Radio–Homeland Security–Computers & Radio–Family & Hobby Comms

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POPULAR COMMUNICATIONS

JUNE 2004

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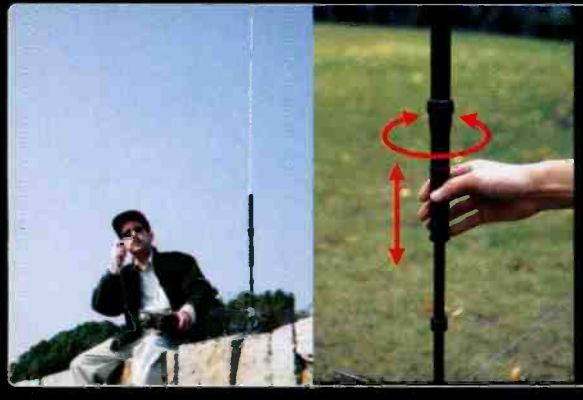

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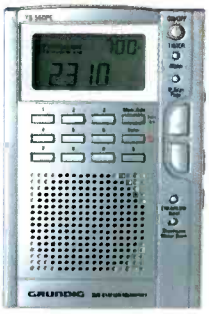

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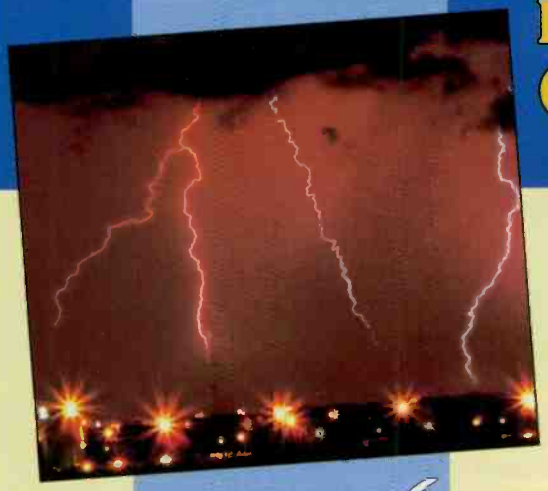

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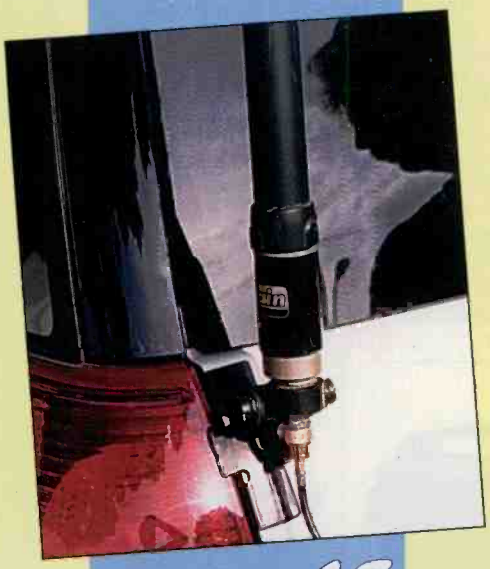

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Departments

On The Cover

The advertisement in the newspaper reads: "Wanted civic minded people to risk their lives and property for no pay and little recognition. As a trained storm spotter you will encounter the most dangerous and yet beautiful weather that Mother Nature can create. The rewards are few but you'll have the satisfaction of saving the lives and property of your fellow citizens and get the chance to experience the overwhelming power of weather in a most intimate way." With an advertisement reading like that, *Popular Communications* columnist Steve Douglass couldn't resist and joined the ranks of the Amarillo Emergency Service Storm Spotter Auxiliary. Do you have the right stuff to be a storm spotter? If so, check out "Into the Storm" on page 6. (Photo by Steve Douglass)

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our readers speak out

letters to the editor

Each month, we select representative reader letters for our "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>.*

Is This Representation?

Dear Editor:

First, let me say right up front, this concerns amateur radio, but it does not concern code versus no-code. Most amateur radio operators were painfully aware of highly emotional debates the past few years over Morse code testing, and they eagerly awaited the promised American Radio Relay League licensing proposal in the hopes that the controversy would end and amateur radio could move into the future. The ARRL proposal was announced January 19, 2004, following the annual ARRL Board Meeting. Most hams seem to agree that the proposed entry-level license class (similar to the old Novice class) is a good idea. Many think the Novice class should never have been discontinued in the first place. Most also accept, some grudgingly, the retention of Morse testing only for the Extra class license. It would seem the ARRL has found an acceptable compromise and finally ended the emotional debates surrounding Morse testing.

A summary of the ARRL proposal recommending a complete restructuring of amateur radio can be found at http://www.arrl.org. This proposal contains some provisions and side effects that are not supported by a large number of hams, including many ARRL members. It should be noted that none of these concerns has anything to do with Morse code, except the possible issue of reciprocal licensing. Discussion of the concerns can be found at the Society for the Preservation of Amateur Radio website at http://www.spar-hams.org. These include:

- Upgrading all Technician licenses, with or without Morse credit, to General class without the General written exam.
- Since many countries still require Morse proficiency, it is not clear that existing General and Technician-Plus licensees will continue to enjoy reciprocal licensing privileges, if there is no method to determine such proficiency, even though they have already passed the applicable exams.
- Novice power limits on 10 meters would be reduced from 200 to 50 watts. The ARRL says this is needed to avoid exam questions concerning RF safety.
- New "Novice" privileges with 100 watts would cover over half of the 80-, 40-, and 15-meter HF bands.
- Some 320,000 Technicians will be lumped in with some 140,000 Generals, increasing the population of these General class bands by a factor of more than 3.

To further understand the concerns it is necessary to understand what separates the Amateur Radio Service from the other radio services that the FCC administers. This is quite succinctly defined in 47 CFR 97.1. The reasons for Amateur Radio are:

(a) Recognition and enhancement of the value of the amateur service to the public as a voluntary noncommercial communication service, particularly with respect to providing emergency communications.

(b) Continuation and extension of the amateur's proven ability to contribute to the advancement of the radio art.

(c) Encouragement and improvement of the amateur service through rules which provide for advancing skills in both the communications and technical phases of the art.

(d) Expansion of the existing reservoir within the amateur radio service of trained operators, technicians, and electronics experts.

(e) Continuation and extension of the amateur's unique ability to enhance international goodwill.

Notice that items b), c), and d) specifically mention technical things, such as "advancement of the radio art," "advancing skills in the communications and technical phases of the art," and "trained operators, technicians, and electronics experts." Clearly the FCC wants to encourage technical endeavors and communication skills. That is what separates Amateur Radio from the other services available to hobbyists. Many would also agree that the technical and communications skills are what allow "hams" to be effective in items a) and d), "providing emergency communications" and enhancing "international goodwill." Amateur Radio clearly was founded on technical skills and many active hams question how the ARRL proposal contributes to those objectives.

How could this have happened—that ARRL presented a proposed restructuring of the Amateur Radio Service that appears to detract from the very technical items specified by the FCC? A glance at some statistics may give a partial answer. As of August, 2003, the number of amateur licensees in the FCC's ULS database was about 685,000. Meanwhile the ARRL membership comprises about 154,000. Of course, this data is not precise, since some ARRL members are not in the United States nor licensed by the FCC, and the FCC database contains licenses of deceased amateurs whose licenses have not yet expired. It does seem to show, however, that more than three out of four American amateurs are not ARRL members. It is noteworthy that the ARRL did not ask even its own members their opinion on the issues of automatically upgrading nearly 60 percent of amateur licensees without a written exam and crowding over three times the number of amateurs into the General class bands. One has to ask the question: "Whom does the ARRL really represent?"

It appears that the ARRL proposal calls upon the FCC to reconsider the purpose of the Amateur Radio Service. If it is to remain a service dedicated to technical and communications skills, why reduce entry-level requirements when 85 percent of applicants already passed the Technician exam? If the rules are supposed to encourage advancing skills, why give 320,000 General class licenses to those who do not pass a 35-question multiple choice test required of all before them and after them?

(Continued on page 73)

tuning in

an editorial

by Harold Ort, N2RLL, SSB-596

FCC: We Did Not Have Relations With The BPL Industry

In the beginning there were lies. Industry lies about BPL (Broadband Over Powerline), that there is *no* harmful interference caused by BPL. Then came bigger lies and wordsmithing with assurances that *if* there *was* interference caused by BPL it would be worked out before wide-scale implementation.

You don't have to be a super-grade employee at the Federal Communications Commission to instantly realize the proverbial cart was positioned before the horse. (I suppose at least that way the Commission doesn't have to face the stink). Why is it, though, that what seems too simple and like common sense to average folks takes the bureaucracy a team of investigators, politicians, and lawyers to figure out? It seems only logical that, even ***before*** *localized* deployment of BPL, the industry would do the smart and proper thing and check for interference first. Apparently they don't think like average people, the very people who will bear the brunt of BPL's interference: the workers at FEMA who have expressed concerns about the interference potential and hams (not just those engaging in hobby talk on the radio, but those working in emergency situations where many times the incoming signal is very weak and already badly beaten by manmade interference from computer monitors, security devices, electric motors, and, yes, overhead powerlines).

Then came *more* lies and deception when the industry itself claimed ignorance of the interference issue—perhaps by doing so they were saying more than they intended, even after technically proficient hams with radios and measurement tools from the ARRL showed them beyond *any doubt* the *tremendous* interference caused by BPL in such locations as Manassas, Virginia, and Westchester County, New York.

As if the blatant disregard for professional analysis and the facts weren't bad enough, the FCC stepped in and embraced BPL, as if saying "Scooch on over here, we think you need some bureaucratic lovin.' " I'm referring here to Commissioner Kathleen Abernathy's inexcusable comments on BPL: "I am very excited about broadband over powerline technology... and believe it has a very bright future." She went on, "...continuing development of BPL technology is a major step forward." A while later, only after more ink and discussion in the radio community about her comments than that over Janet Jackson's Super Bowl stunt, her words were Washingtoneesed into a rather tepid recant.

She also said, "When the Commission completes this rulemaking I expect that we will eliminate many existing rules and substantially modify others; the central question is the degree of regulation that will remain during the transition to a more robustly competitive market."

In January's "Tuning In" I suggested that what she meant to say was, "We're going to rewrite Part 15 so BPL is a shoe-in. This is a big bucks opportunity and our mind is made up. The Notice of Inquiry is merely a requirement." And so it goes, sometimes predicting the future is easier than you think.

To me there's nothing worse than a politician—and Abernathy is certainly one—backpedaling after a deliberate remark before industry representatives. They think they're so cunning and clever in tossing out a comment here and there for public consumption, but in reality their antics just prove to thinking Americans that they and the D.C. money grabbers really don't care what you and I think. Need evidence? There's more, much more.

When was the last time the FCC ever amended Part 15 rules to accommodate anyone? Well, as this is being written, the FCC has released a Notice of Proposed Rule Making (NPRM) on BPL systems. I tried to find a historical precedent where the Commission proposed amendments to Part 15 rules to accommodate another service, but couldn't find any. What they're proposing is to provide measurement guidelines for the BPL devices and system. Given the apparent intimate relationship between the Commission and the BPL industry, it seems like that should have been considered a couple of years ago—in an early planning stage. Would you go on a few dates, finally meet the parents and family pets, and *then* have the stupidity to tell your future spouse's father you'll be glad to marry him or her if only he'd pay for a facelift first? One can't help but wonder why, if the interference issue isn't a major concern, that the Commission, as stated in the NPRM, would require BPL providers to incorporate "...adaptive interference-mitigation techniques" in the first place. Strange, isn't it?

The ARRL's latest electronic newsletter talks about BPL and the FCC's NPRM as follows: "The NPRM goes on to point out that because BPL has the capability to stay clear of specific frequencies, BPL providers can simply "avoid the use of amateur frequencies when in close proximity to amateur outdoor antennas.' "

Unless the technical specs have changed in the past two days, the last we knew was that BPL would operate on HF all the way up to near 80 MHz. How do they propose to "avoid the use of amateur frequencies..." when we're talking about deployment basically covering the entire HF spectrum all the way to the hams' 6-meter band? And this bit about "close proximity to amateur outdoor antennas" is a crock. I know a lot of hams and SWLs that have apartment or condo antennas that aren't readily visible, and plenty of others—myself included—who don't have a mega-acre antenna farm, but use a couple of long wires or a simple vertical antenna. Seems once again the FCC's thinking cap is in the closet.

Did you know that under the proposed rules, the burden of initiating corrective action in interference cases is on the shoulders of the *licensed* services? One assumes that includes our already over-worked public safety professionals—as if they have the time and resources to do what the bureaucracy and industry should do before implementation of BPL—AND without massaging the Part 15 rules to accommodate the powerline industry.

Let's not forget about the Citizen's Band users of the spectrum, who also must be able to *hear* a signal in order to respond to it in an emergency. CB is real, it's here to stay and not all operators are renegades. Remember Hurricane Andrew? CB played a vital role there and will in the future—*if* operators are able to hear each other. Point is CB, FRS, MURS, and other services are entitled the *same* interference protection from Part 15 devices as are individually licensed services.

The Commission noted in the NPRM, "...that power line noise already presents a significant problem for hams...we therefore would expect that, in practice, many amateurs already orient their antennas to minimize the reception of emissions from nearby electric power lines."

(Continued on page 70)

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by Laura Quarantiello, lauraq@cts.com

washington beat

Capitol Hill and FCC actions affecting communications

D.C. Public Safety Network

The nation's capital will soon get a new $2.7 million public safety wireless network. Washington, D.C.'s citywide network is gaining ground and will give first responders a wireless high-speed broadband data network to send voice, data, and streaming video from an ambulance to a hospital. The city is awaiting an experimental license from the FCC so they can test the network in the 700-MHz band.

Part 80 Rule Amendments

The FCC has amended its Part 80 rules governing the Maritime Radio Services. The Commission has declined to create a voluntary restricted Global Maritime Distress and Safety System (GMDSS) license for recreational boaters; clarified the responsibilities of VHF public coast stations that receive calls on the digital selective calling (DSC) distress frequency, Channel 70; clarified that VHF public coast stations that are not exempt from the VHF Channel 16 watch requirement must have a radio operator on duty; prohibited ship operation of any device capable of transmitting on a distress frequency without regulatory authorization; redesignated Channels 75 and 76 for communications related to port operations and established requirements for equipment to operate on the channels with reduced carrier power; authorized domestic use of INMARSAT-E emergency position indicating radio beacons (EPIRBs) and established standards for such devices; required that small passenger vessels have digital selective calling capability one year after the U.S. Coast Guard declares Sea Areas A1 and A2 to be operational, and established additional equipment requirements for such vessels; declined to specify that the qualified GMDSS operator required to be on vessels under their rules must be assigned exclusively to radio communications duties during an emergency; updated the requirements for ship radio installations to incorporate new international regulations; incorporated into the rules the international requirement that all passenger ships have the ability to communicate with search and rescue personnel on two specified aeronautical frequencies; determined to continue listing the carrier frequency, rather than the assigned frequency, in Part 80 Tables of Frequencies; and specified the number of questions to include in the GMDSS radio operator license examinations.

As if that weren't enough, a *Sixth Report and Order* clarified the responsibilities of VHF coast stations as to when they must maintain a watch on the Channel 16 distress frequency and as to their obligation to notify the Coast Guard of a station relocation; declined to impose additional technical requirements for VHF public coast stations operating on offset channels; denied a request to reallocate nine channel pairs from public safety and other private land mobile radio operations to use by VHF public coast stations; adopted new rules requested by the Coast Guard to govern the implementation of Automatic Identifi-cation Systems; established a new emission mask in Part 80 to accommodate a wide range of data services; eliminated the station identification requirement for VHF public coast stations licensed on a geographic area basis; authorized VHF public coast stations to maintain required station records in electronic form; relaxed the posting requirement for VHF public coast stations; and clarified that VHF public coast stations, like other providers of commercial mobile radio services, have been relieved of certain filing requirements. More detailed information can be found in the FCC's WT Docket No. 00-48 and PR Docket No. 92-257.

Cingular Spectrum Licenses

The FCC has approved allocating Cingular Wireless additional spectrum licenses gained from NextWave Telecom. The spectrum will provide Cingular with more cellular capacity in markets it is currently operating. The deal is reportedly worth $1.4 billion. ■

Into The Storm

The Eyes And Ears Of The National Weather Service— Do YOU Have What It Takes?

By Steve Douglass

As any radio hobbyist knows, antennas are natural lightning magnets. When you go out storm spotting, make sure that you aren't parked anywhere close to tall radio towers like these! It's also a good idea to unplug any scanners from outdoor antennas when lightning is close. (Photos by Steve Douglass)

The storm is all about me now. The black clouds swirl and the lightning flashes. A tornado touchdown is imminent. Saner folks are seeking shelter or fleeing the fury of the skies, but I'm heading in the opposite direction, deeper into the squall. I'm about to witness nature going absolutely mad. Glancing up I see the serpentine beginnings of what will become a killer tornado. Facing the forbidding storm before me, I'm armed with only my wits, some radio equipment, and a camera—and I couldn't be any happier.

The year 2003 was a record one for tornadoes. In May, Oklahoma City and its suburbs were hit twice in two days by powerful damaging storms. In a two-week period, over 300 tornadoes struck in the heartland of America causing widespread destruction and many deaths. Civil defense agencies, however, credit storm spotters with saving many lives by providing accurate reports on where the tornadic storms were at any given moment. I am extremely proud of that fact because I am one of them. I am a volunteer storm spotter.

Springtime is here and the severe weather season is upon us, and hurricane season is only a few months away. Severe weather monitoring can be essential in protecting our property and, most important, our lives and those of our loved ones.

Origins Of An Obsession

Over 30 years ago my family moved from the East deep into the heart of tornado alley, the Texas Panhandle. As a child I was very afraid of the severe storms that would regularly sweep through the High Plains, but as I came of age I began to lose my fear of the storms. It evolved into a healthy respect and sense of wonder at the wild beauty of Mother Nature's atmospheric temper tantrums.

My chosen profession is photojournalism, and for six years I worked for the local newspaper where I honed both my writing and photographic skills on many an exciting assignment. But none energized or challenged me like severe storm coverage. After leaving the paper to work as a free-lance writer, I joined a local volunteer emergency organization tasked with providing the community advanced early warning of severe storms.

On any given stormy afternoon, an intrepid group of Amarillo Emergency Service storm spotters and I jump at the chance to go out into weather that storm chasers would think twice about. Unlike storm chasers, however, our task isn't a thrill-seeking adventure. Don't get me wrong. I respect storm chasers (especially those who do double duty as spotters), but our group, and others like us, provides a valuable lifesaving service to the community, becoming the eyes and ears of the National Weather Service and an essential component of the severe weather warning system.

In the many years I have been storm spotting I have seen numerous tornadoes, unbelievable destruction, and great human sorrow. I have also been witness to indescribable natural beauty and stood in awe of the power and majesty of the storm. I have also been scared out of my wits and at the same time felt sorry for those who weren't experiencing the storm as intimately as I was.

When storms are in the forecast, I just can't stay indoors anymore. It suffices to say that to storm spotters, no explanation of why we do it is necessary and for those who think we are crazy, no explanation will ever justify risking life and limb to intentionally venture out into severe weather.

Storm Spotters: The Next Generation

By now you're probably wondering if you have what it takes to brave the inclement weather and become an official spotter for a civil defense agency or even for yourself to protect friends and family. Well, before you watch *Twister* for the 10th time and figure you'd like to do that, too, there are some very important things to consider before venturing out into the storm. The

Only experienced storm spotters should chase storms at night. When visibility is limited, it can be very difficult to see an approaching tornado. This spotter didn't see this twister until it was illuminated by lightning. Another good indication that a tornado is near is seeing the tell-tale flash of power lines being ripped apart.

following list is not just for official spotters; it can also aid you with your family disaster planning.

1. Safety Is Paramount

Take the National Weather Service (NWS) basic and advanced weather spotting courses before even thinking about venturing into a storm. Most NWS offices offer the courses at no cost in late winter/early spring (contact your nearest NWS office for details). In these courses you'll learn about the structure and behavior of severe storms, the warning signs, what to look for, and, most important, how not to get killed.

