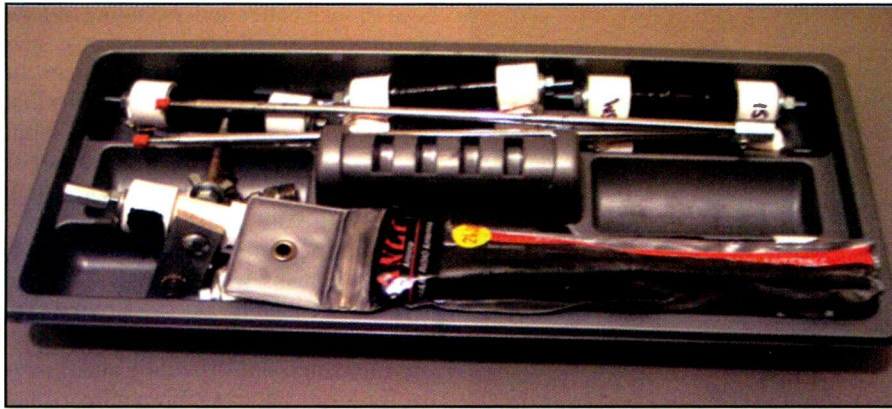
To help ensure that we're up to our respective tasks when called upon, we need to periodically take stock of our preparedness on several levels, one of which is the nuts-and-bolts (literally and figuratively) level: the hardware and personal items we actually bring to an emergency situation. So let's take some time this month to readdress this issue and reassess our readiness.

The "Go-Bag"

Call it a "Go-Bag," "Jump-Kit," "Bug-Out Bag," or whatever, it's all the same basic thing: a bag or container where you keep all your EmComm goodies and personal gear that will allow you to fully function in the chaotic environment following a major disaster or emergency.

We covered this topic several years ago, but it's high time we did it again. With the ARRL Field Day right around the corner and the annual Simulated Emergency Test (SET) coming up in the fall, now is a good time to pull out the EmComm gear and give it a good going over to be sure we can do our jobs when "the balloon goes up."

Our Go-Bag has to contain basically everything we will need as EmComm volunteers to be productive communicators when we deploy to the field. Since most of our tactical communications will revolve around analog FM voice, a sturdy, full-function 2-meter or dualband (2-meter and 70-centimeter) mobile radio with AC power supply, along with the necessary power cords to operate from vehicle batteries, is a must. What, not a 2-meter HT? Well, yes, that's important, too, but it's not your primary radio. A mobile VHF/UHF rig that is synthesized with CTCSS tone encoding and runs at least 35 to 50 watts of RF output is the prime mover for your tactical comms. The HT, while convenient, small, and highly portable, just won't be up to the task of providing consistent, high-quality tactical voice communications. By all means, bring along the HT (again, either 2-meter or dualband) for specialized comms, but do *not* rely on it to be your main radio for deployment. Today's crop



The tool box tray containing all the antenna hardware for the emergency station. Dave uses a homebrew HF vertical antenna that incorporates loading coils for multiband operation. Changing bands is as simple as changing the loading coil and hitting the button on the tuner.

of EmComm volunteers is steering toward dualband mobile rigs due to their versatility, relatively compact size, frequency agility, and ability to put out some serious RF energy.

One of the simplest antennas you can use is a VHF/UHF vertical omni antenna (a simple quarterwave ground plane or a Cushcraft "Ringo Ranger" are two types of omni antennas). This kind of antenna has the advantage of being easily carried and deployed, but it suffers from the lack

of gain in a specific direction. Therefore, while using an omni antenna, it is best to ensure that you have sufficient RF output to make your nets and comm links (a 3- to 5-watt HT coupled to an omni antenna just won't do it under all conditions). Of course you could drag along a 2-meter or dualband "brick" amp and use the HT as an exciter, but this is just another piece of gear to lug along and keep track of. If given the choice, go with the 35- to 50-watt mobile rig and leave the HT in the car or in your bag.

I know, I know, just last month I was touting the virtues for local tactical comms of the Yaesu (Vertex-Standard) FT-817, a 5-watt, multi-mode QRP rig that covers 160 through 10 meters for HF, 6 and 2 meters, and 70 centimeters. I still feel that the FT-817 is almost the ideal rig for EmComm deployments simply because it does so much and has exceptional frequency coverage in one little box (5.3 x 1.5 x 6.5 inches and 2.6 pounds) complete with NiMH battery and charger. However, you must be able to get the RF output up to a decent level (30 to 50 watts on all bands) if you hope to be able to fulfill your EmComm duties. While QRP power levels can certainly be counted on to work in the majority of the cases where good antennas are employed, there will be times when the extra RF power is really required to get the job done. That is why my Go-Bag contains the FT-817 and a 40-watt HF amp and a 35-watt VHF/UHF dualband amp. Possibly a better choice than the FT-817 would be its big brother, the FT-857. This rig looks similar to the 817 but is bigger and boasts 100 watts output on HF and 6 meters, 50 watts on 2 meters, 20 watts on 70 centimeters, and includes DSP and 200 memory channels.

If your served agency does not require

any HF operation, then one very good contender for the EmComm rig of choice would be the Yaesu FT-1500M, a 50-watt, 130-channel 2-meter FM transceiver that is tiny and inexpensive (around \$120 at last look). This rig, while not covering any UHF frequencies, is a very good contender for EmComm deployment due to its small size, big output, rugged construction, and CTCSS tone encode/decode as a standard feature. I have two of these rigs, one in my wife's Pontiac Montana van and the other one in my Nissan Frontier truck. I've used these two rigs for almost two years and they've performed flawlessly.

While it might seem that I'm stuck on Yaesu products, nothing could be further from the truth. ICOM, Kenwood, and Alinco also all provide high-quality, rugged VHF/UHF radios that can be easily pressed into EmComm service. I'm simply more familiar with the Yaesu offerings because I actually own the gear and have a chance to thoroughly evaluate it in the field.

Power Supply?

Of course, all these high-powered rigs mean that you're going to have to provide some kind of power supply to use with the radios, especially in cases where you're on your own and there is no AC main power available.

For AC power, I would recommend any one of a number of the small, portable switching power supplies that put out about 20 amps for powering your gear. Portable supplies are a different matter. Page 17.46 of the 2005 *ARRL Radio Amateur Handbook* (www.arrl.com) has a nice little portable power supply that you can build, if you have the talent. The HF Pack folks (www.hfpack.com) have a section on their website where you can order their portable battery power supply kit, which cost about \$90 to \$100 at last look. Again, this is a kit, and having built one of their 40-watt HF amps for my FT-817, I can attest to the quality of their products and the fact that construction is relatively easy and there is tech support available on the website. Either of these portable supplies will allow you to get on the air with the minimum amount of hassle when no AC power is immediately available.

Alternatively, there are various types of batteries available, including deep cycle marine and car batteries as well as gelled electrolyte batteries. Just remember that these batteries require some kind of charging circuitry. In a pinch, using car

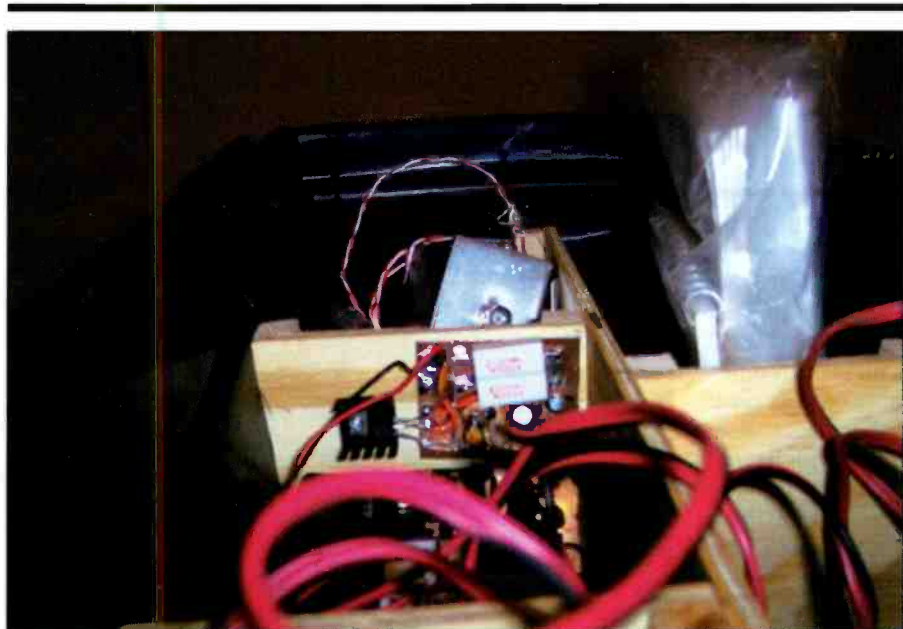
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Dave's station is battery powered. The mini-charger shown is constructed on a small piece of pc board attached to a wooden partition inside the toolbox. The entire charger is powered from a "wal-wart" for convenience and portability.

batteries, you can cycle these in and out of a vehicle to keep them charged. This will keep you on the air for a long time.

Other Considerations

Don't forget a good handheld scanner (a trunktracking one if your area has trunked systems) that allows you to keep up with the action on the local nets and frequencies. Make "AA" alkaline cells the "standard" for all your handheld portable gear, as you can obtain these cells almost anywhere on this planet and they don't suffer from the problems associated with NiCd (Nickel Cadmium) or NiMH (Nickel Metal Hydride) batteries.

Your 2-meter or dualband HT should have a speaker mic at the very least. Preferably you should opt for the ear-phone/mic with VOX/manual switching that can be added to almost any HT. These are available from most manufacturers or RadioShack (the one I use on my HTX-420 dualband RadioShack HT will also work on my ICOM HTs).

A GPS unit and a GMRS/FRS HT are nice additions to your Go-Bag, too. Several manufacturers have married the two technologies, and the result is a GMRS/GPS HT that not only functions as a UHF FM transceiver, but also has the ability to transmit the GPS coordinates of the user to similar units on a net. Not bad!

Don't forget some type of mast system to put your antennas on in the event you can't access a roof or chimney. My per-

sonal favorite (due to its relative low cost) is the old military GRA/4 mast system. With this you can go to 40 feet. The bag has eight 5-foot aluminum mast sections, 2.5-pound sledge hammer (for pounding in guy anchors and antenna base), guy wires, a halyard for wire antennas, and (provided you can find them) a tripod mount that uses three of the mast sections to make a tripod that will take up to five mast sections for a total height of about 30 feet and, for the most part, can be left un-guyed. I used this system recently on a nuclear power plant drill in Luzerne County, Pennsylvania. It works great and is easy to erect and take down (provided you don't have to do it in the dark!).

There are alternative mast systems out there that I'm aware of; some of them top \$400 in price, which is pretty steep in my book. Find a surplus outlet in your area and scrounge a GRA/4 mast kit and you won't be disappointed.

Don't forget to include several lengths of 50-ohm coaxial cable, RG-8X preferably since it's easy to work with, about the same diameter as RG-59/RG-6 (CATV coax), and relatively inexpensive, depending upon where you obtain it. Standardize on connectors, preferably SO-239/PL-259s. Do the same on your power connections. The EmComm community is moving toward the 30-amp Anderson Power Poles (www.westmountainradio.com), which, when properly installed, are incapable of being reverse polarized. If in doubt, ask your local EmComm group

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what they're using and adopt the same. If you have already converted to Power Poles, then make some adaptors to interface your power cabling with the local group's system.

Go-Bag Personal Items

So much for gear. Don't forget to include personal items for hygiene, a change or two of underwear, rain gear, jacket/sweater/windbreaker, hat/cap, gloves, personal meds for what ever ailments you have, spare glasses, aspirin/Tylenol, nose spray, rubber gloves, dust masks, etc. These are all small items that you can stow in your bag or grip with little trouble.

As far as a container for all this "stuff," you're on your own! In the past I've used soft-sided coolers (all of my EmComm radio gear still lives in one), a soft-sided suitcase with rollers, a duffle bag, several types and styles of tool boxes (I still have one I procured at Lowe's that has wheels, but that I had to modify to fit the battery and rigs), a large Rubber Maid box, and even a vest! Whatever method you adopt to house all of your emergency communications "stuff," realize that you, that's right *YOU*, are going to be responsible for carrying or "humping" it when you deploy. Therefore, you need to be cognizant of the fact that weight and mass matters. You can't take it all with you, so don't even try. Weed out and pare down to the bare essentials that you need to keep yourself on the air and sustain you with a minimum of creature comforts.

June 2005 Pop'Comm Survey Questions

Most of my radio listening is done: (mark all that are appropriate)

Daytime at home or on the road	1
At work	2
At home, early evenings right after work	3
At home, most of the evening	4
Only on the road, typically when traveling on business	5
Only on the road, traveling for pleasure	6
At home, during the day right after work	7
Mostly weekends, during the day	8
Mostly weekend evenings	9

I'm a ham and my family and neighbors complain about radio interference to their home entertainment systems or phone.

Yes	10
No	11

I'm a CBer and my family and neighbors complain about radio interference to their home entertainment systems or phone.

Yes	12
No	13

I've tried to remedy the interference problem by doing the following: (mark all that apply)

Using a high or low-pass filter	14
Using ferrite chokes	15
Reducing my operating power	16
Changing my operating hours	17
Grounding my equipment	18
Moving my antenna	19
Buying different home entertainment equipment	20
Only operating mobile	21
Changing operating frequencies	22
I haven't done anything	23
Contacted the ARRL	24
Stopped using my radios	25



This picture shows the KD1JV Antenna Analyzer in an Altoids tin along with a homebrew CW keyer and the paddle set made from a pc board. To keep weight and mass down, Dave went to extremes building these two devices into one Altoids mint tin.

It is an extremely good idea to pack a checklist with each section of gear so you're sure that what you take out on deployment comes back. Losing any piece of gear, and worst or all a radio, can have a dampening effect on your enthusiasm with regard to EmComm.

Fine-Tune For You

That pretty well covers the Go-Bag, Jump-Kit, or Bug-Out-Bag. Of course, feel free to be creative and add or subtract whatever you want to. Just keep in mind that you need to have everything readily accessible to get on the air and *stay* on the air for anywhere from a few hours to several days before being relieved. While the ARRL's ARES guidelines focus on a 72-hour kit, I believe it's prudent to be prepared to deploy for at least two weeks, if not longer. Therefore, you'll need more "stuff" and that means a larger container(s) to drag it all along. One thing I consider a necessity is a six pack of 16-ounce bottles of drinkable water. Add to this some flavoring packets and you'll have some variety in what you drink. You can exist quite well for several weeks without much food, but water it's only about three or four days before your physical condition becomes severely degraded. A week without water and you're dead! Think about it.

That is all for this month. Take advantage of the excellent training during ARRL Field Day and hit the bush with vigor. Until next time, remember: Preparedness is *not* optional! ■

Fine-Tuning Your Radio Monitoring

These days, it's hard to find a scanner with less than 100 channels, but units with 200, 400, and even 1,000 channels are quite common. Of course, most folks who own the 1,000-channel units don't have them full. Even a lot of 100-channel scanners I know aren't full. That's okay; in fact, I think that's probably better.

The reason I mention all this is because I see a lot of people who get into this hobby with 200- or 400-channel radios. Great! And why not, since they're so affordable these days. The pitfall is that a lot of novices fall into the trap of thinking they're not getting their money's worth if the radio's not full. So they find things to fill it up. Then they wind up listening to a busy radio. The scanner probably doesn't make it through any one bank without stopping a few times, particularly in a metropolitan area of almost any size. And while it's stopped, action taking place on other channels is lost. So they wind up with a busy radio that talks a lot, but with little or no understanding of the conversations they're listening to. And after a while, they quit listening.

At the average of 25 to 40 channels per second that most of our scanners run, a fully loaded 400-channel radio will take 10 to as many as 16 seconds to run through them all, even if the antenna's disconnected. That's a lot of time just for a dry run when the idea is to have the radio stop now and then for something we're interested in hearing. Sure, your radio stays busy, but what's really going on? Odds are, you probably don't even know if you're listening to a scanner programmed in this way. You'll hear a lot of activity, but putting the details together gets a bit tough. For most of us the reason we scan is to keep up with the action. So how can we scan and still maintain a focus on important activity?

Take Inventory

One thing you can do is take a look at your situation. What's around you that's important to you? You'll first have to get comfortable with the idea that you're not going to hear everything. Now, what do you really want to concentrate on? What's of major interest? And how much of that is likely to be happening at once? Can you get some mileage by separating agencies into banks? Or geographic areas that need to be on and off as traffic dictates? Can you create a bank of "got-to-scan-all-the-time" frequencies and add and subtract from there by turning banks on and off? Is it reasonable to think you're going to listen to maritime or railroad traffic mixed in with your local police and fire departments? Do you really want to listen to everything all the time, or is it reasonable to turn various things on and off depending on what's happening and what mood you might be in at the time? Most of us wouldn't have the TV, AM/FM radio, and CD player on at the same time, so perhaps getting smart with our scanners makes sense!

A radio with a priority system can really help quite a bit here. If you can program your number one frequency into a priority channel, and use it, you'll find that the radio goes back to that channel when there's activity. That should ensure that you hear more of the traffic on that critical channel.

I used to program my local police channel there thinking that it was the thing I was most interested in and that I didn't want to miss anything. But what I found was that the darned thing interrupted lots of other traffic that was more interesting with routine calls and license plate checks. The fire department channel works much better. They don't talk nearly as often, and what they have to say is much more likely to indicate a major event than what I may hear from the police.

Some radios feature an entire priority *bank* that can be programmed separately from the other channels in the scanner. This makes for an excellent way to keep an eye on several channels at once, but it does take some time for the system to cycle through the entire lot. It's really a personal preference as to what will work best for your listening tastes.

Beyond the priority system, look at your bank structure. Can you quickly turn on and off groups of related frequencies? Can you quickly get to a bank of just the local stuff if something happens around you? If so, then you're using the bank system to your advantage.

Here's another place where your radio may dictate just how much flexibility you have. Most scanners have 10 banks or so, others have more or less. And, of course, the number of channels per bank is another consideration. It's much more important to use those banks to your listening advantage than it is to fill up every available frequency. You want to be able to switch them in and out quickly as activity dictates.

A Brief Detour Down Memory Lane

When I first got into scanning (bear with me, I promise not to get too sentimental), the number of channels was extremely limited by today's standards. In fact, my first public safety monitor didn't really scan, but rather was a tunable receiver that covered VHF High and Low, and the UHF frequencies up to 512

600	700	800	1000
92	94	96	98 100 102
112	116	120	124
48	152	56	160 WEAT
32	34	33	42
0	470	480	490

Radios didn't used to scan at all, and finding things was pretty easy—finding them again wasn't quite so simple.



Putting the scanner in MAN mode allows you to follow the action very closely on just one channel. You'll learn a lot in a short time this way.

MHz. Back then 512 MHz was new because the FCC had only recently authorized those areas for public safety and business band use, and only in areas where it didn't conflict with television channels. In our area, we didn't have any television channels in that range, but we didn't have any public safety users either. All the action stopped at 470 MHz. With a tunable receiver parked on a single frequency, you got to know what was happening on that channel pretty well. Of course, you missed a lot of other things.

Scanners were new and expensive toys. When you did have one, changing channels was a bit of a problem because you had to buy "crystals" to put into the unit. The receiving frequency was determined by these crystals, not by some keypad entry synthesizer that we're all spoiled with today. Would I want to go back? No way! But there were some definite advantages to learning about scanning back in those early days. My first actual scanner was a crystal-controlled four-channel unit that received VHF High band only.

It was only a few years later that synthesized units began to appear (I'm not as old as Harold!). At first, these synthesized units were programmed with a series of switches and code books. Some of you may remember the early Tennelec and Bearcat 101 receivers that were programmed this way. Even the RadioShack "Compuscan" had a series of 1 and 0 codes that were entered by way of a set of programming buttons. These synthesized units expanded the channel capacity to a whopping 16!

Well, of course, it wasn't long before the early keypad programmable units began to appear, and then the number of channels started to rise—dramatically. What happened, though, along with this increased capacity to scan anything anywhere,

was a loss of focus on *what* you were scanning. You see, with those four-channel scanners, we had lots of opportunity to hear the same dispatchers and cars over and over. You had to, because with only four channels, that was all the action you were going to hear. And you really couldn't afford to "reprogram" the scanner often because you'd have to buy new crystals, not to mention taking the radio apart to change them!

After a while you got to know just about what officers were working what shift just by their voices. And you got to understand the system, the dispatch codes, and even the beat plans if you cared to spend the time working them out. We later found out that the ones we had worked out by listening were very close to the real ones that the PD had published. Not bad for a bunch of rookies, eh? The technology controlled the focus of your scanning. Not only was the number of channels limited, but the amount of information you could listen to was also curtailed to reasonable amounts by these very limitations. As a result, there was more continuity of traffic, and you developed a much better picture of the actual activity and calls on a particular channel, because you were on that channel for most of the traffic. So with just a little bit of memory, you could keep track of the fact that the warrant the dispatcher was reading off must apply to the car that just called out on a traffic stop at the corner down the block from your house.

Returning To The Present

Today's bazillion-channel radios have foregone that aspect of scanning, or at least buried it beneath a lot of channels and glitz. It's still there, but you'll have to decide not to use some of your radio's capacity in order to gain in understanding and focus. Programming your radio with judicious use of banks is the first step. Put frequencies together that belong together, and turn off the rest. It makes sense to put a local police and fire department together for dispatch operations so you can tell what's happening on both, but it's also nice to be able to switch through banks to hear all fire or all police should an event occur.

Here's yet another argument for multi-radio use. If you have more than one scanner at your disposal, you can have more banks pre-programmed for the big stuff. Or, if you're comfortable lis-



In the early days of scanning your radio equipment limited you to listening to a very few frequencies at once, so you learned to really hear what they were talking about. It's possible to do this with today's equipment, but you'll have to "work" at it a bit harder (i.e., turn off some channels!)

tening to the squawking from two or more receivers, you can actually segregate important departments or channels in the different radios and run them both at the same time. Eventually, you develop an ear for what's important and what's not. You'll get used to the fact that if the sound came from the left it's the fire department or the police if it was on the right. And you'll have that many more banks available to pre-arrange for things you might want to focus on when they happen, or you can put in other services that you don't want to listen to all the time, but only when the mood strikes you. Get creative!

Trunking

As usual, trunking systems complicate matters quite a bit. In one way, being locked into a trunking system probably helps because your scanner has a limited number of IDs it can track in the trunked bank. That helps you keep your focus on a handful of channels. In a busy system,

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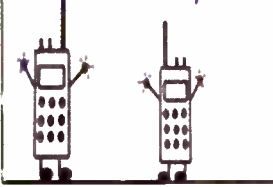
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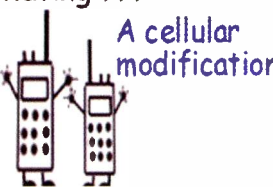
The Adventures of Scanner Dweeb
by M.A. Coletta

Did you hear... chip is going under the knife today...




No.... what kind of operation is he having ???

A cellular modification.



In patient



of course, that may be of little help as part of the reason to go to a trunked system is to relieve the congestion on traditional channels, so by definition, the system was already busy.

On the other hand, trunking scanners can scan multiple systems, or mix conventional and trunked scanning. If you're in an area where there isn't much happening on the trunked system, this may be a big help. But putting a busy trunked system into the mix can slow down your effective scan rate. Most trunked scanners need a second or two to acquire the control signal and figure out what's happening every time they enter a trunked system. The result is a delay in your scanning; and, of course, while you're listening to the trunked system, the conventional channels that you have in the mix are being ignored.

The bottom line is that there is really no way to fix a busy radio and still follow the action. If you're faced with a lot of busy channels in different systems that you feel you want to follow, you're likely to need more than one radio and a lot of concentration.

Try This Experiment

Try this for just a couple of hours: Pick a channel that you normally listen to and put your radio on manual. If you're in a trunking system, pick an ID you're comfortable with. Then sit back and listen.

How much of the traffic do you really understand? Do you know what those unit numbers are and what they mean? Do you know the 10 codes that are being used, or other coded abbreviations? Can you tell what's happening? Do you get any follow-up information on a particular call?

Now, pick a frequency that you *don't* normally listen to, or at least don't pay much attention to—perhaps a neighboring police or fire department, or the county instead of the city. Do the same thing. How much do you understand on this

channel? How much can you figure out just by listening?

It turns out that if you listen long enough you can figure out quite a bit. You may not get all of it, but you can get quite a bit with a little patience. Getting a map out and seeing where particular units respond to calls may be helpful to figuring out numbering plans. Listening to the conversation going on around those 10 codes may help you figure out what kind of call the code indicates.

In the end, what you'll discover is that this is really a completely different listening style—one that you'll either find fun and challenging, or boring as heck. Either way is fine, because it's all about learning and having fun, remember?

Share With Us

While you're at it, send me what you know about your favorite scanning channel's numbering plans. How do they number the units where you are? Do the numbers have some meaning? What codes are used? Police and fire departments, mall security, planes, trains, and taxicabs—they all have a plan of some sort. Pick one and let me know what you've figured out. If we get some good info we'll feature it here in your "ScanTech" column. ■

Frequency Of The Month

Let's pick **160.230** for our frequency this month. Don't be surprised if you don't hear much, but if you do that's great. Either way, let me know and we'll enter your info for a free subscription to *Popular Communications*. Send your entry via e-mail to radioken@earthlink.net or via regular mail to Ken Reiss, 9051 Watson Rd. #309, St. Louis, MO 63126. Be sure to indicate the Frequency of the Month in the subject of your e-mail or on the envelope!

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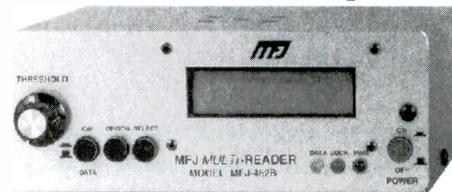
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Indoor Active Antenna

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 1/4"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

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 Shortwave Headphones



MFJ-392B
\$199⁹⁵
New!

Perfect for shortwave radio listening for all modes -- SSB, FM, AM, data and CW. Super 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.

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 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 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 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 1/4"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	6020	Radio Tirana, Albania		0330	9700	Radio Bulgaria	
0000	7545	Radio Ukraine Int.		0330	7285	Voice of Croatia, via Germany	SS
0000	7811	Armed Forces Network, USA	USB	0330	7260	Radio Cairo, Egypt	AA
0000	15360	BBC Relay, Singapore		0400	4985	Radio Brazil Central, Goiania, Brazil	PP
0030	9600	Vatican Radio	PP	0400	4775	Trans World Radio, Swaziland	GG
0030	15245	Voice of Korea, North Korea	KK	0400	4910	ZNBC/Radio Zambia	vern.
0030	6145	Radio Japan/NHK, via Canada		0400	5910	Radio Ukraine Int.	
0030	11865	Radio Canada Int.	SS	0400	6020	Voice of Turkey	
0030	9875	Radio Vilnius, Lithuania		0400	6335	Voice of Iraqi Kurdistan (clandestine)	unid. language
0100	9840	RAI, Italy	SS				Amharic
0100	4052.5	Radio Verdad, Guatemala	SS	0400	6940	Radio Fana, Ethiopia	
0100	9820	Radio Havana Cuba		0400	5500	Voice of the Tigray Revolution (clandestine)	unid. language
0100	7345	Radio Slovakia Int.		0400	4950	Radio Nacional, Angola	PP
0100	15585	Voz Cristiana, Chile	SS	0400	4976	Radio Uganda	
0100	3310	Radio Mosoj Chaski, Bolivia	SS	0400	9780	Republic of Yemen Radio	AA
0100	5815	World Music Radio, Denmark		0400	7190	RT Tunisienne, Tunisia	AA
0100	6055	Radio Exterior de Espana, Spain		0400	9815	YLE/Radio Finland	Finnish
0100	7115	Int. Radio of Serbia/Montenegro		0430	6280	Kol Israel	
0130	4780	Radio Cultural Coatan, Guatemala	SS	0430	4890	Radio France Int. Relay, Gabon	FF
0130	9510	Radio Romania Int.		0430	5985	RTVC/Radio Congo, Congo Republic	FF
0130	9737	Radio Nacional, Paraguay	SS	0500	4915	GBC-Radio Ghana	
0200	9700	Radio Bulgaria	FF	0500	4770	Radio Nigeria	
0200	9410	BBC Relay, Cyprus		0500	5025	Radio Rebelde, Cuba	SS
0200	5970	Radio Belarus		0500	4960	Voice of America Relay, Sao Tome	
0200	9775	Radio Budapest, Hungary		0500	9865	The Voice-Africa, Zambia	
0200	6973	Galei Zahel, Israel	Hebrew	0530	6185	Radio Educacion, Mexico	SS
0230	9675	Radio Cancao Nova, Cachoeira Paulista, Brazil	PP	0530	4777	Radio Gabon	FF
0230	4750	Radio Peace, Sudan		0530	5030	Radio Burkina, Burkina Faso	FF
0230	6010	La Voz de tu Concencia, Colombia	SS	0530	12075	Radio Rossii, Russia	RR
0230	9715	RDP Int., Portugal	PP	0600	4990	Radio Apinte, Suriname	DD
0230	7300	Voice of Turkey	TT	0600	4845	RTV Mauritanie, Mauritania	AA
0300	4860	Voice of Iranian Kurdistan (clandestine)	Kurdish	0600	7125	RTV Guineenne, Guinea	FF
0300	4915	Radio Nacional Macapa, Brazil	PP	0600	5005	Radio Bata, Equatorial Guinea	SS
0300	7125	Voice of Russia, via Moldova	RR	0600	4783	ORTM, Mali	FF
0300	7260	Voice of Russia	RR	0600	6140	Radio Melodia/R. Lider, Colombia	SS
0300	4930	Voice of America Relay, Botswana		0630	11710	Radio Romania Int.	
0300	7390	Channel Africa, South Africa		0700	6020	Radio Victoria, Peru	SS
0300	7110	Radio Ethiopia	Amharic	0700	6070	CFRX, relay CFRB Canada	
0300	7200	Rep. of Sudan Radio	AA	0700	7365	Radio Marti, USA	SS
0330	4885	Radio Clube do Para, Belem, Brazil	PP	0730	7250	Vatican Radio	
0330	3240	Trans World Radio, Swaziland	vern	0800	9870	Radio New Zealand	
0330	3230	Radio Sondergrense, South Africa	Afrikaans	0800	6135	Radio Aparecida, Brazil	PP
0330	5980	RTV Marocaine, Morocco	AA	0800	5964	RVI, Belgium, via Germany	

UTC	Freq.	Station/Country	Notes	UTC	Freq.	Station/Country	Notes
0830	9870	Trans World Radio, Monte Carlo		1530	15350	Voice of Turkey	TT
0900	6060	Radio Nacional, Venezuela	SS	1530	9905	Radio Free Asia, via Palau	unid. language
0900	6025	Radio Amanacer, Dominican Republic	SS	1600	9390	Radio Pakistan	
0900	13685	Voice International, Australia		1600	9940	Voice of Islamic Republic of Iran	
0930	4915	Radio Anhanguera, Goiania, Brazil	PP	1600	15605	Radio France Int.	
0930	3280	La Voz del Napo/Radio Maria, Ecuador	SS	1600	15190	Radio Africa, Equatorial Guinea	
1000	4790	Radio Atlantida, Peru	SS	1600	11940	BBC via South Africa	
1000	4750v	Radio Huanta 2000, Peru	SS	1700	15485	Voice of Greece, via USA	Greece
1000	12085	Voice of Mongolia		1700	15120	Voice of Nigeria	EE, others
1030	4939	Radio Amazonas, Venezuela	SS	1700	15220	Radio Jamahiriya, Libya, via France	AA
1030	9505	Radio Tacna, Peru	SS	1700	15570	Vatican Radio	FF
1030	4919	Radio Quito, Ecuador	SS	1730	15285	Channel Africa, South Africa	
1030	12000	Radio Reloj, Cuba, via RHC	SS	1730	9720	RT Tunisienne, Tunisia	AA
1030	4845	Radio Municipal, Bolivia	SS	1730	11560	Adventist World Radio, Guam	
1030	6134v	Radio Santa Cruz, Bolivia	SS	1730	9520	IBRA Radio, via Germany	unid. language
1100	7280	Voice of the Strait, China	CC	1730	15105	Radio Romania Int.	GG
1100	7305	Radio Thailand	TT	1800	15475	Africa Number One, Gabon	FF
1100	4830	Radio Litoral, Honduras	SS	1800	15190	Radio Pilipinas, Philippines	Tagalog
1100	11890	Voz Cristiana, Chile	SS	1830	11925	Adventist World Radio, via South Africa	FF
1100	4815	Radio El Buen Pastor, Ecuador	SS	1930	9580	Africa Number One, Gabon	FF
1100	9560	Radio Australia		1930	9950	All India Radio	
1100	5915	China Radio Int.	RR	1930	9420	Voice of Greece	Greek
1100	15100	Radio Pakistan		1930	17895	VOA Relay, Botswana	
1100	9405	FEBA Radio, Philippines	CC	1930	9965	Voice of Armenia	
1100	9965	Voice of Hope, Palau	CC	1930	9590	Radio Centrafrique, Cent. African Rep, via France	FF
1100	3315	Radio Manus, Papua New Guinea		2000	11750	Voice of Islamic Republic of Iran	FF
1130	3275	Radio Southern Highlands, Papua New Guinea		2000	11635	Radio Jamahiriya, Libya, via France	AA
1130	3325	Radio Bougainville, Papua New Guinea		2000	9555	BSKSA, Saudi Arabia	AA
1130	13665	China Radio Int., via Albania		2000	9855	Radio Kuwait	AA
1200	6010	Radio Mil, Mexico	SS	2030	15125	Radio Exterior de Espana, Spain, via Costa Rica	SS
1200	6090	CPBS, China	CC	2030	15220	Voice of America Relay, Morocco	unid. language
1200	15675	Radio Ukraine Int.		2030	11625	Vatican Radio	FF
1200	9840	Voice of Vietnam		2030	11630	Central People's Bc. Station, China	CC
1230	4960	Catholic Radio Network, Papua New Guinea		2100	9390	Kol Israel	Hebrew
1230	4890	NBC, Papua New Guinea		2100	17860	Deutsche Welle, Germany, via UAE	GG
1230	7130	Radio Taiwan Intl		2100	9335	Radio Farda, US	Farsi
1230	17535	Kol Israel	Hebrew	2100	11890	Deutsche Welle, Germany, via Sri Lanka	AA
1230	7185	Bangladesh Betar		2100	9605	BBC Relay, Seychelles	
1245	13865	INBS, Iceland	Icelandic	2110	15345	RTV Marocaine, Morocco	AA
1300	11500	Voice of Russia via Tajikistan	unid.language	2130	9920	Radio Free Asia, via Taiwan	CC
1300	12005	HCJB, Ecuador		2200	9425	All India Radio-Bangalore	Hindi
1300	9430	FEBC, Philippines	CC	2200	9990	Radio Cairo, Egypt	
1300	9525	Radio Polonia, Poland		2200	11730	RVI, Belgium, via Bonaire	status uncertain
1300	9615	KNLS, Alaska		2200	11975	China Radio Int. via Mali	FF
1330	12025	Far East Bc. Assn, vi United Arab Emirates	unid.language	2200	9555	BSKSA, Saudi Arabia	AA
1330	15240	Radio Sweden		2200	21470	Radio Australia	
1330	9900	Deutsche Welle, Germany, via Russia	GG	2200	15345	RAE, Argentina	SS
1330	6350	AFN/AFRTS, Hawaii	USB	2230	17815v	Radio Cultura Sao Paulo, Brazil	PP
1330	9415	CBS, Taiwan	CC	2230	7460	Radio Nacional Saharagui, Algeria (cland)	AA/SS
1400	9465	KFBS, Northern Marianas	rr	2330	11760	Radio Nacional Venezuela, via Cuba	SS
1400	9455	Radio Free Asia, Northern Marianas	unid language	2330	17680	RDP Int., Portugal	PP
1400	21745	Radio Prague, Czech Republic		2330	15575	Radio Korea International, South Korea	KK
1430	9855	Voice International, via Uzbekistan	Hindi	2330	15150	Voice of America Relay, Thailand	
1430	11550	Radio Sweden		2330	17605	Radio Japan/NHK, via Bonaire, NWI	JJ
1500	11690	Radio Jordan		2330	17675	Radio New Zealand Int.	
1500	12105	Trans World Radio, Guam		2330	17740	Voice of America Relay, Philippines	
1530	17570	Radio France int.	FF				

New, Interesting, And Useful Communications Products

AOR Introduces The SR2000 Frequency Monitor

AOR USA has just announced the availability of the SR2000, an ultra-fast spectrum display monitor with a high-quality triple-conversion receiver. The new unit puts the power of FFT (Fast Fourier Transform) algorithms to work in combination with a powerful receiver that covers 25 MHz to 3

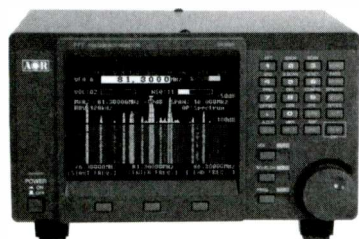
GHz continuous. Featuring a full color spectrum display, the SR2000 instantly detects, captures, and displays transmitted signals. AOR tells *Pop'Comm*, "It is extremely sensitive, amazingly fast and easy to use." Using a built-in five-inch TFT color display, the SR2000 offers a waterfall display function that tracks signals over time and uses colors to define their strength. With advanced digital signal processing, the SR2000 can display up to 10 MHz of bandwidth in real time. The SR2000 covers AM, NFM, WFM, and SFM modes and uses digitally processed IF signals of the RF unit combined with FFT technology to enable spectrum analysis and high-speed signal detection in real time. The keys and single control dial on the front panel of the SR2000 are designed to enable maximum versatility and simple operation. Monitored frequency and audio gain can be adjusted simply by using the main control dial. The SR2000 features 1,000 memory channels and 40 search bank memories, which can be easily be set up to suit individual monitoring requirements. Ideal for base, mobile, or field use, the SR2000 can also be used in combination with a personal computer. According to AOR, the SR2000 was designed for professional users, such as governments, military applications, law enforcement, laboratories, and others who require a sensitive, wide-range frequency monitor.

For more information on the new AOR SR2000 Frequency Monitor, contact AOR USA at www.aorusa.com or call 310-787-8615.

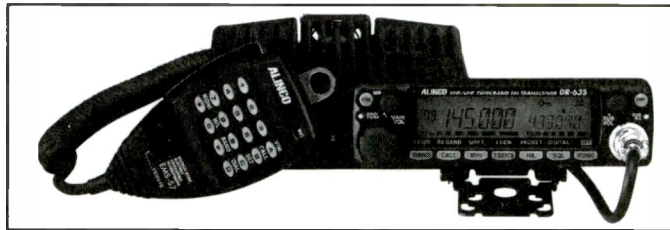
Alinco Introduces DR-635T 2 Meter/440-MHz Mobile/Base Transceiver

Alinco has announced a new dualband mobile/base, the DR-635T, which will be available in the U.S. in May 2005. "Built in response to popular demand, this dualband radio features cross-band repeat, full duplex capability and a detachable remote mountable control head," said Russell Dudley, KW5O, President, Ham Distribution, Inc., North American distributor for Alinco. "It features newly designed RF circuitry for increased resistance to interference from adjacent signals."

The DR-635T also includes a new protection circuit designed to automatically engage when the internal temperature rises while operating in the high-power setting. By automatically changing the power setting to MID, this feature can help protect the radio when it is used for active cross-band repeater operation.



The new SR2000 Frequency Monitor from AOR can perform a search of 10 MHz of spectrum in 0.2 seconds!



The Alinco DR-635T dualband mobile/base transceiver features increased resistance to interference from adjacent signals.

Included with the DR-635T is a feature-packed microphone, the EMS-57. In addition to basic microphone operation, the operator can use the backlit keypad to enter frequencies, switch from VFO to memory operation (and back), select the transceiver's call channel, recall SET mode, change operating bands, select the transmitter's power output setting, and temporarily defeat the receiver's squelch setting.

The DR-635T has a large, six-character alphanumeric display with selectable display color illumination available in blue, violet, or orange. In addition, it features 200 memory channels, ignition key on/off feature, theft alarm feature, CTCSS, DCS encode/decode and DTMF encode functions, along with European Tone Bursts. A variety of scan modes and extended receive capabilities are also available.

Similar in style and function to the DR-620, it shares the ability to operate with Alinco's optional internal packet boards. Digital operators can also order the optional EJ-50U packet board that fits inside the transceiver. With the board installed, 1200- or 9600-bps packet operations can be achieved by connecting a computer to the rear panel DSUB9 port that comes with the optional EJ-50U. For more information, visit the company www.alinco.com.

MFJ Enterprises Small, High-Efficiency Loop Tuner™

Drape a wire around a bookcase and attach both ends to this new MFJ-936, Small Loop Tuner and it instantly turns into a small, high efficiency multi-band transmitting loop antenna. Amateurs can operate from 70 to 30 MHz with 150 watts – no ground, or radials/counterpoises needed.

A 10-foot wire formed into a loop operates 20-15 meters (five-feet for 17-10 meters; 24-feet for 30-40 meters). You can tune any shape loop; circle, square, rectangle or any odd shape. A quarter-

Here's a look at MFJ's new Small Loop Tuners, the MFJ-936 (\$249.95) - and the MFJ-935, (\$199.95) a smaller and lighter loop tuner.



wavelength wire shaped as a circle is the most efficient.

Perfect also for SWLs, it's a "very quiet receiving antenna" according to the MFJ news release. They tell *Pop'Comm*, "Its high-Q rejects out-of-band interference, and reduces overloading and harmonics." The new MFJ Small Loop Tuner has a built-in RF antenna current ammeter for tuning and mount for PVC cross. The MFJ-936 Small Loop Tuner measures (HWD) 4 1/2 x 9 1/4 x 8 1/2 inches and is \$249.95 direct from MFJ Enterprises at 662-323-5869 or online at www.mfjenterprises.com.

New Comet CHA-250B Low-Profile, No Radial 80- To 6-meter Vertical Antenna

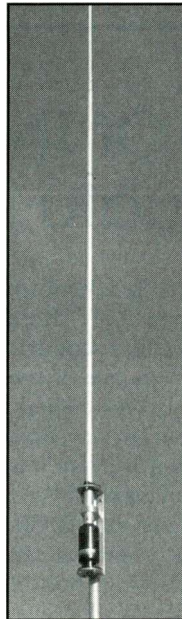
Comet antenna has a new HF/6M vertical antenna that does not require ground radials.

(Continued on page 73)

The CHA-250B is, according to the Comet news release, "easy to assemble, installs easily and eliminates the need for ground radials." The company continues, "The SWR is 1.5:1 or less from 3.5 MHz to 57 MHz. An antenna tuner is not needed, thus making portable operation that much easier."

The new seven-pound Comet CHA-250B is particularly designed for the numer-

Comet's new CHA-250B is ideal for hams or SWLs who need a low-profile antenna.



ICOM Releases REAL Hardware

Many years ago amateur radio was the test bed for new RF technologies; there were our phone patches before cellular and packet radio BBS and mailboxes before e-mail. Now there's high speed data! Some will argue that 802.11 (wireless LAN) has already done this, but not over a distance of 35 miles with 10 watts and an omnidirectional antenna! Welcome to the world of D-STAR.

Three years ago, ICOM introduced the U.S. market to a concept system developed by the Japanese Amateur Radio League (JARL), merging amateur radio, the Internet, and digital communications. D-STAR, as it is commonly known, is a non-proprietary, *open* protocol system combining traditional analog voice, digital voice, and high-speed data. The ultimate goal of the D-STAR project is to allow complete interoperability between traditional analog and digital communications networks, as well as span the globe via a combination of Internet and microwave links. ICOM has slowly released more pieces to this conceptual puzzle. This year ICOM is releasing REAL hardware for this new digital protocol. While both ICOM and Kenwood have announced their support of the JARL's D-STAR protocol, ICOM is the only manufacturer currently manufacturing products for this new technology.

Ray Novak, N9JA, ICOM America's divisional manager for the company's Amateur and Receiver Division, said, "With all the mandates for spectrum efficiency, ICOM sees the progression of digital communications being the future of Amateur Radio. We hope to stimulate the imagination of today's software techies to see how much fun you can have with RF."

While a lot of questions still abound about exactly what D-STAR is, each day new answers to these questions become clear as more people use the gear. One of the biggest beneficiaries for this technology will be the emergency communications groups, as one function of the D-STAR system is high speed data. With the maximum of 128kbps, the D-STAR system can pass a lot more data than the traditional 9600 baud packet.

Novak continued, "While a plug-n-play software package does not exist at this time, it will only be a matter of time before someone develops a package that will automatically reroute traffic through the system when the Internet gets congested, or worse yet, goes completely down."

At this time, ICOM has introduced five radios, the ICOM IC-V82, U-82, ID-800, IC-2200, and ID1 models, that are D-STAR or digital-compatible, with the repeater infrastructure not far behind. For more information on these devices, contact ICOM America, Inc., at 2380 116th Ave. NE, Bellevue, WA 98004. You can also phone them at 425-454-8155 or visit them on the Web at www.icomamerica.com.



The new ICOM ID-800 is a full-featured 2-meter/70-cm voice and data comms mobile transceiver.

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WSHB: The Rest Of The Story, And Radio Vanuatu Is Rejuvenated!

Some of you might have wondered about the fallout from World Harvest Radio's acquisition of Herald Broadcasting's WSHB last year, namely, the discontinued use of WHRI's Noblesville transmitters. It was one of those questions about which one is mildly curious, but not enough to bother seeking out answers. Now we have them anyway, thanks to Dr. Adrian Peterson (long affiliated with Adventist World Radio), who made some on-the-scene inquiries earlier this year. It seems that civilization was encroaching on WHRI's Noblesville, Indiana, transmitter site and a decision was made to close it down. One of the two 100-kW Noblesville transmitters will be (or already has been) moved to the WHRA site in Greenbush, Maine, and the other one to Cypress Creek, South Carolina. (These moves have likely been accomplished by now). The WSHB call has been retired, replaced with WHRI for all the Cypress Creek transmitters. In a nutshell, then, Noblesville is silent; Cypress Creek and Greenbush have been enhanced.

Radio Korea International has changed its name to KBS World Radio. The new moniker is tied into to the merger of Korea's overseas TV channel with the Korean Broadcasting System, the parent of RKI. They've also added a daily half hour in Vietnamese.

The Voice of America Botswana Relay has opened a new frequency in the 60-meter band. Currently **4930** is active from sign on at 0257 and carries "Daybreak Africa" at 0300.

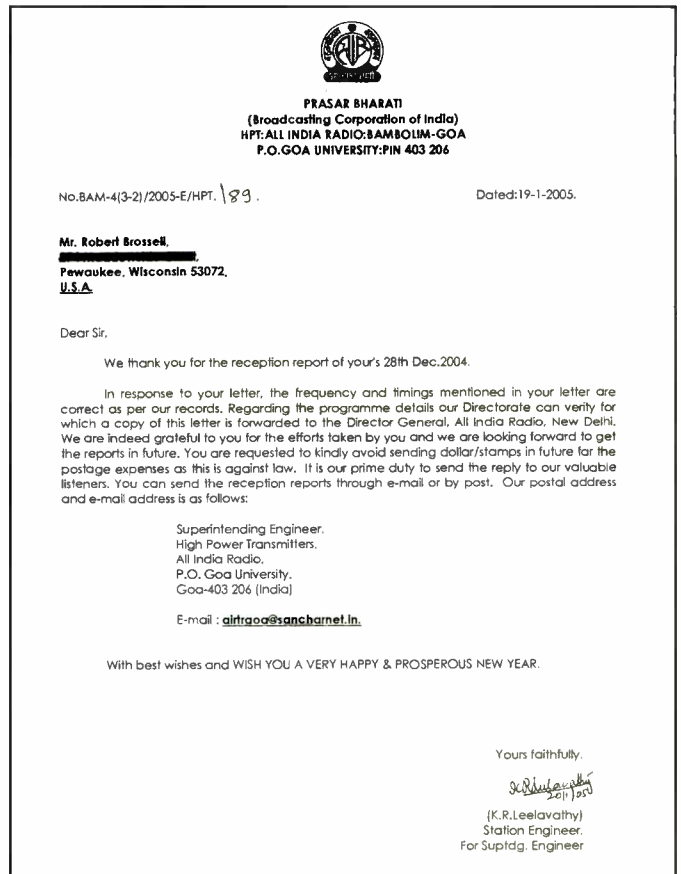
Radio Vanuatu's shortwave transmitters are in the midst of repair and upgrading. Their long-used **7260** frequency has already been noted active again. The old **3945** frequency is also due to come back to life. Your best shot at these will be very late at night, probably 0700 and later. The rejuvenation of Radio Vanuatu is a very welcome event.

By now probably every person who has ever so much as looked at a shortwave radio has heard of the passing of Dr. Gene Scott, who died of a stroke in late February at age 75. Day or night his University Network broadcasts could be heard on several shortwave frequencies over a number of domestic and foreign sites. We're guessing that his broadcasts are still on the air (re-running old tapes) and likely will remain active as long as there are enough folks with healthy checkbooks to keep the dollars coming in.

Radio Melodia, Colombia, on **6140** (usually slightly below) now appears to be relaying Radio Lider, which uses 730 mediumwave and 96.9 FM stereo in Bogotá (the AM also announces as being in stereo). Both stations are members of the Melodia Network in Colombia.

In Taiwan the domestic Fu Hsing Broadcasting Service in Taipei is now on **15250** shortwave, probably using the same facility as Radio Taiwan International. The transmissions are scheduled at 2300 to 0100, 0400 to 0600, 0800 to 1000, and 1300 to 1500.

Political correctness marches on. We've learned that Radio Free Europe/Radio Liberty has discontinued use of its Liberty Bell logo. It seems that, in some parts of the world, bells are



All India Radio, Panaji (Goa), sent this confirmation letter to Bob Brossell in Wisconsin. Note the admonition regarding stamps and dollar bills.

associated with Christianity and the stations don't want to be seen as having religious connections.

Cuba's domestic Radio Reloj is now being carried by Radio Havana facilities. The news headline and time service format can be heard on **6060** and other RHC frequencies between 0700 and 0900, although not necessarily on a regular basis.

The Nigerian Broadcasting Corporation's station at Kaduna is again active on **4770**, signing on 0430. The long dormant **6090** frequency is also reported to have been reactivated.

Reader Logs

Remember, your shortwave broadcast loggings are always welcome. But please, please be sure you list them by country and include your last name and state abbreviation after each log. We also have a continual need for illustrative material, whether QSLs (good copies or originals you don't need returned), station photos and pennants, as well as general station news and

information. And, last but not least, a photo of you at your monitoring position. Why are you so shy?

Here are this month's logs. All times are in UTC, wherein 0000 equals 7 p.m. EST, 6 p.m. CST, 5 p.m. MST, and 4 p.m. PST. Double letters (SS, RR, AA, PP, etc.) are language abbreviations (Spanish, Russian, Arabic, Portuguese, etc.). If no language is specified, the broadcast is assumed to have been in English (EE). For other abbreviations see the sidebar elsewhere in this column.

Get the door, would you? It's logging time!

ANGOLA—Radio Nacional, **4950** at 2336 with man in PP hosting pop show. Five time pips at 0000, ID and news. (D'Angelo, PA) 0412 with music, newscast in PP. (DeGennaro, NY) **7217** (p) at 2250 with vocals and apparent news items. Off at 2256. (Strawman, IA)

ANGUILLA—Caribbean Beacon, **11775** with Dr. Gene Scott preaching at 1930. (Maxant, WV)

ARGENTINA—Radio Nacional, **6060** with SS ID at 0907. (DeGennaro, NY)

ARMENIA—Voice of Armenia, **9965** at 1924 with IS, anthem, ID, schedule, addresses and news. (Burrow, WA)

ASCENSION ISLAND—BBC Relay, **15390** in PP at 2140. (DeGennaro, NY)

AUSTRALIA—Radio Australia, **9475** in CC at 1325 and **11550** in unid Asian language at 2202. (Brossell, WI) **9560** at 1325 and **9580** at 1305. (Northrup, MO) **9560** to East Asia and the Pacific at 1106 and **9580** to the Pacific at 1108. (DeGennaro, NY) **9580** with "Waltzing Matilda" sign on at 0800. Also **21740** opening at 2200. (Maxant, WV) **9590** with news at 1400. (Paradis, ME) **9710** at 1900. (Burrow, WA) **15415** in FF at 0005, **15515** at 2205 and **17795** at 2335. (MacKenzie, CA) ABC Northern Territories Service, VL8A-Alice Springs, **2310**

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
Comm1(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		

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 435* loggings!) Why not join your fellow SWLs and let us know what you're hearing and become eligible for our monthly shortwave book prize as well! 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 "Global Information Guide" columnist at gdex@genevaonline.com (please see column text for basic formatting tips.) So come join the party—we look forward to hearing from you!

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

with music and interviews at 1102, //2325-Tennant Creek and 2485-Katherine. (D'Angelo, PA)

BANGLADESH—Bangladesh Betar, 7185 at 1229 sign on with IS, woman announcer with EE ID and sign on anmts f/by news and commentary. (D'Angelo, PA) 1230 with news, commentary, local music, ID at 1250 and off at 1300. Listed //9550 not heard. (Alexander, PA) 1250 with EE news and actualities. Off a few seconds before 1300. (Strawman, IA)

BELARUS—Radio Belarus, 5970 at 0200 sign on with IS and multi-lingual ID sequence and into listed Belarussian programming. English at 0300 to 0330 Saturdays and 0330 to 0400 Sundays UTC. (Alexander, PA)

BELGIUM—RVI, 9590 via Bonaire with "Radio World" at 0508. (MacKenzie, CA) 11730 via Bonaire with news at 2200. (Paradis, ME)

BOLIVIA—Radio Fides, La Paz, 6155.1 at 1035 with SS talk and brief music segments. (D'Angelo, PA) Nueva Esperanza, La Paz, 6585.3 at 1000 but very weak and only a few words noted here and there. (Wilkner, FL) Radio Malku, Uyuni, 4796.4 at 1010 with man and woman with music, clear ID at 1012. (Wilkner, FL) 1030 with woman in Aymara talk, canned anmts and music. (D'Angelo, PA) Radio Pio Doce, Llalagua-Siglo XX. 5952.4 at 0850 with CP music. SS anmts and talk. Several "Pio Doce" jingles at 0904. Heavy QRM from WYFR-5950. (Alexander, PA) Radio San Miguel, Riberalta, 4902.2 at 0935 with lots of traditional music plus Happy Birthday salutes. (Wilkner, FL) Radio Santa Ana, Santa Ana de Yacuma. 4650.3 at 2255 with rustic vocals hosted by man in SS, ad string at 2308 and two nice IDs. (D'Angelo, PA) 4650.2 at 2305 with music, ID by man. (Wilkner, FL) Radio Mosoj Chaski, Cochabamba, 3310 at 0935 with man and on-air phone call in SS and Quechua. (Mirabal, PR) 2323 with woman announcer and rustic vocals, woman in Quechua. ID at 2329. (D'Angelo, PA) Radio Municipal, Caranavi, 4845.2 at 0915 with CP music, SS talks, IDs. (Alexander, PA) 1029 with rapid SS talk, ID at 1030. (DeGennaro, NY) Radio Santa Cruz, Santa Cruz, 6134.8 at 1031 with news in SS, religious message. (DeGennaro, NY)

BOTSWANA—VOA Relay, 4930 at 0257 sign on with ID. "Yankee Doodle" to start of Daybreak Africa. (D'Angelo, PA) 0340 with VOA News Now. //4960-SaoTome, (Alexander, PA) 15580 at 1856 and 17895 at 1958. (Charlton, ON)

BRAZIL—Radio Anhanguera, Goiania, 4915 at 0943 with PP talk on family health. (DeGennaro, NY) Radio Difusora do Amazonas, Manaus, 4805 with lottery numbers at 0937. (DeGennaro, NY) Radio Brazil Central, Goiania, 4885 at 0413 with music and occasional PP anmts. (DeGennaro, NY) Radio Educacao Rural, Campo Grande, 4755 with music at 0934. (DeGennaro, NY) Radio Cancao Nova, Cachoeira Paulista, 9675 at 0256 with ID, music, commls. (DeGennaro, NY) Radio Educacion Rural, Tefe, 4925 at 1015 with commls, testimonials. (DeGennaro, NY) Radio Difusora, Londrina, 4815 with PP religious message at 0847. (DeGennaro, NY) Radio Cultural Ondas Tropicais, Manaus, 4845 with fast-talking male announcer in PP at 1005. (Mirabal, PA) Radio Educadora de Guaraja, Mirim, 3375 at 0932 with man in PP hosting Brazil pop program. Shouted ID and

commls at 0949. (D'Angelo, PA) 0950 with music and commls. (DeGennaro, NY) Radio Guaruja Paulista, Guaruja Paulista, 3235 with contemporary music in PP at 0925. (Mirabal, PA) 2247 with man in PP and Brazilian pops. //5045. (D'Angelo, PA) Radio Caiari, Porto Velho, 4785 at 1045 with man in PP and shouted ID. (D'Angelo, PA) Radio Guaiba, Porto Alegre, 6000 poor at 0825 with PP talk, ID, local pops. //11785 was very weak. (Alexander, PA) Radio Cultura, Sao Paulo, 17814.7 at 2235 with local romantic ballads, PP anmts. //9615. Both weak but in the clear. (Alexander, PA) Radio Aparecida, Aparecida, 6134.8 at 0755 with PP anmts, local PP ballads. ID at 0800. (Alexander, PA) Radio Nacional Macapa, 4915 in PP at 0221 with music and male PP announcer. (Jeffery, PA) 0328 with ID, music. (DeGennaro, NY) Radio Alvorada, Londrina, 4865 with PP pops at 1007. (Mirabal, PR) Radio Alvorada, Rio Branco, 2460 with Brazilian vocals at 0910. (Mirabal, PR) Radio Nacional Amazonia, 6185 clashing with Radio Educacion at 1019, 11780 at 1123 with homemaking hints. (DeGennaro, NY) 11780 in PP at 0130. (Charlton, ON) Radio Senado, Brasilia, 5990 with PP anmts at 1040. (DeGennaro, NY)

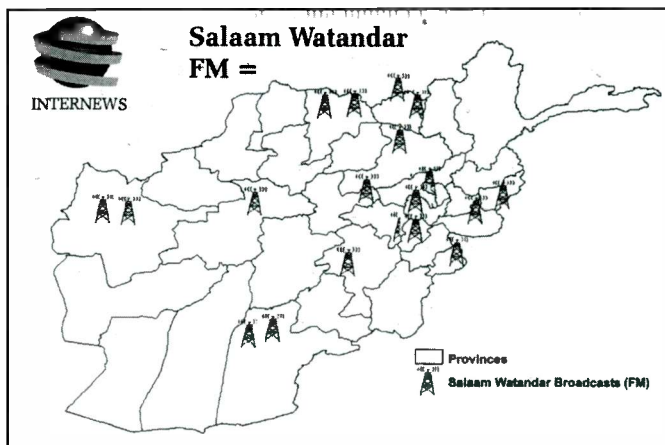
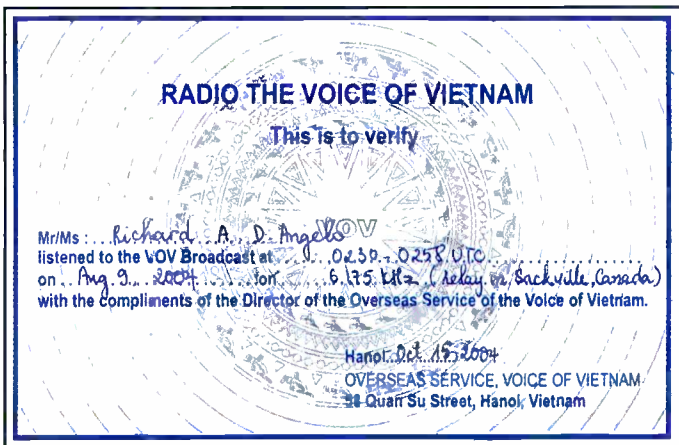
BURKINA FASO—Radio TV Burkina, 5030 at 0531 sign on with instl. anthem, local folk music at 0532 and FF talk. Poor with QRM from University Network (Alexander, PA) 2300 with interview in FF and apparent call-in program. No ID at top of hour. (Montgomery, PA) Tentative at 2345 with African music (Linonis, PA)

BULGARIA—Radio Bulgaria, 5800(t) at 1830 with IS. ID. news. Very weak. (Burrow, WA) 9700 at 0203 in FF with music, news. (DeGennaro, NY) 0336 with news and ID 0340. (Brossell, WI)

CANADA—Radio Canada Int., 11865 with SS call-in show at 0030. (Linonis, PA)



One of the VOA's current QSL cards, this one confirming Rich D'Angelo's reception of the VOA Kuwait relay. The picture shows the satellite receiving installation at the IBB/VOA site in Saipan (Thanks Rich D'Angelo)



The Voice of Vietnam sent this card to Rich D'Angelo for reception of their broadcasts via Sackville, Canada. Internews/Salaam Watandar, which broadcasts for Afghanistan, confirmed Rich D'Angelo's reception via Julich, Germany.