2. Learning the Ways of Weather

If you think that a storm is an unpredictable, violent force of nature, think again. Mother Nature operates by a strict set of physical laws, and if you learn to identify the physics behind storm formation you can place yourself in the exact spot you need to be to observe the storm without risking your life. Although storm-spotting courses are very important, there's nothing like practical experience. I suggest that for the first few storm seasons you *go out with an experienced storm spotter.*

3. Have a Disaster Plan

Instructing your family on what to do if the worst happens is very important. Know where the best places are to take shelter during severe weather and how to safely get there. Planning on what to do should worst-case scenarios happen is also very important. If your town is devastated by a hurricane or tornado, having a designated meeting place for your family to gather can save you a lot of worry. Also keep plenty of emergency spare batteries, food stuffs, cash, and water on hand.

4. Arm Yourself with Information

Knowing what the storm is doing (from official sources) is essential. I suggest any storm spotter or weather monitor have as standard equipment:

• Scanning Radio Receiver: Make sure it's programmed with local police, emergency, civil defense, and storm spotter frequencies. You can get frequency lists for your area on the Internet, from other storm spotters, ham radio operators, and at electronic hobbyist outlets, such as RadioShack. Press organizations are also a good source of frequencies. Those in hurricane-prone areas might consider purchasing a good shortwave receiver (with sideband capabilities) so they can monitor Coast Guard, Hurricane Hunter, and HF storm networks.

• NOAA Weather Radio with Weather Alert: Don't miss those official warnings while listening intently to the scanning radio. Make sure it is loaded with fresh batteries every time severe weather threatens. In fact, consider having battery backup power supplies for all your radios just in case the power goes out.

• Battery-Powered or DC-Powered Portable Television (color preferred): A television set can be very helpful in showing you exactly where to find the worst parts of the storm and the safest places from which to observe. During severe weather most TV stations will broadcast the images of their radars. Learning how to read radar returns can be a lifesaver.

5. Two-Way Communications

You aren't doing any good as a spotter if you can't relay what you're seeing anyone. A cell phone is a must-have item, or consider purchasing a dependable personal two-way radio communications system. Official civil defense spotters are usually provided with a two-way radio to

Storms can be dangerous and beautiful at the same time. By monitoring them, storm spotters help keep your family safe.

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YB 400PE AM/FM/ Shortwave Radio

This high-performance PLL synthesized, dual-conversion YB 400PE receiver pulls in AM, FM-Stereo, Shortwave, and Longwave, including continuous coverage from 520-30,000 KHz. Even Ham radio two-way communications can be heard using the SSB circuitry. Its highly sensitive auto-tuning system stops even on weak stations within the international Shortwave broadcast bands. Its 40 programmable memory presets allow quick, easy access to your favorite stations.

Key features include:

- Easy tuning with direct frequency entry, up/down buttons, and auto-scan
- Multifunction LCD displays time, frequency, band, alarm wake time, and sleep timer
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Unique features define the model YB 550PE, such as 200 randomly programmable memory presets with user-defined memory page customizing, digital fine-tuning control, and favorite station wake-up memory. Through its PLL synthesized digital tuner, receive AM, FM-Stereo, and Shortwave with excellent sensitivity and selectivity. Enjoy the entire Shortwave spectrum that includes all 14 international broadcast bands and continuous Shortwave coverage of 520-29,999 KHz. Its auto-tuning system stops even on weak stations within the international Shortwave spectrum, or with the direct frequency entry system, go instantly to any frequency in its tuning range.

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Key features include:

- Multifunction LCD shows digital frequency, clock, and more
- Alarm and 1-90 minute sleep timer
- Variable, independent bass and treble controls
- Left/right line-level outputs (stereo in FM)
- Includes built-in antennas, sockets for supplementary Shortwave and FM antennas, convertible nylon handle/carrying strap, earphones, and optional AC adaptor

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FR200 AM/FM/ Shortwave Emergency Radio

Requiring no external power source, the FR200 is a versatile multi-purpose tool for keeping informed, entertained, and safe. Combining AM/FM/Shortwave radio and flashlight in one, the FR200 operates without batteries – powered by its built-in hand-crank generator – allowing you to listen to news, music, and international programming from anywhere, including places where power is a problem.

Key features include:

- AM/FM/Shortwave Tuning (SW1, 3.2-7.6MHz; SW2, 9.2-22MHz)
- Hand-crank power generator recharges internal Ni-MH battery
- Built-in flashlight perfect for emergencies or camping
- Splash-proof ABS cabinet withstands your adventures and abuse
- Can also operate on 3 AA batteries or optional AC adaptor

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Receivers and video setup inside the author's storm intercept vehicle showing the wide range of equipment needed to do the job safely. Radios, from right to left, are the ICOM R-3 receiver with built-in video/television, RadioShack PRO-2035 scanner, and Maxon 27 KC CB walkie-talkie. Also shown is a Sony digital camera and Diesel extension speaker.

communicate with either the NWS or an affiliated Public Safety Organization. Amarillo Emergency Service spotters communicate via a reliable VHF system, using repeaters in key areas.

Cell phones are a good communications tool, but also keep in mind that during severe weather cell sites are usually the first to go down, either from being jammed with emergency calls or damaged by the storm itself. My backup communications system consists of a fully licensed UHF GMRS radio with which I can communicate with my family and friends (and fellow storm spotters as an unofficial back channel) and a CB radio tuned to Channels 9 and 19. CB has another advantage: truckers on interstate highways are very good at reporting severe weather they are encountering.

On the road some spotters communicate using inexpensive FRS walkie-talkies. FRS radios are also a good way of locating your family and friends if regular communications channels are down.

6. Maps

Learning how to read maps and plot your location is essential. You must know where you are in relation to the storm at all times. You must also know the roads in your area so you can plan a retreat in case things get dicey. Although not recommended (except for experienced storm spotters), it is possible to outrun a severe storm.

The storm spotter's rule of thumb is to travel at a 90-degree angle away from threatening weather, such as a tornado. In other words, if a tornado is approaching you from the West, to escape go either North or South, *not East* or the storm will just chase you. Consider the purchase of a GPS locator. It is not an essential piece of equipment, but very helpful for traveling in areas you aren't familiar with.

If you can't outrun as storm, seek shelter. Do not remain in your vehicle. If you can't seek shelter indoors, a shallow ditch at the side of the road is much safer than trying to ride out a tornado in a vehicle. I have seen large semi-trucks, and even railroad cars, tossed like toys and then wrapped up into unrecognizable balls of metal. Get as low as you can, below the wind-stream. Don't take shelter under overpasses—they work like wind-tunnels and will suck you right out as well as shoot flying debris right at you.

7. Be Storm Smart

Although I have never heard of a storm chaser or spotter killed or injured in a severe storm, keep in mind that there are dangers, the least of which is tornadoes. You're more likely to encounter damaging hail, dangerous floods, and high winds than tornadoes. More people are killed by lightning or drowning in urban flash-floods than in tornadoes. Don't cross any water if you can't see the bottom of it. Just two feet of water can float and wash away any car.

Not panicking and keeping your wits when the storm is at its fiercest is essential. Keep your head on a swivel, and watch the skies and the road at all times. It helps to bring an extra pair of eyes with you as an observer who can watch the skies while you concentrate on navigation. Don't be afraid to back away from a particularly nasty-looking storm. Better safe than sorry. Hot dogs need not apply.

Approach a storm with caution and a have a plan of attack so you can observe it in safety. Storms have a good and a bad side. Your best bet is to come up from behind the storm, not plunge head first into an approaching severe storm cell. If you can't get around a storm, wait in a place of relative safety until the storm has passed you. Then follow it as it moves away from you. You will most likely avoid the worst parts of the storm this

Two-way radio equipment is mounted between the seats, including a General Electric 30-watt VHF transceiver and a UHF GMRS unit. Also shown is a Uniden BC-1 pre-programmed service search scanner.

"Always unplug cables leading to outside antennas before the storm arrives. Use back-of-set or rubber duck antennas when lightning is close. Don't stand outside your vehicle holding a radio with a metal antenna when lightning is close by."

way and also be in a better position to see tornadoes. Be watchful for downed trees and power lines.

More Severe Weather Monitoring Tips

Always unplug cables leading to outside antennas before the storm arrives. Use back-of-set or rubber duck antennas when lightning is close. Don't stand outside your vehicle holding a radio with a metal antenna when lightning is close by. Remember, you don't have to be directly under a storm to get hit by lightning. I have seen lightning travel out of a storm and hit an antenna 30 miles from the formation. Stay inside your vehicle and only leave it when forced to do so by a tornado you can't escape.

As the storm approaches, monitor the public safety channels of adjoining towns and counties to get a good idea on how strong the storm is. Fire department frequencies and aviation weather advisory frequencies are also good channels to monitor.

Share the storm information you're receiving with friends, family, and neighbors—they'll appreciate it. Don't ever embellish a storm report and make things out worse than they are, but also never hold back important information.

Learning To Expect The Unexpected

So just what are your odds of encountering a tornado? Despite appearances to the contrary, tornadoes are very rare. Expect to see one in about every 10 storms you encounter. The chances are greater that you'll spend hours, days, or even weeks, observing storms and never see a twister. Meteorologists calculate that if you stood in one spot and waited to see a tornado you would see one every 400 years!

However, Mother Nature, like all things natural, has the tendency to ignore man-made calculations and predictions only to make fools of even the smartest humans. Consider this: There is a man living in a small suburb of Oklahoma City who's had his house destroyed by a tornado three times in five years.

Talk about a guy who needs to monitor the weather!

Embrace Obsession

If you're interested in becoming a storm spotter, a good place to start is by visiting www.nws.noaa.gov or http://www.srh.noaa.gov/oun/stormspotting/ on the Web. You should also contact your local Amateur Radio Emergency Service (ARES) and SkyWarn offices. You can also e-mail me directly at webbfeat@1s.net. ■

Shannon's Broadcast Classics

a look back at radio & TV's golden years

by Shannon Huniwell,
melodyfm@dreamscape.com

Local Radio Attacked From Outer Space!

"Alright, let's get some callers on the air," the national talk show host declared. "We've got Jim in Syracuse who is tuned to us on WFBL Talk Radio 1390." There was a brief pause before the caller decided to correct that well-known personality. "Well, actually," he noted, "I'm listening to your show on *XM Satellite*."

A day later, I heard another brief, but telling, "sign of the times" in the radio industry that went like this: "It sure is snowy out there!" quipped the morning announcer on a four-station FM simulcast. "Some schools are on a delay or closed," he continued. "So check your local information sources for details."

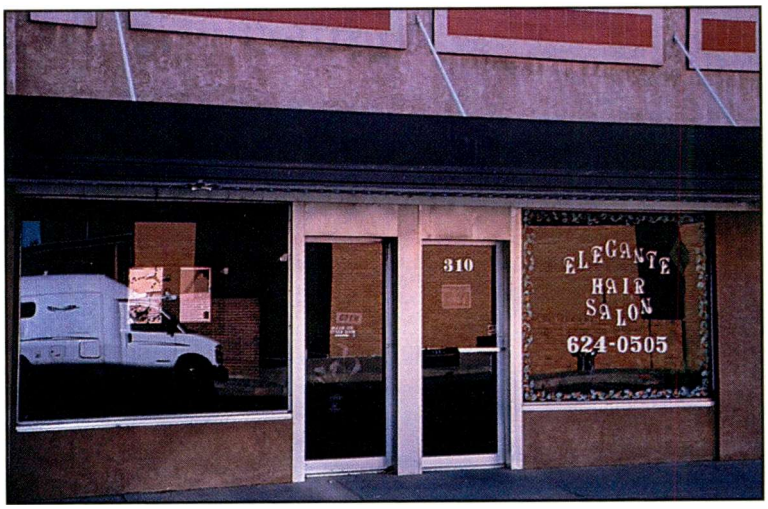
Local information sources? I heard myself complaining out loud. "*You're* supposed to be one of my local information sources!" To me, these very real scenarios signal how far America has strayed from the days of classic local radio when most every station in a given market was competing fiercely to deliver as much hometown detail and flavor as possible. Of course, we can cite the 1930s through early 1950s network radio "golden age" as evidence that folks enjoy programming on a national scale. Even so, broadcast history demonstrates that most of the big old 50,000-watt network affiliated "flamethrowers," often associated with World War II-era network radio's heyday, typically had a popular local morning show, during which fare unique to the station's city of license was happily highlighted.

The return to long-form network programming in the mid to late 1980s, deregulation of mandatory local news/public affairs content, and the easing of multiple station ownership limits, made it possible for stations to de-emphasize live and local programming in favor of music or talk from a network. This resulted in the cutting or attrition of thousands of on-air radio jobs and the dissolution of the broadcast "farm team" that allowed a teen to work as a weekend DJ on the local community's 250-watt daytimer and to hone him/herself into a major market personality.

The eight stations in the Oswego/Fulton/Mexico-New York area (some 25 to 35 miles north of Syracuse) serve as an example of the localism dearth. Though most once fell all over each other trying to air the local remote broadcasts, news, and weather, none today has true local personalities or local emphasis. The average school kid there would look puzzled if you suggested listening to the radio to hear if school is closed. "That's what the info crawl on the bottom of the TV screen is for," they'd respond.

Invaders From Space!

What can we identify as the technological root cause of local radio's erosion? One word could sum up this curse, or blessing—depending on how you look at it. The word is *satellite*. The "bird" liberated network radio from expensive phone line station-to-station links and increased the fidelity to a point where network-delivered voice *and* music sounded great. It's also bringing commercial free, direct-to-listener radio via *XM Satellite Radio* and *Sirius*, which has the potential to cut out of the loop any station that offers the same stuff.

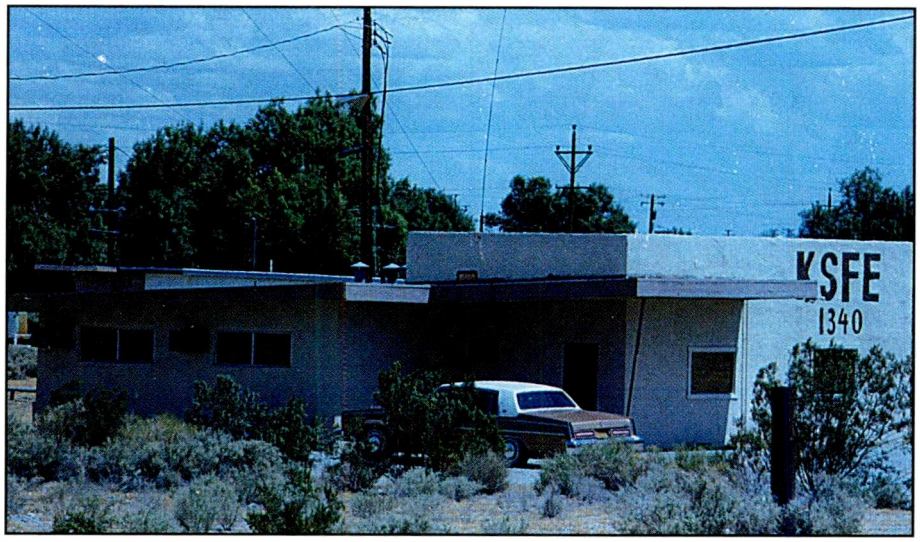


Inside those doors, KGFL announcer Frank Joyce first heard, from a loyal, local listener, the hair-raising tale of crashed UFOs and little spacemen. That was in 1947. Today, the hometown radio studio of the old KGFL is a hair salon. (Courtesy of Jan Lowry, 2003)

Add to this that the local stations carrying primarily network fare are peppered with commercials and sometimes run woefully stale weather/info inserts, it's no wonder that the likes of *XM* are signing up members in the millions and beginning to push traditional terrestrial radio out of consumers' thoughts. True, twenty years from now, I *might* be doing a column fondly reminiscing about the early days of satellite radio. If local stations don't re-emphasize the kind of local broadcasting that they can still do best, however, I'm afraid that the 2024 edition of *Pop'Comm* might have to define what a hometown station *was*.

Speaking Of Space And Homey Radio Days...

Arguably, one of the world's favorite examples of the power of down-home broadcasting involves a small New Mexico AM, now known as KCRX. A Roswell, New Mexico rancher, who counted then-KGFL as his local station, thought to immediately phone that 250-watter when he needed advice. But that's



Built in 1948, this building was home to two very different KSFE stations. Notice that the windows are all boarded up, presumably for keeping drifters and stranded motorists along the nearby interstate highway from trying to break in or to noisily summon the DJ's attention. (Courtesy of Jan Lowry, 1982)

getting ahead of the story, so let's start with some traditional background.

Jan Lowry of *Broadcast Pro-File* dusted off ancient government paperwork to discover that an "N. L. Cotter of Trinidad, Colorado received a broadcast license from the Radio Division of the Bureau of Navigation, U.S. Department of Commerce in mid-February 1927 for a 50 watt operation on 1350 kilocycles. Sequentially-assigned call letters KGFL were attached to the grant." This initial version of KGFL hit the Trinidad, Colorado airwaves a month later.

Almost instantly, Cotter changed his mind about radio in Trinidad and got a construction permit (CP) to move his little station to Raton, New Mexico. Apparently Cotter was in ill health, so he tried selling KGFL. When the transaction flopped, Cotter found people to operate it for him until early 1929, when it temporarily closed down pending Cotter's family finding a suitable buyer. By late 1929, the station had been sold and instructed by the Federal Radio Commission (FRC) to re-frequency from 1350 to 1370 kc.

Another change occurred not long into 1930 when KGFL was transferred again, this time to Walter E. Whitmore, an erstwhile Albuquerque station official who would become its most legendary owner. He petitioned the FRC to let his "Voice of the Mountains" switch city-of-license venues from Raton to Santa Fe, New Mexico. The FRC said, "make it so," and threw in a CP for KGFL to boost power to 100 watts. As a result, a KGFL staff announcer said good-bye to the local Raton listeners at the end of the June 5, 1932, broadcast day.

After a month or so of silence, KGFL made its Santa Fe debut. But Whitmore remained restless enough to keep his station there only through mid-December when the FRC acquiesced to yet another move, this time to Roswell where KGFL re-appeared during the closing days of 1932.

Federal officials also let Whitmore fire up a new station, KICA, at Clovis, New Mexico (some 100 miles away from Roswell). Although they made KICA share the 1370 frequency with KGFL, Whitmore figured he could have this situation changed, too. By early summer 1938, he gained the Federal Communications Commission's okay to build an 180-foot, four-legged, self-supporting tower at 511 West 16th Street in a residential Roswell neighborhood. "The Voice of the Pecos Valley" broadcast from 7:30 in the morning until 7:30 at night when its sister Clovis facility signed on for the evening. Whitmore got the FCC to make KGFL a full-timer in 1940 and gladly accepted the mandated shift from 1370 to 1400 when a North American treaty for frequency reallocation took effect during the end of March 1941.

Shortly thereafter, storefront KGFL studios were opened at 310 North Richardson Avenue. There, in May 1946, it was announced that the station's day power would jump to 250 watts (with the old 100-watt level remaining after sunset). This came as a bit of relief for Whitmore, who had learned that the Commission was about to authorize a second Roswell broadcast outlet, KSWS, with 250 watts days/100 watts night.

"Hello KGFL, I'd Like To Report Some Space Junk And Little Green Men On My Lawn..."

Both stations were especially active around the fourth of July weekend, 1947. That's when KGFL air personality, Frank Joyce, was routinely spinning records and announcing in the street-side studio.

The friendly behind-the-scene routine came to a halt as KGFL's phone rang. Caller and faithful local listener, "Mac" Brazel, had heard Joyce reading a news story about a Washington resident who claimed spotting a formation of flying saucers. Brazel nervously laughed that the Washingtonian's tale was nothing compared to the weird craft that just crashed on his Roswell-area ranch. Joyce recalled that the rancher began reporting some "pretty graphic and sensational stuff, which [Joyce] didn't believe." After a pause on the line, Brazel admitted calling KGFL because he figured folks there would know what he could do about the saucer and its occupants' remains. Talk about public confidence in their hometown radio station!

Reportedly, Joyce suggested that Brazel contact the nearby airbase. Only a few more records had whirred on the turntables by the time a uniformed Army man dropped by the KGFL control room. Lieutenant Walter Haut served as the base's public information officer and hand-delivered a press release indicating that the U.S. Army Air Corps was in possession of a flying saucer that it recovered from Brazel's spread. Joyce well understood the power of local, word-of-mouth radio (even on a modest 250-watter) and so wondered aloud if it was wise to announce the UFO over the airwaves. "It's OK," Haut is said to have responded, and then noted that the base commander thought it'd be a good idea to let people know.

As soon as Haut left, Joyce slapped on a long record, zoomed out of KGFL's front door, and ran down the block to the Western Union telegraph office. It was customary for at least one employee at almost every small market station to moonlight as a "stringer" for a national wire service like the old United Press International. Joyce served in such a

capacity. He knew the saucer story would be of interest to the normally sleepy UPI bureau in Santa Fe.

Though the KGFL tone arm was nearing the end of its record, the young radioman didn't want to leave Western Union without that original Army press release in his pocket. The minute or so in which it took the telegraph girl to transmit the information seemed like hours. Still nearly breathless, Joyce grabbed the wrinkled press release and ran back through the KGFL lobby to the air studio. Racing towards the turntables, he heard phones ringing. On one line was a UPI guy asking for more details. Through an open door to the newsroom, Joyce heard the UPI teletype machine clang out five bells, the utmost alert.

Though other KGFL phone lines still screamed for attention, the excited announcer yanked the wire copy—which had now officially been processed through a major news service—cracked open the mic, and read the UFO crash copy several times. Additional news agencies rang KGFL for a scoop. Joyce made quick work of these callers by referring them to Haut over at the airbase. As he picked up the next call, the nervous broadcaster noticed that his teletype machine had suddenly ceased printing. "I'm with the Pentagon!" an angry caller bellowed before threatening Joyce with harm for airing flying saucer stories. The extremely aggravated man hung up without further explanation a nanosecond after Joyce managed to get in the words that the whole thing had sprung from a fully authorized U.S. Army press release.

What the...?!

Station owner Whitmore eventually got through to the KGFL air studio and demanded Joyce clarify, "What kind of kooky things are going on down there?" The DJ assured his boss that the saucer story was legit, or at least straight from the Army. To be on the safe side, however, as soon as he put down the handset, Joyce found a good hiding place for the original press release so that he'd be sure to have proof for his employer that it wasn't a prank. Whitmore soon came to the station and asked his announcer to hand over that document. It may have been that KGFL's licensee also requested Joyce to signal him if anymore UFO-related calls were fielded.

One can picture the DJ motioning Whitmore, through the studio glass, to pick up the phone when it rang later that evening. Both heard "Mac" Brazel sheepishly mention that the crashed saucer account he'd advanced to Joyce earlier that day wasn't really what happened. With Whitmore's urging, the rancher was invited to return to the KGFL studios to retell his story. The station men waited several hours after dark before a fidgety Brazel arrived. Joyce often remembered that the farmer showed up by himself, though the DJ and Whitmore agreed that Brazel acted like the place was under heavy surveillance.

Station managers perusing broadcast catalogs around 1947, like those at KGFL during the flying saucer summer likely considered gear from Western Electric. WE sometimes went by the name "Graybar Broadcast," and typically used a Mr. Microphone cartoon character to provide its brand with personality. The company was best known for making telephones for its parent, Bell System. Some conspiracy theorists link this giant firm's Bell Laboratories with the Roswell UFO incident. From Bell Lab's New Jersey research center came the transistor, a revolutionary device invented after top scientists there reportedly got a look at the crashed saucer's electronic technology.

"Did I Say That?"

Some claim Brazel's voice made it to a KGFL wire recorder or maybe an early Magnacorder model PT-6 tape machine. Transcribed or not, the noticeably reluctant rancher modified his tune so that the former UFO became fully identified as a garden variety weather balloon. Incredulously, Joyce reminded Brazel about their afternoon phone call when little green men were described. The loyal KGFL listener denied seeing anyone of that color.

Whitmore must have shared Frank Joyce's feeling that their constituent had received a stern warning not to recount any mention of flying saucers. Brazel is reported to have whispered to the broadcasters that each of their "lives would never be the same again," before silently slinking to his truck and disappearing into the New Mexico night.

What About The Local Competition?

Fledgling cross-town rival, KSWS 1230 AM, was only on the air for a couple of months at 4:00 p.m. on July 7, 1947, when the station typist and teletype operator, Lydia Sleppy, took a frantic phone call. Talking a mile a minute on the other end was her co-worker, John McBoyle, who shouted that he had some hot news worthy of immediately sending to KSWS's main network source, ABC. Sleppy summoned a station manager to serve as a witness as McBoyle dictated the scoop about a crashed flying saucer he saw the Army trucking away. While she zipped over the keyboard with a KSWS official at her side, Sleppy noticed that her words had stopped going out over the line. The teletype's warning bell sounded and someone else's typing appeared on the machine.

"This is the FBI," the startled KSWSer recalled reading "You will cease transmitting any such message now!" Shocked, but undaunted, the KSWS personnel got the copy to an ABC hub (likely Los Angeles) via telephone. Understandably, the station was still too new to have garnered the type of listener connection that lead rancher "Mac" Brazel to place his now famous call to KGFL.

And Then What?

After the UFO publicity ebbed a bit, KGFL got back to normal with nothing notable happening until the 1951 passing of owner Walt Whitmore. His son eventually took over the operation, moved the studio from the legendary "saucer story storefront" to a new building not far away.

Another big change came in 1960 when the FCC authorized KGFL's electronic move from the local 1400 spot to the regional channel 1430 kc. The mod

allowed (through a new transmitter site northwest of Roswell) 5-kW non-directional days with 1,000-watt directionalized power at night. Not very long ago, Jan Lowry checked to see if the old single tower base was still in place. Yes, it remains for truly enthusiastic radio buffs to see today.

For reasons simply described as "financial," KGFL listeners noticed that their station went dark in May, 1967. Just over a year later, the Whitmore family secured a buyer for the facility. The deal to Southwestern Broadcasters, Inc., called for $50,000 cash and $444 per month for 10 years. By early November, 1968, the AM returned to the air with a middle-of-the-road (MOR) music format and new callsign, KKAT. Subsequent changes for this Roswell property included Top-40 fare in 1971, a sale (for $33,771) in early 1972, contemporary/progressive formatting, and then a bankruptcy and silence in 1974.

After three years of being "dark," the station had the issue of its license renewal placed for an official hearing by the FCC in 1978. In the meantime, KKAT's nice red-tiled roof studio was sold and converted into a medical office. The Commission granted renewal and the station re-debuted with Spanish programming under a 1980 call change to KCRX. In 1994, studios were relocated (and yet again four years later) and the format went to a *satellite* (not UFO)-delivered Adult Standards/Big Band offering.

The Santa Fe Chief

While on this month's theme of formerly live Southwestern locals that now give listeners "bird"-originated programming, a sandy desert peanut whistle comes to mind. My father first told me about little KSFE in Needles, California, after he drove past the studios on a business trip.

As the story goes, he was with an associate who liked quiet and didn't particularly appreciate Daddy tuning up and down the radio dial as they headed back east. Having gotten a very early start and crossing California on Interstate 40 at about 7:30 a.m., his passenger didn't warm up to the suggestion that they stop at KSFE for a short visit before continuing their trek. Reportedly, the fellow insisted they keep moving after observing cattle scratching their posteriors on the tiny station's tower guy wires.

Dad loves to contrast the KSFE morning news lead story he happened to catch that spring Saturday in the 1970s with big city journalism. As my father recounts,

> A squeaky-voiced, novice DJ played the official sounding news intro tape, and then stumbles through some copy about a vandalism incident where "currently unknown perpetrators are reported to have exploded a firecracker device in a well-known high school English teacher's Unites States Postal Service approved mailbox. Local police say they estimate the damage to the property will come to approximately seven dollars."

Not One, But Two Needles' AMs At 1340

Interestingly, the first KSFE was only on the air for approximately 14 months before going dark due to "economic woes." It had been born in June, 1948, when Oscar Shelley's Shelley Radio Electric Company secured an FCC authorization for a 250-watt fulltime station for Needles on 1340 kc. The call KSFE was selected to commemorate the community's long association with the Santa Fe Rail Road. Shelley promised the Commission that he'd get KSFE back in business as soon as refinancing was completed. According to officials, though, he sold the station for $15,000, without seeking the required governmental sanction.

The fellow who thought he'd purchased KSFE put it back on the air around Christmas time 1949, but the FCC convened hearings to determine if Shelley (still technically the station licensee) was fit to run a broadcast outlet. "No!" was the final answer, so this incarnation of KSFE "left the air permanently on August 4, 1950 [as the FCC] revoked its license and deleted the call letters."

What's The Story With That Abandoned Tower And Building Off Route 66?

It may have been that just such a query prompted students Bernard Fitzpatrick and Leo Newsome Jr. to get into station ownership. Each was studying for his "First Phone," or FCC First Class Radiotelephone license, at the Ogden School in Los Angeles. By the end of July, 1952, the duo had received Commission permission to re-populate the 1340 AM spot in Needles. After acquiring the 150-foot tower, masonry studio/transmitter building (on the north side of U.S. Route 66, a few miles west of downtown Needles), and equipment from Mr. Shelley's failed radio venture, they opted for his erstwhile KSFE identification, and started fresh on the air in October, 1952.

Considered by most late 1940s radio engineers as the company that built the Cadillac of AM transmitters, Boston area-based Raytheon Corporation offered the RA-250 and RA-1000 amplitude modulation "boxes" to broadcasters who were interested in quality over price. The smaller Raytheon would have been perfect for KSFE. Close inspection of the transmitters' mid sections reveals a drop-down shelf on which the duty engineer could fill out the official operating log or take notes about any of the dozen (actually 13 in the RA-1000) meters. A few of these rigs are still in daily operation, as broadcast equipment supplier and Raytheon expert, Dan Churchill, of Cavendish, Vermont, maintains a surprising stock of spare parts.

Fitzpatrick bought out his partner in 1956. The following year, he got the FCC nod to classify his KSFE as an "S-H" or "specified hours" station. That meant that the 250-watt fulltime could specify hours of operation less than the traditional 6 a.m. to 10 p.m. minimum. In KSFE's case, it ran from 6:55 in the morning until just past evenings at 7. On Sundays, the Needles facility was silent.

Sale After Sale After Sale...

Fitzpatrick let KSFE go to a new owner in 1960. He paid $30,000 plus an option on the real estate, but only kept the station for two years. Another new licensee—this time with two brothers—entered the picture, but later one bought his siblings' shares. Though given the okay to increase

day power to 1 kW in late 1971, the Needles outlet only did so temporarily before dropping down to 250 watts.

Finally, in 1973, the 1000-watt day level was stabilized (with 250 watts nighttime). Summer 1981 saw a relatively big money ($525,000) sale of KSFE. The seller had only given $57,500 for it, albeit in the early 1960s. The "S-H" designation was deleted so that the 1981 owners could run KSFE around the clock.

Unfortunately, the extra time didn't keep them out of bankruptcy the following year. Several court appointed trustees and receiverships ran KSFE until another sale could be arranged, this one in early 1989. The new people got the go-ahead to run KSFE's transmitter at 1 kW day and night.

Change Is The Name Of The Game

Over the years, the Needles station had switched formats (from country to MOR, contemporary hits), settling on news/talk output around Christmas, 1991. With this modification, the old KSFE calls were scrapped in favor of the moniker KTOX, for "K-talks." Motorists passing KTOX during late 1996 would notice that all identification on the now vacant (except for the transmitter) radio building was painted over. All local programming was discontinued in lieu of a simulcast with KRLV Las Vegas.

In 2000, KTOX went through another sale, this time to owners who re-established a studio in Needles and—like most similarly formatted stations—pulled talk shows from a satellite.

This Just In— KSFE Alumnus Offers A Couple Of Neat Tales

Pat Michaels helps program KCDZ-FM in Joshua Tree, California, but a couple of decades back, he called KSFE his radio home. Michaels smiles while reflecting on a few of his many fond memories of AM 1340. During the spring of 1986, as he remembers,

The morning show host was on the air during a typical warm Needles day. He'd just completed running Paul Harvey news, when the station suddenly shut itself off the air. The DJ rushed over to the glowing transmitter in the room next to the studio to see what was the matter. All the lights were on and everything seemed to be in proper order.

After switching the main power switch on and off, he reset all the gear in the rack, to no avail. So, he called the General Manager, Cliff Wilson. The GM couldn't understand why his air-talent couldn't get on the air, especially since all the equipment appeared to be functional. Again, the confused jock reset everything. Nothing appeared to be wrong, except that the darn station wouldn't broadcast! The morning DJ was not known as a tech-savvy kind of guy. He broke things a lot.

Frustrated, the GM said he would hurry in to see what could possibly be the problem. Meanwhile, the morning host had nothing else to do, so he went outside to smoke a cigarette. When the manager finally arrived, he couldn't help but ask how long the jock had been standing outside. "Oh, about 10 minutes or so." Next, the GM asked, "AND YOU DON'T SEE ANYTHING WRONG OUT HERE?" The morning guy replied, "No, I don't think so."

"Look around you!" his boss directed. The morning man finally realized what the GM had seen. It was KSFE's four-decades-old, 150-foot, red and white tower lying horribly twisted on the ground only a few feet from the station. The tower's guy wires were strewn everywhere. Lights from the tower were broken and scattered. If it had fallen a bit to the right, the morning guy would have had a heck of a wake-up call.

Suddenly, the morning guy wondered, "Do you think we can still broadcast with the tower that way?" The GM grimaced and told him to go home! The very next day, they strung a cable between two telephone poles and hooked the transmitter to it. We were back on the air with low power! It took about five months before the ownership coughed up enough money to replace the old tower.

Michaels also recalls,

KSFE's interior was the size of a one-bedroom cottage. If you used the official 1340 bathroom, everyone there knew it. Our morning guy was a rather heavyset fellow. When I mentioned he broke things, I meant not only equipment, but also the station toilet. Yes, he was doing his business in there, and we heard a crash. Water rushed out of the bathroom, as did various unmentionables. Like the tower, the poor old KSFE toilet remained out of service for months. The entire bowl of the toilet shattered.

During my mid- to late-1980s' tenure in Needles we used a cassette automation system and had carousel tape cartridge machines. The mixing board for the station consisted of four cheap RadioShack home studio-type units wired together. Our production was always recorded "straight to cart." Music or sound effects had to be right the first time or you would have to start all over again. Once, I stopped by the KSFE studios rather late at night to record a commercial spot in relative peace and quiet and found the night guy, with a woman, under the console, completely naked! I did an about face, and left.

Michaels says he got hired at the 1000-watter as a "replacement for the former afternoon DJ who got fired for throwing a chair at the wife of one of KSFE bigger-spending advertisers while at a local bowling alley. Apparently, she had said he stunk on the air.

Being so close to the interstate highway, the KSFE staff always had problems with vagrant bums and people with broken down vehicles. Michaels says, "I'd be on the air at 10 p.m. and hear someone pounding like mad on the station window. The cops were called quite a few times, to be sure!

No matter the internal antics, Michaels notes,

KSFE was very much embraced by the local community. Most of the other stations in the market were "satellite," with only a weather forecast for localism. KSFE, during the late 1980s, provided local news hosted by a 70-year-old longtime resident of Needles. Her name was Maggie Mcshan. She was a reporter for the *Needles Star* newspaper. Mcshan knew everybody! They would always tune in to hear her local gossip. Mcshan continued for some time until an illness with her husband caused her to quit the radio. I believed she passed on several years ago. I still remember her "elderly" delivery that made Paul Harvey sound young. Sometimes her news story would last 20 minutes! And most of it was about some town council meeting.

Cliff Wilson the aforementioned KSFE General Manager was very much involved with chamber of commerce and even spearheaded a community project to refurbish Needles' historic landmark, Harvey House, which was a bustling Santa Fe train station in the 1890s. On top of all that, the staff worked hard to serve the community. We did play-by-play for the local high school football games and basketball. We sold out every commercial break to local merchants. The downfall of the station came from one of the owners who never seemed to put any of the profits back into the station. It was more of a tax write-off situation. But KSFE people sure had a lot of spirit and love for that little station.

Michaels laments that the only memento he has from the station is a KSFE briefcase (for things such as ad sales literature) they gave him when he started there. He wishes he'd taken some pictures of the place, something most of us who've worked at a modest broadcast outlet now feel we should have done in those good old days before satellite and deregulation started chipping away at real local radio.

Send In Those Letters

Don't forget, we can always use your letters and old QSLs, postcards, coverage maps, and advertisements from radio's golden years. Send them to me c/o *Popular Communications*, 25 Newbridge Rd., Hicksville, NY 11801. ■

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by Gordon West, WB6NOA

Dayton Special: See The Outside Antenna Selections!

The Dayton Hamvention offers you the ultimate opportunity to view vehicle antenna installations. It's one thing to be inside and looking at all of those gee-whiz antennas sold by the vendors, but it's altogether a different learning experience to see *how* these antennas hang onto vehicles in the parking lot.

Gaze at the acres and acres of swap meet antennas. This gives you the chance to inspect mounted antennas up close and to ask questions of the person who is selling swap stuff in front of the vehicle. Of course, wait until there's a lull in selling, because getting rid of all that swap stuff is their first and most important mission—gabbing about their antenna on the side or stern end of their vehicle gets second priority. But nonetheless, go in there for a close look!

If you have a Technician class license, or if you're just getting started in amateur radio, concentrate your outside antenna inspections on the multitude of dual-band and tri-band VHF/UHF antennas you'll find. Carefully inspect how they physically hang onto the vehicle, keeping in mind that most dual-band and tri-band VHF/UHF antennas are not very fussy about a metallic ground plane directly below the feedpoint.

Got A Roof Rack?

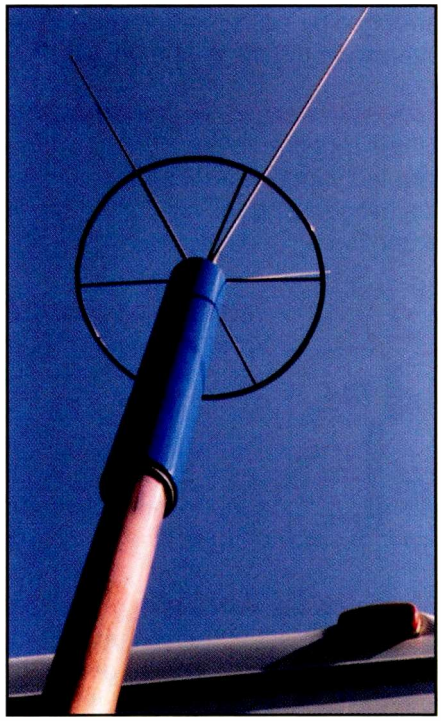
If you have a roof rack, check out the nifty roof rack mounting configurations antenna manufacturers are now offering. Also look closely to see whether or not the "up and over" lay-down capabilities are holding up to the tough environment. If you spot an antenna base wrapped in duct tape, it's a good sign that the inside spring on the lift-and-lay mechanism has failed, and the only way to keep it in place is with extra help. Find out what brand of antenna it is, and then see whether or not the manufacturer inside was aware of the problem and if they've gone to a heftier spring-loaded, lay-down system.

The Famous Lip Mount

Look at all the terrific lip mounts. Look carefully and see that no holes had to be drilled in the vehicle to get the dual-band or tri-band VHF/UHF antenna in place. With the permission of the vehicle owner, see how sturdy the lip mount antenna system is, or isn't. A lot depends on the construction of the angled bracket and the two or four internal Allen screws. Whenever possible, you'll want to choose a lip mount with a minimum of *four* Allen screws holding it onto any lip of the vehicle.

Other Mounts And Observations

Be sure to compliment the *real hams* who went to the supreme sacrifice of boring holes in the roofs of their vehicles to get their VHF and UHF antennas in place. These are real road warriors who are squeezing the last quarter dB out of their system by getting the antenna as high up as possible and in the middle of the roof for the ultimate in ground plane below.



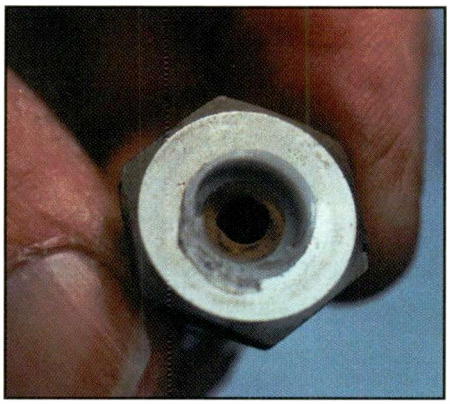
This capacity hat eliminates 10 coil turns on 75 meters!