13655 at 1320. (Northrup, MO) CFRX, Toronto, **6070** at 2015 with call-in on auto questions. (Maxant WV)

CENTRAL AFRICAN REPUBLIC—Radio Centrafr.que, 9590 via France at 1922 with lots of African songs in local language and man anncr in FF. (Montgomery, PA)

CHILE—Voz Cristiana, **6070** at 0750 with SS religious programming. //9780. (Alexander, PA) **11745** in SS at 0128 and **15585** in SS at 0136. (Charlton, ON) **11890** in PP to Brazil at 1051. (DeGennaro, NY)

CHINA—China Radio Int., **9570** via Cuba, **9665** via Brazil in SS at 0342 and **11975** via Mali in FF at 2211. (Brossell, WI) Xinjiang PBS, Urumqi (t) **4980** with man/woman talking in listed Uighur at 0104. (D'Angelo, PA) CNR Beijing-1, **11630** with flute and vocals at 2210. (Strawman, IA) China Huayi BC Corp., Fuzhou (p) **4830** with long Mandarin talks at 1310. (Strawman, IA) CPBS, Geermu, **6090** at 1150 with EE love songs to 5 +1 time pips and ID, fanfare and news in CC. (D'Angelo, PA) **11630**-Lingshi with American pops, CC commentary at 2045. (DeGennaro, NY) Voice of the Strait, Fuzhou, **7280** at 1035 with woman in CC. (Foss, Philippines) China Music Jammer, **9455** covering Radio Free Asia from Saipan at 1953. Also **9885** against RFA at 2103. (Brossell, WI)

CLANDESTINE—Voice of Delina, **15650** at 1458 with open carrier, tones and HOA musical opening at 1500, f/by woman and ID in Tigrigna language and into program of short musical breaks and talks. (D'Angelo, PA) Voice of the Tigray Revolution, **5500** at 0358 with IS on a horn instrument, talks in unid language at 0400. (Brossell, WI) (p) At 0408 with man in long talk, woman anncr at 0415. (Montgomery, PA) Voice of Iranian Kurdistan (p) **4860** at 0259 with nice Kurdish vocals and talks. (D'Angelo, PA) Radio Nacional Saharagui, **7460** at 2301 with ballads and frequent IDs. (Strawman, IA) Radio Free Asia, **9455** via Saipan in CC at 1600. (Northrup, MO) in Asian language with EE sound bites at 1404. Also **9920** via Taiwan in

CC at 2142. (Brossell, WI) Voice of Iraqi Kurdistan (p) **6335** at 0415 with Mid East instls. Poor with some RTTY QRM. (Alexander, PA) Radio Farda, **9335** via Sri Lanka with pops heard at 2116. (Brossell, WI)

COLOMBIA—Radio Lider, Bogota, **6139.8** at 0415 with Latin pops hosted by man in SS. Relay of local AM/FM. (D'Angelo, PA) 0550 with SS ballads, many "Radio Lider" IDs but also mentions of "Melodia." (Alexander, PA) La Voz de su Concencia, Puerto Lleras, **5910** at 0950 with SS talks, mentions of Puerto Lleras, frequent TCs and lively rhythms. //6010. Also noted at 0346 to 0407 close with "Concencia" IDs, not Marfil Estereo FM. (D'Angelo, PA) **6009.8** with music, religious message in SS at 1125. (DeGennaro, NY)

Congo (REP)—RTVC, **5985** with abrupt sign on at 0429 with Afro-pops, ID and FF talk. Mixing with weak WYFR, which went off the air from 0448 to 0455 when they came back at very strong level. (Alexander, PA)

COSTA RICA—University Network, **9725** at 1300. (Northrup, MO)

CROATIA—Voice of Croatia, **7285** with news at 2315. (Maxant, WV) 7285 via Germany in SS at 0336. (DeGennaro, NY)

CUBA—Radio Havana Cuba, **9505** in FF at 2200 with news of the Americas. (DeGennaro, NY) **9550** at 1330, **9600** at 1235, **11760** at 1310, **11800** at 1250 and **12000** at 1315, all in SS. (Northrup, MO) **9820** in EE at 0110 and 11760 in SS at 0128. (Charlton, ON) **15120** in SS at 0030. (Linonis, PA) Radio Rebelde, **5025** in SS at 0857. (DeGennaro, NY) Radio Reloj, **12000** via RHC with man/woman and news in SS at 1054. Off 1055. (DeGennaro, NY)

CYPRUS—BBC Relay, **9410** with music program at 0215. (Jeffery, NY) **9750** with Albanian service at 1415. (Strawman, IA)

CZECH REPUBLIC—Radio Prague, **9435** heard at 2149 with SS to Western Europe and South America. (DeGennaro, NY)

DOMINICAN REPUBLIC—Radio Amanecer, **6025** at 1655 with news of local churches, slow religious songs. (Mirabal, PR)

ECUADOR—La Voz del Napo, Tena, **3279.5** at 0931 with man sending salutations to different family names in SS and local language. (Mirabal, PR; DeGennaro, NY) 1030 with long Catholic mass, f/by beautiful flute music. (Wilkner, FL) HCJB, **6005** with local news in SS at 1129, ID and program summary; also **6080** in QQ at 1104 and **9785** in GG at 0242. (DeGennaro, NY) **11960** in SS at 1225 and **12005** in EE at 1315. (Northrup, MO) Radio Buen Pastor, Saraguro, **4815** with SS religious message at 1054. (DeGennaro, NY) Radio Quito, **4919** at 0503 with Latin vocals hosted by man, ID at 0516. (D'Angelo, PA) 1115 with local news in SS, "Muy Buenos dias, Radio Quito." (DeGennaro, NY) HC2IOA time station, **3810** in SS at 0939. (Mirabal, PR)

EGYPT—Radio Cairo/Egyptian Radio, **7260** at 0327 with songs in EE, AA. (DeGennaro, NY) **9855** at 1631 with poor modulation, headlines at 1646, possible mailbag at 1652. (Burrow, WA) **9990** at 2139 and **11665** in AA at 2031. (Charlton, ON) 9990 heard at 2203. (Brossell, WI)

ENGLAND—BBC, **9525** via Florida at 0055 and **11765** via Ascension at 0055. (Charlton, ON) **12095** at 2000. (Maxant, WV) **13660** in AA at 1711. (Mirabal, PR)

EQUATORIAL GUINEA—Radio Bata, **5005** at 0554 abrupt sign on with SS ballad, SS talk, Afro-pops, IDs. Mostly constant talk by man/woman after 0603. (Alexander, PA) Radio Africa #2 (t) **15190** with Afro folk music mixing with very strong BBC-Antigua at 1620. (Alexander, PA)

ETHIOPIA—Radio Ethiopia, **9560** at 1600 with ID, frequencies, news headlines, music, to 1604 then news with ID, music at 1612, ID and bells at 1630 and more news. (Burrow, WA) Radio Fana, **6210** in African dialect at 0400. (Brossell, WI) **6940** with long talks at 0414, //6210. (Montgomery, PA)

FRANCE—Radio France Int., **15300** at 1737 with two men talking in FF. (Mirabal, PR) **15605** with news for Africa at 1600. (Paradis, ME) **17570** in FF at 1525. (Charlton,

ON) **17710** via Japan in FF at 2345. (MacKenzie, CA)

FRENCH GUIANA—RFI Relay, **4890** in FF with news at 0401. (DeGennaro, NY) 0430. (D'Angelo, PA) **9800** in SS to Central America at 0109. (DeGennaro, NY) **17630** with interview of someone who was a captive of the Colombian ELN guerrilla group. Off abruptly at 1828. (Mirabal, PR)

GABON—RTV Gabonaise, **4777** at 0532 with abrupt sign on with FF talk, Afro-pops, "Radio Gabon" IDs at 0600, 0604. (Alexander, PA) Africa Number One, **9580** in FF with pops at 1932. (Charlton, ON) 2110. (Brossell, WI) **15475** at 1802 with two men in FF talking about military conflicts in Africa. (Mirabal, PR)

GERMANY—Deutsche Welle, **6225** via Irkutsk in RR at 1345 and **9900** via Irkutsk in GG at 1338. (Brossell, WI) **11690** via Canada at 2033. (Charlton, ON) **11990** in GG at 2043. (Charlton, ON) **17860** via UAE in GG at 2109. (Mirabal, PR) Bayerischer Rundfunk, **6085** in GG at 2123. (Brossell, WI) IBRA Radio via Germany **9520** in unid African language at 1743. (Brossell, WI)

GHANA—Ghana Broadcasting Corp., **4915** with domestic news heard at 2145. (Brossell, WI)

GREECE—Voice of Greece, **7475** in Greek at 2000. (Paradis, ME) **9420** in Greek at 1952. (Charlton, ON) 9420 with Bouzouki music at 2140. (DeGennaro, NY) **15485** at 1700. (via Delano—gld) (Maxant, WV)

GUAM—Adventist World Radio (t) **11560** at 1733 with religious talk, Bible teachings. Very weak and no ID. (Burrow, WA)

GUATEMALA—Radio Coatan, **4780** with anthem at 1032, opening SS anmts, ID, ranchera and religious music. (Alexander, PA) Radio Verdad, Chiquimula, **4052.4** with EE religious service at 1152, supposedly for listeners in Belize. (Wilknor, FL) Radio Buenas Nuevas, San Sebastian, **4799.8** with music and religious talk heard at 1057. (DeGennaro, NY)

GUINEA—RTV Guineenne, **7125** with various music styles, FF anmts, news at 2053 to 2111. (D'Angelo, PA) 2150. (Brossell, WI) 2236 to 2350. (Montgomery, PA) 2330 to 0000 with many IDs. (Linonis, PA) 2340 to close at 0001. (Alexander, PA)

HAWAII—AFN/AFRTS, **6350 USB** with movie review at 1345. (Brossell, WI)

HONDURAS—Radio Litoral, La Ceiba, **4830** with EE religious talk at 1037. (DeGennaro, NY)

HUNGARY—Radio Budapest, **9775** at 0208 with talk on status of Hungarian Paprika in the EU. (DeGennaro, NY)

INDIA—All India Radio, **4760**-Port Blair (p) with typical Hindi vocals at 1348. (Strawman, IA) **4895**-Kurseong at 0102 with Hindi vocals and HH talk and 5010-Thiruvananthapuram from 0023 sign on with instl music, woman with ID and talk, time pips at 0030, ID and news. (D'Angelo, PA) **9425**-Bangalore in presumed Hindi at 1745, **9470**-Bangalore at 2110, //9425. Also 9820-Panaji (Goa) in Hindi at 1350. (Brossell, WI)

9425-Bangalore in HH at 2146; **9445**-Bangalore in EE to Europe at 2154, 9470-Aligarh in HH to South Asia at 0143 and **11715**-Panaji in EE to Australia at 2056. (DeGennaro, NY) 9445/0050 in EE at 1927. (Charlton, ON) **11620** with EE to Europe at 1900. (Maxant, WV) **13770**-Bangalore with slow Indian music and woman in apparent Hindi at 1716. (Mirabal, PR)

INDONESIA—Radio Republik Indonesia, **3325**-Palankaraya (Kalimantan) at 1155 with woman in II. SCI at 1158 and into Jakarta news at 1200. **3976.1**-Pontinak (Kalimantan) at 1052 with Koran through top of the hour and man in II. Some music and amateur QRM. **4605**-Serui (Irian Jaya) at 1145 with vocals, local ID at 1159, SCI and Jakarta news relay. //3325 and 4925. **4750**-Makassar (Sulawesi) at 2145 with mix of Indo pops and II talk to SCI at 2159, generic RRI ID and Jakarta news. **4790**-FakFak (p) at 2135 with two men in II, woman in II, brief music between various talk segments. Fade out by 2154. **4925**-Jambi (Sumatra) at 1149 with pop vocals to top of hour. Jakarta news joined in progress at 1201. (all D'Angelo, PA) **3266.5**-RRI-Gorantola at 1041 with songs. Also **4000**-Kendari (Sulawesi) with local music at 1023. (Foss, Philippines)

IRAN—VOIRI **9555** in SS to South America at 0148 and **9905** in SS at 0216. (DeGennaro, NY) **9610/9940** with EE news at 1613, ID and "Important Events in the Christian Calendar Year 2004." (Burrow, WA) **11750** in FF at 1207. (Chandler, ON)

ISRAEL—Kol Israel, **6280** at 0435 with woman and EE news, mostly Middle East items. (Montgomery, PA) **9390** in HH at 2114. (Brossell, WI) **17535** in HH at 1239. (DeGennaro, NY)

ITALY—RAI (p), **9760** at 1935 but too weak to determine language. (Burrow, WA) **9840** in SS to South America at 0113. (DeGennaro, NY) **11800** at 2230 with birdcall and bells IS, ID. (Charlton, ON) 0030 to 0045 in II. (Linonis, PA) 11880 at 2042 to 2045. Radio Australia in the background. (Montgomery, PA) **15320** (via *Ascension—gld*) at 1751 with talk and comments about soccer. (Mirabal, PR) IRRS, **5775** at 2220 with

ID and request for reports, promo for Tsunami fundraiser, pop vocal and promo for European Gospel Hour. (D'Angelo, PA) 2221 with EE IDs, light pops, promos for Reaching Up Radio, Chain Surfer Radio. Off at 2302. (Alexander, PA)

JAPAN—Radio Japan/NHK, **6145** via Canada at 0058 and **11895** via French Guiana in JJ at 2041. (Charlton, ON) **9505** at 1350. (Northrup, MO) **11855** via Ascension in EE to Central Africa at 2103. (DeGennaro, NY) **17605** via Bonaire in JJ at 2338 and **17810** (direct) in CC at 2349. (MacKenzie, CA)

JORDAN—Radio Jordan, **11690** at 1500 with news and pop. (Paradis, ME) 1515 with call-in program, pops, news at 1600. (Alexander, PA) 1656 with western contemporary tunes, news headlines at 1700. (Burrow, WA)

LATVIA—Stoer-sender, **9290** via Latvia at 1346 with pops and talk in GG. Gone by 1400. (Strawman, IA)

LIBYA—Radio Jamahiriya, **11715** in FF at 2005. (Charlton, ON) **11635** in AA at 2049. (DeGennaro, NY) **15220** with Koran at 1706. (Brossell, WI) (all via *France—gld*)

MADAGASCAR—Radio Netherlands Relay, **7285** with Indonesian service at 2242. (Strawman, IA)

MALAYSIA—Radio Malaysia, Sarawak, **7270** in unid language at 1032. (Foss, Philippines) **7295**-Kajang at 1624 with Radio 4 service. (Burrow, WA)

MALI—ORT Malienne, **4782.4** at 2230 with FF pops and ballads. Off in mid-sentence at 0002. Usually signs off with NA. //5995. Also noted at 0622. (Alexander, PA)


MAURITANIA—Radio Mauritanie, **4845** in AA at 2137. (Brossell, WI) 2345 closing with Koran at 0000. (Linonis, PA) 0044 in AA. (DeGennaro, NY)

MEXICO—Radio Educacion, **6185** with possible political speech in SS at 0130. (Linonis, PA) Songs in SS at 0355. (Brossell, WI) 1119 with LA music. (DeGennaro, NY) Radio Mil, **6010** at 1255 with moderate ballads, headline news at top of hour, mentions of Mil and back to ballads. Low audio level. (Strawman, IA) Radio UNAM, **9600** with ID and flute music at 1740. (Brossell, WI)

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 Rick Barton of Phoenix, Arizona. Universal Radio has sent Rick a copy of *Joe Carr's Receiving Antenna Handbook*. If you don't have a copy of Universal's latest catalog in your listening post, you're missing a great resource! So before you turn your receiver on next time, call Universal at 614-866-4267 and request your free copy. You can also e-mail them at dx@universal-radio.com, or send them a note at 6830 Americana Parkway, Reynoldsburg, OH 43068.



ADVENTIST WORLD RADIO
THE VOICE OF HOPE

QSL

"Are you tired? Worn out? Burned out on religion? Come to me. Get away with me and you'll recover your life. I'll show you how to take a real rest."

MATTHEW 11:28
The Message

Adventist World Radio sent Rich D'Angelo this QSL verifying reception of their transmissions via the United Arab Emirates.

MOLDOVA—Voice of Russia relay **7125** in RR at 0311 and **7180** at 0318. (DeGennaro, NY) **7125** heard at 0555, anthem at 0600. (MacKenzie, CA)

MOROCCO—RTV Marocaine, **5980** in AA at 0350. (Brossell, WI) **15345** in AA at 1515. (Paradis, ME) 1519. (Charlton, ON) 1754 with phone-in. (Mirabal, PR) 2110 with woman in AA. (Jeffery, NY) 2136 in AA. (DeGennaro, NY) VOA Relay, **15220** in unid language at 2043 and **15240** at 2048 with "Africa World Tonight" (Jeffery, NY) 15240 at 1707. (Brossell, WI) 1743. (Mirabal, PR)

NETHERLANDS—Radio Netherland, **9895** in DD at 1942 and **11655** in EE at 2009. (Charlton, ON) **17875** via Canada at 1940. (Maxant, WV)

NETHERLANDS ANTILLES—Radio Netherland Relay, Bonaire **15315** in DD heard at 2100. (Jeffery, NY) 15315 and **17725** at 1930. (Maxant, PR) **17810** in DD 2103. (Mirabal, PR)

NEW ZEALAND—Radio New Zealand Int., **9870** with birdcall IS at 0755 sign on and into news. (Maxant, WV) Story reading at 1412. Also **9885** with "New Zealand Today" at 0918. (DeGennaro, NY) **17675** at 2333 with weather and news items. (MacKenzie, CA) 0317 with interview with president of Palau. (Foss, Philippines)

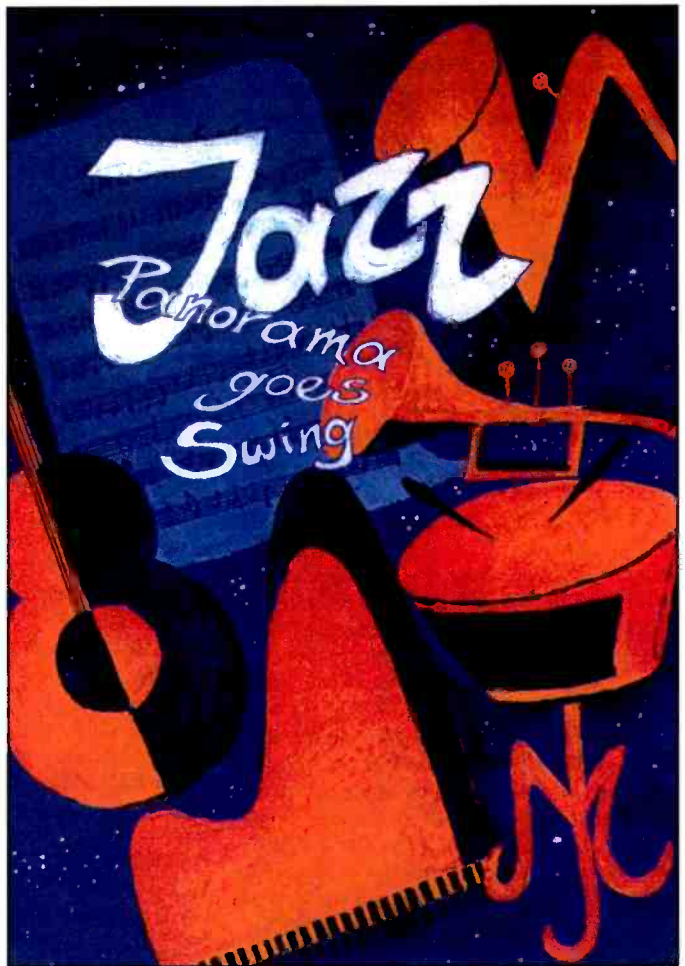
NIGERIA—Voice of Nigeria, **7255** at 2216 in Hausa and apparent news. (Montgomery, PA) **15120** at 1700 with program preview, news "Landmark" program, Afro-pops, "People and Places." Audio varies from poor to very good, depending on the program. (Alexander, PA) Radio Nigeria, Kaduna, **4770** at 2155, ID and James Brown vocals. Three minutes of dead air at 2204. (D'Angelo, PA) 2225 with variety of pop, hip-hop. Off with NA at 2300. Also noted at 0431 sign on. (Alexander, PA)

NORTH KOREA—Voice of Korea, **7140** heard at 1015 with march music and passionate chorus. (Foss, Philippines) **15245** at 0030 with usual stuff about Kim Jong Il. (Linonis, PA)

NORTHERN MARIANAS—KFBS, **9465** in RR at 1408. (Brossell, WI)

PAKISTAN—Radio Pakistan **9390** heard at 1558 in presumed EE. IS then broadcast starts at 1600 with narrative. Off at 1615. (Burrow, WA)

PAPUA NEW GUINEA—Radio East New Britain, Rabaul, **3385** at 1210 with man in EE and Pidgin. (D'Angelo, PA) Radio Bougainville, (t) **3325** at 1200 with possible vocal anthem under RRI-Palankaraya. Very poor. (D'Angelo, PA) Radio New Ireland, **3905** at 1014 with rock/pop singer in unid language. (Foss, Philippines) 1143 with island vocals hosted by man in Pidgin. ID and EE news by woman at 1200. Sporadic ham QRM. (D'Angelo, PA) Radio Southern Highlands, **3275** at 1155 with country-western, //3355-Simbu. (D'Angelo, PA) Radio Madang, **3260** at 1135 with nondescript vocals and man in EE and Pidgin. (D'Angelo, PA) Radio Manus, **3315** at 1142 with male in EE hosting love songs. (D'Angelo, PA) Radio Simbu, Kundiawa, **3355** at 1200 with country-western, multiple IDs and fre-



Hamburger Local radio (Hamburg, Germany) confirmed reception of one of their "Panorama" jazz programs. (Thanks Rich D'Angelo)

quency anmt at 1202. Orchestral NA at 1204. (D'Angelo, PA) NBC, **4890** at 1038 in EE and Pidgin. (DeGennaro, NY) 1232 with western pops, ID, PSA, more music until news at 1300. (Burrow, WA) 1337 with soft ballads. (Brossell, WI) Catholic Radio Network (t) **4960** at 1228 with some music and choir, snippets of EE talk by woman. Poor and quickly fading. (D'Angelo, PA)

PERU—Radio Libertad, Junin, **5036.3** signs on after 1100, usually close to 1115 to 1120. (Wilkner, FL) Radio Tarma, Tarma, **4775** with religious talk in SS at 1101. (DeGennaro, NY) La Voz de la Selva, Iquitos, **4824.4** with SS songs at 1041. (DeGennaro, NY) Radio La Hora, Cusco, **4855.6** at 1025 in QQ with occasional SS anmts. (DeGennaro, NY) Radio Maranon, Cajamarca, **4835.5** at 1027 with man in SS, OA vocal. Low modulation. (D'Angelo, PA) Radio San Antonio, Callalli, **3375** at 1052 with man in SS and lively OA vocals. (D'Angelo, PA) Radio Victoria, Lima, **6020.2** at 0745 with SS religious talk, music. (Alexander, PA) Woman preaching in SS at 1030. (Mirabel, PR) Religious message in SS at 1053. (DeGennaro, NY) Radio Horizonte, Chachapoyas, **5019.9** at 1050 with OA folk music, SS anmts, ID. (Alexander, PA) Radio Oriente, Yurimaguas, **6188** at 1045 with local music, and man with "atencion, atencion." (Mirabal, PR) Radio Municipal, Pano, **3173**, at 0912 with OA music in SS and local language. (Mirabal, PR) Radio Altura, Piura, **5014.5** at 0304 with SS talk and OA music. Seemed to just fade away around 0330. (D'Angelo, PA) 0310 with SS talk, OA music, SS pops, commls, ID. Off abruptly at 0322. (Alexander, PA) Radio Santa Monica, Cusco, **4965** at 0940 with SS talk, ID, OA music, commls, (Alexander, PA) 0949. (DeGennaro, NY) Radio Imperio, **4386.5** at 1127 with SS religious talk, ID, TC, more religion. (D'Angelo, PA) Radio Atlantida, Iquitos, **4790** at 0955 with SS religious songs. (Mirabal, PR) 1050 with

SS talks, OA vocals. Low modulation. (D'Angelo, PA) Radio Tacna, Tacna, **9504.7** at 1030 with ID and numerous Radio Nacional IDs. (Wilkner, FL) Radio Huanta 2000, Huanta, **4746.8** at 1000 in QQ with local music. (Alexander, PA) **4746.9** at 2335 with commls, SS ID, talk, OA vocals. (D'Angelo, PA) 4747 in QQ at 1053. (DeGennaro, NY) **4748** at 0950 with folklorico and SS talk. (Mirabal, PR)

PHILIPPINES—Radio Pilipinas, **11730//15190** at 1805 with Tagalog talk, ID at 1808 and music. (Burrow, WA) FEBC, **9430** at 1328 with talk and hymns in CC. (Brossell, WI) VOA Relay, **17740** in EE at 2340. (MacKenzie, CA)

PIRATES—WSPY, **6925 USB** on and off at 2036 repeating, "This is WSPY." Then, from 2037 to 2039 rock, IDs and a few numbers. No address. (Zeller, OH) WEAK Radio, **6925 USB** with oldies from 2352. (Mirabal, PR) Rock things hosted by man to 0020 when lost. WEAKRadio69@yahoo.com. (D'Angelo, PA) James Bond Radio, **6950 USB** at 2256 with numerous James Bond themes plus Bondvoice clips. (D'Angelo, PA) Undercover Radio, **6925 USB** at 2325 with soft instl music, ID with email and postal address. (D'Angelo, PA) Voice of Laryngitis, **6925.6 USB** at 2238 with siren and seal barking sounds, Michael Jackson in a Shakespeare sit, ID and Battle Creek address. (D'Angelo, PA) The Crystal Ship, **6856** at 2342 with various rock/pop selections, ID at 2346 as "You are on board the Crystal Ship, plundering the airwaves." (Wood, TN)

PORTUGAL—RDP Int., **9715** in PP at 0108 and **17575** in PP at 1527. (Charlton, ON) **17680** in PP at 2345. (MacKenzie, CA) **9715** in PP at 0250 and **11980** in PP at 0216. (DeGennaro, NY)

ROMANIA—Radio Romania Int., **6055** ending at 2155 "Our broadcast in English is coming to an end" then frequencies and website and off at 2156. (Brossell, WI) 6135 at 2339 announcing a CD winner and various talks and features. (Montgomery, PA) **9510** with folk music and talk at 0145. (DeGennaro, NY) **15105** in GG at 1734. (Charlton, ON)

RUSSIA—Voice of Russia, **7260** in RR to Central and South America at 0333. (DeGennaro, NY)

RWANDA—Deutsche Welle Relay, **6180** in unid African lang. at 0320 and **12035** in unid Asian lang. at 2213. (Brossell, WI) **9720** in unid African language at 2229 and **11690** in GG at 0051. (Charlton, ON)

SAUDI ARABIA—BSKSA, **9555** in AA at 1950. (Brossell, WI) 2208 with discussion in AA. (DeGennaro, NY) **15315** in AA at 1500. (Paradis, ME)

SEYCHELLES—BBC Relay, **9605** at 2107 with news on fighting in Congo and Uganda. (Brossell, WI)

SINGAPORE—Mediacorp Radio, **7170** in Tamil at 1023. Also **7235** with East Indian type music at 1037. (Foss, Philippines) BBC Relay, **15360** at 0000. (Linonis, PA)

SLOVAKIA—Radio Slovakia Int., **7345** in Slavic language at 2010. (DeGennaro, NY)

SPAIN—Radio Exterior de Espana, **5970** via Costa Rica in SS at 1058 and **6055** at 0110 with music by 19th Century Spanish composers (DeGennaro, NY) 1245. (Northrup, MO) **15125** via Costa Rica in SS at 2032. (Jeffery, NY)

SOUTH AFRICA—Radio Sondergrense, **3320** with pops and talks in Afrikaans at 0349. (Brossell, WI) 0402 with man and woman reading news in Afrikaans and some EE voice clips. (D'Angelo, PA) Channel Africa, **15285** at 1710 with report on AIDS in Africa. (Brossell, WI) 1739 on anti-Muslim people in Zanzibar. (Charlton, ON) Adventist World Radio, **11925** at 1827 with music, ID in EE and FF. (Burrow, WA)

SOUTH KOREA—Radio Korea Int., **15575** at 0000 in KK with ID and news. (MacKenzie, CA)

SRI LANKA—SLBC, **15475** in unid language heard at 1325. Very weak. (Northrup, MO) Deutsche Welle Relay, **11890** in AA to North Africa and Middle East at 2108. (DeGennaro, NY)

SUDAN—Radio Peace, **4750** at 0232 with EE talk, ID "This is Radio Peace. Thank you for listening" and choir. (D'Angelo, PA) 0400 to 0430 close with non-stop talk in unid African language. (Brossell, WI)

SURINAME—Radio Apinte, **4990** at 0330 with oldies hosted by man in EE, ID at 0345. (D'Angelo, PA) 0416 in DD. (DeGennaro, NY) 0500 with clear "This is Radio Apinte" and into rock numbers. (Wilkner, FL) 0655 with light US pops and ID as "The Happy Station." (Alexander, PA)

SWAZILAND—Trans World Radio, **3240** at 0338 with religious talk in listed Ndu language. Also **4775** in listed Lomwe at 0352. EE ID at 0356. Into GG at 0400. (D'Angelo, PA) 4775 in GG at 0403. (Brossell, WI) **9500** at 1727 with IS, ID and Bible passages. (Burrow, WA)

SWEDEN—**11550** at 1350 on cold-water exploration and high-speed networks. (Brossell, WI) **15240** at 1330 with news, "Nordic Life." (Paradis, ME)

TAIWAN—CBS, **9415** in CC at 1330. (Brossell, WI) Radio Taiwan Int., **7130** at 1243 with EE broadcast including "Let's Learn Chinese." (Burrow, WA)

TAJIKISTAN—Voice of Russia, **11500** in unid language at 1300. (Northrup, MO)

THAILAND—Radio Thailand, **7285** in presumed Thai at 1044. (Foss, Philippines) **7305** at 1104 in TT with presumed news. Also **5890** via Greenville in TT at 0100 sign on. (DeGennaro, NY) **9535** at 2030 with 15-minute EE program. (Paradis, ME) **9840** with news, ID at 1907. (Burrow, WA) VOA relay, **5985** in KK at 1305. (Strawman, IA) **15150** with program on the late Artie Shaw at 2345. (Linonis, PA)

TUNISIA—RT Tunisienne, **7225** in AA at 1800. (Paradis, ME) **9720** in AA at 1737. (Brossell, WI) 2053. (Charlton, ON) **17735** in AA heard at 1244. (DeGennaro, NY)

TURKEY—Voice of Turkey, **6020** at 0405 with news, IDs. (Burrow, WA) 0424. (DeGennaro, NY) **6055** at 2007. Possibly list

of EE broadcasts at 2018. (Montgomery, PA) **15350** in unid lang. at 1530. (Paradis, ME)

UGANDA—Radio Uganda, **4976** at 0405 with EE news, numerous mentions of Uganda and other African countries. (D'Angelo, PA)

UKRAINE—Radio Ukraine Int., **5910** at 0400 with IS, ID, Chimes, program notes and headlines. (Burrow, WA) **7545** at 0000 in presumed Ukrainian. (Linonis, PA)

UNITED ARAB EMIRATES—FEBA relay, **12025** in unid language at 1330. (Northrup, MO)

UNITED STATES—AFN/AFRTS, Key West, **7811** down from listed 7812.5 at 2025 with EE programming, possibly from NPR. (Montgomery, PA) 0000 with AP Network News. (D'Angelo, PA)

UZBEKISTAN—Radio Tashkent **6165** weak in EE at 0105. (Charlton, ON) **9715** at 1330 sign on and into news. (Alexander, PA) Voice International (via) **9855** at 1420 with Hindi service. (Strawman, IA)

VATICAN—Vatican Radio, **9600** at 0030 moving into next language segment. (Charlton, ON) **9645** in II at 1115 and **11625** in FF at 2040. (DeGennaro, NY) **15570** in FF at 1720. (Brossell, WI)

VENEZUELA—Radio Amazonas, Puerto Ayacucho, **4939.7** at 1015 with SS call-ins. (DeGennaro, NY) 1025 sign on with national and state anthems, ID and into romantic ballads. (Alexander, PA) Radio Nacional via Cuba, **11760** at 2330 with revolution talk, then "Musica Venezuela." (Linonis, PA) **13680** at 2330 in EE/SS with various reports. Program off suddenly at 2355, carrier ran to 0010. (Maxant, WV) Observatorio Naval Capital time station, **5000** at 1046 in tandem with WWV. (DeGennaro, NY)

YEMEN—Republic of Yemen Radio, **9780** with Koran at 1939. (Brossell, WI)

ZAMBIA—ZBC/Radio Zambia, **4910** at 0335 with Afro hits and talk in unid African language. (Brossell, WI) 0404 in unid language. (DeGennaro, NY) (p) At 0440 in local language. (Montgomery, PA)

And that empties the IN tray for this time. Unending thank yous to the following who persevered through generally poor conditions and came up with the logs: Bruce R. Burrow, Snoqualmie, WA; Robert Wilkner, Pompano Beach, FL; Alvin Mirabal, St. Just, Puerto Rico; Jerry Strawman, Des Moines, IA; Stewart MacKenzie, Huntington Beach, CA; Robert Charlton, Windsor, ON; Robert Brossell, Pewaukee, WI; Rich D'Angelo, Wyomissing, PA; Joe Wood, Venore, TN; Dave Jeffery, Niagara Falls, NY; Jack Linonis, Hermitage, PA; George Zeller, Cleveland, OH; Ray Paradis, Pittsfield, ME; Brian Alexander, Mechanicsburg, PA; Marty Foss, Guinayangan, Philippines; Cero DeGennaro, Feura Bush, NY and Robert Montgomery, Levittown, PA. Thanks to each of you and, until next month, good listening! ■

Signals From Beyond The Horizon: DXing The FM Band

The AM DXing season is pretty well ended, and now the static from summer thunderstorms is showing up. There is still listening to be done on the AM band, and sunrise and sunset are still good times to hunt these stations down. Maybe your local station got hit by lightning or a power outage, giving you a chance to listen on a frequency where you normally wouldn't get a chance (yes, it DOES happen!). In this month's column, I'd like to highlight that other band that many AM DXers switch over to, sometimes with some amazing results: FM!

Ah, the FM band, in stereo, with no static or noise—sometimes. When you start hearing noise on your local station, it's time to start tuning in between the stations to see what's going on. Generally, when there's interference to a frequency you're listening to from another station about 20 miles away, or from one that's using low power (6000 watts or less), you'll hear a hash-type noise in the stereo signal. That's when you should start looking.

There are two basic conditions that affect the FM band and bring those stations to you: tropo and *E*-skip. During tropo, a station's signal is enhanced by ground conditions and pushed out about 100 to 250 miles beyond its local coverage area, with signal strength varying. It's generally common in the morning or late nights, with the effect becoming weaker as the sun rises. It's also most common along the coast, but there have been some good, though infrequent, inland openings as well. *E*-skip is marked by signals coming from 750 to 1,000 miles away. It generally takes place during the day and early evening, and can last for just a few minutes to hours with signals going from one end of the continent to the other. It can also be very signal variable, going from weak to strong enough to wipe out the entire FM band within 10 miles of a transmitter site. *E*-skip signals are a little tougher to identify, since the signal has a tendency of varying in signal strength, from very strong and holding well, to weak, fluttery and fading at station identification time (that's Murphy's Law working!). The phenomenon can also be more localized; when an opening is present, signals from just about all the stations from one area are audible.

The prime FM DX months are June, July, and August. Listening times can vary, depending on whether the opening is tropo or *E*-skip. In the past, I have always noted tropo conditions to start showing up after a change in the weather from dry to humid. *E*-skip can happen just about any time, and working it is largely a question of being in the right place at the right time.

What You Need To Get In On The Action

It doesn't take a lot to get into FM DXing, just a fairly sensitive and selective radio that will let you get in between the local and semi-local signals in your area. There are receivers available for around \$100 that will work great for the beginner, and there are systems you can put together that will run you into the thousand of dollars.



The venerable CCRadio Plus from C. Crane Company (www.ccrane.com) has been lauded as an excellent radio that's exceptionally sensitive and selective, making it an ideal FM DX receiver.

If you're just getting started, my best advice is to research the receivers you're interested in buying. Product reviews are the best way to find out how good a receiver's selectivity is and how well it will handle co-channel signal rejection. Next, try the receiver out if you have the chance to do so. Some stores have display models, and always ask if you can try the set. If you can get results you're satisfied with there, it's generally safe to assume the set will work even better once it's taken to a better location.

One source for reasonably priced receivers is your local ham-fest! This is a radio/electronics "trade show" and flea market, generally set up by the local ham operators' organization. Shows can range from just a few tables to something that will fill up the local fairgrounds, or the "Big Show": The Dayton Hamvention, the biggest one in the United States these days. If you look around, you'll always find someone with the equipment you need. If you find something you're interested in, make sure you ask that all important, obvious question: "Does it work?" And if there's electricity available, can you take it for a test listen? In most cases, the seller at the table will give you an honest answer and offer any advice they may have on the unit. And prices are generally respectable, so if you feel comfortable with what you see and are willing to take a chance on making a good deal, my advice is to go for it!

Movin' Up

Okay, now the FM DX bug has bitten you, you heard a few stations from thousands of miles away, your log book is filling up, and now you want to start getting a little fancier in how you can hear the stations. Congratulations, you're moving from the rookie into the pro category.

Take a look at possibly upgrading your receiver. What do you want? The best suggestion is to look at a receiver that



The GE Superadio III has been around for a long while and is still going strong. It also is an excellent radio for FM DXing and is typically available for under \$60 in the United States.

will let you listen closer to your local stations. This would involve tracking down a unit that would be more in the professional category. Look through the catalogs. Again, if you can find them, study product reviews or, better yet, ask other FM DXers what they're using and you'll find out what the "hot" receivers are.

If you have the space available, think about adding an outside antenna. A directional FM band antenna can open up a whole new world in listening, where you can have the antenna mounted on a rotor and set it for a different direction, giving you the chance to hear more distant stations or those that have been buried under other signals. The key to any antenna is good front-to-back rejection. All directional antennas have a front end (the end where a signal is at it strongest). As the antenna is turned, the front end pick up should move with the antenna. For instance, if you're picking up a station from the north and you want to hear what is coming in from the south, you simply rotate the antenna 180 degrees. The station from the north should then become inaudible or greatly reduced in strength; the lower the signal, the better the front-to-back signal rejection of the antenna. If the signal stays the same, the rejection is not good. An antenna I've had good luck with over the years is the Finco FM4G, which has been recommended as one of the better ones by various FMDXer clubs.

Using an FM signal amplifier may or may not benefit you. With an amplifier, you are basically increasing the level of any signal across the entire FM band, so in the event you have a noise condition present, the noise itself will *also* be

Your Broadcast Loggings Needed!

What are you hearing on the AM or FM bands? Do you have any recent QSL cards, letters, or station promo items you'd like to share with our readers? Please send them to me here at *Pop'Comm*, along with any broadcast news from your local area. You can send mail to *Popular Communications*, "Broadcast Technology," 25 Newbridge Road, Hicksville, NY 11801 or e-mail me at TheRadioColumn@aol.com. Loggings should follow the format you see in this month's column: STATION FREQUENCY, CALLSIGN, location, brief reception details, followed by your last name and state/province abbreviation. Please contribute!

increased. Signal amps can also overload the input to your receiver, causing signals to show up where they don't belong on the dial. Again, this is something you have to try out for your particular listening situation. In most cases, a good receiver has enough sensitivity that, with the help of a good antenna, signal boosting really isn't needed.

A Few More Tips

If you're technically minded, there are a couple of other devices that can boost your chances of tuning right alongside your local stations or knocking out the signal of an offending station. Most receivers today use ceramic filters to control how much space a signal will use on your receiver's dial. With a ceramic filter, you'll generally see an improvement in the selectivity of your receiver. For more information, visit www.stevemcvie.com or at www.Digikey.com. If you live near a local station that's strong enough to overload your receiver, making it show up at a few spots on the dial other than where it belongs, may be the answer. You can do this with a signal trap. This is basically a notch-type filter that's set for a specific frequency and installed in the lead-in of the outside antenna. This will bring down the level of the offending signal so it doesn't overload the set (this may even help in getting something on an adjacent frequency). A good source for these traps is Microwave Filter Company, located in East Syracuse, New York. Information can be found at www.MicrowaveFilterCompany.com, and specifically look for information on the FM Notch Filter, model 5KFM. Keep in mind these units are sealed and set to a specific frequency that you must request when ordering.

A big benefit to the FM DXer is the log book by Bruce Elving, *The FM Atlas*. With its complete listing of stations, this is probably your best source for what's going on with the FM band. The log also goes into other details, such as power lev-

els, antenna height, and whether a given station is directional!

Lastly, check out what other people are doing. One club that is *tuned in* with the FM DXer is the Worldwide Television & FM DX Association (WTFDA). More information can be obtained on WTFDA by writing P.O. Box 501, Somerville, CT 06072 or by visiting its website at <http://anarc.org/wtfda/>.

And as always, if there is any other group or club which features FM listening as part of its publication, please let us know and we'll be sure to pass it along to our readers. Good luck, and let me know what you're hearing when the FM band is open to your area!

Club News

The annual convention of the National Radio Club will be held Labor Day weekend at the Best Western in Kulpsville, Pennsylvania. Why does this sound familiar? Because this is the same location as the annual NASWA Winterfest held in March (see "The 18th Annual Winter SWL Fest" elsewhere in this issue). If you're interested in stopping by, please do so.

Regretfully, we learned of the passing of Don Erickson of Riverside, California, due to a fire at his house on March 1. Don had served as publisher and editor of the International Radio Club of America's *DX Monitor* and had edited columns for the National Radio Club. Don also operated Century Print Shop and was known to have numerous items, such as DX publications and magazines stuffed in his house! Our sincere condolences go out to his family.

Broadcast Loggings

1560 WAGL, Lancaster, SC, heard at 1735 with oldies. Signal was 35 over S9 with slight fading and static. "This is The Music of Your Life on 50,000 watt WAGL, Lancaster." (IEN-GA)



Grundig's Satellit 800, while somewhat large, is another excellent receiver you should seriously consider.

730 WPIT, Pittsburgh, PA, good signal. Listened to a station ID, followed by a Robert Morris College football game. News/talk/religious programming. (Ressler-OH).

1020 KDKA, Pittsburgh, PA, strong signal. Listened to an interview with vet-

eran overnight talk show host Bob Loge, who announced his retirement after 16 years. He will still work for the station, providing commentary for KDKA's monthly newsletter, News/talk. (Ressler-OH).

1140 CHRB, High River, AB, noted weak under WRVAs talk programming,

again still being heard in the east and still a good bet for those needing something from the west. (DS-PA)

1360 WNJC, Washington Township, NJ, noted with talk program, ID then into an oldies program. This is a good bet for those needing the state of NJ in their logs, if you're not in an area where 1360 is plugged by a local signal. And you never know what you'll hear since programming is all purchased by the person on the air. (DS-PA)

1150 CKOC, Hamilton, ON, "Southern Ontario's only 24-hour oldies station" noted very clear and atop frequency. (DS-PA)

640 KFI, Los Angeles, CA, even though this is operating at reduced power from an auxiliary antenna due to the main tower collapsing after being hit by a plane in January, the signal is being heard as far east as Ohio. (DS-PA)

580 KJMJ, Alexandria, LA, financial Planning program and then Gospel Music. Top of hour ID. Decent signal that faded from time to time. "It's eleven o'clock. You're listening to Radio Maria on AM 580, KJMJ, Alexandria, Louisiana". (IEN-GA)

1220 WKMT, King's Mountain, NC, Southern Gospel competing with Urban Gospel from WHK in Cleveland, Ohio, up to sign off. Decent signal with fading. "...join us again tomorrow on WKMT, King's Mountain". (IEN-GA)

1220 WHK, Cleveland, OH, Urban Gospel competing with Southern Gospel from WKMT in King's Mountain, NC. WKMT signed off at 0027 and then WHK was easily heard after that. Decent signal with fading. "AM 1220, The Word." (IEN-GA)

A special tip of the hat to Ira Elbert New, III, Watkinsville, Georgia, and "Ressler, OH," who we hope will ID themselves in the future. DS-PA is your faithful columnist on the road!

Coming In July

That's it for this month. Thanks to you all for your continued support! We would appreciate hearing from you, either with your DX loggings or general station news from your area—it's all helpful.

Next month we'll take a look at how AM directional antenna systems work and talk with a consulting engineer who's involved in the design of such systems and what it takes to get it through the FCC application process. Best of DX to you! ■

FCC News And Call Changes

WMTR-1250 Morristown, NJ, is now operating with 5000 watts daytime and 7000 watts nights.

WPEN-950 Philadelphia, PA continues to make adjustments for a pending increase in power. Presently the station is operating with 5000 watts day and night. A previous application was made for 50,000 watts day and night from a new antenna site located west of Philadelphia. A change was then requested to operate with 50,000 watts daytime from the new location west of Philadelphia and using the site of WWDB-860 as their night location with 20,000 watts. Now the latest change is for 5000 watts daytime from their original location during the day and 21,000 watts night from the WWDB site (adding two more towers to the present WWDB four tower system).

WMWX 95.7 Philadelphia, PA changes formats and now is "The Ben FM."

WMAL-630 Washington, D.C., has made an application to increase daytime power to 10,000 watts.

An application has been made on 1620 for a station in Toms River, NJ, with 10,000 watts day and 1000 watts night. This is an application for a new station that was previously dismissed.

An application for a new station on 890 in Exmore, VA, was recently amended to add critical hours operation with 220 watts. The application was for 330 watts day and night. This application was dismissed by the FCC for "non progress," and it is suspected that this will keep the application active.

A move by WGSM-740 from Huntington, NY, to Mount Olive, NJ, with a proposed six-tower antenna system has been turned down.

Reported "Off the Air" are WAAA-980 Winston-Salem, NC; KHRO-1650 El Paso, TX; WLVA-590 Lynchburg, VA; and WRKN-970 Brandon, MS.

In Canada, CFPS-1490, CHAT-1270, CHOR-1450, CFVM-1220 and CBAG7-1340 have made applications to convert to the FM band. Once the change is granted and the station is on the air, programming will be simulcast for three months and the AM station will then be taken silent.

1290 WWFS, Peoria, IL, returns to its former call WIRL

1240 KSQR, Sacramento, CA, returns to its former call KSAC

1300 WOGY, West Hazleton, PA, is now WKZN

1550 WXHL, Elkton, MD, is now WSRV

1600 KMNY, Pomona, CA, is now KAHZ

1410 KMYR, Wichita, KS, is now KGSO

How To Get—And Give— The Most RF With Kirk's Exclusive Antenna Tips!

In the good old days, when serious, DX-getting antenna work always took place in the winter, there were several rules of thumb, all loosely centered around the concept: "The colder it is when an antenna goes up, the better it will perform." And that meant year-round! So, if you could hack the freezing weather, you were good to go antenna-wise. The corollary for hams in climates that are always warm escapes me.

Although it's March in Minnesota as I write this month's column, the weather forecast for tomorrow is for a balmy 61 degrees. And when you get this issue in your hot little hands, the weather may be hot, too. Doesn't that contradict the old adage? Heck no. Like I said, that was then...and this is now (an new adage that's warmer and friendlier)!

In the solid-state era, antennas can be erected any time. The only penalties come from ignoring good design and good installation practices (much like they always did). This month's column, while not providing exact construction details, contains a few choice tips that may make you think twice about your planned spring and summer antenna work.

Enough with the adages. Let's get to the good stuff!

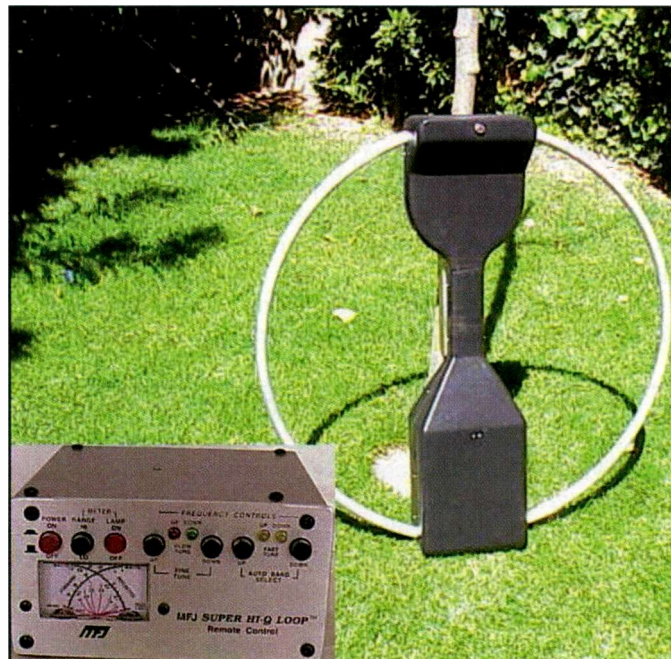
Antenna Tips

- **Use the Buddy System:** Even if you've built a ham antenna or two and you're reasonably experienced with safely installing them, have a ham buddy (or some other, lowlier friend, spouse, or neighbor) on hand to help out. Two heads are better than one...and not just while working on towers. Even your buddy should be smart enough not to stand directly below you (if you're on the roof, climbing a tree, etc.).

- **They Don't Call 'em References for Nothing:** Before you go off half cocked and make things more difficult than they need to be, make sure you have a plan or a schematic in place before you start cutting and soldering. If you need a good beginner's reference, check out *Simple and Fun Antennas for Hams*, by Chuck Hutchinson, K8CH, and Dean Straw, N6BV. Chuck is a ham's ham and Dean has forgotten more about antennas than most antenna engineers will ever know. If you want the phone-book-size, definitive reference, pick up a copy of *The ARRL Antenna Book*. It'll last a lifetime. Both can be found at your favorite amateur radio bookseller, or from www.arrl.org.

- **Ignore Gooch's Paradox at Your Own Peril:** If only because it attracts good radio karma, I've mentioned Gooch's Paradox here before. It's the definitive truism about home-brewed antennas, and is simply stated: "RF Gotta Go Somewhere." Passed down to me by Dave Newkirk (ex-W9VES, ex-WJ1Z), a former ARRL HQ staffer and all-'round radio mentor, Gooch's Paradox is often invoked when explaining the performance—good or bad—of a particular antenna.

Because "RF gotta go somewhere," it might make it to your



Speaking of antennas and autocouplers, this ultra-compact MFJ Model 1786 (at ground level for photo purposes only!) has a little of everything—tuners and couplers! I've had several of these three-foot, 30- to 10-meter loops (continuous coverage, ham and SWL) going back to the mid-'90s (MFJ still uses an excerpt from my QST Product Review on its website). My current unit is on top of the downtown commercial building I just moved into, but is not easily photographed. I found this photo of the antenna and its remote tuning unit at www.inteco2000.com. For ops in antenna-restricted neighborhoods, condos, apartments, hotels, etc., the 1786 (and its other MFJ cousins performs about as well as an inverted Vee or dipole at a similar height. The magnetic loops are much smaller, however, and don't even look like traditional antennas, so users can often "hide them in plain sight." Call them lightning rods, storm detectors, weather stations, bird perches, UFO landing beacons—whatever! MFJ doesn't exactly give them away, and they do have a bit of a learning curve, but I've never seen any other "ridiculously small antennas" outperform the 1786. And I'm certainly not the only ham who feels that way! Check out all MFJ's compact loops at www.mfjenterprises.com. The Big Daddy Loop works all the way down to 40 meters.

antenna and efficiently radiate into space (good!), make your coaxial cable hot to the touch (not so good), spew energy from your alleged "station ground" (bad), "gakk" your neighbor's TV (up to you), feed back along the coax shield and zap you on the lip when you're speaking into your mic (painfully bad).

RF might go just about anywhere, but it's "gotta go somewhere." Let's hope that, through good design, construction, and installation, somewhere is into space!

• **Outside Is Better than Inside:** With darn few exceptions, outdoor antennas generally outperform indoor antennas. Although a 10-meter dipole inside the penthouse suite of a skyscraper may work better than a similar outdoor dipole 10 feet off the ground, most ops will want to try to put up some kind of outdoor antenna if at all possible.

• **Higher Is Better:** In general, the higher an antenna is, the better it performs. This isn't *always* true, of course—especially when you're trying to work a station 100 miles away on 40 meters—but for our purposes, it's pretty much a fact.

• **Bigger Is Better:** Almost universally, the bigger an antenna is (in length and wire/element diameter), the better it performs. A 30-foot vertical whip works better than a 12-footer, which works better than a five-footer. If you could make a full-size loop from solid copper wire (or hollow copper pipe) the diameter of a baseball bat, it would outperform a similarly sized loop made from even the highest quality conventional antenna wire.

If you go overboard, however, the rule breaks down. A dipole antenna made with 20 miles of wire (a convenient 10 miles on a side) probably won't work better than a dipole cut for 160 meters. In fact, it might not do much of anything! Thankfully, 20-mile-long antennas aren't common (unless you live in Texas).

• **Take the Balanced Approach:** At the risk of bringing down the wrath of certain groups and individuals, let me state for the record that, especially for beginners, balanced antenna designs (dipoles, loops, and reasonable variations) are easier to successfully build and use than unbalanced antennas (verticals, end-fed wires, random wires, and the like). Achieving a decent RF ground for unbalanced antennas can be a real pain, while balanced designs need no RF ground to perform as intended. Period.

• **Coax Is for Resonant Antennas Only:** Feed your antennas with coax only if the antennas are reasonably resonant at the operating frequencies. That is, feeding a 40-meter dipole with 50-ohm coax works great (on 40 or 15 meters, where the SWR is reasonable), but using the same antenna and feedline on 80 meters is an SWR disaster! You'll be QRP even if your transmitter puts out 250 watts! Don't feed non-resonant, multiband antennas with coax! Just don't do it!

So what's a guy to do if he can only put up one wire antenna and has to use

it on all HF bands? As I've preached previously, simply put up the biggest, highest loop or dipole you can muster and feed it with open-wire line or ladder line (a bit more convenient) through a reasonably balanced antenna tuner (or see the next tip for the lazy ham's approach).