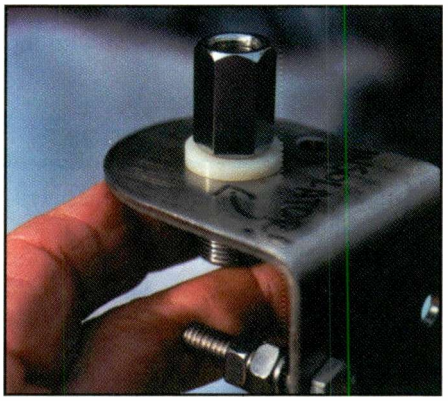
If you get an opportunity, see if they'll explain how they routed the coax inside the headliner to ultimately get down to the equipment below. Again, these hams should be complimented on their bravery in punching holes in their vehicle and, scarier yet, yanking down the headline to route the coax.

Take note whether there are few dual-band or tri-band through-the-glass installations. While on-glass antenna technology has been around for years, window tinting and the way safety glass is now put together sometimes make on-glass mobile antennas a challenge to tune up, and even a greater challenge to keep the standing wave ratio down. If you find an outside ham who swears by the on-glass antenna system, find out which brand of antenna it is and pay particular attention to how they grounded the inside of the mount to the window frame. It's getting tougher and tougher with mostly plastic vehicles!

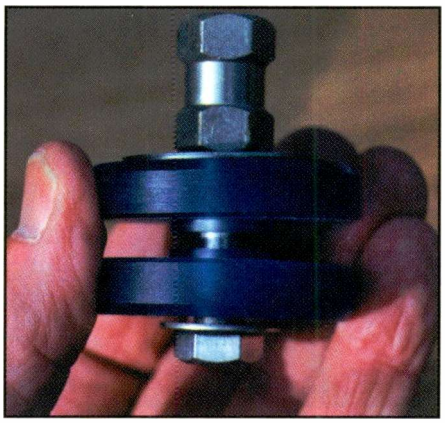
For you 2-meter single-sideband buffs, the horizontal loop antennas you spot are specifically for 2-meter and above, SSB, weak signal operation. The horizontal loop must be a minimum of 18 inches above the top of the vehicle for best performance. Many hams prefer to mount their horizontal VHF/UHF loops with magnetic mounts. The mightiest of magnetic mounts comes from an inside exhibitor called Metal & Cable. Their magnets will nearly rip the roof off unless you follow the instructions on how to get them on and off with relative ease. Ask for David at Metal & Cable.

Just down from David's inside booth is Universal Radio with an interesting antenna called Nil-Jon. This antenna is intended to be mounted right off the roof, with no elevation necessary, and its three different length rods jutting out at about 45 degrees up-angle are said to produce vertical as well as horizontal radi-





Watch out! This fitting will fail under the load of a heavy coil antenna.



Here's a much more secure 3/8-inch x 24 mount where the bolt goes all the way through.

ation. It works! I am a hot and heavy 2-meter mobile DXer on SSB, and I compared the strange-looking Nil-Jon antenna to my regular loop, and it was a nearly identical performer *without* the loop height. Look it up at www.niljon.com and see for yourself that it offers terrific triband capabilities from 140 to 480 MHz with no tuning necessary. I've loaded up to a couple hundred watts in mine and nothing has arced over.

Dual And Quad Loops

But the real 2-meter horizontally polarized SSB performers are the stack of dual and quad loops on a big hefty mast, usually on a hitch mount or one of Metal & Cable's big mag mounts. They look strange, but they really increase your capabilities if you're planning on doing some 2-meter SSB DXing down on 144.200, or some 70-centimeter DXing at 432.100, upper sideband (no FM on these frequencies; it's exclusively upper sideband).

Then feast your eyes on those vehicles that also sport rotatable beam antennas. If it's a three-element beam, it's probably a T-hunter set-up. Operators usually will go for cubicle quads where they can physically rotate the antenna to change polarization. If it's a big 11-element beam, or a stack of 11-element, 2-meter beams, these are weak-signal Rover operators who go out to the far reaches of radioland and provide other VHF/UHF enthusiasts with rare grids and some exciting weekend contacts. Please take a moment to compliment them also for all the effort they put in when the rest of us sit at home in our warm ham shacks to work them, as they freeze their behinds out on a mountaintop!

BIG Antennas!

The big high-frequency whips *must* be big. The smaller the coil, the lower the Q (a measurement of an antenna's selectivity to a specific frequency). The higher the "Q" the greater the performance on that frequency. High Q is obtained by using a physically large loading coil. Even if you think you'll never get above Technician to operate on HF, keep in mind that the ARRL proposal to the FCC would bump up Technician class operators to worldwide, high-frequency, General class privileges by automatic upgrade. I personally think that every Tech would want to study up for the General class theory test, but we'll wait and see on this proposal. Two years from now, though, ham operators who want HF privileges *may* no longer need to demonstrate Morse code proficiency and the upgrade will be quick and simple, which means more HF antennas hanging onto all of those vehicles you see at the Dayton Hamvention swap meet.

Notice the big coils. The higher up the mast you find the coil, and the larger the coil's diameter, the greater the Q. This means a louder signal transmitted over the HF airwaves. When you spot the little motorized antennas for HF with their little automatic base coil systems, they indeed will put a signal out onto the HF airwaves, but not *nearly* as strong as the operator's with a big coil in the center of the tall HF antenna system. Everyone on 40 and 80 meters will complain that your little base coil signal is a sissy compared to others with a more formidable HF antenna system. So if you can, go for the very largest antenna you think you can get away with when you're ready to come up on HF mobile.

Take a look at the number of HF operators with a large open or closed coil who have gone to the additional steps of adding a capacity hat above the coil. The capacity hat 24 inches above the coil will distribute antenna current more uniformly along the top whip, increasing Q, and will decrease the number of turns necessary for resonance in the loading

A strong lip mount on your vehicle will hold a variety of HF antennas.

coil. On 40 meters, for example, eight turns fewer might be achieved with top hat capacity loading!

Motorized Antennas

You will see plenty of motorized antennas. Credit should go to Don Johnson, W6AAQ, for publicly printing specific construction steps on his January 1992 antenna design. His original design shows a cordless screwdriver motor doing all the work, hence the name a screwdriver antenna. The motor drives the coil form up and down where OUTSIDE contacts pick up the coil at specific spots for resonance. If you see the antenna nested, the operator is probably on 10 or 15 meters. If you see the antenna fully deployed with the coil windings showing, the antenna is probably working 40 or 75 meters. The original 1992 drawing shows 150 turns with #16 plated copper wire on a 1-1/2 inch diameter PVC coil form. Many commercial manufacturers have adopted this design, and many have also improved the motor that drives the coil up and down.

A very popular, high-performance, high-frequency high-Q antenna is from Charlie, W6HIQ. He created his own design, where the coil remains enclosed and fixed and a round beryllium contact travels up and down the coil for proper resonance. Charlie points out distinct advantages of this system over the more traditional DK3 HF mobile antenna, and you can quiz him in the booth (number 252, on the inside) and see the differences for yourself. Charlie prides himself on talking technical about his own antenna and saying zero about other designs so as not to engage selling floor antenna wars. I'm always comfortable around any seller who specifically sidesteps bashing the competition!

Here's a Hustler brand center-loaded whip with matching network at the base.

Look at how all these antennas may be mounted on the vehicle frame. Intermediate-sized antennas, like the popular Yaesu motorized ATS series, hold on well with trunk-lip mounts. Anything larger may require a heavy aluminum L-bracket off the rear of the vehi-

Marine lay-down mounts from W6HIQ.

Here's N6VNI's way of mounting the ATAS-100 in the center of a metal lined fiberglass bed cover. He gets great results from 40 to 10 meters!

cle or frame-and-trailer hitch mounts. The problem, however, with "low down" mounts is feedpoint contamination. Unless the feedpoint is completely sealed with Universal Radio's Coax Seal, it's wide open for water to migrate up the coax and kill the connection. Anytime you spot an HF antenna fed with coax where you can actually see the inside of the coax and the *green* braid, you can be assured their signal may be down several dB due to waterlogged coax.

Low mounting may also require shunt-open inductors at the base. As long as these are kept clean and regularly serviced, they work well in bringing the feedpoint impedance back up to 50 ohms. But many times at the Dayton Hamvention I spot completely corroded feedpoint connections, including a disintegrated matching inductor. It's no wonder *that* ham is complaining about high VSWR.

You will also spot some ingenious multi-band, multiple-coil schemes. They work! They usually require monofilament to keep them in place when driving.

You might also spot some CB whip HF installations, where the whip is driven by a remote-mounted, automatic antenna tuner nearby. The tuner does all the work, and a little bit of signal ultimately makes it through and onto the relatively short CB whip. Oh sure, the SWR looks good, but your on-the-air signal reports will never match what you might get from a tuned antenna system *without* the mobile antenna tuner.

But mobile tuners have their place *if* you've got a big whip down on 75 meters. It's going to take the remote-mounted tuner to add or subtract some inductance and capacitance, depending on how far away you want to operate from natural whip resonance. SGC, MFJ, and LDG tuners are great ways to give your solid-state transceiver a good 50-ohm match to put out max power to whatever is on the other end of the tuner system.

Work The Swap

Don't forget to always walk "the swap." Sure, it's probably going to rain now and then, but this is a good time to gab with the sellers as they wait out the downpour while telling you all about their particular HF or VHF/UHF mobile antenna system, proudly displayed on their vehicles. Take pictures, take notes, and see for yourself how those on the air are regularly working to up their signal capabilities and can actually outdo that big whip on the other vehicle five spaces down the way.

Finally, see if you can spot THIS: a big monster whip mounted to an L-bracket with a 3/8-inch x 24 threaded receptacle and a coaxial cable receiver below. If you spot one, kindly tell the owner the perils of the compression fitting that goes between the whip, L-bracket, and coax cable receiver. Any big whip will easily yank the base fitting out and the whip will fly off, becoming a hazard to anyone following behind. The better mount is one continuous bolt and insulators with the coax split apart and weatherproofed—not a lost antenna!

See you all at Dayton—and don't forget to check out all those antennas! ■

by Alan Dixon, N3HOE / WPUC720 / KST8678

A Telematics Primer—Continued
Including The New "Class L" Citizens Band Radio Service

Last month, we focused on a couple of evolving *telematics* technologies. For those just joining us on this ongoing topic, you'll need to know that "telematics" is a relatively new term used to describe communications, navigational, and computing functions in land motor vehicles and railway cars. Additionally, some telematics industry proponents contend that the term also encompasses entertainment systems, including car stereo equipment, satellite broadcast receivers, and backseat DVD/VHS video players. As we've said here previously, just remember that *telematics* is to cars, trucks, SUVs, and rail cars what *avionics* is to aircraft. And despite the newness of the term, the fact remains that various forms of "telematics" technology have been in our automobiles for quite a few years already.

I tend to explain all of this again every time I mention "telematics" in my column. Otherwise, I get e-mails and letters from folks saying that they have never heard of the term. So, I kindly ask you regular readers to bear with me, at least for the first couple of paragraphs here! Last month's column served as a telematics primer of sorts, and this month's follow-up will give you more fascinating information you need to know.

I realized just after last month's "On-The-Go Radio" column went to press, that I had said something that might appear to be self-contradictory. I had commented about "the nascent (new) telematics industry," while maintaining that "telematics devices have been in our automobiles for decades." So then, which is it? Actually, these statements weren't conflicting at all. You see, the key word here is "industry." I should add that another key word here is the *key word* itself: "telematics." Got that? What I am saying is that *as an industry* in and of itself, telematics dates back only about a decade or so. And this is—not coincidentally—just about how long the term itself has existed. On the other hand, we have had CB radio, car stereo, and even wireless telephone (including pre-cellular IMTS mobile phones) telematics for dozens of years. It is simply that no party had made, or succeeded in making, a concerted effort to *converge* these various technologies into a single manufacturing and marketing concept. And that is, quite literally, the long and short of the story!

So why do we go on and on about telematics in this column? Because "On-The-Go Radio" is all about the mobile Personal Radio Services, as well as ancillary mobile services such as wireless phones. And in the near future, personal radio will become even more tied to telematics than it has been already. Very recently, the FCC crafted new rules to establish a new voice and data Personal Radio Service *specifically for telematics use*.

Channel No.	Channel Use	Frequency Range (MHz)	Bandwidth (MHz)
170	Reserved	5850-5855	5
172	Service Channel	5855-5865	10
174	Service Channel	5865-5875	10 or 0
175	Service Channel Alt*	5865-5885	0 or 20*
176	Service Channel	5875-5885	10 or 0
178	Control Channel	5885-5895	10
180	Service Channel	5895-5905	10 or 0
181	Service Channel Alt*	5895-5915	0 or 20*
182	Service Channel	5905-5915	10 or 0
184	Service Channel	5915-5925	10

*** Alternate Service Channel configuration:**

Channel Numbers 174/176 may be combined to create a single 20 megahertz wide channel, designated **Channel 175**.

Channel Numbers 180/182 may be combined to create a single 20 megahertz wide channel, designated **Channel 181**.

Figure 1. ITS DSRC Telematics "Class L" CB Radio. (Chart by N3HOE; Source: FCC)

The New "Class L" CB Radio Service!

Last month in this column we broke the news about the FCC's newest mobile Citizen's Band Radio Service. The Commission released these new rules in February right at press time, and you learned of it first right here in *Pop'Comm*, while—yet again—some other prominent radio hobby and consumer magazines, as well as wireless trade journals, were evidently asleep at their posts!

Regular readers will remember when *Pop'Comm* first announced the then-new MURS ("Class J" CB radio) VHF-FM CB radio service in the November 2000 issue's "Washington Beat." In fact, most subscribers had that issue in hand weeks before the service was actually authorized to start up, in late November of that year! It was months before most other radio periodicals mentioned MURS—an acronym for multi-use radio service—if at all. (Some apparently felt that MURS was too insignificant to report.) And early indications are that this same phenomenon is happening again with "Class L" CB, the latest addition to the Personal Radio Services.

The rules for this new CB radio service appear in FCC Report And Order FCC 03-324, in WT Docket 01-90 and ET 98-95, released February 10, 2004. These new rules will become effective 60 days after being published in the *Federal Register*, possibly right about the time you are reading this! This new mobile service is more formally known as the Dedicated Short Range Communications Service (DSRCS) of the Intelligent Transportation Services (ITS) of the U.S. Department of Transportation. And as such, the mobile service rules for the general public are codified under FCC Part 95, Subpart L; hence

Paul and wife's Bombardier quads. His is red, hers is the yellow one. (Photos courtesy of K6PAW)

Here's a closer look at the perfectly functional RadioShack 19-1210 MURS transceiver installlations. Notice the back-of-set rubber duckie antennas.

the traditional and now informal "Class L" moniker.

And it really is a *true* CB radio service. The FCC purposely revised Part 95 rules §95.401 (CB Rule 1) "What are the Citizens Band Radio Services?" by adding a new paragraph (g) to include "Dedicated Short-Range Communications Service On-Board Units (DSRCS-OBUs)." This section continues by stating that the rules for this service are contained in Subpart L of Part 95, and that, "DSRCS-OBUs may communicate with DSRCS Roadside Units (RSUs)," which are actually authorized under Part 90 of the FCC rules: "DSRCS, RSU, and OBU are defined in §90.7..."

What do the FCC's Part 90 rules have to do with this new CB radio service? This as-yet-unused service did not start out as a CB radio service. In fact, this new service was first announced in FCC Report and Order FCC 99-305 in ET Docket 98-95, as originally reported in *Pop'Comm*'s February 2000 "Washington Beat." So when it was originally codified in the latter half of 1999, the ITS DSRC Service had not been conceived of as a CB radio service at all. In fact, it was codified under Part 90, the rules part covering most land-mobile two-way radio services. Late in 2003, however, the Commission reconsidered its rules for this service and decided to split different operators' regulating authority among both licensed Part 90 Land-Mobile Services and Part 95 licensed-by-rule Personal Radio services.

But wait, there's a bit more to this than the decision as to the service rules under which this telematics DSRC Service will operate. When you first read about the new DSRC Service here in *Pop'Comm* just over four years ago, we correctly reported that this new service was to be for "traffic monitoring, travelers' alerts (signaling), automatic toll collection, emergency vehicle preemption of traffic signals, and possibly collision avoidance radar...for short-range data..." *There was to be NO voice traffic*. But with this new Report and Order, that has changed. Voice communications *will* be authorized—a very appropriate mode addition to what is now officially designated as a highway-use Citizen's Band Radio Service!

Basically, the revised rules specify that state and local government agencies operating ITS DSRCS stations will operate as licensed Part 90 stations, while motorists will interoperate with these official Part 90 stations, as well as with other motorists as licensed-by-rule Part 95 CB radio service stations. DSRCS "Class L" CB radio is set to operate in the 5.850- to 5.925-GHz band. Amateur radio already enjoys secondary privileges from 5.650 to 5.925 GHz, with 5760.3 to 5760.4 MHz being the propagation beacon subband. Federal government radar will remain the primary service in the band.

The original Part 90 rules for ITS DSRCS in FCC 99-305 stated that the FCC had dedicated the 5.850- to 5.925-GHz microwave band for newly developing traffic safety and control uses. The U.S. Department of Transportation has been a major proponent of ITS since the concept evolved a number of years ago, and the original petition had been filed by the Intelligent Transportation Society of America. These RF systems were intended to have relatively low-power transmitter operations in the milliwatt range, with up to 30 watts effective isotropic radiated power (EIRP) maximum, for short-range data between passing vehicles and roadside systems.

Under those original DSRCS rules, federal government radiolocation (radar) was to retain its existing primary status in the band, and ITS/DSRCS users would have to tolerate any interference from government stations. Part 97 Amateur Radio was to retain its existing secondary status in the band, even though hams have been authorized much higher power levels than DSRCS. The Commission had "suggest(ed)" "informal" frequency coordination among amateurs and DSRCS operators. Part 18 Industrial, Scientific, and Medical (ISM) users were also to remain in the band. But since ISM only generates RF energy, and is not used for communications, there would be no need for interference protection. Part 15 unlicensed devices would also continue to be used in the band, without any interference protection, as always. Our own report in February 2000 concluded with the original premise that ITS DSRCS was to be a non-voice system, with applications still under development.

But if any telematics applications were ever seriously under development since that time, none made it to mass market, if any made it to market at all. And this was likely a major contributing factor leading to the FCC's rethinking of the DSRCS telematics concept this year, resulting in this more recent Report and Order, FCC 03-324. In short, a few of the more significant changes between the original ITS DSRCS Order and the newer Order establishing the telematics-specific DSRCS "Class L" Citizens Band Radio Service, are as follows:

- This is a licensed-by-rule CB radio service; for motorists, not a Part 90 land-mobile service and not a Part 15 unlicensed device (and thereby unprotected) service.
- Voice communications will now be permitted, not just data, signaling, and radar! But, Commercial Mobile Radio

Notice Paul's upgraded MURS/2-meter VHF antenna installation on the rear bar.

Services (CMRS) or commercial wireless-type services will be prohibited in the band.

• The American Society for Testing and Materials (ASTM) standard E2213-03 for IP-based digital communications has been adopted.

To paraphrase the FCC's description of this evolving service: DSRCS telematics will provide highly reliable real-time data communications with rapidly moving vehicles. The ASTM-DSRCS standard is an extension of the IEEE 802.11 and IEEE 802.11a standards, for vehicles traveling at high speeds. The ASTM-DSRCS standard enables wireless communications over short distances between stations on the roadside and mobile radio units, between mobile units, and between portable units and mobile units.

DSRCS operations will generally occur over line-of-sight distances of less than 1,000 meters between roadside units and mostly high-speed vehicles (up to 120 mph), but occasionally stopped and slow moving vehicles, or between high speed vehicles. DSRCS operations will use *short-range, low-power data transmissions of limited duration*. In many instances vehicles will be traveling at highway speeds and will quickly pass through the "communications zone" of a fixed roadside transmitter.

In-vehicle communications units are called On-Board Units (OBU's). An OBU is a DSRCS transceiver that is normally mounted in or on a vehicle, but which in some instances may be a portable unit. An OBU can be operational while a vehicle or person is either mobile or stationary. OBU's receive and contend for time to transmit on one or more RF channels. Except where specifically excluded, OBU operation is permitted wherever vehicle operation or human passage is permitted. OBUs are *licensed-by-rule* under Part 95, Subpart L rules.

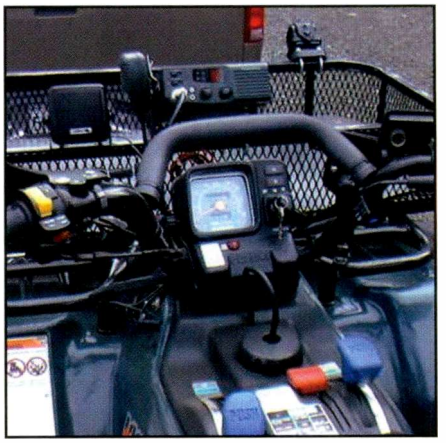
Communication units that are fixed along the roadside, over the road on gantries or poles, or off the road in private or public areas are called RoadSide Units (RSUs). An RSU is a DSRCS transceiver that is mounted along a roadside or pedestrian passageway. An RSU may also be mounted on a vehicle or hand carried, *but it may only operate when the vehicle- or hand-carried unit is stationary*. An RSU transmits data to or exchanges it with OBUs in its communications zone. RSUs are *licensed* by eligible entities (such as public-safety agencies) under Part 90, Subpart M rules.

The ASTM-DSRCS standard also establishes band segments as well as other technical and operating parameters, most significantly a control channel. The band plan, by ITS America, will divide the 5.9-GHz band into the following channels: seven 10-MHz-wide channels consisting of one Control Channel (Channel 178) and six Service Channels (Channels 172, 174, 176, 180, 182, and 184) and one 5-MHz-wide channel, which will be held in reserve. The ASTM-DSRCS standard uses Orthogonal Frequency Division Multiplexing (OFDM) for ITS DSRCS operations in this band (see **Figure 1**).

Under the ITS America plan, Channel 172 was designated for vehicle-to-vehicle communications, and Channel 184 was for "high power" public safety and non-public safety DSRCS operations. Non-public safety applications were secondary to existing public safety applications on Channel 184. Channels 174 and 176 and Channels 180 and 182 could be combined to produce two 20-MHz channels, Channels 175 and 181, respectively.

What does the FCC tell us about transmit power levels permitted in this band? The ASTM-DSRCS standard establishes an overall maximum allowable device output power of 750 mW (28.8 dBm) and the maximum allowable EIRP is 30 watts (44.8 dBm). A device is allowed to transmit more power to overcome cable losses to the antenna as long as the *antenna input* power does not exceed +28.8 dBm and the EIRP does not exceed +44.8 dBm.

However, specific channels and categories of uses have additional limitations under this standard. There is a complex matrix of power levels for different uses on the various channels. For example, private OBU operations on DSRCS Channels 172, 174, 176, 178, and 184 shall not exceed 28.8 dBm antenna input power, but only 33 dBm EIRP. The same goes for public safety OBU operations on Channels 172, 174, and 176,



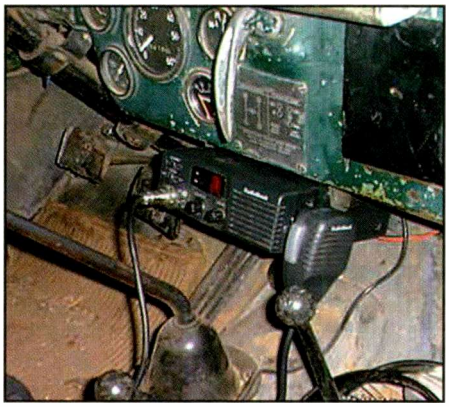
This is another of Paul's quads (sitting on the trailer) with a 19-1210 installation just above the handlebar, on the front basket.

but public safety OBU operations on Control Channel 178 are permitted a substantially higher antenna gain, providing up to 44.8-dBm EIRP. All of this notwithstanding, one time-honored rule-of-thumb concerning RF power levels does apply: RSUs and OBUs shall transmit only the power needed to communicate over the distance required by the application being supported. Licensed amateurs, does this sound familiar?

The FCC is also adopting the following priority framework: First, DSRCS communications involving the imminent *safety-of-life*—whether by public safety entities or by nongovernmental entities, such as in vehicle-to-vehicle collision avoidance—must have access priority over all other DSRCS communications. Next, public safety communications by *public safety* entities have access priority over all DSRCS communications *except* safety-of-life communications. Communications by the following entities will be presumed to be "public safety" priority communications: state and local governments, possessions, territories, districts, and authorities, including mass transit and toll authorities.

This priority access of communications channels protocol in telematics DSRCS, which encompasses both Part 90 public safety licensees as well as Part 95 "Class L" mobile CB radio, is a radical and significant departure from the Priority Access Service (PAS) scheme authorized for wireless telephones. Cooked up by the FCC, PAS—that maligned and ill-conceived cellular (along with the Personal Communications Service and Specialized Mobile Radio)—assigns first priority access to an open channel on the basis of *who* the user is, rather than *what* the emergency is—that is, if an emergency exists at all! A politician or bureaucrat phoning home to sweet-talk a spouse can get *absolute priority* over your own call to 911 to summon an ambulance for your

Paul also upgraded his VHF antenna installation on this third quad, on the back of the rear basket.



There's something new in Paul's old Jeep. Local two-way communications should have been so neat and easy in 1946!

injured child. Shame, shame, shame! But, I digress. Happily, this will not be the case for "Class L" CB radio users, or for anyone else licensed for the DSRCS. *Safety-of-life* comms get top priority at all times. Period.

What Happens Next?

Many in government and in the telematics industry envision a time not too many years in the future when all new cars, trucks, and SUVs will come with "Class L" digital CB radio systems, including the full suite of 5.9-GHz DSRCS telematics, as standard equipment. From my own industry experience, I will hazard a guess that we could *start* seeing this in as little as three years from now. Remember though, this new telematics service is more political than technological. That consideration alone could easily result in a literally interminable delay or a completely different incarnation of this technology than is outlined here. As we have just seen, this later FCC Order already has changed the ITS DSRCS telematics concept before it has even gotten off the ground!

In addition to DSRCS as provided by original equipment manufacturers (OEMs) in new automobiles, it is likely that the automotive aftermarket industry will start to produce add-on "accessory" "Class L" CB radio and related telematics for older vehicles. It is likely that any aftermarket will develop after OEM products hit the street. This would possibly be due to research and development costs in which OEM carmakers may be compelled to invest, if required by future federal DoT standards—again, *possibly*. That is an expense that the aftermarket may find more profitable to wait upon, so to speak.

Finally, will this new "Class L" Citizen's Band Radio Service replace traditional 27-MHz "Class D" CB radio as the highway traveler's radio mode of choice? Given the FCC regulatory specifications as well as the technical specifications for this newer service as it stands to date, I say no. First, the Commission notes that voice mode in DSRCS CB radio is intended for short safety warning messages. Second, considering the very low transmit power levels in "Class L" CB, range will be very short, at about one-half mile, precisely as it is intended to be.

No, I am not certain that anything will replace standard 27-MHz CB radio for highway use in the foreseeable future. In fact, our familiar "Class D" CB radio would make a very fitting adjunct to the newer "Class L" voice service. It is important to bear in mind that these two services have different functionalities. It really is not a fair comparison between the two. This brings to mind the many times I have heard radio communications enthusiasts attempt to compare CB radio to cellular phones. Please! I cringe at the thought. As is the case with the different classes of CB radio, CB and mobile phones are nothing alike, are intended for completely different purposes, and therefore defy comparison. If any other radio service will give 11-meter CB radio a "run for the money" for highway use, it may be CB radio's only VHF FM service, MURS ("Class J" CB radio).

MURS At Work And At Play!

I recently heard from *Pop'Comm* reader Paul, K6PAW/KHL3186 from Central California. Along with extending his appreciation for our MURS reporting here in "On-The-Go Radio" over the previous year or so, Paul tells us how he has put MURS two-way radio, with the excellent RadioShack model 19-1210, to work for him:

I live in the mountains of Central California. I have a few friends that have no interest in becoming hams, as my wife and I and some of our friends are. Our group all fish, hunt, and ride quads. We all wanted two-way radios. We tried CB and found they were too noisy with all the people from the valley talking. We have installed MURS 19-1210 RadioShack radios on our quads, in our Jeeps, pickups, and boats and are using the BTX-127 handheld at times. They really have been great!

I am using the small antenna on the radio for now, but am going to install a mobile antenna soon.

And as it has turned out, Paul has completed that antenna upgrade, and has provided us with some excellent photos of his various RadioShack 19-1210 installations. In addition to some outstanding installations on his (and his wife's) "quad" All-Terrain Vehicles (ATVs), Paul also has one neatly under the dash of his otherwise all-stock original equipment 1946 Jeep. That Jeep is still "going strong" according to Paul. And I wouldn't doubt that for a moment. That old Jeep is showing some wear, as you might imagine, but those things were just about bulletproof! While out in the backcountry, Paul also carries a 2-meter Amateur Radio Service handheld in case of emergency. Well then, keep on enjoying riding, Paul. I know you'll stay safe and stay connected.

That's about all for this early summer month. Please join us again right here next month, when we take another look at what the Personal Radio Services—CB, FRS, MURS, and GMRS—can do for us, whether at work or at play. We'll see you then. ■

Info Central

by Harold Ort, N2RLL, and D. Prabakaran

news, trends, short takes, and other things radio

Radio Kuwait Begins DRM Transmissions

Radio Kuwait has started broadcasting its Arabic programming in digital mode towards Europe. The DRM broadcasts are scheduled at 0930 to 1305 on 13620 kHz, and 1315 to 1730 on 9880 kHz.

Radio Kuwait is also broadcasting in DRM mode to North America in Arabic at 2200 to 0200 UT on 11675 kHz. However, they are still using the old audio library, meaning that listeners who have upgraded their DRM software will not be able to receive any audio.

Voice Of Jammu Kashmir Freedom Starts New Morning Broadcast From Pakistan

Voice of Jammu Kashmir Freedom, operated by Hark at ul Mujahhideen, is noted with a new morning broadcast on 5990 kHz at 0230 to 0400 UTC. It has been operating for a long time near 5101 kHz from 1300 to 1430. This transmitter is in Pakistan and has lot of hum, which is also noted on the new frequency of 5990.

Star Radio In Monrovia To Be Re-launched

The Swiss-based Hirondelle Foundation is planning to re-launch Star Radio, a unique independent media outlet located in Monrovia and broadcasting throughout Liberia until its forced closure by former president Charles Taylor in 2000. The Foundation says Star Radio's mission is to be an essential information tool to help the Liberian peace process, and it should also rapidly become a tool for the humanitarian agencies in order to enhance better understanding of relief and protection operations among Liberian audiences.

AIR's 24-Hour News Channel, And Test Transmissions

India will launch a 24-hour news channel of the All India Radio (AIR) on April 2, according to Union Information and Broadcasting Minister of India, Ravi Shankar Prasad. He said the Indian government was keen on ushering in a radio revolution in the country, adding that the Amit Mitra Committee was looking into the various aspects of FM radio, such as revenue-sharing, licensing, and technology back-up. Based on the committee's recommendations, more FM stations would be established.

Initially the service will only be available on shortwave, attaining nationwide coverage by using three powerful transmitters formerly used for AIR's external service broadcasts. Although there are concerns at AIR about the audio quality of daytime shortwave transmissions, the Ministry of Information and Broadcasting has the view that using shortwave is the most cost-effective method of transmission in the current political circumstances (where government spending on pre-election projects is under public scrutiny).

AIR is conducting test transmissions on shortwave, according to Spectrum Manager Sunil Bhatia. You are requested to send detailed reports on the reception quality of the following times (UTC) and frequencies: 0025 to 0530, 0700 to 1330, 1430 to 1730 on 7420, 7360, 7270, and 7220. You can also send the reports via their e-mail address at spectrum-manager@air.org.in.

Radio Free Europe Continues Broadcasting To Bulgaria—Under New Name

The U.S.-financed Radio Free Europe/Radio Liberty is to continue broadcasting to Bulgaria, even though it was expected to end on February 1, as Georgi Stoychev, director of the Bulgarian section, has announced. At the end of November, 2003, it was announced that Radio Free Europe would stop broadcasting to Bulgaria and six other former Communist countries (Croatia, Estonia, Latvia, Lithuania, Romania, and Slovakia) by the end of the year. The Bulgarian government, together with the Radio Free Europe Foundation, currently finances the broadcasts in Bulgarian, and the financing has been extended by a month.

The foundation is registered in Bulgaria and holds a broadcasting license until 2010. The station will not change its frequencies, but will be succeeded by Radio New Europe, as under Bulgarian legislation the company is not allowed to sell the license, but is allowed to change its name.

Harris Completes Mediumwave DRM Demonstrations In China

Harris Corporation recently completed the fourth in a series of DRM (Digital Radio Mondiale) digital radio demonstrations over the mediumwave broadcast band for officials at Guang Dong Radio, Zhu Hai, China. Guang Dong Radio runs 80 radio stations and serves more than 60 million listeners in southern China. An existing Harris DX 10 mediumwave AM radio transmitter was converted to DRM for the nine-day digital broadcast demonstration at the Zhu Hai transmission site.

Harris successfully conducted China's first over-the-air DRM demonstration on the mediumwave broadcast band for Beijing Radio, and has since held DRM demonstrations at SARFT (State Administration for Radio, Film, and Television), Beijing, and Cheng Sheng Broadcasting Corporation in Taipei, Taiwan. Attendees at these demonstrations were able to listen to the DRM transmissions on digital radio receivers from Fraunhofer and Coding Technologies. The officials at these four organizations are actively evaluating potential digital formats, including DRM for their broadcast facilities.

Harris has the largest installed base of DRM-ready, AM transmitters with more than 1,000 DX series, solid-state mediumwave AM radio transmitters installed worldwide. DRM field-testing has been completed on DX transmitters from power levels of 10-kilowatts to 200-kilowatts.

China Radio Expands Urdu Network For Pakistani Listeners

China Radio International (CRI) has decided to expand its Urdu service from one to three hours' duration daily for Pakistani listeners. The program will also be received in India and Bangladesh. Currently, the Urdu service program is for one-hour duration and is heard in Pakistan between 9 and 10 p.m. The CRI had launched its Urdu service on August 1, 1966, to introduce China, especially, in Pakistan in its own native language. According to a senior Pakistani broadcaster, Naveed Chohan, who is work-

ing as an Urdu expert with CRI, the Urdu service is gaining popularity due to its news and current affairs programs. He said it is playing a very important role promoting Sino-Pak friendship.

Voice Of Russia DRM Broadcasts To Europe

The Voice of Russia is now broadcasting regularly on 12060 kHz to West and Central Europe in the DRM mode as follows:

1400–1500 Russian
1500–1600 English
1600–1700 German
1700–1800 French

The broadcasts are from the Moscow-Taldom site, DRM power 35 kW, beamed 240 degrees.

Radio Mustaqbal Radio Service For Somali Refugees

The shortwave transmissions of the "Radio Mustaqbal" radio service for Somali refugees in Ethiopia, organized by EDC (Education Development Center) USA, started in January 2004, are due to end with the school year in Ethiopia in July. The programs are produced locally in Ethiopia; more details about this project can be found at http://ies.edc.org/projects/ethiopia.htm. The organizers are interested in reception reports, especially though from the target zone.

Indonesia To Set Up Radio Stations In Border Regions

The Indonesian government will set up official government radio stations in every area on Indonesian territorial borders to prevent the people from receiving misleading information. The Indonesian government will set up Radio Republic of Indonesia (RRI) stations following the country's loss of the Sipadan and Ligitan islands recently. State Minister for Communication and Information Syamsul Muarif said that the presence of RRI stations in border areas was considered important to disseminate accurate information on the country's development. During a parliamentary hearing, Syamsul said that the distribution of accurate information on Indonesia was very important for the people living in border areas so that they would not be spoon-fed information from neighboring countries. Syamsul also said that the government had currently been working on the plan by making an inventory of every island in border regions. The inventory was also conducted to identify the feelings of people on those islands so that they could get accurate information about Indonesia.

FEBA Radio Via AIR-FM

In April, 2004, FEBA radio began a new half-hour English transmission via AIR FM in Bangalore, India. New offices and a new on-air studio were completed in February in preparation for the re-launch of World Music Radio in March, 2004. A new 10-kW shortwave transmitter was expected to be delivered in January from Canada but has been delayed a couple of times. Frequencies will be 5815 and 15810 kHz

China Radio International To Broadcast To Eastern Europe

China Radio International (CRI) will be broadcasting to Eastern Europe on 1395 kHz, beginning in March 2004. CRI will be broadcasting in English two hours a day on mediumwave for Eastern European listeners. The broadcasts will be aired at 0700 to 0900 UTC on 1395 kHz from a transmitter in Albania. The programs will be:

0700–0755 RealTime Beijing
0755–0800 Learn Chinese Now
0800–0830 News and Reports
0830–0855 Daily CRI feature programs
0855–0900 Learn Chinese Now

Not likely to be heard in the U.S., except under unusual circumstances, CRI nonetheless wants reception reports on this broadcast sent by e-mail to crieng@cri.com.cn.

Syrians' Pro-Democracy Station Operational Soon

Syria's largest pro-democracy dissident group, the Reform Party of Syria (hizb al-islah al-sourie), has announced that the Syrians' pro-democracy radio station will become operational soon. Radio "Free Syria" is to be located in Cyprus and will air to Syria and Lebanon. The programming of Radio "Free Syria" will cover a variety of political, economic, and social issues. The aim is to communicate to fellow Syrians living under Ba'th dictatorship the importance and benefits of democracy, freedom of expression, the goodwill of the U.S. policy in the Middle East, and the need to rid themselves of a culture of violence. For more information, visit http://www.reformsyria.com. ■

homeland security

power, and products

by Rich Arland, K7SZ

Special Review: ICOM's R-75 Receiver

Now that you've all run out and erected a killer HF antenna, thanks to last month's "Homeland Security," we're going to spend some time in this month's column reviewing the ICOM R-75 SW receiver.

My involvement in the shortwave listening side of the hobby is cyclic, dating all the way back to the late 1950s through the mid-1960s, when I was a very active SW listener (SWL). I even had a *Popular Electronics* Monitoring Certificate with the callsign WPE7BYR (now, we'll see how old you *really* are!). From about 1967 to the mid-'70s there was a hiatus, and then from 1975 to 1979 I engaged in some half-hearted SWL activities. That SWL sprint faded after a few years, but the SW bug bit hard once again in the early 1980s through the mid 1990s. During this time I prowled the HF spectrum searching for rare countries and listening in on utility (UTE) and military communications (MILCOM).

Here's the R-75 at my operating position. I am using the MFJ-1020C Active Antenna as a preselector, NOT an active antenna.

The overwhelming desire to procure a top-quality SW receiver recently overcame me once again. My escalating interest in international SW broadcasting, coupled with Steve Douglass's "Utility Communications" column right here in *Popular Communications*, stirred my latent interest in logging MILCOM. After perusing e-Bay and looking over the various retail outlets specializing in used HF receivers, I finally settled on a Kenwood R-2000, sitting in the used gear department at Universal Radio in Reynoldsburg, Ohio.

I've known and dealt with Fred Osterman, owner of Universal Radio, for over 20 years and during that time he never steered me wrong on a radio deal. I called Fred and inquired about the R-2000 on his used list. Fred confirmed that the receiver was in great shape, but said, "Rich, why not spend a couple of bucks more and get the latest offering from ICOM, the R-75?"

Hmmm, sounded like a plan. But before committing to the deal I wanted to do a bit of research on the R-75 to find out just what the mainstream SW/UTE listeners thought of this radio. Some time spent doing your homework on a new piece of gear can often save you some valuable cash. No radio is perfect, and Fred even admitted that the R-75 "had some warts." Time to get to work.

In Search Of Information

Off to the Internet I went in search of reviews and comments on the R-75. After visiting several websites and reading the comments and the subsequent review on the North American Shortwave Association (NASWA) website (www.naswa.com) as well as the two done by Radio Database International (RDI) in the 2004 edition of their *Passport to World Band Radio* (*PWBR*), I was convinced that the R-75 would be the best receiver for my money. As a matter of fact, quoting from the RDI review in the 2004 *PWBR*, "...It is a first rate receiver for unearthing tough utility and ham signals, as well as world band signals received via manual 'ECSS' tuning. Nothing else equals it on the sunny side of a kilobuck." This is indeed high praise! Man, those two sentences say it all!

I called Fred back and we did the deal—$449 plus shipping and the R-75 arrived in two days! It seems that ICOM was offering special pricing on the R-75 and Universal Radio had an "ICOM Day," with additional price cuts on selected models. Thanks to an ICOM factory promotion I was able to save over $150 on my R-75. In addition to the cash savings the R-75 came bundled with the optional UT-106 digital signal processor (DSP) board which adds audio DSP and notch filtering to this outstanding receiver. Talk about a deal! To top it all off, I asked Fred to perform a "laying-on-of-hands" complete with "special DX incantations" (all done while listening to selected cuts from Jethro Tull) to increase the DX I'd be able to log with this new receiver!