• **Couplers versus Tuners:** Geez, I wish I had known this stuff when I was a teenager. I'd be on the DXCC Honor Roll for sure! Shack-mounted antenna tuners can be a real life-saver, especially when the loads they're matching are reasonable. For example, using a shack- or rig-mounted tuner to tweak a coax-fed 80-meter dipole into submission on 75 meters is a piece of cake (and probably 10 meters, too).

On 160 meters, however, things get real ugly, unless you're feeding the dipole with open-wire line and a balanced antenna tuner. Sure, the SWR on the feedline will be extreme, but the incredibly low-loss characteristics of open-wire line will make the best of it. You'll still have to twiddle the knobs on the inductors and capacitors, however, and that can get tedious for band hoppers!

The lazy ham's approach—and I think the smart ham's approach!—is to put the antenna tuner at the antenna feed point and feed the tuner with 50-ohm coax. The tuner tweaks the antenna match and the SWR on the coax is negligible, which makes everything good. These special tuners are called antenna couplers, and they're also automatic! You talk/key and the autocoupler matches the antenna for you in a jiffy. Some autocouplers even remember the tuning solutions for your favorite frequencies, allowing them to match your antenna in less than half a second! My favorite autocouplers are made by SGC. Point your web browser to www.sgcworld.com and check out the SG-237 and the SG-239. My 237 has been to hell and back, and still works "like new."

How'd You Do?

So, there you have them—antenna tips to change the way you think about your spring and summer antenna building season! If you put up your own masterpiece, let us know about it! Send your success story, QSL cards, questions, and letters to me at *Popular Communications*, c/o "Ham Discoveries," 25 Newbridge Road, Hicksville, NY 11801. See you again next month! ■

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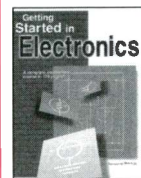
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Back to Basics—Part V

High End Shortwave Receivers

Plus Air Force Pushes For Narrowband

This month we continue our series on shortwave receivers both new and old school and those that lie somewhere in between. In this issue we'll be taking a look at the newest high-end radios as well as some vintage receivers that we old crows swear by. Keep in mind, we're concentrating on HF-only capable radios and not the all-band (DX-to-daylight) receivers.

Although I have had experience with many of these receivers, you'll find more extensive reviews on the Internet. Where I have deferred to the experts (who have much more hands-on experience with these receivers) I have quoted from and listed their websites, where you can find more in-depth information.

Old School: Collins R390A/URR

Although designed in the 1950s, the Collins R390 is still considered by many the finest general coverage shortwave receiver ever built. Although an antique by today's standards, there are hundreds of R390s still in use at military and government listening posts. Hams and old-school utility monitors regard a used R390 at a good price something akin to finding the Holy Grail of radio receivers, even though it's a tube-type radio. I must admit, I hold lust in my heart for a friend's Collins R390 and told him he must leave it to me in his will, even though he's much younger than I am (kind of made him a bit suspicious!).

To quote the experts at the www.r390a.com website:

Tuning .5 to 31.999 MHz and employing 21 vacuum tubes and weighing in at 85 lbs, this electro-mechanical wonder was designed in the early 50's and released for military use on February 24, 1954. Thanks to features such as a 6DC6 first RF amplifier, a suite of 4-Military Grade Collins mechanical filters teamed up with full tracking RF and IF sections, the R390A is capable of copying AM and CW signals down to its -143db noise floor, close to the galactic limit, all this while maintaining the capability to operate in high overload, strong signal environments.

Originally built by Collins Radio Company in Cedar Rapids, IA, the R390A was designed by 2 teams. The mechanical team was lead by Fred Johnson, while Collins' Ernie Pappenfus, K6EZ, oversaw the electronics team. Besides Collins Radio, 12 other sub-contractors built R390A's until the last one rolled off the assembly line in 1984. Banks of these fine radios served the country in all branches of the military. Additionally, they found service with the CIA and NSA to monitor communications from behind the Iron Curtain. During the Cold War years, the R390A was so valued it was classified TOP SECRET, a security measure which remained in force until the mid-1960's.

Because those who have them treasure their Collins receivers, finding a good working R390A on the open market is a rare event. Usually people will settle with finding a trashed surplus unit and resort to either restoring it themselves or having a professional do it, which can cost anywhere from \$400 to \$1,000 depending on how much work needs to be done. A search on eBay rarely results in finding a complete R390A, but one can find many tubes and parts, with individual tubes going for around \$15 each.

Unique opportunity to own one of the world's finest all-band receivers. 500 kc to 32 mc!



Limited quantity of famous R-390A/URR radio receivers . . . brand new. Original manufacture, 1968 production . . . fully tested to meet U.S. Government specifications. Range 500 kc to 32 mc, 30 1-mc bands, digital readouts. Original pack, includes two instruction books, complete set running spares. New low price \$1,700* . . . fully guaranteed.

*A few new, but shelf-worn, units available at lower prices.
WRITE OR CALL FOR DETAILS

EAC Industries, Inc., 20 Bridge Avenue, Red Bank, N.J., 201/747-5100, Ext. 51.

Here's the venerable Collins R390A/URR. Although a literal antique, this receiver is still considered by many UTE monitors to be one of the greatest shortwave sets of all time.

Old/New School: JRC NRD-525/NRD-535

Not really old school and not really new school, the NRD-525 and NRD-535 are excellent radios that bridge the gap between old 1970s–80s vintage radios and the newer state-of-the-art computerized sets. Boasting excellent sensitivity, features, and a great look, owners of receivers from this excellent line from Japanese Radio Corporation could do much worse and not much better. The NRD-525/535Ds were among the first receivers to feature computer control via a standard RS-232 interface, and they still offer one of the most comprehensive approaches found on any radio.

The NRD-535D's more advanced features include ECSS (Exalted Carrier Selectable Sideband) phase lock AM tuning, continuous variable bandwidth control, 500 Hz to 2.4 kHz with tuning steps of 1 Hz possible with direct digital synthesis, 200 channel memory with scan and sweep operation and superb sensitivity, selectivity, and image rejection. Although it has been discontinued and replaced by the NRD-545, good used units can be found from \$500 to \$900.

New School: JRC NRD-545

Undoubtedly the most sophisticated HF receiver intended for the hobbyist or even commercial market, the NRD-545 replaces the NRD-535. The NRD-545 is a great-looking machine with an elegant multi-colored display with features that include true digital signal processing at the IF level. Quoting Universal Radio at <http://www.universalradio.com>:

The receiving system employs a triple conversion circuit with IFs at 70.455 MHz, 455 kHz and 20.22 kHz. The NRD-545 uses a 40-bit



The Ten-Tec RX-350 is a favorite among hard-core MILCOM and UTE monitors because of its good performance and spectrum display.

extended floating point Digital Signal Processor with an 18-bit oversampling system A/D converter and a 16-bit D/A converter. The DSP functions on 13 types of circuits after the IF, previously configured using analog circuits. DSP is used for all-mode detection including AM synchronous detection (ECSS). Incredible selectivity characteristics are achieved by the use of an Infinite Impulse, structure concurrent Chebyshev-type digital filter.

In English this means that the NRD-545 gives you a continuously variable bandwidth from 10 Hz to 10 kHz in 10-Hz steps. You virtually have 990 different bandwidths, each with excellent adjacent channel rejection. DSP is also used to control Pass Band Shift, another tool to reduce QRM. A 256-step DSP noise reduction circuit and 256-step DSP Beat Canceller and DSP Auto-Track Notch are other new tools in your arsenal to help you dig out difficult DX signals. The DSP AGC works in all modes and is continuously variable from .04 to 5 seconds in SSB/CW/RTTY. In its 1,000 memories you can store frequency, mode, bandwidth, ATT, AGC, and step. Other refinements include keypad, DSP squelch, RS-232 port, ECSS, Dial Lock, Tone, RF gain, Scan, Sweep, Mute, Dimmer, Clock-Timer, Adjustable Dial Torque, Attenuator, modular construction, and two Noise Blankers. A basic Baudot RTTY demodulator, feeding the RS-232 port, is even included.

You may customize many functions of the receiver by simply pressing the [FUNC] key followed by the [ENT/kHz] key. Twenty-five parameters may be set to your personal needs, and you simply click to view user setups. The NRD-545 operates from several power sources, including 100, 120, 220 VAC \pm or from 12 to 16 VDC (13.8 VDC). The supplied accessories include a DC power cord, spare fuse, and various plugs.

New units can be obtained for just under \$2,000, with good used units going on eBay for not much less.

Old/New School: Watkins Johnson HF1000

A few years ago I was fortunate enough to get to play with one of these wonder radios when the manufacturer loaned one to me for review. It was extremely hard for me to send it back, but since (back then) it cost more than the used car I was driving I unfortunately had to part with it, but not before I was able to discover what an amazing receiver it is.

Based on a design originally used for receivers used by the NSA and CIA and other government entities, when the HF1000 hit the consumer market it was the first time a receiver of its caliber was available to the radio hobbyist, albeit at the hefty price of \$5,000. Its sensitivity and selectivity was nothing short

of miraculous, and when I compared it to my favorite RF-4900, my Panasonic seemed as deaf as a post. Hooked to my random length long-wire dipole antenna, it pulled in stations I never knew existed. Just for grins I decided to see what it could do when connected to my VHF/UHF discone antenna—it still blew the knobs off any HF radio I owned! Its features include DSP IF, NB, PBT, preamp, 100 memory scan, sweep, keypad, AGC, squelch, channel lockout, RS-232 interface, BITE, IF Output, BFO, notch filter, and synchronous detection. Good used units can be found for around \$3,000.

Old/New School: Racal RA6790/GM

Many UTE monitors consider the Racal RA6790/GM the equal of the Watkins Johnson HF1000. Although this receiver began its life in the mid '70s and was discontinued in the late '80s, it's still very sought after due to its rock-solid stability and its ability to pull weak signals out of the noise threshold. Features include direct entry keypad, three speed tuning rates, AGC, BFO, BITE, RF Gain, Line Out jacks (two), and an external speaker jack. Add-on accessories include LF frequency band extension, VLF frequency band extension, IF Converter, Very NBFM, MA6004 Control Unit, ISB 2 channel, ISB 4 channel, high stability option, and serial port option.

Good used units can be sporadically found on eBay and Ham radio forums from \$700 (for a heavily used unit) to \$1,800 for a mint condition receiver. Buyers beware: Sometimes surplus units have been sold on the Internet with no filters installed, and these can be very difficult to find.

New School: Ten-Tec RX-350

Another wonder-radio that pros and hard-core UTE monitors swear by, the Ten-Tec RX-350 is one of the few commercial receivers that feature a spectrum (not real-time) display that is very helpful in finding elusive HF communications stations. The Ten-Tec RX-350 boasts a large, clear LCD display as well as DSP at the IF level, 1024 (8x128) memories [frequency/mode/bandwidth], 12/24 hour clock-timer, spectrum display, synchronous AM detection, PBT, RF Gain, and Dual Voss. Used units start about \$900, with newer units fetching almost \$1,500.

That concludes our look at HF receivers. A great Internet site to look at the receivers listed above (and many more) is at www.dxing.com, where you'll find reviews of many of the receivers listed here and in previous columns.

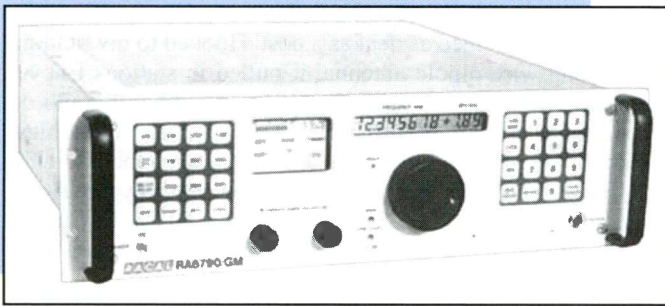
Next month in "Back To Basics" we will focus on HF antennas. Until then, I want to hear from you about what you use and what works best for you.

UTE News You Can Use— Air Force Pushing For Narrowband

According to an *Air Force Print News* article by Gerald Sonnenberg, the USAF is moving the majority of its communications to narrowband. Here's the story reprinted with *AFPN's* permission:

Air Force Communications Agency Public Affairs SCOTT AIR FORCE BASE, Ill. (AFPN)—As the demand for radio frequencies continues to grow, so does the need to increase efficiency. Air Force Communications Agency officials here helped create more capabilities by providing the roadmap for moving the Air Force away from wideband to narrowband radios.

Land mobile radio systems enable military forces to quickly establish command, control and other critical communications during train-



Rapid HF monitors consider the Racal RX6790/GM almost the equal of the Watkins Johnson HF1000, but it's not nearly as expensive.

ing and deployed operations, and they are critical components of the global information grid, officials said.

In 1995, National Telecommunications and Information Administration officials mandated that federal agencies operating radios in selected UHF and VHF frequencies move from a wider emission band of 25 kilohertz to a narrower emission band of 12.5. Radios accessing the 162 to 174 megahertz frequency range were given until Jan. 1 to move. Radios accessing other frequencies have until 2008 to move.

This gave Air Force officials the difficult challenge of converting 151,600 radios in its inventory. Not doing so could affect mission-critical radio communications support, officials said.

The Air Force manages its radio inventory at the base level, and it turned to agency officials to develop a plan to transition the entire, decentralized radio fleet to the narrowband configuration.

Agency officials said they worked with those of the Air Force Frequency Management Agency, major commands, direct reporting units and other field operating agencies to take the first steps and keep security forces and first responders in business.

The conversion plan broke down radio equipment into three categories: mission-critical, mission-essential and mission-support.

Mission-critical radios included force protection, medical response and airfield operations. Mission-essential equipment covered activities such as transportation and supply logistics. Mission-support assets encompassed activities that contained base services.

"What the Air Force is doing is replacing radios and infrastructures or reprogramming equipment for narrowband compliance," said Master Sgt. Reginald Sanders, of the communications agency. "Each radio can then be programmed by the base (radio) manager. The amount of labor depends on how many pieces of equipment need to be replaced and programmed."

Northrop Grumman Explores "Brilliant Aircraft"

According to the Northrop Grumman website:

U.S. Air Force aircraft could expand their primary roles to include network servers in the sky under some new concepts being explored by Northrop Grumman Corporation (NYSE: NOC) and Evergreen International Aviation.

Air Force tankers, airlift and transport aircraft currently provide an ever-present and persistent platform that could be equipped with data storage, processors and disseminators to create an airborne network server. These "brilliant aircraft" could receive critical battlefield information from other battlefield sensors, and then distribute it on demand to tactical war fighters.

The Air Force's large-aircraft requirement provides an opportunity to equip a segment of the fleet with a 'plug-and-play' equipment module that could bring the cellular approach to the battlefield," said Dale Burton, vice president for technology and chief technology officer for Northrop Grumman's Integrated Systems sector. "As we continue to explore various concepts for the Global Information Grid, we

find ideas in the commercial world that could be made mobile and taken to the front lines. In essence, these "brilliant aircraft would be delivering knowledge to power freedom."

Northrop Grumman and Evergreen are considering conducting a "brilliant aircraft" demonstration later this year using intelligence, surveillance and reconnaissance assets such as Joint Surveillance Target Attack Radar System (Joint STARS) and a surrogate Global Hawk unmanned aerial vehicle working in conjunction with an Evergreen wide-body aircraft. For the demonstration, each aircraft or representative surrogate aircraft would be equipped with a suite of communications equipment that would allow it to share data and provide network services.

Enough To Build A Bomb

The Director of the CIA, Porter Goss advised a special Senate panel that there are enough unaccounted nuclear weapons grade materials missing from Russian nuke labs to build a large nuclear bomb. FBI Director Robert Mueller and Adm. James Loy, secretary of Homeland Security Department, reported that Al Qaeda still actively seeking weapons of mass destruction including nuclear, biological, chemical materials and there have been several cases of suspicious persons reconnoitering weapons storage facilities and that terrorist groups continue to try and find ways to circumvent enhanced security measures so they can strike the U.S. again within its borders.

Goss also said he could not say for sure where the missing nuclear materials might be and they could quite possibly be in the hands of terrorists.

Spies Like Him

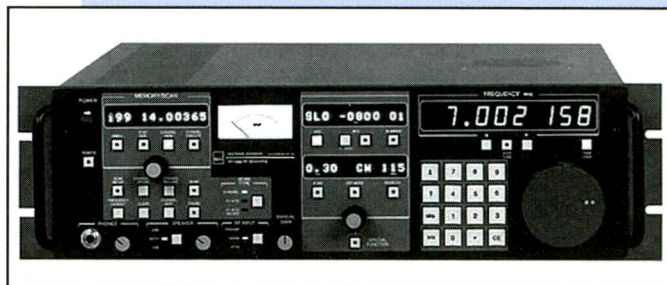
I received several interesting letters concerning the "Spies Like Us" story that appeared in the March issue concerning the mind-numbing games spies played during the Cold War. In one, L. W. Rousseau wrote,

I read your column in the March Issue of *Popular Communications*, and with great appreciation of your section "Spies Like Us." As a communication engineer with the Ground Electronics Engineering and Installation Agency (GEEIA) with the U.S. Air Force, I was involved with and did a tremendous amount of work for the design and installation of your friend's HOME (covert listening post) and many like it all over the world for everyone including The Agency, The Company, DIA, ARPG, ARPA and others from 1959 to 1994.

Most people would not believe how often the same types of events took place between us Cold War combatants.

In 1963 I had just completed installing a digital communication system from Diayabikar Air Force Station in Turkey to Cheyenne Mountain, Colorado, when I began encountering jamming of the HF part of the multi-path system.

I attended a meeting in Weisbaden, Germany, to notify the Air Force and DOD how much it would cost to engineer the system to overcome



The Watkins Johnson HF-1000 is a commercial version of a professional receiver originally designed for U.S. government listening posts.



Japan Radio's NRD-535 HF receiver is not only one of the best-looking radios on the market, but many believe it's at the top of the line in hobbyist and commercial HF receivers. (Photo courtesy Japan Radio Corporation)

the jamming. When I had finished my briefing and those concerned were discussing the cost, a member of the State Department stood up and said: "There isn't any reason to spend all of that money. We have an agreement with the Kremlin. In return for not jamming their surveillance and command and control communications all we have to do is ask them to stop when they are jamming our surveillance and command and control communications systems and they comply."

In front of the assembled players, God, and the State Department my comment was functionally the same as your friend's, but I added, "Why are we wasting the taxpayer's money doing this stuff?"

When you hear stories like L.W.'s, you can't help but think that the words *government* and *intelligence* are sometimes mutually exclusive!

Reader's Logs

Want to see your utility logs in print? Then send them to me via e-mail in the format below. So they get in the next issue, send them in by the 1st of the month. Help me out by formatting them in numerical (frequency) order. That makes my job that much easier and ensures your logs get in the magazine. Don't forget, we want your VHF and UHF MILCOM logs as well!

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

3167.4: 9FH, N2I, 3WK in USN Link-11/Link-16 coordination net in JAX OPAREA at 1115. (MC)

3270.0: UNID YL/EE repeating "CIO2" phonetically in USB at 2055Z. (CG)

3810.0: LSB HD2IOA, Instituto Oceanografico de la Armada, Guayaquil, Ecuador. Time Standard station, in SS at 0939 (AM/PR)

4041.0: NNN0ZWR with NNN0GBN4, NNN0TTZ, NNN02RQ closing Navy MARS Net at 0059. (MC)

4260.0: UNID YL/EE with letters, given phonetically with no apparent grouping. USB at 2031Z. (CG)

4270.0: UNID YL/EE with letters given phonetically with no apparent grouping. USB at 2050Z. (CG)

4360.0: UNID YL/EE repeating "VLB2" phonetically in USB at 1850Z. (CG)

4372.0: FRANCHISE wkg Z6D at 2040. (MC)

4560.0: UNID YL/EE with letters given phonetically with no apparent grouping. USB at 2047Z. (CG)

4724.0: JAYHAWK, ROYAL, and NIGHTSTAR in J-STARS ground surveillance exercise over Georgia at 1622. (MC)

4739.0: RESCUE 320 (CC-130) p/p via HALIFAX MILITARY to RCC Halifax. They report they have 30 minutes left in their expanding square search. They've seen lots of lights in the area from logging camps and suggest RCC might want to make contact to see if they've seen any smoke or fire at 0239. (MC)

4880.0: UNID YL/EE repeating "ULX2" phonetically in USB at 1902Z. (CG)

4950.0: ICSSIL (Rockwell Collins Signal Integration Laboratory, probably Irvine, CA): 1239 USB/ALE sounding. Also sounding on 07410.0; 09050.0; 13850.0; & 20960.0. (RP)

4560.0: UNID YL/EE repeating "yankee hotel foxtrot" in USB at 2033Z. (CG)

5091.0: UNID YL/EE with letters phonetically with no apparent grouping in USB at 1906Z. (CG)

5273.0: UNID with "263 263 263 1" repeated. Probably 1 msg for "263". CW at 2042Z. (CG)

5320.0: USCGC COCHITO (WPB-87329) wkg Group Cape Hatteras to report they have sighted a pod of 4 Right whales 500 yards from them headed north at 1359. (MC)

5422.5: NORTH RALEIGH RADIO, CHOPTANK RADIO, and MOORESVILLE RADIO in USCG Auxiliary Net at 0003. (MC)

5684.0: HUNTER 16 (CP-140, 14 Wing) wkg HALIFAX MILITARY. HALIFAX reports 3YI is already in receipt of message. Designates this freq as primary and A6C as secondary. HUNTER 16 requests WX at Greenwood and Brunswick at 2143. (AM)

5696.0: CAMSPAC wkg CG 1701 (HC-130, CGAS Barbers Point) for ops report at 0212. (MC)

5696.0: CG 2128 (HU-25) airborne from Guantanamo Bay en route Port-au-Prince requests guard from CAMSLANT at 1253. (MC)

5708.0: 591466 (KC-135R # 59-1466, 136th ARS, NY ANG, Niagra Falls NY): 2339 USB/ALE TO OFF (USAF GSC, Offutt AFB). (RP)

5732.0: 17C reporting TOI to PANTHER. TOI is anchored vessel REBECCA. Vessel states they are waiting for a pilot to go into port, but 17C states they seem suspicious at 2326. (MC)

5732.0: 13C advising PANTHER that DOLPHIN 54 is airborne from homeplate and they have passed TOI position to them and SHARK 16 at 0034. (MC)

5778.5 G24502 (prob CH-47 helo, "F" Coy 1/131st Avn, AL NG Birmingham AL): 0250 USB/ALE TO T1Z131 (1/131st Avn, AL NG, Birmingham AL). This helo also noted as R24502 on 07360.0 & 08040.0. (RP)

5875.0 R23695 (prob UH-60 helo): 2035 USB/ALE TO EAATS (Eastern Army Aviation Training Site, Muir AAF, Ft. Indiantown Gap PA). Also noted on 08171.5. (RP)

6370.0: UNID YL/EE repeating "victor lima bravo two" in USB at 2149Z. (CG)

6370.0: UNID YL/EE repeating "VLB2" phonetically in USB at 2037Z. (CG)

5071.0: USB SVO Olympia Radio GREECE Female voice in a taped loop repeating: "This is Olympia Radio calling on channel eight-zero-six, twelve-thirty-two, sixteen-forty and twenty-two-seventeen" in EE and GG at 0030 (AM/PR)

6694.0: PATHFINDER 20 (in the Bay of Fundy) wkg HALIFAX MILITARY to report off station at 2340Z. They will be doing pilot training before returning to Greenwood. HALIFAX passes that MOC does not require hourly posit reports at 2342. (MC)

6739.0: NARRATOR with comms checks at 0051. (MC)

6761.0: ETHYL 58 radio check with UHAUL 99 at 2347. (MC)

6930.0: UNID YL/EE repeating "SYN2" phonetically in USB at 2030Z. (CG)

6911.5: P5Z101 (5/101st Avn, Ft Campbell KY): 0117 USB/ALE sounding. (RP)

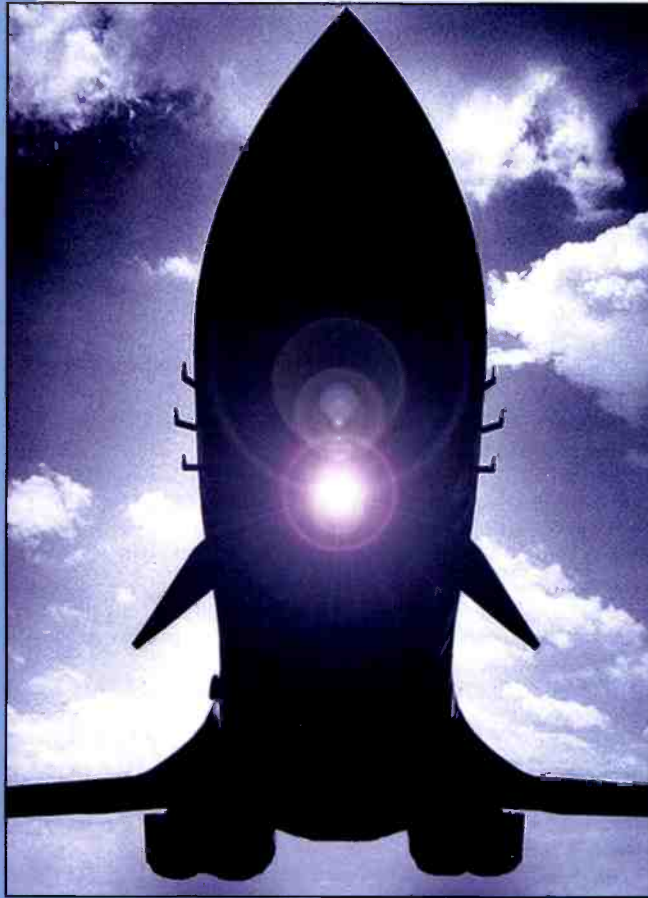
7313.5: AFF2FL and AFF2TFL in 2FLST1 Florida MARS Training Net at 1401. (MC)

7360.0: G23280 (prob CH-47 helo, "F" Coy, 1/131st Avn, AL NG Birmingham AL): 0110 USB/ALE TO G24502 (prob CH-47 helo, "F" Coy 1/131st Avn, AL NG Birmingham, AL). Also noted on 08040.0. (RP)

7632.0: NNN0KAG as NCS in SHARES SE Region Net taking check-ins from NNN0WAS GA, AAT4HM TN, NNN0JUN MA mobile in FL, AFA1SX FL, AA4V4AR at 1615. (MC)

7635.0: HILL CAP 49, HEADCAP 45, KITTY HAWK 30 in National CAP Net at 1725. (MC)

7635.0: HEAD CAP 45 as NCS wkg HILL CAP 49, WILD WOOD 5, and PENN CAP 5 in CAP National Chaplain's Net at 2201. (MC)



If the USAF has its way, soon all of its bombers, like this B-1, will be wired with new narrowband radios. (Photo By Steve Douglass)



According to insider reports, "Brilliant" aircraft systems are being tested inside the fuselage of an everyday KR-135. The only way to tell the difference between the test aircraft and a tanker is by a long row of antennas along the bottom and spine. This is an unmodified KR-135 from Altus AFB, Oklahoma.

7777.0: D30 (possibly Mexican Army 30th Inf Bn, Guadalupe): 1109 USB/ALE TO DIAMANTE (unidentified, Mexican Army). (RP)

8040.0: CGOOPS (unidentified US Army Avn unit): 0001 USB/ALE sounding. (RP)

8065.0: SKYWAT (US Army Flight Watch, Soto Cano AB, Honduras): 0556 USB/ALE sounding. (RP)

8065.0: R23740 (prob UH-60 helo): 1439 USB/ALE TO KBN-WNG (probably 1/109th Avn, IANG, Boone Airport, IA). (RP)

8135.0: AAA (Israeli Air Force): 0205 USB/ALE sounding. Also sounding on 07848.0. (RP)

8301.6: Sri Lanka Navy P 621 checking in with Sector San Juan. Identifies as 210 foot former USCGC Courageous en route Puerto Rico. Last port of call Little Creek, VA. Standing by this freq for further comms at 1946. (MC)

8734.0: Olympia Radio, Greece, with voice announcement by YL/EE at 1937Z. (CG)

8971.0: WAFER 20 (P-3C) radio check with GOLDENHAWK. Passes SPARE GROUP 3 at 2128. (MC)

8983.0: CAMSLANT passes that they are searching for a raft with 6-7 people drifting towards Cuba. A 23 foot vessel in the area has family members looking for the raft at 2248. (MC)

8992.0: REACH G3 (KC-10A, 305 AMW) wkg Andrews HF-GCS for relay of inbound message to Al Udeid AB, Qatar at 2224. (MC)

9007.0: CANFORCE 4495 wkg TRENTON MILITARY to report 2303Z departure from Prestwick and 0705z ETA Winnipeg monitored at 0005. (MC)

9025.0: ADW (USAF GSC, Andrews AFB): 1538 USB/ALE TO 491710 (KC-10 # 70-1710, 305th AMW, McGuire AFB NJ). (RP)

9025.0: F29 (HU-25 # 2129, CGAS Miami): 2347 USB/ALE

TO JNR (USAF GSC, Salinas PR)-[AMD]CCCCD9, 9918663020587NNNN. (RP)

9025.0: 190005 (C-5 # 69-0005, 337th AS, Westover AFB MA): 1906 USB/ALE sounding. (RP)

9025.0: CG 1504 (HC-130) ALE initiated call to LANTAREA COMMAND who passes location of cruise ship at 1906. (MC)

9050.0: CRSSIL (Rockwell Collins Signal Integration Laboratory, probably Cedar Rapids, IA): 0943 USB/ALE sounding. Also sounding on 13850.0; 15760.0 & 18610.0. (RP)

9251.0: UNID YL/EE with 5-figure groups each given twice at 1940Z. (CG)

9081.5: KFMHNG (prob 1/126th Avn, MA NG, Otis ANGB, MA): 1420 USB/ALE sounding. (RP)

9295.0: ALBANY (NY NG, Albany): 1900 USB/ALE TO SYRNY (NY NG, Syracuse). (RP)

9295.0: 86OPS (86th Med Coy, VT NG, Colchester/Burlington VT): 1421 USB/ALE sounding. (RP)

9295.0: RVHNY (NY NG, Riverhead NY): 1506 USB/ALE sounding. (RP)

10046.0: 4XZ, Israel with beacon in CW at 2153Z. (CG)

10648.0: UNID YL/EE repeating "yankee hotel foxtrot" in USB at 1601Z. (CG)

10051.0: Gander Radio, Newfoundland with WX for Canadian cities. USB at 2125Z. (CG)

10242.0: 25C wkg PANTHER to report they are airborne and RTB and requests they notify Autec Ops at 2047. (MC)

10818.0: 17W wkg J3D. Requests they come up BLUE-6/AZUL-6 then requests they increase power and they exchange position reports. [Joint USCG/Colombian Navy Patrol] at 2318. (MC)



Intelligence analysts report that there is enough missing nuclear materials for terrorists to build a nuclear bomb, but the technical capabilities in building a working warhead are well beyond the capabilities of any terrorist organization. (Photo of a "dummy" modern nuclear bomb by Steve Douglass)

10993.6: SHARK 14 radio check with Sector Key West monitored at 2342. (MC)

11175.0: WARHAWK (E-6B) p/p via Offutt HF-GCS to Tinker AFB to pass EAM message of 8 groups at 1907. (MC)

11205.0: HALIFAX MILITARY wkg HUNTER 16 (CP-140, 14 Wing) at 2133. (MC)

11205.0: SMASHER wkg SHARK 84 (C-130) to report they passed their request to MNMG (Managua, Nicaragua) tower at 1621. (MC)

11226.0: 190019 (C-5 # 69-0019, 337th AS, Westover AFB MA): 1606 USB/ALE TO GBLNPR (Global Non Secure Internet Protocol Router node). Contact also attempted on 18003.0. (RP)

11226.0: 170036 (C-5 # 87-0036, 60th AMW, Travis AFB CA): 2154 USB/ALE sounding. (RP)

11226.0: Razor 06 (sounds like): 2339 USB/ALE and voice in direct dial w/unidentified station who passes WX for 0130Z. (RP)

11229.0: APPETIZER wkg BROWN RECLUSE to inquire if they have heard from station OPTIONAL. APPETIZER then makes call-outs to OPTIONAL at 1953. (MC)

11232.0: Trenton Military: 2251 USB w/Atlas 42 (unidentified). Trenton advises Atlas 42 that there is no traffic for them from the Trenton Rescue Coordination Center. (RP)

11232.0: Trenton Military (very weak): 1558 USB w/CG 1503 (HC-130, CGAS Elizabeth City) w/position report (4624N/5727W). At 1950 CG 1503 advises Trenton they have contact w/St Johns and are securing HF radio guard. (RP)

11232.0: Trenton Military (very weak): 1806 USB w/Atlas 42 (unidentified, possible CT-142-weak). Atlas 42 makes reference to Winnipeg. They have trouble reading each other so they QSY to 17994.0. They are unreadable to me on 17994.0. (RP)

11232.0: NATO 19 wkg HALIFAX MILITARY for WX at Goose Bay, Sdr Stroemfjord, Keflavik, and Prestwick at 0258. (MC)

11439.5: R22988 (prob UH-60 helo): 2012 USB/ALE TO T2Z238 (2/238th Avn, IN NG, Shelbyville, IN). Also noted on 08171.5. (RP)

13015.5: IAR, Rome, Italy with beacon in CW at 1418Z. (CG)

13200.0: TITAN 20 (KC-130, VMGRT-253) p/p via Andrews HF-GCS to TITAN OPS to pass 2300Z ETA at 1941. (MC)

13215.0: 5571425 (KC-135E # 57-1425, 151st ARS, TN ANG Knoxville, TN): 1750 USB/ALE sounding. Also sounding on 09025.0. (RP)

13215.0: 170041 (C-5 # 87-0041, 9th AS, Dover AFB): 1549 USB/ALE sounding. (RP)

13375.0: "Lincolnshire Poacher" numbers station. YL/EE with

"05288" several times followed by 5-figure groups, each given twice. USB at 1609Z. (CG)

13528.0: UNID with letter "S" repeated in CW at 1542Z. (CG)

14483.5: CGOOPS (probably US Army, Cargo Ops?): 1937 USB/ALE TO CGO22 (prob helo, Cargo 22??). Also noted on 07360.0 & 09295.0. (RP)

14487.0: UNID YL/EE with 5-figure groups each given twice at 1545Z. (CG)

15025.0: SHARK 66 wkg SHARK 80 for relay to SMASHER. Departed Honduras en route Charleston at 2255. (MC)

15043.0: ADW (USAF GSC, Andrews AFB): 2000 USB/ALE TO E30352 (E-3B AWACS # 77-0352, Tinker AFB). ALE handshake followed by pp w/66th ??? (too weak) in work related conversation concerning next week's schedule. NOTE: No phone number noted in ALE AMD. (RP)

16240.0: 1307 (possible Italian net): 1719 USB/ALE sounding. (RP)

17988.0: NOJ (USCG ComSta Kodiak, AK): 1932 USB/ALE TO J12 (HH-60J CGAS Kodiak). Also noted on 15082.0. (RP)

18003.0: 571451 (KC-135 # 57-1451E, 108th ARW, McGuire AFB NJ): 1927 USB/ALE sounding. (RP)

18003.0: 537997 (KC-135R # 63-7997, 99th ARS Robins AFB GA): 2055 USB/ALE sounding. (RP)

18003.0: 190019 (C-5 # 69-0019, 337th AS, Westover AFB MA): 1614 USB/ALE TO HAW (USAF GSC, Ascension Island). Aircraft attempts direct pp but gets recorded message of inability to complete the call as dialed. Tries two more times, gets same recorded message, then gives up. (RP)

20810.6: KWN94OS (US Embassy/Consulate): 1924 USB/ALE TO KMN94 (US Embassy/Consulate). (RP)

This month's star contributors are Mark Cleary (MC), Ron Perron (RP), Chris Gay (CG), and Alvin Mirabal (AM). ■

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Software-Defined Radio—Part I

Is It A Computer Or A Radio?

Back when I was a kid I had the opportunity to witness some interesting technological transformations taking place around me. For example, I watched the gradual disappearance of steam locomotives as they were replaced by diesel. Likewise, my family took me on trips on some of the last piston-driven commercial aircraft, which were being replaced by turbine-driven prop-planes and then jets.

For those who live through such periods there is always a great nostalgia for what was lost. Frankly I've got some great memories of my father keeping pace with steam locomotives as we drove along a road paralleling the track. And of our local airport, which used to be little more than a glorified bus station but is now a huge composite of multiple buildings, runways, and facilities. The same applies to radios, and to TV sets for that matter. My family was fortunate enough to be one of the first in our city to be able to own a TV, with which we could pick up all of two channels, both in black and white, of course. We also had some great old console radios from the 1940s with multiple bands for picking up shortwave broadcasters.

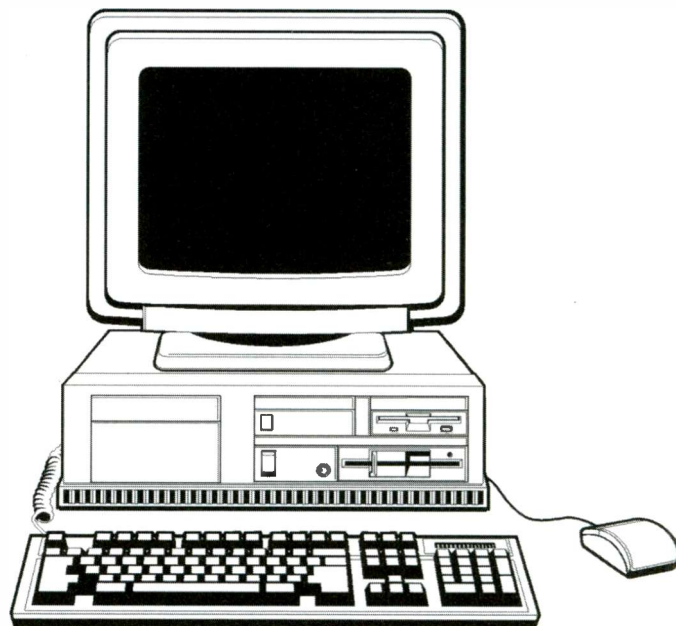
Like a lot of people of my generation my interest in radio and electronics came out of household radios and appliances. In that regard, there were two radios that got me hooked: a 1939 RCA "Globetrotter" multi-band shortwave radio and a 1960 "Spanmaster" two-tube regenerative shortwave kit. The originals were lost or given away many years ago, but I've been able to pick up working replacements at radio swap meets. I still get a lot of pleasure out of firing them up every once in a while and listening to some DX stations on the AM broadcast band or to those shortwave broadcasters still on the air today.

The New Digital Era

While nostalgia is an enjoyable personal pastime, today's reality is that we are now firmly in the grip of the digital age. AM and even FM are now the steam engines and prop-planes of this current generation. Frankly anything to do with analog electronics (that is anything that is dependent upon a continuously variable electronic signal rather than digital electronics' discrete non-continuous values) is on its way out. Given the tremendous number of benefits offered to us through digital technology, this new development holds great promise of better consumer products and radio equipment. That promise is better quality sound and pictures, more channels to choose from, greater range of programs, CD-quality sound from shortwave broadcasters, and exciting new digital modes for ham radio operators.

Yes, we are definitely moving into a brave new world of improved communication that is being brought about through the broad application of digital technology, and we will all benefit from the results.

Or will we? Let's just consider something that is very important about analog radio transmissions.



With either AM or FM transmissions (or even Morse code and radio teletype) you could always receive the signal, even if the intelligence (that is the message) was being jammed. Think about all those heroic moments during the 1930s, or World War II, or during the Cold War when "the Free Nations" broadcast news and information to people in fascist and communist countries. The only way that information could be blocked was through direct jamming of the broadcast signals. But if someone was careful enough and quick enough, he or she could find a clear signal and be able to hear information from an alternative point of view. Let's not forget that listening to that information was illegal, and to be caught was to risk torture, imprisonment, and even death.

The point is that during that period a person with a suitable length of copper wire, a rusty razor blade, a lead pencil, and a metal safety pin could build a serviceable radio that was undetectable. What I'm talking about here is, of course, a variation on a crystal radio, substituting the razor blade for the crystal detector. The fact is that analog technology is simple technology, which you can literally create out of household items. I've seen crystal radios made out of tin foil, bathroom tissue tubes, kitchen knives, and the headphones made using either tuna or cat food tins. In fact, back during WWII, many people would build crystal radios into wooden doors, with a secret built-in hiding spot for the headset and tuning apparatus. The antenna would be wound around the edge of the door, so it would act like a loop, and thus not only have a degree of amplification, but be directional as well. Because it was not a super-heterodyne design, a crystal radio did not have an oscillator circuit. Both the Germans and the Russians had trucks out in the streets



Here's an example of a WWII vintage U.S. Navy receiver that represents the analog way of doing things. It was big, heavy, and powerful, but it received only one frequency at a time. It worked in its day, but only with a lot of human intervention and interpretation.

listening for the oscillator circuits of illegal radio receiving sets, but the crystal radio was completely invisible to them.

But try to build a radio that will allow you to either employ today's digital technology or listen to new digital modes by using simple household items. It is simply not possible.

The Implications Of Digital Technology

In this month's column I want to introduce you to some very big developments that are taking place right now in the field of radio design; developments that are going to radically change the way radios are both made and used. Much of today's radio (and television) technology is not that far evolved from the time that Heinrich Hertz demonstrated the existence of radio waves, around 1885. Most modes of radio transmission and reception still use his basic model, which is to broadcast radio waves from a transmitter and have the receiver passively pick up the signal using an antenna. But the old Hertzian model of broadcast radio is going to be scrapped and replaced with an entirely new paradigm of radio use. This change is going to be very significant. It's happening right now and it's going to directly affect the way you and everyone else will be using radio technology throughout the 21st Century.

Let me introduce this new paradigm of radio use to you using the old *StarTrek* series as a model. Just about everyone is familiar with the classical TV show that originally aired in the late 1960s. There were two iconic images presented on that show that stick in people's mind: that of the handheld communicator used when Captain Kirk and his crew would go off-ship to explore a new world, and that of Lt. Uhura sitting at her communications console keeping in touch with him and relaying messages to other members of the crew on the bridge.

It's pretty easy to see that what Captain Kirk had in his hand was a souped-up version of today's cell phone, and not surprisingly, many of today's cell phones look a lot like the *StarTrek* version. Some would argue that today's cell phones are even better because they have built in cameras and text messaging, while all Kirk could do was wiggle a few knobs

and dials when he had trouble hearing the ship. More importantly, as you'll remember if you were a hard-core fan, when Kirk was onboard the *Enterprise* he had to walk over to what were basically intercoms scattered around the ship. The communicator was used from time to time, but generally only in a time of real emergency, and then it still had to be routed through Lt. Uhura's console. Speaking of Lt. Uhura's, console, today you'll find her communications console in a host of settings, including military, police, fire, and other public safety services (though I don't know how many of them are being manned by women in short skirt uniforms and tall boots as was then envisioned as our future).

I think we can all see how the original *StarTrek* communications system works today using fairly conventional technology. Yet, ironically enough, *StarTrek's* model of radio communications in the 22nd Century is precisely the *old* paradigm that we are going to be saying goodbye to in the very near future. Now let's consider the type of radio system used in a subsequent series, such as *StarTrek: The Next Generation*. There the bulky handheld communicator was gone and people instead wore a new technology called a "Comm Badge." You've seen on the re-runs where Captain Picard is in conversation with one of his crewmen, when out of the blue someone calls him, apparently out of the thin air. Rather than looking startled and surprised, Picard sharply taps the badge on his chest and says "Picard here," and begins conversing with someone else over a comm-link. Just to be able to communicate like that would be very impressive, given that the Comm Badge is about as big as a silver dollar. But, wait, there's more!

Captain Picard, and everyone else aboard his ship, is able to use these Comm Badges everywhere—in a Jeffries tube, in an elevator, on a shuttle, down on a planet's surface. Just try doing that with your cell phone and see how long it will be before you get an "out of service area" message. Likewise, the Comm Badge is also directly linked to the ship's computer and can perform a wide range of tasks other than voice communication. If Picard wants to know exactly where a crewman is, all he has to do is ask the computer and an answer is instantly forthcoming. On top of all that, the Comm Badge can also provide a wide range of medical information about the person wearing it, along with environmental information about where they are, to name only a few important functions. More importantly, the communications console no longer exists as a separate function on Picard's version of the *Enterprise*. It's now been delegated off to either Lt. Commander Data or Warf, depending upon the urgency of the situation, and they do communications tasks along with a host of duties.

One big technology change that took place between the original *StarTrek* series and *The Next Generation* was that any console could become the communications console. That was because the console was actually a computer screen with a touch-sensitive surface, so its function could be re-programmed instantaneously. Lt. Uhura's post was definitely an analog device with all sorts of mechanical buttons, always threatening to break her rather long fingernails. It was definitely hard wired because if anything went wrong large sparks would spray from its innards, which would have to be accessed by opening a panel in the bottom, exposing the very visible wires.

So, when all is said and done, what was "futuristic" in 1968 when the original *StarTrek* first aired is pretty much standard today, and in some ways even superseded by our current technology. Yet what if I said that much of the apparently more advanced technology featured in *The Next Generation* is about



The AN/USC-61 Digital Modular Radio (DMR). The new radio communications standard for the U.S. Navy for the 21st Century. Able to transmit on any frequency between 2 and 2000 MHz, this unit is no bigger than a mini-fridge and can be programmed into any configuration needed "in the field" using the appropriate software program. (Photo courtesy Joint Tactical Radio System Program Office)

to become available to us now? That's the important paradigm change we're now facing thanks to a true merger of radios and computers, and it's going to radically change the way both those technologies are fashioned and used.

Is It A Computer Or A Radio?

Two new terms you're going to hear a lot in the upcoming years are software radio and cognitive radio. Over the next series of columns I'll be explaining to you what they are and how they'll impact both the computer and radio industries.

Software and cognitive radio are already transforming the way in which communication functions are performed around the world. At this time the primary driving force behind this transformation is, not surprisingly, the United States Navy, followed by the Joint Tactical Radio System initiative (JTRS). Already the US Navy has in operation a new system of communications called Digital Modular Radio (DMR). Rather than having a room full of radios as before, the DMR is a fully computerized system that fits into a small box about the size of a mini-bar fridge. How exactly do you get a whole room full of radio equipment down to something that small? The answer is simple: you eliminate all your bulky hardware by turning it into virtual components in a computer program.

Remember the series I did on the Ten-Tec RX-320 in which I introduced you to the concept of virtual radio components? At that time I showed you how the theory of virtual components originated just before World War II and finally came to be developed using mainframe computers during the 1970s. Everyone at that time thought they would never come into practical use because of the amount of computational power that was needed. But thanks to the development of the PC computer, and a whole new generation of high-power CPUs to go with them, that technology came to be available.

In that series I demonstrated how programmable devices can be used to create some virtual components within a radio system. You may also remember that the RX-320 was made up of two circuit boards: the RF tuning section and the DSP processing section. The DSP section was itself made up of three chips: the mini-computer where the DSP circuitry was created in virtual form, the ROM chip that held the programming to create the virtual components, and a modem chip to allow you to hook up the radio to your computer via a serial cable. Now, with true software-defined radio even that RF circuit board is eliminated. In a true virtual radio, what happens instead is that broad chunks of the RF spectrum are sampled, turned into digital information, and then processed.

This ability to sample large sections of radio spectrum opens up some very significant monitoring and signal processing possibilities. I've already told you about the SDR-14, manufactured by a company called RFSpace, that samples all radio events between 0 and 30 MHz. With your conventional radio you can pick out one signal among many that are picked up by your antenna, then amplify and detect it. With a software-defined radio, you capture every single signal on that antenna, convert them all into digital form, then use DSP to pick out the one you want to monitor.

To give you an idea of just one possibility available to you with the SDR-14, you can digitally record all of the radio activity that takes place on any 150-kHz wide segment of the RF spectrum from 0 to 30 MHz on your computer for up to 24 hours. You can then go back and check any and all activity in that 150-kHz spectrum found within that recording. Let's say, for instance, you're listening to a segment of the 40-meter ham band; you can listen to every single Morse code (CW),



This is a field version of one of the new generations of cognitive radios being used by the U.S. military. What is eliminated is the old "he who pushes the button first with the loudest signal gets heard." With this radio nobody goes unheard. (Photo courtesy Chaotic.com)

voice, or broadcast signal that took place during that time, no matter when it occurred. You can have three broadcasts going on at the same time and each would be recorded, then you can go back and listen to each one at your leisure.

Again, what makes software-defined radio special is that it samples a very large chunk of RF spectrum and then uses software-defined circuitry to process all that information. As you can see, with a highly sophisticated software program you could route and control a vast number of communications streams using a number of different modes.

What is most significant about software radio is how it will end the Hertzian Paradigm that traditional radio transmission and reception is built upon. What do I mean by that? Well, simply listen at night to an AM broadcast radio on a channel that does not have a strong local station. What you will often hear is hodgepodge of stations, with the strongest station standing out from the others. That has always been the problem with "classic" radio—you needed either more power or fewer stations on a channel in order to be heard clearly. That's why such things as "clear channels" were developed in AM radio, as well as non-interfering antenna broadcast patterns for TV and FM radio.

The problem with that solution, though, is that it requires a lot of very expensive RF real estate and equally expensive transmitters and antennas. However, once you get into more chaotic situations, like a military battle, you run into even more difficulty trying to keep on-the-air discipline. The truth is that if you have one channel and multiple operators, it's going to sound like bedlam when everyone presses the transmit key at the same time. Once that happens, it's just as if you have no communications ability at all.

So the real promise of software and cognitive radio is no more pile ups or missed messages. Just a smooth, seamless integration of messages that all get to the proper place at the proper time and in the intended format, whether voice, video, text, or data. More importantly, all of these messages are 100 percent encrypted, private, and secure, so the information contained is only used by the people for whom it was intended. Imagine the possibilities.

Radios That "Think"

The U.S. Navy is not committed to the development of software radios simply because of the significant reduction in the size of the components (though it's certainly a welcome feature on submarines, where they are now extensively used). What is more critical to the Navy is that there is also a significant reduction in size for those communication units used by Naval personnel. What is being talked about, frankly, is wearable communications gear, as in the *Star Trek* comm badge.

However, I'm not talking about a new type of walkie-talkie here, but an entirely new way to keep people connected through an entirely new paradigm of communication, using an active interaction

between a radio and its operating environment. This is called "cognitive radio," which is based upon software-defined radio. These are radios that are "aware" of their surroundings, so to speak, and which re-define themselves in order to work properly as those environments change.

Let's take a conventional example, a Family Radio Service (FRS) radio. I'll use it to illustrate the current limitation of the Hertzian Paradigm and how a software-defined cognitive radio will create a new paradigm. Say two people are each using an FRS radio out in an open space and they are walking away from each other. As they do so, the signals start to fade to the point where communication is broken. In order to hear each other, they have to walk back toward each other. The point here is that radio waves lose power at the rate of the square of the original power once they leave an antenna. The only way you can fix this is to either increase the power being used or improve the antenna. Why? Because if you look at the original system that Hertz invented, it was made up of only an antenna and a source of RF power. Nothing much has changed since then. Really, all a conventional radio does is help the antenna along by tuning and amplifying the signal.

Cognitive radio, on the other hand, looks at the entire radio spectrum and "decides" what part of that spectrum it will use. Let me replace those FRS radios those two people were using with brand new software-defined radios with cognitive abilities. First off, these new radio units are only a fraction of the size of the original FRS radios and have no controls other than on and off. Our two people are in different parts of a house and one of them wants to go out for a walk. Using the same wireless computer network that these people connect up to with their laptop computers, they are able to talk to each other using these radios over that network. It's low power, encrypted, and each of the radios "knows" to connect up to the network and how to find the other radio by voice commands. The two people now go out for a walk, and if they want to talk to each other they can, this time by using a low-power cellular network found throughout the neighborhood. There is no fading or dead spots in this system, so each time they communicate the signal is 100 percent clear.

Now say one of the people steps into a store; the radios note that this has happened. The radio in the store then connects up to the wireless network in that building and routes the signal back to the



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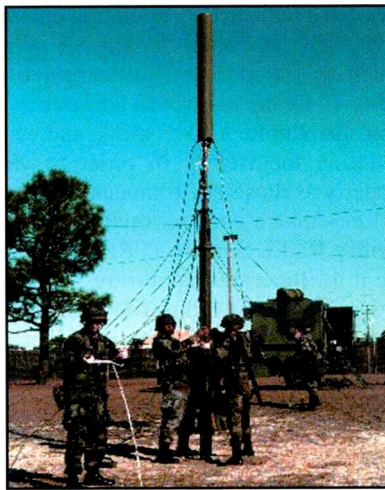
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friend standing outside the store using a link between the store's system and the low-power cellular network. After having picked up some picnic supplies, our two friends head out to the country using public transportation. Again, if they are split up, even if they are riding on a bus or in a subway, they will still be in contact with each other as the entire system contains a low-power communications network that enables people to remain in touch. In fact, while traveling outside of the city, our two friends are also able to talk with other people in other cities and other parts of the world if they want to. The Internet can route their messages to other systems and can find anyone who has his or her communicator on. Finally our friends get to their destination and head out into the country via a trail. Here they may keep in contact via a conventional cell system, much like today's cell phones, or their communicators may switch over to a low-power communications satellite circling the Earth in low orbit. Throughout their journey, our friends have stayed in touch because their communications devices switch back and forth between various systems, always ensuring contact.

This is *not* science fiction, but working technology that is available off the shelf today. I've worked hands-on with earlier versions of cognitive radio back in the late 1990s when you still required a 20-pound box of radio and computer parts to make it work. However, the significant change is software-defined radio itself, which has reduced to a fraction the size of the equipment.

What has also changed significantly is the way in which software-defined radio eliminates the communications barrier caused by multiple standards. Consider for a moment that cell phones have standards such as GPRS, EDGE, and UMTS that prevent phones from sharing information with others. The fact of the matter is that without technological convergence to one standard, current cell phone technology is rapidly reaching a dead end. Also, if they remain on a circuit-based technology, cell phones will need to become bigger, run hotter, and require larger batteries. By switching to software-defined radios, all of these problems are eliminated. More than that, a software-defined radio with cognitive ability would also be able to include data processing, entertainment functions (including high-definition TV), global positioning functions, group-based video games, and maybe some tricks that are just now being thought up by some 16-year-old genius.



Today's US military's tactic is not just to gain control of the ground, sea, and air during a conflict, but the radio spectrum as well. Software-defined radio systems with cognitive capability will instantly adapt to the frequency allocations of a country or region and be able to sort out the signals of the good guys from the bad very quickly. (Photo courtesy Armed Forces Communications and Electronics Association)

You can see why the U.S. Navy and other military services are excited about all this. Imagine being able to send your troops out into the field supplied with wrist-based communications units. They would be able to access real-time data, such as maps and video feeds of an area, and be able to see the location of each of their teammates superimposed on that map. The communications device would only be wearable by that person because it would be linked to a chip implanted on his or her body, so it could not fall into enemy hands—and the digital signal being supplied would be completely encrypted and secure.

Again, none of what I am writing about is science fiction; it's all there ready to be used and the early versions are already out in the field!

Big Brother Lurks In The FCC

Now, having told you all about this wonderful new technology, there are a few things you need to know regarding how the FCC may keep *you* from using it. Right now we're at the same point in the radio-monitoring hobby as we were back in 1919 when the U.S. Navy was set to see all amateur activity banned, including the private ownership of radio receivers. Let's not forget that it was only through the lobbying efforts of people like Hiram Percy Maxim, one of the founders of the

American Radio Relay League, that this prohibition was prevented and we were "allowed" to monitor a significant portion of the radio frequencies.

Today, however, it is not the radio monitoring hobbyists who are working to keep the radio waves open to radio monitoring. The fact is, it is the computer hobbyists who have taken up the cause and grabbed hold of the concepts of software-defined and cognitive radio. They're the ones working hard to keep this new digital technology accessible to the ordinary person and out of the control of corporate and government interests. They are the ones—not the radio monitoring community—who are really grappling with the issues over who really owns this technology and who will ultimately control it. What the computer and personal rights activists have confronted, and which the radio monitoring community has not, is that there are laws already in place to control this new radio technology and who will use it. More importantly, these laws are *not* designed to protect your rights, but are there simply for the benefit of corporate interests.

At this time the key issue is the "broadcast flag," and it's being focused on the new high-definition television (HDTV) technology that's currently gaining ground. A broadcast flag is a copy protection method for HD digital TV programming. The HD digital television's circuitry contains a tamperproof device that will detect a "flag" embedded into the broadcaster's signal. Once detected by the television's circuits, the flag will prevent the program contained in the signal from being copied in full HD digital quality. The HD television will only allow an inferior quality copy of a program's image, and even then you will only be able to copy using an FCC-authorized device that can also detect that broadcast flag. In fact, the broadcast flag can also be used to prevent any copying at all if the broadcaster wants that option because of copyrights.

What is of great importance here is that it will be illegal for hobbyists or experimenters to build or use devices that can circumvent a digital flag, even if it's just to make HD copies for their personal use. In this regard the FCC is specifically targeting hackers and the manufacturers of devices designed to foil a broadcast flag. The penalties for such activity will be prohibitively high and the FCC promises strict enforcement in order to protect the interests of copyright holders in the entertainment business.

As of July 1 of this year, all HDTVs manufactured in the United States will

have to be digital-flag compliant, *even if you build it yourself*. Right now, throughout the United States there are people who are sharing plans and technology to convert their computers into a HDTVs in order to beat the deadline so they can own a legal device with which to make off-the-air copies of TV programs.