The ICOM R-75 And The Computer

One of my main requirements for a new SW receiver (or any new piece of radio gear for my shack, actually) is the ability to

control the radio via computer; in this case my old, very unreliable Dell Inspirion 3000. Hey, Dude, it was free—it cost me $30 to get it up and running and I have only had to wipe the hard drive and reload the operating system three times! Other than that, it's been a real workhorse!

We'll take a close look at some radio-related software in a future column. For now let's just say that ICOM offers basic control software for their products, as well as other after-market software dealers. Prices vary, so if you get the chance, by all means check out the functionality and ease of use on any software you buy for your radios.

Computer interfacing to any receiver opens up a whole new world of monitoring. Most computer/receiver software is capable of storing thousands of discrete frequencies and modes, enabling the active SW/UTE listener to instantly load and/or change the frequency databases used to monitor various services.

Case in point: I like to listen to international SW broadcasters (speaking of which, whatever happened to HCJB?) and I also like to try my hand, early in the morning, at hearing the Indonesian regional SW outlets on 90 meters. In addition, I am a MILCOM "stealthy" addict, always eager to eavesdrop on military communications in the hopes of hearing one of the elusive "black project" aircraft that Steve Douglass writes about in his "Utility Communications" column. Let's not forget the Hurricane Hunters based out of Keesler AFB, Mississippi. There is nothing like having a ring-side seat on a WC-130 for a white-knuckle ride into the eye of a hurricane! Following the action while the "Coasties" (U.S. Coast Guard) are on a Search and Rescue (SAR) or drug interdiction mission makes for some fascinating listening, too. Then there's the thrill of listening to the rebroadcast of live space shuttle (whenever it gets off the ground again) and ISS transmissions from W3NAN in Greenbelt, Maryland, on the HF ham frequencies.

The R-75 has only 99 actual memories, so loading all these frequencies into the available memories in the radio will quickly fill all the memory slots, with quite a few frequencies left over. It's better to organize your receiving database by service: International SW broadcasters, Indos, MILCOM (subdivided into Hurricane Hunters, USCG SAR, flight test frequencies, etc.), and amateur radio. This allows you to select and load into the receiver exactly what you want to hear. It is a simple matter to dump the stored frequencies and quickly reload the desired service(s) should the situation warrant. When properly set up, computer-assisted monitoring is a godsend to the active listener/monitor.

A brand new Heathkit GR-78 SW receiver I just built from a kit about a month ago sits next to the ICOM R-75

The R-75—A Closer Look

The ICOM R-75 covers 30 kHz to 60 MHz using the following modes: USB/LSB, CW, RTTY, AM, synchronous AM (S-AM), AFSK and FM. It has a total of 101 memories, 99 programmable memories, and two band-edge scan memories. It is powered directly from 13.8 VDC via an outboard AC power supply. While the lack of an internal AC supply might be looked upon by some as a negative, in reality this means that you can power the R-75 directly from a 12-VDC source like a vehicle battery, perfect for emergencies or "radio safaris" into the bush. Current consumption is around 1 amp, depending upon audio output. There are dual antenna connectors on the back panel, one for 50-75 Ω coaxial input (SO-239) and the other a push-type terminal for 500 Ω end-fed wire antennas. Next to the 500 Ω antenna terminal is a similar push-type terminal that serves as a ground for the receiver. This should be connected to the station ground for safety purposes.

The R-75 uses a triple conversion IF scheme. The first IF is at 69 MHz and the second is at 9 MHz. The last IF stage is the old standby, 455 kHz. By using a very high first IF frequency, ICOM engineers have virtually eliminated birdies or "ghost" signals, resulting in a very clean receiver that is a real pleasure to listen to.

Receiver Sensitivity

Receiver sensitivity, expressed as minimum discernable signal (MDS), is a measure of how weak a signal the receiver can hear. In essence, the *lower* the number the more sensitive the receiver. In the case of the R-75, average sensitivity was around -130 dBm, without the preamps on. This is very respectable and is right in line with the multi-thousand dollar receivers on the market. The R-75 has a two-stage preamp capable of delivering an additional 10 dB and 20 dB of preamplification respectively to the RF front end, which will lower the MDS to around -140 dBm!

While on the surface it sounds good to run with an additional 10 to 20 dB of preamplification in line so you can hear the really weak stations, in reality it's a *VERY* bad idea. The dual-stage preamp amplifies everything, the desired signal, band noise, interference, adjacent channel splatter, etc. Therefore, by using a preamp *unnecessarily* you tend to destroy the excellent noise characteristics and selec-

tivity of this receiver. Remember, your system noise figure is established at the antenna. Any additional noise added to the system after the antenna will degrade receiver performance, sometimes substantially. This usually manifests itself in an overloaded RF front end and/or a trashed up IF strip with very poor IMD and dynamic range. In other words, the extra gain is not always warranted or useful. Use your preamps carefully.

Sensitivity is only a part of the total equation when looking at how well a receiver works. Two other important parameters (in addition to sensitivity) are dynamic range (two-tone third-order intercept/Intermodulation Distortion, or IMD) and selectivity. Dynamic range defines how well the receiver will perform hearing weak signals in the presence of a strong signal. Outstanding dynamic range equals outstanding receiver performance. It's that simple. The R-75 has very good two-tone third-order IMD numbers around 90 dB. Again, these numbers are in line with high-end receivers costing substantially more.

Selectivity is the ability of the IF stages to reject unwanted signals while passing the desired target signals. This boils down to the "skirt selectivity" of the IF filters, measured at the 6 dB and 60 dB points on the filter bandpass curves. The steeper or narrower the skirts, the less prone the IF is to signals just outside the IF passband. This translates into better receiver performance. Thankfully, the R-75 comes equipped with a couple of filters suitable for listening to AM and SSB signals, with the option to add one additional filter each to the 9 MHz and 455 kHz IF stages. Once installed, these optional filter combinations are selectable, by mode, from the receiver front panel. ICOM offers optional filters for narrow (500 Hz) CW, ultra narrow (250/300 HZ) CW/RTTY, and 1.8, 1.9, 2.8, and 3.3 kHz for AM/SSB operations. In addition, there are two IF shift controls on the front panel to alter (move) the upper and lower portions of the IF passband to avoid unwanted signals. Nice touch, ICOM.

The R-75 has a large tuning knob that includes a variable tuning rate/step, depending upon how fast you turn the knob. The main tuning shaft uses optical encoders/decoders for years of trouble-free operation. Band/frequency changing is quick, using the keypad on the right side of the front panel. Memories are loaded via the MW (Memory Write) button below the keypad. Memory locations are chosen using the up/down buttons, also located beneath the keypad. Frequency entry using the keypad is a bit cumbersome because of how the frequency must be entered, but the manual explains how to do this in detail. Once you get the procedure down it's a simple matter to quickly key in the desired frequency and perform a rapid frequency change.

The large, easy-to-read LCD display panel tells all about the R-75, including frequency, memory channel or VFO mode, antenna selection, reception mode selection, 24-hour clock, S-meter, AGC action, scan mode, etc. If you want to research the specifications and take a gander at a great lab report on the R-75, I suggest you obtain a copy of the January 2000 *QST* (pg. 67). The lab specs are very impressive, to say the least.

I was hoping that Radio Database International (RDI) would have done a "white paper" on this receiver, but they've opted not to as of this writing. Instead RDI offers a mini-review of the R-75 in the current (2004) *PWBR*. Actually they offer two reviews, one with the modifications performed by Kiwa, an after market producer of mods for this and other receivers, *and* a mini-review of the stock radio as it comes from the factory.

The Kiwa mods attempt to address (at reasonable cost) the less-than-stellar synchronous AM detection performance, which has been characterized as a major "wart" on the R-75. It's no secret that in the S-AM mode, the R-75 is lacking. However, my approach to this is to listen in either the USB or LSB mode, zero beating the carrier, to improve reception, reduce fading and interference. Another direct benefit of using USB/LSB reception is that you are employing much narrower IF filters, which definitely can make a difference on today's crowded bands. RDI makes the case for the Sherwood Labs (a facility used by RDI to test radio equipment) mods to improve the R-75's ability to work in the S-AM mode. Unfortunately, the Sherwood modifications are more expensive than the radio. The Kiwa mods are cheaper, but theoretically don't offer much improvement in the R-75's S-AM performance. In my opinion, at the price I paid for my R-75, the ability to receive in the S-AM mode doesn't even enter into the equation. So what? There are work-arounds that are free (use USB/LSB).

Using The R-75

Specs and lab test results aside, the real test of any receiver is its on-air performance. Here the R-75 is a dynamite piece of gear. It's very easy to use without much of a learning curve. After installing the optional DSP filter unit (according to the instructions in the manual), I was on the air in fine style, listening to UTE and MILCOM transmissions, along with the normal assortment of international SW broadcasters. I found that switching between USB and LSB while listening to an AM signal resulted in no retuning of the main tuning knob. This means that the SSB filters and the beat frequency oscillator injection were properly aligned at the factory.

While I have never had to use the two-stage preamp on the front end of the receiver, I have found use for the 10-dB attenuator when encountering extremely strong SW signals. Using 10 dB of attenuation on 49 meters dramatically improves the reception of weaker signals sitting beside much larger signals.

Listening to CW on the ham bands was a real treat. However, I can understand why serious CW ops would want to install a 500-Hz or narrower CW filter in the 9-MHz IF to improve receiver performance. Don't get me wrong, the R-75 performed admirably in the CW mode on the ham bands. However, during contests you'll need all the help you can get! That's where the additional filters come into play. I plan on adding filters in both the 2nd and 3rd IF strips, just to wring every bit of performance out of this receiver that I possibly can.

Where To Lurk

Having a good antenna coupled to a great receiver is only part of the equation. Now you need to know *where* to prowl in order to hear some really good "stuff" on the HF bands. Depending upon your particular interests in HF monitoring, there are various books and frequency listings published—some are free, others aren't.

Probably the granddaddy of them all is the *World Radio TV Handbook* (*WRTH*). This classic frequency guide lists all the current SW broadcasters along with each country's AM/FM and TV outlets. The *WRTH* is organized by service and country so you can see at a glance what frequencies are active on HF as well as other broadcasting services within the selected country. Each year *WRTH* also reviews SW receivers and accessories, so the book is definitely worth the price of admission. Speaking of price, the *WRTH* costs around $25 and can be found on Amazon.com (www.amazon.com) and at Barnes & Noble bookstores.

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W6SAI HF Antenna Handbook
by Bill Orr, W6SAI

Inexpensive, practical antenna projects that work! Guides you through the building of wire, loop, Yagi and vertical antennas.

Order No. HFANT **$19.95**

Keys, Keys, Keys
by Dave Ingram, K4TWJ

You'll enjoy nostalgia with this visual celebration of amateur radio's favorite accessory. This book is full of pictures and historical insight.

Order No. KEYS **$9.95**

Understanding, Building & Using Baluns & Ununs
by Jerry Sevick, W2FMI

The successor to the popular and authoritative *Baluns and Ununs*. Great deal of new tutorial material, also includes new designs not in his previous book, and crystal clear explanations of howand why they work.

Order No. 2BU **$19.95**

Heathkit - A Guide to the Amateur Radio Products
by Chuck Penson, WA7ZZE

This greatly expanded Second Edition is a must for collectors and Ham history buffs, but is a terrific trip down memory lane for any Ham who was there or wishes he had been. Pick up this 328-page volume and you won't be able to put it down!

Order No. HEATHKIT **$29.95**

The Short Vertical Antenna and Ground Radial
by Jerry Sevick, W2FMI

This small but solid guide walks you through the design and installation of inexpensive, yet effective short HF vertical antennas. With antenna restrictions becoming a real problem, this book could keep you on the air!

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The Mobile DXer
by Dave Mangels, AC6WO

An in-depth look at Mobile DXing-Includes its language; versatility; selecting and installing mobile HF radios; mobile HF antennas and tuners; tuning HF antennas; utilizing tools, tactics, and techniques; and more!

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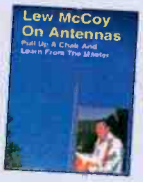

The NEW Shortwave Propagation Handbook
by W3ASK, N4XX & K6GKU

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Another good book for folks interested in the HF International shortwave broadcast scene is the already-mentioned *PWBR*, which is celebrating its 20th anniversary this year! The *PWBR* is advertised as "The TV guide for world band radios." Now, if you are new to the hobby, "world band radio" is a common term. However, many of us old timers prefer to use the *international SW broadcasting* title. I guess RDI, the folks who publish the *PWBR*, needed a gimmick or "hook" to sell their wears early on and the "world band radio" title was adopted and it stuck. Either way you slice it, the *PWBR* is a storehouse of information on the international SW broadcasting scene, listing times, frequencies, and languages, along with other pertinent data for each SW broadcast outlet.

As with the *WRTH*, the *PWBR* also includes product reviews of SW receivers and accessories along with feature stories about the world of SW. This excellent frequency guide can be found at Amazon.com and Barnes & Noble bookstores for around $22.95.

The *WRTH* and *PWBR* are both specific to the commercial broadcasting side of the SW hobby. If you are more interested in UTE and MILCOMM, you'll need some additional material. Enter *The Worldwide Aeronautical Communications Frequency Directory* by Robert E. Evans and *Military Monitoring* by Steven A. Douglass. Bob Evans's book has a master frequency list that is absolutely indispensable. It lists all the current aeronautical HF frequencies used by the military, government, and private industry. Steve Douglass' book provides a very comprehensive listing of DoD HF and VHF/UHF frequencies, along with a "Top 100" guide to the most active (productive) frequencies to monitor.

While it might seem redundant to have both of these fine UTE guides on the shelf, rest assured that the information contained therein is worth its weight in gold, especially to the neophyte in the radio hobby. Since military and utility monitoring are so diverse, there is no such thing as "too much information." Both of these books can be obtained from Universal Radio, 6830 Americana Pkwy, Reynoldsburg, OH 43068. Check out their website at www.universal-radio.com or phone them at 800-431-3939.

Further information on pirate radio stations, UTE monitoring, and current SW broadcast schedules is scattered all over the Internet. My first stop for SW broadcast schedules would be the NASWA website (www.naswa.com). They have a quarterly SW broadcast schedule posted that is a must for anyone serious about international SW broadcast listening. There are lists and newsgroups for all aspects of HF monitoring, including MILCOM and UTE listening. Don't forget the popular shortwave and DXing organization's SPEEDX site (http://www.cybercomm.net/~slapshot/speedx.html#worldbandradio), which has a large UTE following. The best advice I can give is to do a search on "Shortwave Broadcasting," "MILCOM," "Utility Monitoring," or "FEMA HF Frequencies" and see what pops up.

Till Next Time

That's a wrap for this month. I hope you have enjoyed our two-part look at the world of HF monitoring. I am sure that you can see the benefits of adding a quality HF receiver and antenna to your monitoring post. There is a lot of information out there on the HF spectrum that is waiting to be received. In the mean time, remember: Preparedness is **NOT** an option. ■

POPULAR COMMUNICATIONS

June 2004 Survey Questions

When buying an FRS/GMRS combination walkie-talkie I'm concerned about the GMRS licensing requirement:
Yes 1
No 2
Depends on where I'll use the radio 3
I'm not aware of the licensing requirement 4

I have a pair of FRS walkie-talkies and use them for:
Staying in touch with my family at the park, mall, playground, etc. 5
Emergencies 6
Nothing right now; I got them and then put them aside 7
Additional hobby-type radio activities 8

I have GMRS transceiver and have filed for a license:
Yes 9
No 10

I'm a licensed ham:
Yes 11
No 12
Not yet, but currently studying 13

I think of GMRS as:
An alternative to ham radio 14
Not very useful 15
Too expensive 16
Too complicated 17
An alternative to CB Radio 18
An alternative to RFS 19

I live in the following:
Large urban area 20
Suburbs of a metro area 21
Small town 22
Rural area 23
Military installation 24

As an alternative to GMRS I'm considering using MURS (Multi-Use Radio Service) radios:
Yes 25
No 26
Not Sure 27
Need more information on MURS 28

I would use GMRS but the five-year $75 license fee is too expensive
Yes 29
No 30

With all of the features on cell phones today I'm finding that even in emergencies, all I really need is a cell phone with a fully charged battery:
Yes 31
No 32

The two most important features of GMRS are:
Portability (such as a walkie-talkie or plug-and-play type mobile 33
Compact size 34
Long battery life 35
Higher power than FRS, thus greater range 36
Better quality equipment than FRS 37
More professional looking than other two-way radios 38
No test to get on the air 39
Less crowded frequencies than FRS 40

the wireless connection

a look behind the dials

by Peter J. Bertini, radioconnection@juno.com

Capacitor Redux—Caps That Appear Original, But...

An older radio restoration book suggests that only those components proven defective during troubleshooting should be replaced. That was over 20 years ago, and times have changed. Now, most restorers agree that good wax capacitors simply don't exist! Most examples have significant leakage, and will fail in time.

Some believe that if the caps are used as cathode bypasses, leakage currents have little effect on the set's performance. But I've seen these caps have mechanical failures where the leads attach to the foil as the wax dries and shrinks causing them to go open, so I've always advocated replacing *all* wax capacitors using caps made with modern, stable dielectrics. In this column I want to take this approach one step further, but let me digress for a few moments...

Photo A. The author's 7S629 Zenith tabletop. This handsome set was produced in 1941.

The Zenith 7S629

Photo A shows a recent acquisition to the collection, a Zenith model 7S629 dating from 1941. This radio witnessed a lot of history; it probably was a family's link to the news and world events during World War II. You can almost envision a family gathered around this radio each evening, hoping for news about loved ones serving overseas, or perhaps listening to the BBC on the set's shortwave bands.

This attractive radio used seven tubes, featured shortwave coverage, station presets, and "tone-organ" pushbutton controls. As you can see, it also sported the familiar large, black dial scale that Zenith was renowned for and that is coveted by collectors. These are fairly common sets, and sell for around $125 to $250, depending on condition.

Zenith produced a similar set in 1942, their model 7S632. Styling changes made it less attractive than the 1941 model, and thus less desirable. The year 1942 saw the end of civilian radio production for Zenith and other radio companies. **Photo B** shows the 7S629 radio chassis. The wax caps sport the Zenith lightning bolt labels; I think it would be a shame to replace them

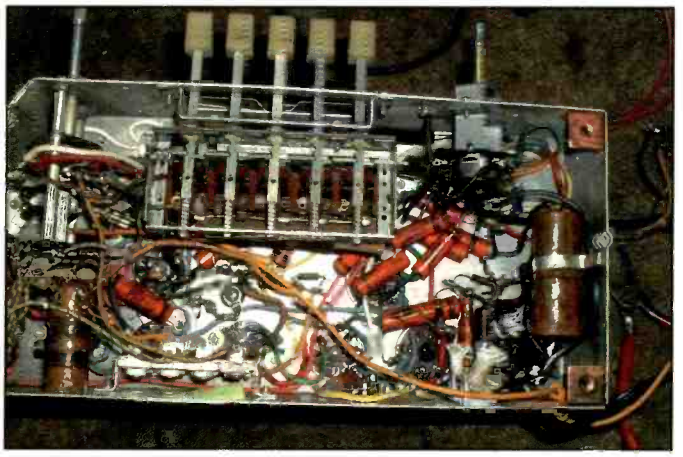

Photo B. This radio's chassis sports its original wax capacitors. The caps were re-stuffed with new Mylar capacitors to preserve the chassis appearance.

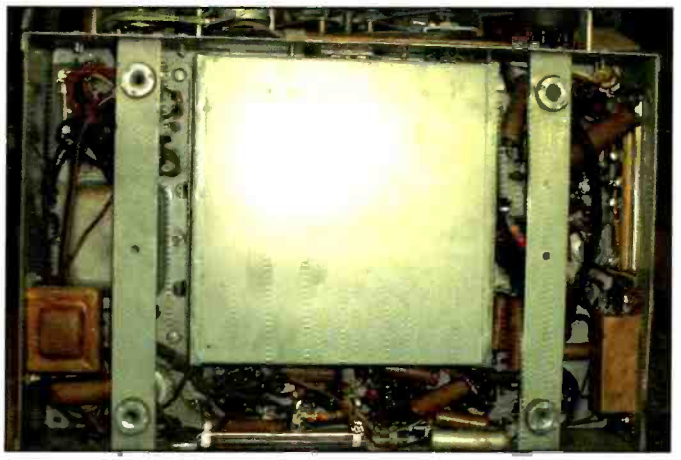

Photo C. The author's 10T chassis also sports rebuilt wax capacitors.

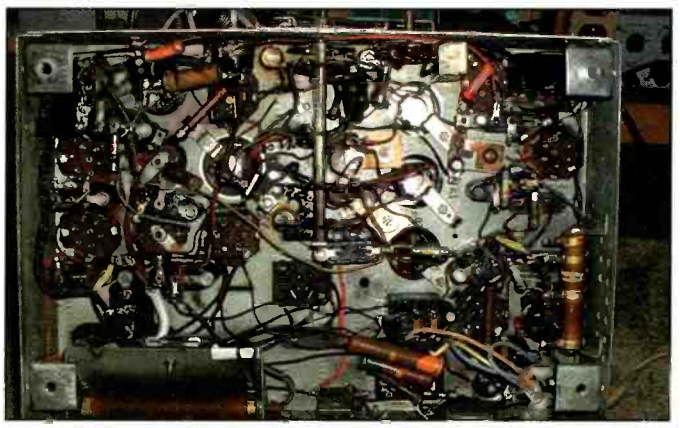

Photo D. This 16B chassis was also restored using techniques that maintained the original factory appearances.

Photo E. The large filter and metal capacitor shells on the Philco 16B.

Photo G. I'm now saving old capacitors for possible future reuse.

Photo F. More restoration efforts that hide the newer components inside of the older original factory parts.

Photo H. Rebuilding old wax caps requires a means to heat and soften the old wax.

with modern looking Mylar capacitors. I'd like you to examine **Photos C, D**, and **E** as well.

Other Examples

Photo C is the bottom view of my RCA 10T tombstone's chassis, a radio that I've shown in past columns. **Photo D** shows the bottom view of one my Philco 16B radio chassis, Photo **E** is a top view of the same Philco (note the two filter capacitors and the large metal can that houses several of the set's larger-value paper bypass capacitors).

Hidden Secrets

What's my point? Well, each of these radios is fully restored! A sharp-eyed examination of the 16B chassis might uncover the added fuse holder, added for safety during the restoration. But other than that the set looks completely original. The wax caps appear to be undisturbed, and the Bakelite boat capacitors likewise look unmolested. Of course, faithful readers will probably recall our series on restoring Philco radios and the techniques used for rebuilding Philco's Bakelite boat caps!

Photo I. Instead of wax, the caps are resealed using hot glue sticks.

Photo J. Tube sets run warm, and dirt and dust will readily stick to the wax capacitors, making them hard to read.

The RCA 10T chassis also reveals little evidence that any restoration has taken place. But **Photo F** reveals that some work was done on the 16B—those filter caps and the can capacitor have been rebuilt and restored! Yet, the wax capacitors appear to be original in these three examples. That's the secret these three sets share and the crux of this month's column. Those wax caps have been removed, gutted, re-stuffed, and reinstalled! For years I've been cutting out wax caps and discarding them, **Photo G** shows a pile of them I've recently started saving for future rework and restoration.

What's Needed?

You won't need much to do similar restorations. Other than a few simple hand tools, you'll need a good hot air gun (see **Photo H**) and a good hot glue gun. The hot glue gun shown in **Photo I** can be found at any local craft or hardware store for a very modest sum. Hot air guns are more expensive; you might get by using an older hairdryer to start with.

You'll need to clip and remove the wax capacitor from the chassis. I suggest doing each cap one at a time to avoid con-

Photo K. Heating the cap with the hot air gun, followed by a quick wipe down with a paper towel to remove the wax and dirt, reveals the original label details.

Photo L. The hot air gun is used to lay heated air around the capacitor body. Once sufficiently heated, the wax softens, permitting the capacitor can be easily gutted.

Photo M. Needle-nose pliers are used to pull the ends free of the heated capacitor body. An unsharpened pencil is used to push the old capacitor body out of the shell.

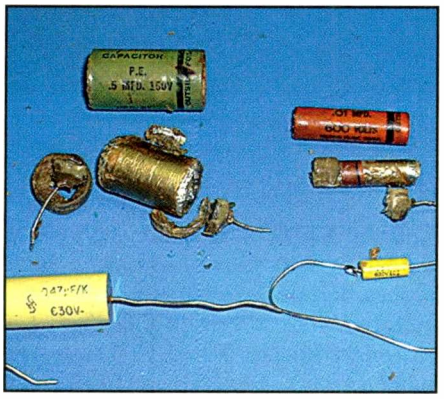

Photo N. Old meets new. The empty shells, old paper capacitor body, and the new Mylar capacitors that will be used to rebuild the factory capacitors.

fusion as to where the parts should be returned! Here's a tip: jumper the cut ends in the chassis with alligator jumper leads to help keep track of where the part came from. You'll need to clean the capacitor shell. The example shown in **Photo J** is typical of what you'll find. Dirt and dust adhering to the wax coating pretty much obscure the part's value and markings. Heating the capacitor with the hot air gun and quickly wiping it with paper towels removes the grime and surface wax and yields the results shown in **Photo K**. Much better!

Gutting The Capacitor

I like to use a small vise to hold the capacitor while I'm heating it with the hot air gun. The hot air is carefully worked around all sides of the old capacitor (see **Photo L**). The idea is to get the part hot enough to soften the wax, permitting the end caps and wire leads to be pulled free of the cardboard body. If you see smoke and bubbling wax, back off and go slower (see **Photo M**)! A close fitting wooden dowel (an unsharpened wood pencil does well) is then used to push the capacitor assembly out of the shell. After seeing how readily these caps fall apart, it's easy to understand why failures are so common.

Re-stuff The Capacitor

Photo N shows the gutted shells, with the replacement Mylar capacitors that will be reinserted and sealed into the original capacitor cardboard shells. Axial lead Mylar's are a comfortable fit, but I've also been able to fit radial lead caps in many cases. If the replacement capacitor leads are too short, it's easy to splice a longer length of thinned bare buss wire (about 20 to 22 AWG) at the component body; the splice will be hidden inside the shell once the shell is refilled and sealed. If there is a lot of slop between the capacitor body and shell, you can build up the diameter by adding wraps of tape over the Mylar capacitor until a snugger fit is achieved. It doesn't have to be very snug, however. The liquid hot glue is fairly viscous and won't flow through small cracks.

Photo O shows hot glue being injected into the open ends of the cardboard capacitor shells. After filling, the capacitors are left sitting undisturbed for several minutes to allow the glue to settle and harden. The glue turns from transparent to opaque as it cools. If the glue settles, add more as needed. Once you're satisfied, flip the capacitor 180 degrees and fill the other end. The finished products

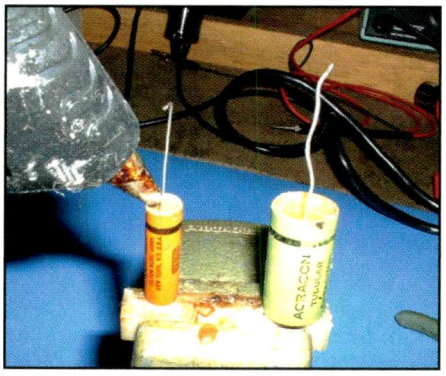

Photo O. Heated hot glue is injected into the capacitors to seal them and replicate the original wax fillers.

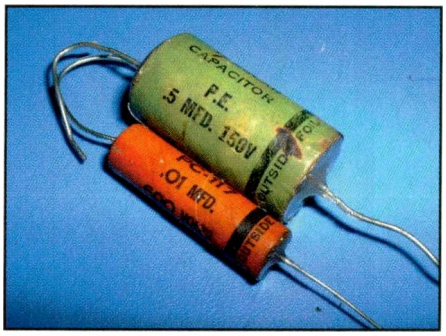

Photo P. The end products ready for reinstallation in the radio.

are shown in **Photo P**, ready for reinstallation in the radio.

Wax Or Glue?

Some restorers prefer to reseal the caps with wax salvaged from the old caps. It looks a tad better than the glue, but it is harder to work with. You can also partially fill the caps with hot glue, and then fill to the top using wax salvaged from old caps.

Now, I will admit that rebuilding wax capacitors is taking restoration to what some have termed ridiculous levels. It's a matter of taking pride in your work and doing what you think is the best approach for your sets. I'll admit that I don't do this level of restoration on all sets I work on; it's reserved for the best examples in my collection where I feel the extra effort and time is well spent. Once the original wax caps are discarded and hit the landfill it's pretty hard to get them back.

Scratch-Building Capacitors

If you've stayed with me this far you're probably wondering what to do when a wax capacitor is missing or severely damaged. Here's the answer: build new caps from scratch!

In some instances, new axial lead Mylar capacitors might be large enough to approximate the size of the original part, permitting new labels to be directly applied over them. This is usually true for larger values, say .47 Mfd @ 630 volt parts. But, smaller caps (for example .001 Mfd @ 630 volts) will likely be physically much, much smaller than a vintage wax capacitor of similar value. The trick here is to house the new part in a larger tube to resize it to a larger package.

The outer shell can be made from Glowsticks (see **Photo Q**); sections cut

Photo Q. The plastic shells from Glowsticks can be recycled for tubing to resize small Mylar caps to more closely resemble vintage capacitors. (Photo by Bill Meachum)

Photo R. Examples of Mylar caps resized using Glowstick tubing. (Photo by Bill Meachum)

Photo S. New labels heighten the illusion. The label artwork was originated by Sylvain Vanier. (Photo by Bill Meachum)

from the plastic tubing can resize the small axial Mylar capacitors to better approximate vintage capacitor packages. The caps are sealed in the plastic tubes with hot glue. **Photo R** shows two examples of Mylar caps using tubing salvaged from Glowsticks. Now, add some new labels, and viola! See the results **Photo S**. These are the handiwork of our friend, Bill Meachum, in Puerto Rico.

Where can you find appropriate labels? Well, by using a scanner to copy the old capacitor labels and a good program like PaintShop Pro to cleanup the artwork, it's pretty easy to reprint new labels made from the artwork on existing capacitors. Bill's labels are from artwork produced by Sylvain Vanier in Canada. A man of many talents, Syl was the fellow who showed us how to make replica dog-bone resistors in a previous column. More of Sylvain's handiwork is shown in **Photos T** and **U**. These, and other capacitor labels in .jpg file format, can be found on his webpages at www.oldradioz.com/id19.htm. Syl provides these files as a service for non-commercial use by fellow collectors. You'll find a lot of interesting vintage radio-related materials at his website at www.oldradioz.com.

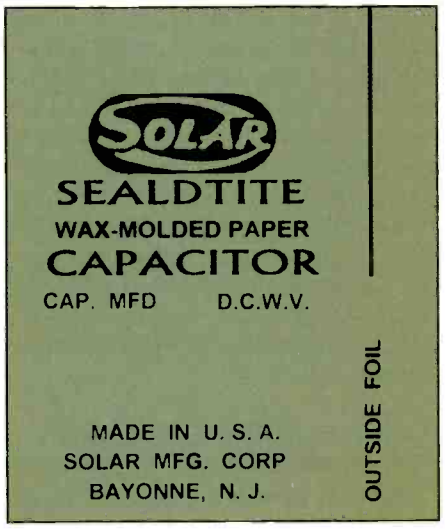

Photo T. Example of the artwork that can be downloaded from Sylvain Vanier's website. (Courtesy Sylvain Vanier)

Photo U. More artwork from Syl's website.

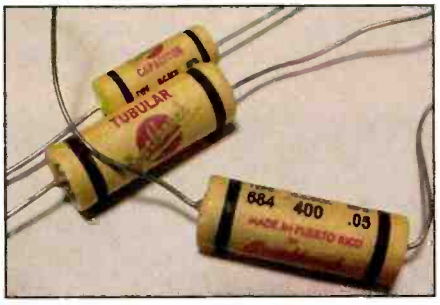

Photo V. Bill Meachum's whimsical capacitors sport his Sparkbench brand. (Photo by Bill Meachum)

Photo W. Bill Meachum made this label using Paint Shop Pro. (Photo by Bill Meachum)

Whimsical Fun

Bill Meachum also sent us a few photos of capacitors sporting his "SparkBench" labels (see **Photo V** for examples). Samples of the label artwork Bill produced using PhotoShop are shown in **Photo W**. The SparkBench moniker is Bill's own creation and is not an attempt to replicate an original vintage component. Although not authentic, they would be fine in homebrew rigs or for use in those common vintage radios that haven't much collector interest.

Well, I've definitely exceeded the column bandwidth for this month! So, until next time, keep those soldering irons warm and get busy restoring your favorite classic radio! ■

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

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You'll *read* interesting commercial, military, diplomatic, weather, aeronautical, maritime and amateur traffic . . .

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

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

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-- all over the world -- Australia, Russia, Japan, etc.

MFJ-462B **$179.95**

Printer Monitors 24 Hours a Day

MFJ's exclusive *TelePrinterPort*™ lets you monitor any station 24 hours a day by printing transmissions on an Epson compatible printer.

Printer cable, **MFJ-5412**, $9.95.

MFJ *MessageSaver*™

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

High Performance Modem

MFJ's high performance *PhaseLockLoop*™ modem consistently gives you solid copy -- even with weak signals buried in noise. New threshold control minimizes noise interference -- greatly improves copy on CW and other modes.

Easy to use, tune and read

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

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

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

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

Use 12 VDC or use 110 VAC with MFJ-1312B AC adapter, $14.95. 5¼Wx2½Hx5¼D inches.

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

Try it for 30 Days

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

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"World Radio TV Handbook" says MFJ-1024 is a *"first-rate easy-to-operate active antenna ...quiet... excellent dynamic range... good gain... low noise... broad frequency coverage."*

Mount it outdoors away from electrical noise for maximum signal, minimum noise. Covers 50 KHz-30 MHz.

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MFJ-1024 **$139.95**

Indoor Active Antenna

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

MFJ-1020B **$79.95**

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, $14.95.

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-200 MHz including low, medium, shortwave and VHF bands.

MFJ-1022 **$49.95**

Detachable 20 inch telescoping antenna. 9 volt battery or 110 VAC MFJ-1312B, $14.95. 3⅛x1¼x4 in.

Eliminate power line noise!

MFJ-1026 **$179.95**

New! 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

MFJ-959B **$99.95**

Matches your antenna to your receiver so you get maximum signal and minimum loss.

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, $14.95.

Dual Tunable Audio Filter

MFJ-752C **$99.95**

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 in.

High-Gain Preselector

MFJ-1045C **$99.95**

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, $14.95.

CW, RTTY, ASCII Interface

MFJ-1214PC **$149.95**

Use your computer and radio to receive and display brilliant full color FAX news photos and incredible WeFAX weather maps. Also RTTY, ASCII and Morse code. Frequency manager lists over 900 FAX stations. Auto picture saver.

Includes interface, easy-to-use menu driven software, cables, power supply, manual and *JumpStart*™ guide. Requires 286 or better computer with VGA monitor.

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 inches.

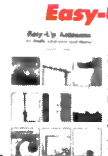
MFJ-956 **$49.95**

Super Passive Preselector

MFJ-1046 **$99.95**

New! **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.

Easy-Up Antennas



How to build and put up inexpensive, fully tested wire antennas using readily available parts that'll bring signals in like you've never heard before. Antennas from 100 KHz to 1000 MHz.

MFJ-38 **$16.95**

MFJ Antenna Switches

MFJ-1704 **$64.95**

MFJ-1702C **$24.95**

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.

World Band Radio Kit

Build this regenerative shortwave receiver kit and listen to signals from all over the world with just a 10 foot wire antenna. Has RF stage, vernier reduction drive, smooth regeneration, five bands.

MFJ-8100K **$69.95** *kit*
MFJ-8100W **$89.95** *wired*

21 Band World Receiver

MFJ's new 21 Band World Receiver lets you travel the world from your armchair! Listen to BBC news from London, live music from Paris, soccer matches from Germany and more! Covers 21 bands including FM, Medium Wave, Long Wave and Shortwave. *Sony*® integrated circuit from Japan, multicolored tuning dial, built-in telescopic antenna, permanent silkscreened world time zone, frequency charts on back panel. Carrying handle. Operates on four "AA"s. Super compact size!

MFJ-8121 **$39.95**

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Tech Help: (662) 323-0549

world band tuning tips

your monthly international radio map

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
0000	11725	Radio Cairo, Egypt	
0000	9400	Radio Bulgaria	
0000	15385	Radio Korea Int., South Korea	
0000	6090	Caribbean Beacon, Anguilla	
0000	4935	Radio Capixaba, Brazil	PP
0030	9575	Radio Medi Un, Morocco	FF
0030	4830	Radio Tachira, Venezuela	SS
0030	9810	Radio Ukraine Int.	
0100	6175	Voice of Vietnam, via Canada	
0100	3250	Radio Luz y Vida, Honduras	SS
0100	9935	Voice of Islamic Rep. of Iran	AA
0100	11735	Voice of Korea, North Korea	
0100	5636	Radio La Poderosa, Peru	SS
0100	6190	Radio Slovakia int.	
0100	9940	Radio Slovakia Int.	
0100	9870	Radio Austria Int.	
0100	7485	Radio Free Asia, via Tajikistan	vern
0100	15400	YLE/Radio Finland	Finnish
0130	13695	Radio Thailand	TT
0130	9770	SLBC, Sri Lanka	
0130	5905	Radio Ukraine Int.	
0130	21605	UAE Radio, Dubai	AA
0130	4940	Radio Amazonas, Venezuela	SS
0130	9715	Radio Tashkent Int., Uzbekistan	Uzbek
0130	6055	Radio Exterior de Espana, Spain	SS
0130	4052.5	Radio Verdad, Guatemala	SS
0200	17675	Radio New Zealand Int.	
0200	9770	BBC Relay, Seychelles	
0200	9835	Radio Budapest, Hungary	
0200	7180	Voice of Russia, via Moldova	
0200	9765	Voice of Russia	
0200	4965	Christian Voice, Zambia	
0200	5025	Radio Rebelde Cuba	SS
0230	4960	Radio Cima Cien, Dominican Republic	SS
0300	3320	Radio Sondergrense, South Africa	Afrikaans
0300	3291	Voice of Guyana	
0300	7225	RTT Tunisienne, Tunisia	AA
0300	6045	Radio Universidad, Mexico	SS
0300	7285	Voice of Croatia	
0300	6940	Radio Fana, Ethiopia	Amharic
0300	3340	HRMI/Radio MI, Honduras	SS
0300	9705	Radio Mexico Int.	SS
0300	3345	Channel Africa, South Africa	
0300	9885	VOA Relay, Botswana	
0300	3306	ZBC/Radio Zimbabwe	vern
0300	4895	Radio Bare, Brazil	PP
0300	7305	Vatican Radio	
0315	3240	Trans World Radio, Swaziland	unid
0315	7545	Kol Israel	HH
0330	5980	RTV Marocaine, Morocco	AA
0330	11915	VOA Relay, Sao Tome	unid
0330	7160	Radio Tirana, Albania	
0330	5840	Radio Canada Int., via Sweden	AA
0330	7100	Voice of the Broad Masses, Eritrea	vern
0400	4810	XERTA/R. Transcontinental, Mexico	SS
0400	4910	ZBC/Radio Zambia	Swahili
0400	9660	Radio Japan/NHK, via French Guiana	SS
0400	7200	Sudan National Broadcasting Corp.	AA
0400	9755	China Radio Int., via French Guiana	
0400	7345	Radio Prague, Czech Republic	
0400	7275	RT Tunisienne, Tunisia	AA
0400	6985	Voice of the New Sudan (cland)	
0400	5026	Radio Uganda	
0400	4910	ZNBC/Radio Zambia	
0400	11730	BBC Relay, Seychelles	unid
0400	9820	Radio Havana Cuba	
0400	5500	Voice of Peace/V of Democratic Eritrea	unid
0430	5985	RTVC, Congo Rep.	FF
0430	6015	VOA Relay, Botswana	PP
0500	6085	Bayerischer Rundfunk, Germany	GG
0500	6155	Radio Austria Int.	GG
0500	4951	Radio Nacional, Angola	PP
0500	5025	ORTB, Benin	FF
0500	5047	Radio Lome, Togo	FF
0500	6250	Radio Nacional, Equatorial Guinea	SS
0500	6900	Turkish Meteorological Radio	TT
0530	9665	Radio Nacional do Brazil	PP
0600	4783	ORTM, Mali	FF
0600	4760	ELWA, Liberia	
0600	7125	RTV Guineenee, Guinea	FF
0600	4915	GBC/Radio Ghana	
0600	5030	RTV Burkina, Burkina Faso	FF
0600	4845	Radio Mauritanie, Mauritania	AA
0600	6090	Radio Veritas, Liberia	
0800	6115	Radio Union, Peru	SS