Now here is the point:

It is perfectly legal to make off-the-air copies of TV programs, or to record what you hear on your radio for that matter, and it will remain so after July 1. Likewise Congress has not made any law regarding the digital flag—it is a regulation solely set by the FCC. More importantly, the origin for this regulation came directly from Hollywood, not from any lawmaker. An organization called the “Broadcast Protection Discussion Group,” which was little more than a high-priced lobby group for American Broadcasters and Film Studios, swept aside any protest and had “their” regulations put into place. The bottom line is that a broadcaster will be able to insert a broadcast flag into its digital stream and that flag will program your HDTV, or any “legal” copy device hooked up to it, to prevent it from copying.

Now if you think you’re simply going to hack together a work-around device or modify an existing one, forget it. First off, an important part of the FCC regulations puts a strong onus upon equipment manufacturers to make their goods completely tamper-proof. Second, the penalties will be steep enough to deter you from being an ardent defender of civil rights unless you’ve got very deep pockets.

What seems to have been forgotten in all this is that the electromagnetic spectrum, broadcast frequencies, and even the copyright laws themselves are held in the public trust by the FCC and the federal government. Your interests, not those of corporations, *should* be the first concern of any federal or state agency if the United States government is truly “of and by” the people.

The Implication Of Broadcast Flags For Radio Monitoring

So why should broadcast flags be an issue for people whose hobby is monitoring radio signals with general coverage receivers or scanners? What would be the impact on the radio-monitoring hobby of not being able to copy a TV show off the air in its original HD format? That’s what we’ll look at next month as we delve deeper into how software-defined radio actually works. Frankly, all the columns I’ve written since the beginning of 2002 have led to this technological convergence point, where we begin to move into an entirely new paradigm of radio construction and operation. If you have back copies of *Pop’Comm* on hand, do yourself a favor and review them, particularly the issues on computer sound cards, audio sampling techniques, and using virtual components. The information I provided there will be critical for understanding how software-defined radios sample broad sections of RF spectrum and then process them into usable information, no matter what format they were originally in.

As I said at that beginning of the column, I’ve seen a lot of change in my time. From that experience I have a lot of sentimental feelings about many things that have changed or simply no longer exist. The truth, though, is that if you want to grow, you have to learn to let go. I’m afraid that as software-defined radio and cognitive radio become more established, many features of the old analog radio world that we enjoyed so much will disappear. Again, with all gain, some loss occurs, and I’m sure each of us has his own example that to draw upon. The bottom line is that with digital technology it’s very easy for the gov-

ernment to require that certain features be included in the design of a software-defined radio that would make it impossible to monitor certain frequencies or modes of transmissions. Those same laws could be used to prevent the sale of the technology, such as high-speed RF sampling devices, needed to create software-defined radios.

The precedence has already been set with the restrictions being placed upon HDTV technology as of July 1, and there is absolutely nothing saying that the same restrictions could not be placed upon monitoring radios. There is already precedence there with the blocking of 800-MHz cell phone frequencies, and there is more legislation where that one came from. Right now it’s the computer geeks and civil rights activists who are carrying the ball for us radio monitoring types regarding our future freedom to be able to listen to what we want. They’re hiring the lawyers and fighting the FCC in court to enable us to build our own software-defined HDTV sets in the future. It’s not a big jump to see that the precedents set in those court cases will determine whether we will be able to monitor a wide range of radio frequencies with “conventional” or homebrew software-defined radios, let alone record what we hear even if we can tune them across the radio spectrum.

So are we going to let the geeks and the activists work alone, or are we going to help them? The answer to that question will determine if there will still be a radio monitoring hobby over the next 10 to 20 years. The choice is entirely yours. Don’t let the FCC make it for you simply because nobody was there to speak up for your interests. Remember, radio monitoring has never been a right that was Constitutionally guaranteed, but a gentleman’s agreement laid out in the laws governing the use of radio as it existed under the old Hertzian Paradigm of radio transmission and reception. Once that paradigm ends and is replaced by a new one representing software-defined radio, does that old agreement end?

It’s as simple as that. We have to create an entirely new agreement from scratch. Are you ready?

Drop Me A Line

You can e-mail me with any questions at carm_popcomm@hotmail.com. As mentioned before, I cannot answer general questions on computers, but will 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,” Popular Communications, 25 Newbridge Road, Hicksville, NY 11801.

I have placed a list of the columns I’ve done over the past two years, along with a summary of the content, on my webpage, which has moved to www3.sympatico.ca/joe_in_ey. There you’ll also find instructions on how to purchase back issues of *Popular Communications*. Remember that I cannot release previously published material as *Pop’Comm* owns the copyright. Also, please remember that 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.

Lastly, remember our troops overseas and give them your support. The “Any Service Person” mail program has been suspended for security reasons, but you can refer to the U.S. Department of Defense’s official webpage, “Defend America.” They have a specific section found at http://www.defendamerica.mil/support_troops.html, which has an amazingly wide range of practical and useful ways you can directly help. Please take some time to check out the resources suggested on that webpage and put them to use. ■

On The Bench: Inrush Current Limiters—Your Radio's First Line Of Defense Against Damaging Surges!

Inrush Current Limiters (ICLs) are resistors with a negative temperature coefficient (NTC). In simpler terms, a NTC device's resistance will drop logarithmically as its body temperature increases. Passing voltage and current through a resistor will cause the device to dissipate energy in the form of heat. Remember the basic power formula, $P = I \times E$, that shows P (power in watts) is equal to the current (I in amperes) times the voltage (V).

What does this have to do with vintage radios? Well, actually a lot! I've just started using these devices in my restorations in the past year, and I've grown accustomed to using them in every radio that passes over my bench.

How Are They Used?

First, let's make sure not to confuse surge limiters, a term used for ICLs by some manufacturers, with metal oxide varistors, or MOVs! MOVs are voltage-clamping devices used in surge protector power strips to clamp voltage surges or voltage spikes on the AC line. ICLs and MOVs are entirely different devices, and they are *not* interchangeable! Remember those zapped power strips discussed in an earlier feature on surge protectors here in *Pop'Comm*? Those strips failed in a spectacular manner when the internal MOV devices broke down, shorted the AC line voltage, and caused sparks to fly! The ICL is wired in series with one side of the AC line. A good spot to add the ICL device is in series with the set's AC line fuse. **Figure 1** shows how this is done electrically.

Photo A shows what the ICL devices look like. Ametherm¹, who graciously supplied us with the samples for this article, made these devices. Another well-known manufacturer is Keystone Thermometrics². Ordering info is given at the end of the column.

What Do These Surge Limiters Do?

When cold, a tube filament is at a much lower resistance than it is after warm-up. In AC transformer powered sets, this means the power transformer is hit with a big current surge when the radio is first turned on. The tube filaments are also subjected to a large turn-on surge current. To some extent, the internal resistances of the primary and secondary windings limit these currents, but the ICL will provide a much softer voltage ramp up, protecting the filaments from possible failure.

Have you ever noticed that a household lamp is most likely to burn out when first turned on? It's the same for radio tube filaments. The inrush current surge on a cold filament is the culprit. Ditto for simple AC/DC tube radios. The series-strung filaments are directly across the AC line; there are no current limiting effects from the internal resistance offered by transformer windings to limit the initial surge current. Even though these tubes are

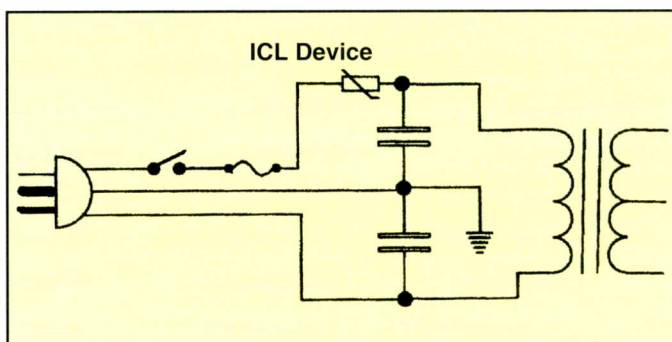


Figure 1. This schematic shows how to install the ICL in an AC transformer-powered set.

designed to equalize the start-up surges equally, in reality one or two tubes will exhibit a bright filament flash when voltage is first applied. The pilot lamps often glow abnormally bright until the tubes warm and the voltages equalize. Is \$2 or \$3 an unreasonable expenditure to protect the ever-diminishing resource that is the number tubes available to future hobbyists? I don't think so.

Here's something else to consider: More modern radios using silicon rectifiers will also have the initial charging currents for the input filter capacitors to contend with. This means that the power switch contacts are subject to extra wear, tube filament life can be shortened, the AC line fuse has to be derated so it won't blow when the set is turned on, pilot lamps fail sooner than they should, the diodes are subjected to extra stresses, and the list goes on!

How They Work

A cold ICL has a relatively high resistance. A popular device among hobbyists is the CL-90 from Thermometrics. This device has a cold resistance of 120 ohms. Assuming a 120-volt

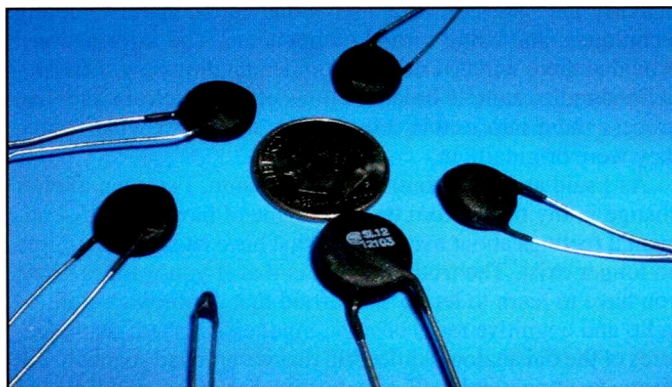


Photo A. Here are a few examples of Ametherm ICLs. A dime is shown along side for size comparison.

AC line voltage, the cold resistance implicitly limits the initial current surge to less than 1 amp. When the radio is turned on, current flows through the ICL, which begins to heat, lowering its resistance. At some point, equilibrium will be reached when voltage drops across the device and both voltage and temperature stabilize. At its maximum 2-amp rating, the CL-90 can reach temperatures approaching 140 degrees C, with a minimum resistance approaching 1 ohm. It takes about 1 to 2 seconds for the ICL to warm up and drop to its lowest resistance. Conversely, you should allow at least 30 seconds for the ICL to cool down before turning a protected radio back on.

Choosing The Right ICL

The ICL should be matched to the current being drawn by the equipment to be protected. In practice, the CL-90 will do 95 percent of the time. I've used these successfully in sets that draw well under 1 amp, but this means the devices will not reach their maximum operating temperature before equilibrium is reached. This isn't necessarily a bad thing—having an extra 3 to 5 ohms of resistance in the circuit helps to compensate for today's higher AC voltages, and instead of the radio seeing 125 volts, the voltage after the ICL might be 120 volts. The CL-90 is more readily available to hobbyists than is the Ametherm line, unless you plan on meeting minimum orders and stocking up on a supply. That's unfortunate, because the Ametherm line is more extensive and features a better selection of higher-resistance, low-current devices that are suited to our needs.

There isn't anything magical or overtly critical about this; I've gotten away with one or two different ICL devices for most of my restorations. Remember, the ICL will only get so hot, provided it isn't run past its ratings! If the voltage across the device increases, it will dissipate more heat energy, reducing its resistance and the dissipated power accordingly. These parts *want* to work. At worst, if the ICL you select is poorly matched to the radio and has too high a current rating, you'll end up dropping too much voltage across the ICL, and with the current being too low, the device will never reach operating temperature to correct the condition. Or, it may take an abnormally long time to heat up and stabilize. Underrating the ICL may cause it to run too hot and possibly fail.

What about ham transmitters and larger boatanchors³? Early tube-based ham transmitters are ideal candidates for ICL protection. Since the larger ones draw so much current, here are a few additional suggestions. Choose a device with a larger body diameter; you'll see that very similar devices are offered in different sized packages; the difference is that the larger packages are rated to withstand more joules, or inrush related energy, than their smaller counterparts. Where cold resistances of 220 ohms to fewer than 100 ohms are fine for smaller consumer radios, you might want to go to a device with a 40- or 50-ohm cold resistance for these higher-current devices. The voltage drop across the smaller resistance will be adequate, given the higher current draw. If the transmitter uses multiple transformers for different sections and for the filaments, you can use a separate ICL for each transformer.

Table 1

Here are the specifications for several ICL devices that are suited for vintage electronic equipment. This list is by no means complete; it is merely representative. Refer to the manufacturer's spec sheets for temperatures for minimum and maximum resistances.

Manufacturer	Part Number	Max. Resistance	Min. Resistance	Max. Current
Ametherm	SL10-5002	50 ohms	0.69 ohms @ 1.6 amp 1.03 ohms @ 1.2 amp 1.86 ohms @ 0.8 amp 4.95 ohms @ 0.4 amp	1.6 amp max.
Ametherm	SL10-12101	120 ohms	2.0 ohms @ 1.0 amp 6.6 ohms @ 0.5 amp	1.0 amp max.
Ametherm	SL03-50101	500 ohms	8.85 ohms @ 0.5 amp 18.7 ohms @ 0.25 amp 26.8 ohms @ 0.15 amp	0.5 amp max.
Ametherm	SL12-12103	120 ohms	2.34 ohms @ 3.0 amp 5.0 ohms @ 1.5 amp	3.0 amp max.
Thermometrics	CL-90	120 ohms	1.18 ohms @ 2 amp 1.75 ohms @ 1.5 amp 3.04 ohms @ 1.0 amp 7.80 ohms @ 0.5 amp	2.0 amp max.
Thermometrics	CL-140	50 ohms	0.89 ohms @ 1.1 amp 1.28 ohms @ 0.825 amp 2.17 ohms @ 0.55 amp 5.27 ohms @ 0.275 amp	1.1 amp max.

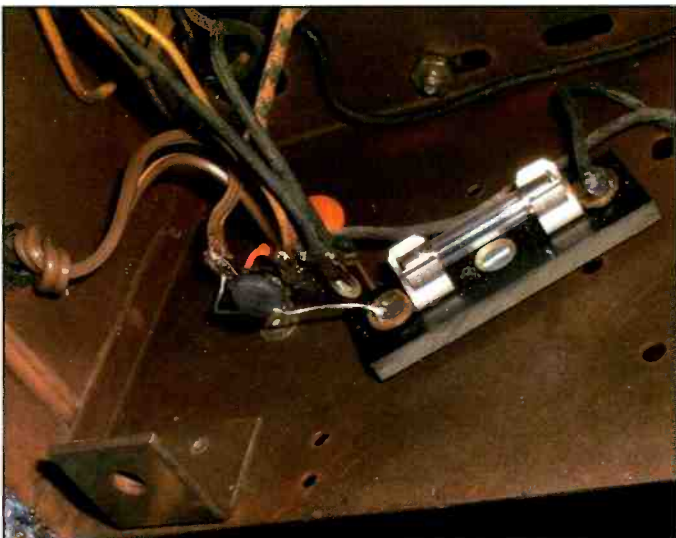


Photo B. ICL installation in my newly restored Zenith 5905 chassis. This chassis was used in console models and also in the Zenith 9S232 Walton tombstone radio. The Walton cabinet is undergoing restoration. A similar tombstone was featured in the TV series of the same name during the 1970s.

Massive boatanchor receivers like the Heathkit Mohawk or any of the Collins 51J series, 75A series, or the bigger Hammarlunds, Hallicrafters, etc., will draw considerable current and should be equipped with a 2- or 3-amp device, or larger, to match the maximum AC current drawn by the receiver.

Table 1 presents data for a few select Ametherm and Thermometric devices that I keep on hand in my shop.

Mounting The ICL

Photo B shows the underside of a recent “Wireless Connection” acquisition: a 5905 Zenith chassis from a Zenith Walton 9S232 Shutterdial tombstone radio. This restoration will be featured in a future column. Note the addition of the fuse

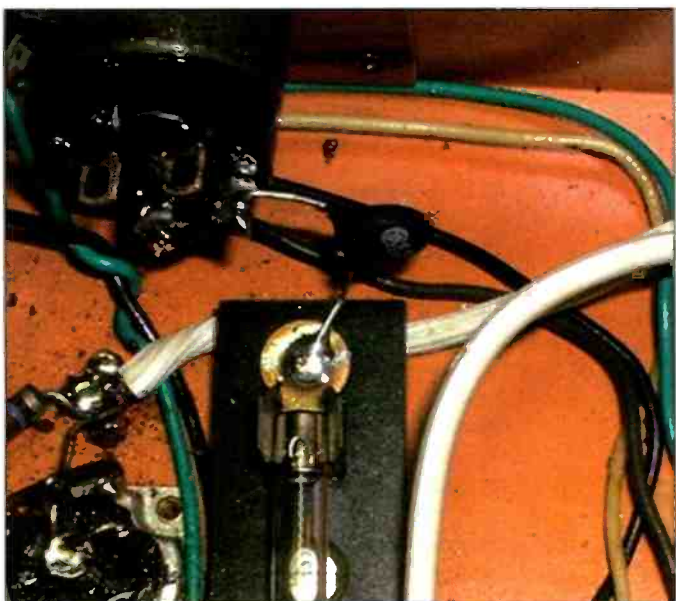


Photo C. This ICL is installed in a National SW-54 AC/DC five-tube receiver.

block and ICL device on the chassis side apron. Here’s where you have to be very careful. The ICL will become very hot in normal operation. This means several precautions must be taken. First, the device must be mounted so it isn’t close to nearby objects—it should be mounted away from other components and wiring. It should be well clear of the radio cabinet baseboard when the radio is back in the cabinet.

Leave a little lead length on the ICL, at least an inch minimum. This will minimize heat traveling down the wire leads and keep the solder connections from repeatedly overheating, which might cause them to crystallize and eventually fail. Make sure that the ICL leads are fully wrapped and tightly crimped on the terminal strip lugs before soldering—a good mechanical connection is important. The ICL in **Photo C** was installed in a National SW-54 receiver, and **Photo D** shows an ICL installed in a five-tube Zenith tombstone chassis. My ICL installations all pretty much follow the same pattern.

Testing The ICL

After restoration, the Zenith 5905 chassis drew around 800 mA (or .8 amps) once it warmed up and started playing. The starting current was well over 1 amp, which is what the radio was fused for. It’s not a good situation. With the CL-90 in the circuit, the current never peaked over 800 mA, meaning I didn’t need to worry about the 1-amp fuse failing, or needing to go to a higher 1.5-amp fuse, which would have lowered the set’s level of protection in case of failure. It’s best to keep the radio fused as close to the normal operating current as possible, and with a fuse that will blow as quickly as possible in case of problems. Using a slow blow fuse, in lieu of the ICL to protect the fuse, is poor practice. The ICL dropped the line voltage by a few volts, meaning the power transformer was now running that much cooler.

When the radio is warmed up and playing, the ICL should be hot, which is normal, and the voltage drop across it should be less than 5 volts. If much more, you will need to select an ICL with a lower current rating. Remember, the resistance/heat curve is logarithmic: if the device isn’t allowed to get hot



Photo D. Another ICL being used in a smaller Zenith tombstone chassis. These examples show how the devices are mounted away from nearby wiring or components. It should be well clear of the wooden cabinet baseboard when the chassis is back in the cabinet. Note the inch-long lead lengths on the ICL device and the firm mechanical connections.

enough, it might start acting erratically for small input voltage shifts! The current drawn by the radio *should not exceed* the ICL maximum current rating specified by the manufacturer. This is the key to using these fellows successfully!

Final Caveats

Here are a few negatives, and I only mention them in passing, since they aren't serious issues in most instances. If the line voltage drops, say during a brownout condition, the ICL will see less current and its resistance will increase. This means

the radio voltage will decrease in greater proportion than the brownout condition might suggest. Conversely, the opposite happens if the line voltage runs higher than normal, the ICL will run hotter, decreasing its resistance, thus increasing the voltage to the set.

Well, that's a wrap for this month! I hope this information serves to improve your restoration skills. Until next time, keep those soldering irons warm and those old radios playing. Remember, we love getting your letters and photos. If you have something to share or to suggest to us, please drop us a line. See you again next month! ■

References

1. Ametherm, 3111 North Dear Run Road, Suite 4, Carson City, NV 89701; www.ametherm.com; Phone: (800) 808-2434. Contact the factory directly to locate your local distributor for Ametherm parts. Minimum orders may apply.
2. Thermometrics, www.thermometrics.com. Thermometrics devices are available from numerous parts vendors, including Allied, Arrow, and Newark. I suggest contacting hobbyist-friendly vendors such as Digi-Key at 800-344-4539 or Mouser Electronics at 800-346-6873 to procure small lots of Thermometric devices. Reasonable minimum orders may apply.
3. Boatanchors, amateur radio slang, not derogator, refers to early heavy, metal cased, and usually vacuum tube-based vintage consumer or military electronic equipment that is massive and heavy when compared to contemporary technology.

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POWER UP (from page 43)

ous hams who live in areas that frown upon large antennas. The CHA-250B consists of five sections of aluminum tubing of various diameters that slide into one another and are fastened by a hose clamp, self-tapping screws or Allen screws. The bottom section of aluminum tubing is supplied with the matching network already mounted, minimizing installation time, which, according to Comet is easily done in less than 10 minutes. The antenna is designed to mount to a mast with a diameter ranging from one to two inches and comes with an SO-239 connector. The CHA-250B is not only resonant on the ham bands, but also on the shortwave broadcast bands. An SWL who wants an antenna that's "all bands in one," low profile, and simple to erect will find that this antenna fits the bill nicely. It's not designed to replace a Yagi or any other full size antenna, but, as Comet tells us, "One person can effortlessly raise the antenna at night when no one can spot it, and take it down before daybreak.

More information on the Comet CHA-250B can be obtained by contacting Comet's North American distributor, NCG Companies, Inc., at 1275 North Grove Street, Anaheim, CA 92806, phone 800-962-2611. You can also e-mail them at sales@natcommgroup.com. The estimated price at press time was \$425.

RigExpert Plus Transceiver Multimode Digital Interface

Rig Technologies has just released its new RigExpert Plus, which takes the user well into the future of digital interfaces. It offers a multitude of new features, including allowing you to use a single USB cable for complete control of your computer and radio setup. Other new features include an optical S/PDIF audio input/output, the well-known K1EL WinKeyer v. 10, and dual inputs and single output (all controllable from the unit's front panel). You won't see a lot of cables coming out of the rear of the small 1 3/8 x 7 x 3 1/2 inch (HWD) unit! You can



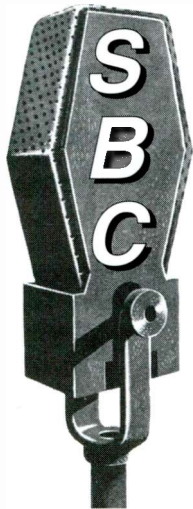
The RigExpert Plus digital interface uses a single USB cable for computer control.

even update the hardware online through the *in-cluded* USB cable. Visit www.rigexpert.com. Live tech support is also available from 10 a.m. to 6 p.m. EST. For more info visit the company website at www.rigexpert.com. Pricing of the new unit was not available at press time.

Cushcraft's New MA8040V Low-Frequency Vertical Antenna

The MA8040V is a brand new Cushcraft self-supporting HF vertical that, according to Cushcraft, "delivers excellent DX-hunting performance on 80 and 40 meters." The MA8040V weighs in at less than nine pounds and can be erected by one person. Parallel resonators use a combination of inductive and capacitive top loading to deliver automatic band switching, high efficiency, and low SWR on both bands. The antenna, which covers 3.5 to 7.3 MHz, is designed to handle maximum legal power. A radial kit is included. It's also ideal for shortwave DXers who need an antenna that's inconspicuous against a backdrop of trees and foliage. For more information on the MA8040V, which has a suggested retail price of \$225, contact Cushcraft Corporation at 603-627-7877 or visit them online at www.cushcraft.com.

Do-It-Yourself Radio—And Other Cheap Ways To Cure The Broadcasting Bug



“You’ve got to be joking!” the fifth grader exclaimed to his new friend. The two had been hiking all Saturday morning and had stopped for lunch in a field near a radio tower. Actually, only one boy had packed some food. The other kid, who’d just admitted to not owning a radio, said he wasn’t hungry, but gratefully accepted half of a sandwich and a few potato chips. During a dessert of crispy apples, the pals gazed upward at the red-and-white antenna accented by blue sky and an occasional puff of clouds. It provided a relaxing setting in which to shoot the breeze about a variety of topics important to 11-year-olds.

“Whatdya suppose the invisible waves from that tower have in them right at this second?” mused the scruffier of the two fellows.

“Probably some music or a commercial or something,” his friend guessed.

Eventually, the conversation included predictions of what they would do for a living someday. The youngster with no radio surprised his compatriot by stating his wish to become a disc jockey. He’d enjoyed hearing the DJ on the hefty, leather-case portable that the bus driver played on the way to school each morning, and then mimicked the broadcaster with an impromptu

weather forecast and record introduction: “And folks, here’s a top nifty-fifty tune from Elvis the Pelvis on *Color Radio KWKY Channel 96* here in Farmington, New Mexico!” They both laughed and then silently reclined in the tall grass for a while before the first kid respectfully wondered why his friend didn’t have a radio. “Money,” was the reply. “I don’t exactly have any, and my Pop usually don’t neither, especially not for nothing like a transistor radio or something. “Besides,” he announced quietly, not wanting to sound too strange, “we don’t get electricity in our house—at least not now.”

“So what do you need?” asked his buddy. “Is it a radio that won’t cost much to get and always runs for free, without being plugged in or even hooked to batteries?”

“What kind of radio does that?” the other boy asked, with doubt evident in his voice.

“Does your father have any razor blades?”

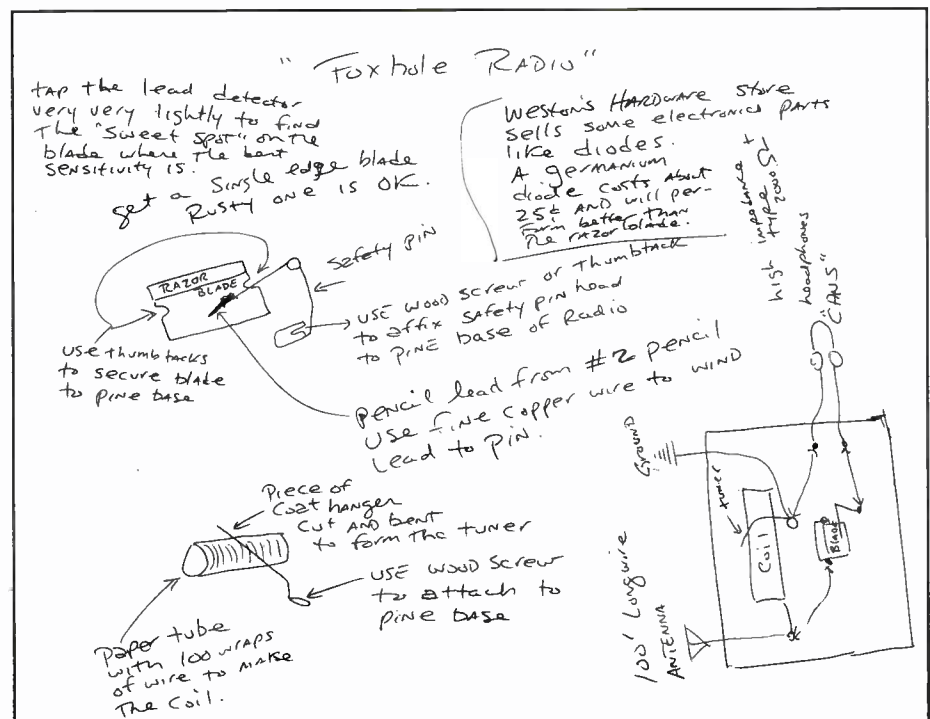
“Maybe some old rusty ones,” he said in disappointment.

“I think those are the best kind for the receiver I heard about. We’ll need to get some wire for your antenna and coil. Also, it wouldn’t hurt if we could talk to someone who could give us specific directions for making the thing.”

Surprise Help

In the distance they could see what looked to be a new Ford Falcon parked on the long dirt driveway of the small, unpainted cement-block building from which protruded a thick cable

Here’s what our story’s helpful station owner jotted down for Jim and his buddy. From these simple directions they built a working foxhole radio. Jim remembers the razor-blade/lead-pencil setup as being “very persnickety” in that it had only a couple of tiny “sweet spots” that would detect the local AM stations. “We lived in a trailer, and sometimes,” he recalls, “the safety pin would get bumped when someone heavy walked around. It would take me a while to nudge it back into the right position. There were times, too, when signals from all three of our local AMs converged in one piece of the blade. It was a fun way to start in radio, but I was sure glad to graduate to a legitimate 9-volt transistor pocket portable a few months later.”



THE KWYK NIFTY FIFTY SURVEY

IT PAYS TO LISTEN TO THE GOLDEN SOUND OF KWYK

COMING SOON TO THEATRE



96

LAST WEEK

1.	MONSTER MASH	Bobby Fickett-Garage	8	21.	WORKIN FOR THE MAN & LEAH	Roy Orbison-Monument	17
2.	PATCHES	Dickey Lee-Smash	1	22.	DON'T GO NEAR THE INDIANS	Rex Allen-Mercury	Debut
3.	SHEEY	Has 4 Seasons-Van Jay	2	23.	GINA	Johnny Mathis-Columbia	39
4.	RAMELIN' ROSE	Nat "King" Cole-Capitol	2	24.	"BLOW OUT THE SUN"	Della Rease-Victor	14
5.	ONLY LOVE CAN BREAK A HEART	Gene Pitney-Musica	7	25.	LITTLE BLACK BOOK	Jimmy Dean-Columbia	Debut
6.	ALLEY CAT	Gene Pitney-Musica	7	26.	SEND ME THE PILLOW YOU DREAM ON	Johnny Tillotson	12
7.	WHAT KIND OF LOVE IS THIS?	Bert Fabric-Atco	13	27.	PUNISH HER & SOMEDAY	Bobby Van-Liberty	15
8.	KING OF THE WHOLE WIDE WORLD	Joey Dee-Roulette	5	28.	TEENAGE IDOL	Rick Nelson-Imperial	20
9.	SURFIN' SAFAR & 407	Elvis Presley-Victor	9	29.	THEY TELL ME IT'S SUMMER	The Flatwoods-Dolton	21
10.	GREEN ONIONS	The Beachboys-Capitol	11	30.	THE BOYS' NIGHT OUT	Fatti Page-Mercury	39
11.	I REMEMBER YOU	Booker T & MG's-Atco	14	31.	IF A MAN ANSWERS	Bobby Darin-Capitol	Debut
12.	RAIN RAIN GO AWAY	Frank Ifield-Van Jay	Debut	32.	WHAT KIND OF FOOL AM I	Sammy Davis-Japtisa	Debut
13.	YENUS IN BLUE JEANS	Bobby Venton-Epic	44	33.	WARMED OVER KISSES (Left Over Love)	Brian Hyland-ABC/Par	Debut
14.	BEECHWOOD 45781	Jimmy Clanton-Atco	Debut	34.	CLOSE TO CATHY	Mike Clifford-UA	Debut
15.	LIMBO ROCK & POPEYE	The Marzelleas-Tamla	Debut	35.	SWISS MAID	Dal Shannon-Bigtop	18
16.	ALL ALONE AM I	Chubby Checker-Parkway	26	36.	SHE'S NOT YOU	Elvis Presley-Victor	10
17.	HIS A REBEL	Branda Lee-Dacca	28	37.	NEXT DOOR TO AN ANGEL	Neil Sedaka-Victor	49
18.	RINNY DINK	The Crystals-Philis	Debut	38.	JAMES (Hold The Ladder Steady)	Sue Thompson-Hickory	45
19.	SHEILA	Baby Cortez-Chees	4	39.	IT'S LOVE THAT REALLY COUNTS	The Shirelles-Scepter	37
20.	IT MIGHT AS WELL RAIN UNTIL SEPT.	Tommy Roe-ABC/Par	18	40.	LOVE ME TENDER	R. Chamberlin-MGM	Pick
		Carroll King-Companion	4	41.	SUSIE DARLIN'	Tommy Roe-ABC/Par	Debut
				42.	(Dance with The) GUITAR MAN	Duane Eddy-Victor	Debut
				43.	PUPPY LOVE IS HERE TO STAY	Billy Storm-Vista	Debut
				44.	THREE WAY LOVE AFFAIR	Buddy Knox-Liberty	40
				45.	WHEN THE BOYS GET TOGETHER	Joanna Sommers-WB	37
				46.	AGAIN	The Lettermen-Capitol	Debut
				47.	GOT A FUNNY FEELING	Cliff Richard-Dot	Debut
				48.	LOLLIPOPS AND ROSES	Fau Peterson-Capitol	48
				49.	STOMPIN' ROOM ONLY	The Marketts-Liberty	Debut
				50.	I LEFT MY HEART IN THE BALCONY	Linda Scott-Congress	Debut

FOR WEEK ENDING OCTOBER 20, 1962



***Was A Pic Of The Week**
PIC HIT OF THE WEEK Rodge Martin-Dot
I'M STANDING BY Jim, Tony, and Bob
FEATURE ALBUM The Lettermen-Capitol



This was the Science Fair kit that got Jim started collecting simple radios. Although no book can be found on the box or instruction booklet, he estimates it hails from the late 1970s. The directions include a decent explanation of how a crystal radio works and indicate that this one is really a "diode" radio. "The function of the diode is basically the same as the old crystal," notes the booklet, "but with the advantages of being smaller and easier to use." It suggests that the truly interested crystal-radio user should head to the local library to request books on the topic.

The flip side of that informal foxhole radio schematic contains a "Nifty Fifty" music survey that was a few weeks old when the boys sought advice at the KWYK transmitter site. Number one on the charts was a tune that Jim has spun on many succeeding late-October Saturdays—The Monster Mash. If some of the song titles (such as Blow Out The Sun, by Della Reese) don't look familiar to you, it's evidence that many pop-station music directors of the 1950s and '60s assembled their own music research (from record stores, phone requests, Billboard magazine, and local DJ input) and sometimes selected records for airplay that few others were spinning. "Local" hits often resulted.

that led to the broadcast tower. A short walk through the field got them to the site's open door. There the taller youngster called out to a man inside who was standing in front of a big bluish-green piece of equipment with glowing honey-colored tubes. A hand-printed sign on this box read *Trusty Betsy Kilowatt*.

"Holy smoke!" the guy exclaimed. "You kids scared the heck out of me! I didn't expect to see anybody way out here. I'm just glad I didn't have my hands in Ole Betsy's high voltage when you first hollered!"

"We're sorry, mister. It's just that we're kinda interested in broadcasting, and my friend here wants to be a DJ someday, but he doesn't even have a radio. We want to build one of those razor-blade receivers. Maybe you know how we can construct one?"

"Oh, you mean a foxhole radio like the G.I.s at the front used to make. See, the Germans had radio-direction-finding equipment that could hone in on super-heterodyne receivers, so our soldiers close to the fighting weren't supposed to use regular radios. That's when some clever Yanks came up with the simple

set built from junk that the Krauts couldn't detect."

"I think that's the one we're talking about," the smaller, cleaner-cut boy confirmed. "It won't set us back much, will it? My friend here requires a type of receiver that's low price, low maintenance, and free of all operating costs."

"Son, let's just say that a foxhole radio is perfect for the impecunious listener," the

A 1988 version of the Science Fair crystal set. To attract rock-music-oriented kids, RadioShack got rid of the father/son project cover theme and replaced it with an artist's rendition of well-dressed engineers broadcasting (more likely just recording) an equally spiffily attired rock band. Like the earlier kit, this features a plastic frame with a round cardboard insert on which the components could be wired via spring connector posts. Jim conducted a performance test comparing this kit to what is arguably the Cadillac of do-it-yourself crystal sets—the 1950s' Heathkit model CR-1. "With a 100-foot long-wire antenna and good ground connection," he reports, "both sound good when dialing local stations. The higher-quality components—including dual gang capacitors—on the CR-1, however, pull in distant signals much more reliably than can the Science Fair."



A step up from the crystal sets is the 1970's "learn as you build, two-transistor AM radio, P-Box" kit. The "P-Box" referred to the little punch-hole plastic box in which the kit was packaged and would be built. Instructions included an electronics tool wish list (wire cutters, pliers, soldering iron, etc.) that could be fulfilled via a display board at nearby RadioShack. A classic 9-volt rectangular "transistor radio battery" served as the completed set's power source. It retailed for \$3.95 and only featured earplug listening. For about a buck more, one could get RadioShack's low-end, ready-to-go "Flavor Radio" pocket portable with speaker. Of course, a factory-built radio couldn't teach much to budding broadcast engineers. Incidentally, RadioShack kits of this series/era were pretty diverse and included projects such as a musical synthesizer organ, burglar alarm, AC/DC variable power supply, three-way code oscillator, solar-powered AM radio, IC AM radio, metal locator, field-strength meter, electronic metronome, three-transistor shortwave radio, moisture detector, and the WWV (US time-signal station) converter for an AM radio. Jim says his goal is to collect all of these and at least a dozen more relatively obscure "P-Box" kits offered circa-1975. He's not alone. A check of eBay typically shows lots of bidders for such vintage Science Fair products.



"I scour every RadioShack I see for a left-over AM broadcasting Station Kit," Jim admits. He said, "I think I have seven of them, including one found on a clearance table for 99 cents. It's my absolute favorite of the Science Fair series, partly because each one's instructions include a certification section that the builder is supposed to sign and date. In so doing, the person who has just completed the broadcaster kit swears that he or she will assemble the kit in strict accordance with RadioShack materials and guidelines, operate it somewhere between 510 and 1600 kilohertz, use no more than a 9-volt battery, and be certain that the combined length of the antenna and its lead wire is not greater than 10 feet!" Using a cartoon character that looks to be a bug (perhaps to represent that the kit could give one the "radio bug"), RadioShack predicted that with the regulation-length antenna the signal would travel four to five feet, and seemed quite concerned that the kit's radio waves might exceed such legal limits. One RadioShack dealer franchisee told Jim that a kid came into his shop, bought one of these kits, and promptly returned the next day for three 100-foot rolls of wire. "Son, did you see that form in the direction booklet that says the antenna can't be more than 10 feet?" the proprietor asked. "Yeah," the boy smiled. "That's how I figured out that I need a lot more wire to make the thing transmit better."

square of pine will do nicely. The detector consists of a razor blade, some lead from a #2 pencil, a big safety pin, and a bit of thin wire to secure the lead to the pin. For the coil you gotta have a cardboard tube. Uh . . . look in the john over there. I volunteered our star DJ to pull transmitter meter calibration duty last week when I was on vacation. Five bucks says there's

not a shred of toilet paper left on the roll." "Only the cardboard, sir," my friend said. "That figures! But anyway, that's just what the doctor ordered, so bring it here. See if you can scrounge any wire from the trash can in back of the patch panel—that thing with all the red cords plugged into it. Seems to me I chucked a bunch of cop-



Is that all there is to an AM transmitter? Just a plastic and cardboard "breadboard" frame, as well as a couple of little bags of components that can get you on the air with the 1983 version of Science Fair's beloved kit? Who can say just how many radio/TV careers these miniature stations have started?

per-coil wire last spring," he said. There was a football-shaped mound of thin, varnish-coated wire that appeared to have quickly been wound around a piece of yardstick. The radioman had the kids go outside and untangle enough for him to wind 100 turns around the bathroom-tissue tube. When they re-entered the transmitter house, the fellow inspected the wire, peering over his glasses studiously positioned at the end of his nose. Buzzing noises from a row of fluorescent lights, plus some faint, tinny-sounding music in the transmitter tubes, made it seem as if the jury was out for hours. The guy declared the wire "A-OK" and then silently commenced winding the coil. A couple of times during the procedure he sighed and glanced (with an uninten-



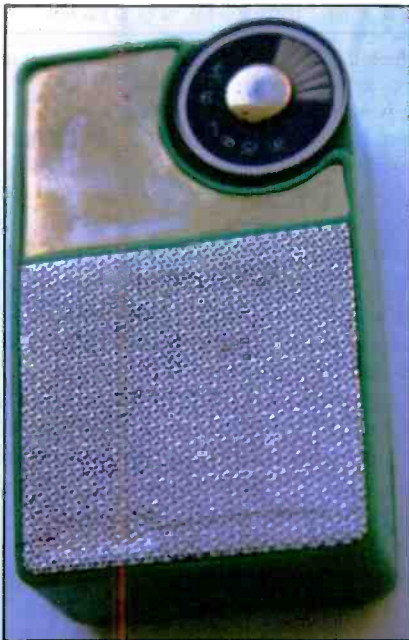
Philmore Manufacturing Company was arguably the most prolific crystal-radio purveyor from the 1920s into the 1960s. Many of its sets were entry-level radios that influenced generations of future radio professionals. Here is a tin containing (in felt packing) a lead disc encasing a chunk of galena crystal from broadcasting's early days. The stone was marketed as being "X-tra loud and super sensitive." The disc fit into a tiny cup positioned underneath a "cat's whisker" detector mechanism central to most first-generation crystal radios.

tional hint of pity) at the bigger kid's threadbare jeans and grubby T-shirt, as if deciding something.

"Tell ya what, gentlemen," he slowly intoned. "There's a decent set of high-impedance cans—or to use proper English, *headphones*—in that top desk drawer. On behalf of station management, I'd like to donate them to you for this educational broadcasting project." Before the boys could respond, he continued with instructions: "Get some thumbtacks from the bulletin board over there. Use them to secure the coil, razor blade, safety pin, and wire connections to

the pine base. Gimme one of those coat hangers that's on the back of the bathroom door. I'll cut and bend it into a sort of 'Z'-shaped tuner that'll rub across the top of the coil wire, from which we'd better sandpaper off some of that lacquer so that the coat hanger/tuner can make a good connection on the wire windings. Where I've made the little eye at this end, you'll need to screw it to the base, but not completely tight."

Finally, the guy had the youngsters take the ball of wire for an antenna and ground, and then gave them hints on getting the foxhole receiver to perform. These hints



age two-transistor set sound like? They were a little tinny, not too sensitive to selectivity between strong signals, and only capable of pulling in local stations. Although the two-transistor circuitry was common among most of these radios, there literally were dozens of variations in case designs.



There's an entire category of radio collecting for transistor sets, and a sub-section that simply concentrates on circa-1960 cheap, Japanese-built two-transistor pocket portables such as this unidentified brand. No matter the maker, most of the two-transistor units were labeled a "BOY'S RADIO." US import regulations at the time considered any receiver with less than three semiconductors a "toy" and not subject to protection duties tacked onto the price of higher end transistor portables from the likes of Sony. What did the average

included the suggestion that they find a "thick," or single-edge, razor blade with a blue tint to it. "If it's not in the budget, however, a used, rusty one will provide acceptable results. Gimme a call at the studio if you run into trouble," he offered, as the boys carried their newfound electronics out of the transmitter shack.

"Are you the electrician?" the smaller kid asked.

"No, boys, it's much worse than that. I'm one of the station owners. That's how I got lucky enough to be the poor soul who has to check on Ole Betsy, our transmitter here, every week."

"Gosh, the actual owner! Thanks very much for all of your help, sir . . . oh, and for the headphones, too!" they both said to the man standing in the doorway. Then the kids disappeared into the adjoining field. "Bye, Betsy!" the taller one yelled happily, but by that time the transmitter building's door was closed.

Getting It To Work!

The man who as a boy years ago had called out to the station owner (who wishes to be identified only by his first name,



Not much is known about Educational Electronics Company's Handy-Walkie radio. A check inside the plastic box indicates it holds a one-tube AM receiver. The crystal earphone plugs into the case. A clip (not seen) on top can be connected to a long-wire antenna, which certainly limits the Handie-Walkie's walk-around range. The knob on the bottom runs a volume control. Tuning is supposed to be accomplished by a now-missing slider that apparently protruded from the slot labeled with the 1-to-10 scale. Jim figures this radio was current around 1955–1960.

Jim) told me this story and about how he and his friend put together the foxhole radio components. As per the radio-station official's scribbled plans, they strung a long-wire antenna. They also pounded an old piece of metal into the earth (for a grounding point) under the cracked and taped-up bedroom window of his dilapidated mobile home. Several hours later, the two delighted in taking turns listening to top hits emanating through the cans connected to the foxhole receiver. "They're playing the Beach Boys now," one said. "The DJ is giving the weather," the other nodded in reply. "Chilly tonight, but partly sunny and warmer tomorrow." It worked better when they discovered the practicality of each taking a "can" and listening simultaneously.

Suddenly it was sundown, and the station began signing off. The small boy checked his watch, looked worried, and said he'd better get going, running off towards a shortcut through a trail in the brush.

Although this happened over 40 years ago, Jim still credits that chance meeting with the station owner, plus the encouragement of his buddy, as the catalysts that got him into the radio business. Sadly, he never again saw his friend. The boy had been staying with relatives while his parents were gallivanting in Europe. Apparently, they'd already shipped him back east to his grandparents when Jim tried to find him, only a week later, in order to report on various reception successes with their foxhole radio. "He'd told me where he lived, but we always met at school. Actually, I wasn't sure where he was staying. Maybe I tried the wrong street, but you know how kids get mixed up. Anyway, he didn't come back to school after Christmas vacation, and the teacher just said he'd relocated."

The Bug Bites!

Jim tells me the radio bug really bit him after that. "Because of my crummy home situation, I didn't have many childhood friends, except for the DJs and other on-air people I could invite

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**No Batteries! No Tubes! No Distortion!
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The world's best entertainment and educational features are to be had for the listening in. The very low prices asked for these really good and practical sets puts them within the reach of every man, woman, boy and girl. "If you really wish to learn all about radio," advises the editor of Radio News, "start with a good crystal set." A crystal set has many advantages, but the main ones are simplicity and absolute clearness. There is no distortion and no noise. There are no batteries to buy. No tubes to wear out, in fact there is no maintenance expense whatsoever. They cost absolutely nothing to operate and they will give you constant service for an indefinite period of time. The reception is loud and clear. **Prices below do not include aerial or ear phones.**

Little Wonder Crystal Radio



Price \$1.00
Compact in size but big in results. This set will receive broadcasting within 25 miles of a station or even greater distances when conditions are favorable. The open type detector permits adjustments to be made to the finest degree. The set includes the Philmore supersensitive crystal which assures quick results when "looking" for a station, because the entire surface of the crystal is sensitive. **No. 6581. Little Wonder Crystal Radio. Price Postpaid. \$1.00**

SUPERTONE CRYSTAL RADIO



\$1.50
A rigidly constructed radio receiving set which will give everlasting service. Has a range of 200 to 600 meters with a receiving radius of over 25 miles. Under favorable climatic conditions, reception may be had within 100 miles from a broadcasting station. Reception is loud and clear without distortion of any kind. **No. 6582. Supertone Crystal Set \$1.50**

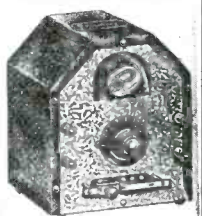
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The "Blackbird" is a most efficient crystal radio receiving set. Will receive broadcasting from stations up to 25 miles (greater distances under favorable conditions) loud and clear that will bring joy and happiness to the listener. This radio is equipped with a super-sensitive crystal enclosed in a glass housing, thus effectually keeping out dust, etc. No tubes or batteries required. Price does not include Aerial Kit or Phones. **SHIPPED POSTPAID. No. 6583. Blackbird Crystal Radio \$2.50**



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508 JOHNSON SMITH & CO., DETROIT, MICHIGAN

Page 506 of the 1938 Johnson Smith & Co. novelty catalog featured four Philmore crystal sets priced from a buck to \$3.95. While the cheapest one utilized an open-air, swivel, ball-type cat's whisker, the others were fitted with a long (U-shaped) wire crystal detector covered with a clear dome.

in via the radio. That foxhole set soon gave way to an eight-transistor Lloyd's brand model TR-800 AM portable radio that I got from a local hardware store in exchange for doing some odd jobs on several Saturdays. Sometime the next spring, I figured that if I showed up at the aforementioned transmitter shack, I might run into the owner again and he'd let me work at the station. As luck would have it, a few afternoons later I noticed that the station was off the air, so I hiked over to the tower site and found the guy vacuuming out Ole Betsy. He remembered me and wasn't in too bad a mood, considering a mouse had gotten into the transmitter and tripped the breaker."

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"Coulda turned out a lot worse," the relieved radioman admitted. "Thought it might have been the modulation transformer biting the dust."

That encounter netted Jim an after-school job cleaning up at the studio, and beginning in his junior year in high school, a weekend air-shift. Along the way, Jim's mentor taught him some radio-engineering fundamentals, enough so he earned his FCC First Class Radio-telephone license even before enrolling in an Associates Degree tech program at a community college. Since the late 1960s, he has worked with about a dozen radio outlets, mostly small- to medium-market facilities in the Southwest and Rocky Mountain areas.

Although enjoying being on the radio, Jim laughs about his voice being better suited for broadcast engineering. Thus, he decided to go in that direction. As chief engineer for a small market group (three AM/four FM stations), he still is able to maintain some interest in radio history, mostly in the form of faithful, old tube transmitters (now usually the stations' backup units). However, Jim notes that even the most local of local broadcasters is getting ready for digital transmission and has already replaced turntables, cart machines, and reel-to-reel machines with computer-based gear.

During the late 1980s, while picking up some resistors and capacitors at a small-town RadioShack dealer (one of those now rare little RadioShack franchise shops, as opposed to a company-owned RadioShack store) that also sold lumber and hardware, Jim got sidetracked from his station repair needs when he spotted a \$4.95 Science Fair brand crystal-radio kit on the shelf. Later he and his daughter had fun making a school project out of it for her fourth grade show-and-tell assignment.

Watching her practice explaining how the set worked took Jim back to his days with the foxhole radio and his long-ago-vanished grade-school pal. "It was the kind of evocative, reminiscent baby-boomer experience," he reflects, "that got me thinking it would be fun to collect vintage Science Fair kits. Most were discontinued by RadioShack in its move to attract a younger, techno-savvy clientele, making some of the kits pretty tough to find today."

My thanks to Jim for sharing his radio memories and for sending pictures of several kits in his "mini museum of cheap, do-it-yourself radios." Enjoy the images and expanded captions. See you again next month!

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Bill Tells The Truth...For Once

A lot of what I write might be considered too strange to believe, so I thought I'd write the absolute truth for once. Our editor, Harold "refill that ink cartridge" Ort will just chime in whenever it becomes too unbelievable.

It all began when I took two days off from work so I could attend a Harmonica Convention in Williamsburg, Virginia. ("Oh sure, Bill, you expect them to believe that..."), and while I was smart enough to take a portable scanner for the quiet moments, I did not take my AM/FM portable, because I knew from previous conventions that every waking minute was taken up with live music (sounding like a swarm of angry bees). I swear that from now on I will always keep a portable AM/FM radio with me *wherever* I go.

I packed my harmonicas, an electric bass, an amplifier, one of my pet rats (the hotel allowed pets), and some clothes and drove to a friend's house the night before, where I slept and was met by a third friend the following morning so that we could all ride together. My harmonica-playing friends are true friends indeed, as witnessed by their willingness to provide comfort and transportation to my rodent friend without making any jokes. Okay, without making *too many* jokes. Frank drove quite legally the whole way, but we did avoid a few trouble spots by being forewarned of incidents.

Our computer-based directions to the hotel were fine until the last mile (as so often happens), so we stopped and talked to some humans, who knew the hotel and told me that I had a rat on my shoulder. I thanked them on both accounts and we arrived at the hotel with no further problems. Our other travel mate, Ed, who is 80-something, was concerned that the management would balk at the rodent on my shoulder. "Not to worry," I told him as we checked in.

"What's that on your shoulder?" the girl at the desk asked. "Long-tailed hamster," I said.

"Oh. Looks like a rat."

"Shhh," I said. "She's sensitive about that."

"Oh. Okay."

Just then the scanner squawked on my belt. "Are you one of those ham radio operators?" she asked.

"Undercover ham." I said.

"Oh. Okay." she said. "Nothin' goin' on at the hotel, is it?"

"No ma'am. It's across town."

I was really surprised at my friends' ability to keep straight faces through all the Jack Webb dialogue, but they were, after all, professionals. Both former Navy men with many years of keeping straight faces to their credit. We got into our room, made sure our little rodent friend was comfortable and wouldn't scare our housekeeper, and headed out for something to eat.

By the time we arrived at the restaurant, which took maybe 15 minutes, my body ached all over and I felt as if I had the worst case of the flu in the world. But I had had a flu shot. This couldn't be happening, and certainly not now. I ordered a small bowl of soup instead of my normal three large entrees, sipped a little, and headed to the car to wait for my friends. By the time they arrived, I asked them to stop at a drug store and get me

some of everything. We went back to the room and I crashed. Three hours later I stumbled down to the lobby and asked all the harmonica players if there was someone who might take me to a hospital. A dear friend from back home saw me and immediately volunteered.

We found the hospital but couldn't find the emergency entrance. Eventually I convinced my friend to stop at a lighted entrance with a janitor inside. I banged on the door, stuck out my tongue, and pointed down my throat. Looking back, I don't know what this might have signified, but he let us in, got us a wheelchair, and pointed us toward the ER, giving me a good shove.

To shorten the bad part and eliminate the disgusting part, everyone in town had the same symptoms, but I didn't have the flu. Everyone else did. I ended up with a leg infection, which ended up to be cellulitis. I stayed in the waiting room for three hours, then in the little room with curtains for five more hours, then in a hospital room for four more days, connected to IV bags and monitors.

Their bed was the worst, I couldn't get comfortable, I ached all over, I couldn't sleep, and I didn't have my radio. I was in a stupid gown that twisted with my IV hoses conspiring to kill me, and by the fourth day I was yelling obscenities at everything but the nurses, who were remarkably nice despite my disposition.

And they had a television. I was as physically uncomfortable as I could be, and not too well mentally, either. My two good friends, one in his 70s and the other in his 80s, were doing their best to care for my pet rat in a hotel room while attending a harmonica convention. I was madder than @#*&^%! that I couldn't be there, but so sick and uncomfortable that I wouldn't have gone if I could have, and all I wanted was an AM/FM radio, but all I had instead was some pathetic television with 5,286 channels, each worse than the one before. The best thing I could watch was the *Mythbusters*, which I think was on the Mythbusters Channel, and it was only borderline good.

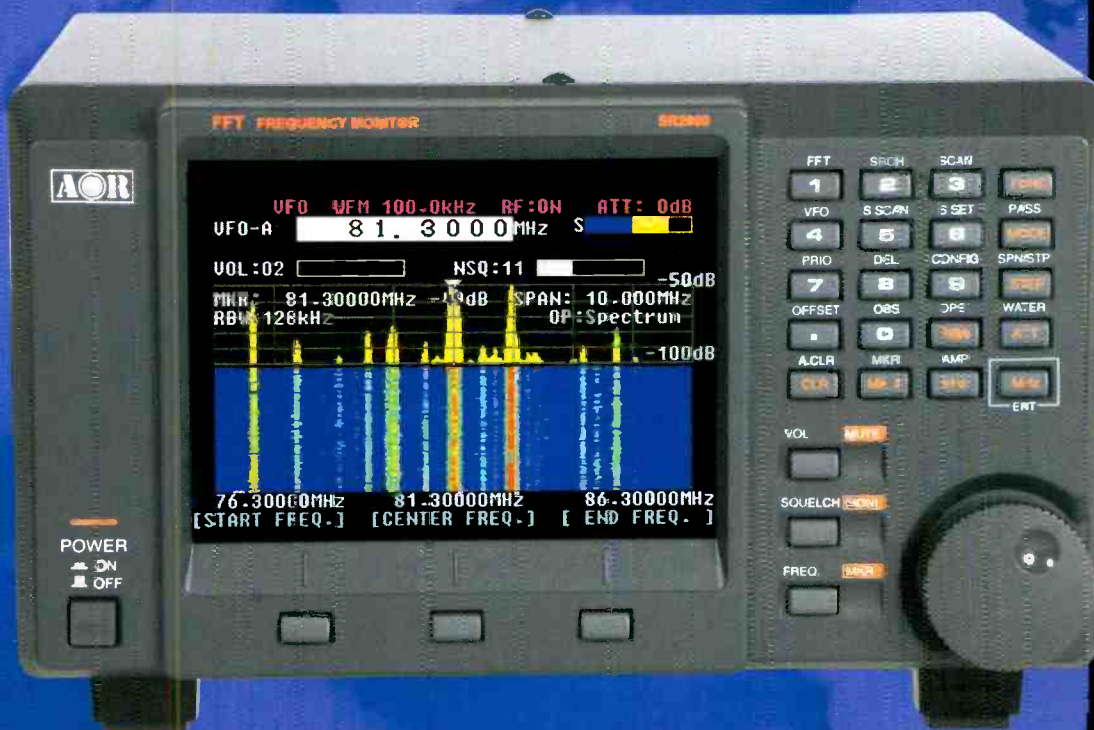
I remembered my scanner. It was in my camera case, which I had brought for some crazy reason. It worked for an hour. The NiCds were almost dead and I had no charger. I listened to the various electronic devices in the hospital till I remembered I could receive the FM band, and I did, but only at low volume to make the batteries last, and they didn't last long enough, and the gift shop was closed, and I had no cash, and no one on the floor had any AA batteries, and when the gift shop opened Monday morning, they were out of AA batteries, but they'd be getting them in "soon."

I had my cell phone. I called the PBS station, asked them to put me on hold, and they asked why. I said I wanted to listen to their station. They said they couldn't tie up a line. I thanked them anyway.

I know that our mothers have always warned us to wear clean underwear at all times, because you never know when you might be in an accident and go to the hospital. Well, the next time they get *ME* into an ER and cut my clothes away, instead of clean underwear, they're gonna find an AM/FM radio and plenty of spare batteries! ■

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