UTC	Freq.	Station/Country	Notes
0800	6070	CFRX, Canada	
0900	5993	Radio Senado, Brazil	PP
0930	6090	Radio Esperanza, Chile	SS
1000	9885	Radio New Zealand Int.	
1000	4901	Radio San Miguel, Bolivia	SS
1000	4773	Radio Unica, Bolivia	SS
1000	5952	Radio Pio Doce, Bolivia	SS
1000	12085	Voice of Mongolia	
1000	4876	La Cruz del Sur, Bolivia	SS
1000	6135	Radio Santa Cruz, Bolivia	SS
1030	9520	Radio Veritas Asia, Philippines	CC
1030	6010	La Voz de tu Conciencia, Colombia	SS
1030	4870	La Voz del Upano, Ecuador	SS
1030	4919	Radio Quito, Ecuador	SS
1030	9500	Far East Bc. Company, Philippines	CC
1100	5020	Radio Horizonte, Peru	SS
1100	4800	Radio Buenas Nuevas, Guatemala	SS
1100	4774	Radio Centinela del Sur, Ecuador	SS
1100	4800	Radio Cultural Coatan, Guatemala	SS
1100	6010	Radio Mil, Mexico	SS
1100	5970	Radio Exterior de Espana, Spain, via Costa Rica	SS
1100	5240	Xizang PBS, Tibet	CC
1100	6130	Lao National Radio, Laos	Laotian
1130	3385	Radio East New Britain, Papua New Guinea	EE/Pidgin
1130	2310	ABC Northern Territories, Alice Springs, Australia	
1130	17625	Wales Radio int., via England	
1130	4830	Radio Litoral, Honduras	SS
1130	3355	Radio Simbu, Papua New Guinea	EE/Pdigin
1200	4870	RRI - Wamena, Indonesia	II
1200	6105	Radio Universidad, Costa Rica	SS
1200	4890	NBC, Papua New Guinea	
1200	3385	Radio Milne Bay, Papua New Guinea	EE/Pidigin
1300	15155	Voice of Turkey	
1300	9935	BBC Relay, Cyprus	AA
1300	9935	RS Makedonias, Greece	Greek
1300	15545	Voice of Islamic Rep. of Iran	AA
1330	9740	BBC Relay, Singapore	
1330	9705	Voice of Pujiang, china	CC
1330	15725	Radio Sawa, via Morocco	AA
1330	7365	KNLS, Alaska	
1400	9885	Pakistan Broadcasting Corp.	Urdu
1400	13790	Voice International, South Africa	CC
1400	9975	Trans World Radio, Guam	unid
1400	9820	All India Radio	
1400	11580	KFBS, Northern Marianas	CC
1430	17805	Radio Romania Int	
1430	17645	Voice of Russia	
1500	11335	Voice of Korea, North Korea	
1500	15435	BSKSA, Saudi Arabia	AA
1500	18960	Radio Sweden	Swedish
1500	15110	Radio Kuwait	AA
1500	17720	China Radio Int., via Cuba	
1500	21660	BBC Relay, Cyprus	
1500	15350	Voice of Turkey	TT
1500	21490	BBC via South Africa	
1500	15475	SLBC, Sri Lanka	
1530	15120	Voice of Nigeria	
1600	15240	VOA Relay, Morocco	
1600	15395	UAE Radio, Dubai	
1630	17695	Radio Netherlands Relay, Madagascar	DD
1630	11690	Radio Jordan	
1700	15355	Radio Japan/NHK, via Gabon	
1700	12050	Egyptian Radio	AA
1730	17535	Kol Israel	HH
1800	9780	Republic of Yemen Radio	
1800	9425	All India Radio	
1800	17705	Voice of Greece, via Delano	Greek
1800	11955	Radio France Int., via Gabon	FF
1800	11845	Radio Farda, USA, via Sri Lanka	Farsi
1830	15265	Channel Africa, South Africa	
1830	21485	Voice of Russia	FF
1900	11655	Radio Netherlands	
1900	11715	Radio Jamahiriya, Libya, via France	AA/EE
1900	11720	Radio Budapest, Hungary	
1900	15190	Radio Pilipinas, Philippines	Tagalog
1900	21655	RDP Int., Portugal	PP
1930	12105	Adventist World Radio, via Germany	
2000	21550	RDP Int., Portugal	PP
2000	13630	Radio Marti, USA	SS
2000	13765	Vatican Radio	
2000	11765	Radio Romania Int.	
2000	12105	Adventist World Radio via South Africa	FF
2030	11990	Radio Kuwait	
2030	9960	Voice of Armenia	
2100	15345	RTV Marocaine, Morocco	AA
2100	17680	Voz Cristiana, Chile	SS
2100	13745	Radio Free Asia, via Northern Marianas	CC
2100	21740	Radio Australia	
2130	9990	Egyptian Radio	
2130	11975	China Radio Int., via Mali	FF
2130	17820	VOA Relay, Philippines	
2130	9540	Radio Tirana, Albania	Albanian
2200	17510	KWHR, Hawaii	
2200	9580	Africa No. One, Gabon	FF
2200	9625	CBC Northern Quebec Service, Canada	
2200	11600	Radio Prague, Czech Republic	
2200	9870	BSKSA, Saudi Arabia	AA
2230	15565	Radio Vlaanderen Int., Belgium, via Bonaire	
2230	7190	Radio Africa, Equatorial Guinea	unid
2230	17880	Adventist World Radio via Guam	CC
2230	11660	Swiss Radio Int., via French Guiana	
2230	9630	Radio Aparecida, Brazil	PP
2230	17890	China Peoples Broadcasting Station	CC
2300	9655	Voice of Turkey	
2300	9675	Radio Cancao Nova, Brazil	PP
2300	17860	Deutsche Welle Relay, Rwanda	GG
2330	9635	Voz Cristiana, Chile	SS
2330	9675	RAI Int., Italy	II
2330	11815	Radio Brazil Central, Brazil	PP
2330	11635	Central Broadcasting System, Taiwan	CC
2330	12133.5	AFRTS/AFN, Florida	USB
2330	11900	Radio Bulgaria	
2330	6060	Radio Nacional, Argentina	SS
2330	15345	Radio Nacional, Argentina	SS

power up:
radios & high-tech gear

by Harold Ort, N2RLL

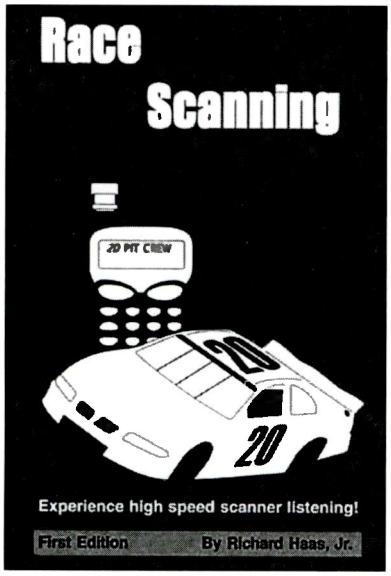
review of new, interesting, and useful communications products

Race Scanning Made Easy!

Every once in a while we get a product that knocks our socks off. It isn't always a mega-buck piece of radio equipment, but many times it's an accessory, or even a book. We were quite impressed with the small 40-page *TV Guide*-sized book, *Race Scanning* by Richard Haas, Jr., published by Universal Radio of Reynoldsburg, Ohio.

If you're not yet a hard-core race fan, but have been thinking about taking your handheld scanner to the track, you're in for a treat, because this is the only reference book you'll need. It includes chapters on the history of race communications, what you can expect to hear, what you need, racing terms, flags, tips and tricks, and even racing frequencies.

Our recommendation: Pack up the car, bring the family, and don't forget the scanner—and *Race Scanning*! It's an invaluable trackside resource, and it's only $4.95 from Universal Radio Research, 6830 Americana Pkwy, Reynoldsburg, OH 43068; Phone: 614-866-4267.



Race Scanning *is the latest book from Universal Radio in Reynoldsburg, Ohio. It's chock-full of invaluable information and is a must-have, especially if you're new to race scanning.*

New MFJ-1668 Manually Tuned Screwdriver Antenna

MFJ's new manually tuned screwdriver antennas let you operate all bands from 80 to 6 meters continuously, including all WARC bands and the new 60-meter bands (depends on model). MFJ says, "It far outperforms other HF compact antennas."

The antenna includes an extra long 10-foot (19-inch collapsed) telescoping whip for fixed mobile operation only. It vastly increases efficiency when you're stopped at a hotel or rest stop, etc. A 4-1/2 foot (23-inches collapsed) telescoping stainless steel whip is also included for mobile and limited-space operation. It has a highly efficient loading inductor. For highest Q, the coil is wound with heavy gauge wire with wide spaced turns on a core that is mostly air.

A tuning sleeve electrically removes turns to eliminate detrimental self-resonance effects caused by "wander leads." The tuning sleeve is on the low-impedance side of the coil to minimize power-robbing stray capacitance and detuning hand capacitance effects. Tuning is smooth, easy, and sure—the frequency stays put after you tune it. There is no tedious back and forth trial and error tuning procedure.

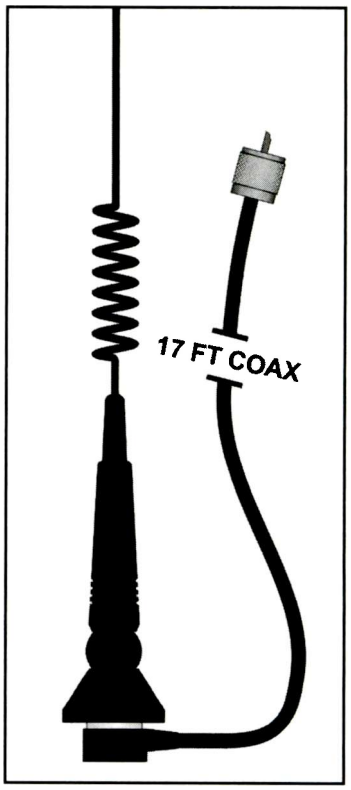
The whole coil assembly is one unit and does not move. A separate movable sleeve adjusts frequency. A nylon-tipped thumb-screw locks the sleeve. A wing nut lets you connect a matching capacitor or inductor for 1:1 SWR.

Standard 3/8 x 24 mounting hardware is used for both the loading coil and both whips, and you can use any standard 3/8 x 24 mount. The manually tuned screwdriver antenna handles 200 watts PEP. Add coax, connect ground/counterpoise and you're ready to operate.

The MFJ-1668 Manual Screwdriver Antenna covers 80 to 6 meters, and the continuously adjustable loading coil is 36 inches long by 2 inches in diameter and weighs 2.6 pounds. The MFJ-1668 costs $159.95 and is available from MFJ Enterprises, Inc., by calling 800-647-1800 or visiting them on the Web at www.mfjenterprises.com.

Firestik's No Ground Plane CB Antenna

Firestik's DS14-FG "No ground plane" (NGP) CB antenna kit was specifically designed to solve the lack of ground plane (counterpoise) problems found on vehicles constructed of plastic, fiberglass, wood, or aluminum. This includes, motor homes, boats, automobiles, and 18-wheeler trucks. Ground plane problems typically show up in the form of high standing wave ratio (SWR) and poor performance. The isolated ground plane that is built into this kit will also eliminate problems on metal base vehicles that lack the sufficient ground plane for proper operation. This could be due to the size of available ground plane (on ATVs, bicycles, motorcycles, wheelchairs, etc.), or because the operator chooses to mount the antenna in a location that doesn't properly take advantage of available ground plane. The DS14-FG kit has an adjustable base so you can mount it on the roof, trunk, top of fender, or on the side of a vehicle with up to 70 degrees of tilt from vertical. This is the perfect kit for motor home roofs, the roof of a pick-up camper or cap, the trunk deck of a Corvette, or the roof of a fiberglass or aluminum 18-



Firestik's No Ground Plane antenna is $49.99 (MSRP) and available from dealers nationwide.

wheeler tractor. The installed height above roofline is only 13.5 inches.

The radiating element on this antenna has a series of spring-like coils similar to most cellular phone antennas. The base coil has a built-in ball and socket that allows the user to hand-loosen the loading coil and either adjust the antenna's angle or lay it down for storage or washing. Adjusting the SWR is as easy as loosening a pair of set screws and moving the whip up or down as required. The rated maximum wattage for the antenna in this kit is 30 watts, which exceeds the FCC-authorized output of 4 watts by 650 percent. All parts of the antenna are finished in black.

The kit includes 17 feet of high-quality RG-58 A/U coaxial cable. Due to the vibrations found on all mobile installations, a multi-wire stranded center conductor is used to prevent breakage. Surrounding the center conductor is a long-life, flexible polyvinyl insulation. To guard against signal leakage, the center conductor is shielded with a copper wire braid that averages about 95 percent coverage (versus the industry standard of 70 percent). The coaxial feedline, besides being the conduit for the signal to reach the antenna, serves as a tuned circuit that creates the necessary counterpoise. If a longer cable length is required, the user may add standard RG-58 A/U cable between the radio and system cable, preferably in lengths that are multiples of nine feet.

The base of the Firestik mount is about 1.25 inches in diameter. An integrated rubber o-ring on the base seals the mount tightly to the vehicle. One 13/32-inch hole is all that is required to install the mount. All necessary hardware is supplied with the kit.

Each Firestik kit includes a free microphone hanger and comes complete with user installation documentation. Firestik notes that, "All antennas, regardless of style or manufacturer, *must* be tuned after installation on the vehicle. Transmitting antennas are not 'plug-n-play' devices." Firestik antennas carry a one-year, all-component warranty. For more information, contact at Firestik Antenna Company, 2614 E. Adams St., Phoenix, Arizona 85034-1495l; Phone 602-273-7151; Web: www.firestik.com. Don't forget to tell them you read about their No Ground Plane antenna in *Pop'Comm*.

Batteriesbatteries.com Announces First-Ever Print Catalog!

Batteriesbatteries.com just contacted us with news of their first-ever 24-page *print* catalog. They say, "This unusual catalog offers some of the nation's lowest prices and some very hard to find battery types."

Batteriesbatteries.com specializes in the redistribution of factory-fresh battery inventories declared surplus by some of the country's leading equipment manufacturers. It features specials on alkaline, zinc carbon, nickel cadmium, nickel metal hydride, lithium, lithium ion, cellular, and much more. Additionally, batteriesbatteries.com is a direct importer of batteries and battery packs from the Orient and offers wholesale and below wholesale prices.

This catalog will be of special interest to battery pack assemblers, distributors, dealers, MROs, OEMs, exporters, schools, police and fire departments, hospitals, government departments, institutions, and large quantity users. You're invited to call, FAX, e-mail, or write for a free copy of the batteriesbatteries.com catalog today. Their website is at batteriesbatteries.com. Write to P.O. Box 276, Alburg, VT 05440; E-mail: ted@batteriesbatteries.com; Phone: 514-739-8723; Fax: 514-345-8303.

by Kirk Kleinschmidt, NTØZ

ham discoveries

connecting as a radio amateur

Can't We All Just Get Along?

As I write this month's column, car bombs are still killing innocent civilians in Iraq, Israel, and Spain, the suspected Ohio freeway sniper has been taken into custody, and even Martha Stewart is looking at jail time for lying to the feds!

The world at large seems to be filled with hostility, and if we're not constantly vigilant, that hostility can creep into the relative sanctity of our beloved amateur radio. By its very nature, ham radio is a friendly pursuit. But—just like a typical kid who's seen 13,000 murders and more than a million TV commercials by age 16—the influence of the outer world *can* affect us. That crud can creep under our skin or get under our collars and spill over into our friendly hobby!

Be careful! Be mindful! You may not even recognize the wrong path as you begin to tread upon it.

Small, seemingly innocent infractions can accumulate and drag you down. Being rude on the air, being a lid (poor operator), causing intentional interference, kerchunking the repeater, letting the thrill of the chase transform you into an amateur radio monster all represent the wrong roads. All of these bad behaviors are committed by ops who started out as helpful, friendly hams.

I've been on the butt end of more than a few bad radio encounters. We all have. But I will never forget an incident that, for me, epitomizes bad operating. It left me feeling hollow and wondering about the integrity of my fellow hams.

I was 27 years old at the time, and I'd been a ham since I was 15. DXing and awards-chasing were my mainstays then. In all my years as a ham, I had never had a decent 80-meter antenna or a "good" 80-meter DX location.

Moving to the East Coast changed all that, and I set out in search of countries on the lower bands. My antenna wasn't *that* spectacular, however, and I didn't use an amplifier, so working Europeans on 80-meter CW was a thrill in itself. Heck, as a kid I'd worked hundreds of Europeans on 20, 15, and 10 meters, but never on 80. From my rather unspectacular Midwest location, working Europe on 40 meters was rare and exciting (with my present antenna, an 80-meter horizontal loop that I've mentioned in previous columns, working EU stations from Minnesota is now routine).

One night, much to my surprise, I heard a nice, "plenty strong" 80-meter CW call coming from a station in Oman. I was stunned! This wasn't just Europe, it was the Middle East! I knew I'd better catch this one as soon as possible (before the Packet Clusters Weenies got wind and all was lost).

I called. He came back to someone else. Next turn, I called again—and he came back to me! The problem was, he had only the "ØZ" part of my callsign, and he kept asking for the rest. What happened next shook my faith in amateur radio.

"ØZ? ØZ?" the op kept repeating, and every time he did a powerful station in Ohio kept transmitting its callsign on top of me (I looked up the callsign—a big-time contest club station).

Through five patient rounds the station in Oman kept trying to get my callsign, and each time he asked for me *only*, but the 8-land big-gun wiped me out. Finally, the Oman op apologized and moved on to work others who had swarmed in from Packet Cluster Land.

Make no mistake. The 8-lander wasn't confused. He could hear me just fine. He was simply being a lid—on purpose. And in the process he crushed my 14-year dream. He just took it away from me. After 20 years of hamming I have yet to work the Middle East on 80 meters!

I'm sure you've encountered something similar, and if you haven't yet, you will. Be prepared. Practice forgiveness in advance or your blood pressure will likely suffer (as mine did)!

The Thin Veneer Of Civilization

The specifics of how bad radio behavior comes about are probably moot. The fact is, ham operators—though technical pioneers, housewives, carpenters, and wonderful comrades—are people, too. And people act strangely every now and then. Always have...always will. Although every generation of new hams seems to think radio rudeness is a modern creation, it's not. (Old-timers often contribute to this myth by recounting radio's fabled "good old days," which when reviewed impartially, weren't always so good. Uncrowded, yes. Pioneering, sure. Filled with friendship and imbued with a sense of wonder, absolutely. Free of bad behavior, no way!).

Poor operating is probably more noticeable nowadays because the number of hams has dramatically increased over the decades, which ironically increases the need for good on-air behavior.

To our credit as members of a radio *service*, the ranks of those hams who are habitual offenders comprise a tiny minority. But a healthy dose of prevention is always a good idea. And erring on the side of courtesy is more desirable than its alternative.

In examining several facets of one key practice—finding a clear frequency—this month's column is really about common sense and common courtesy, qualities every new ham should cultivate (along with patience!).

A Frequency To Call Your Own

Hams, or groups of hams who, for whatever reason, seem to have "laid claim" to certain frequencies can be problematic in any era. FCC regulations and common courtesy clearly indicate that emergency communications *always* have priority. And when emergencies do not exist, frequencies are appropriately utilized on a "first-come, first-served" basis.

And even if everyone's not playing by the rules, *you* should. Here's how considerate operators find clear frequencies!

1. First, tune up your rig and/or antenna tuner with as little

power as possible. Carelessly laying down a strong carrier on an "in-use" frequency is rude at best, life-threatening at worst. Most modern antenna tuners and SWR/power meters will tune up just fine with 5 or 10 watts, instead of 100 or 1,000. If you're really considerate, use one of several new devices to tune up your antenna system without radiating *any* power.

2. Before you call CQ, tune the part of the band you want to operate on and *listen*. Then listen some *more*. You'll get a good initial idea of propagation and general activity, both of which vary daily, seasonally, and yearly.

3. When you've found what seems to be an unused, clear HF "channel," say (for voice modes): "Is this frequency in use? This is NTØZ." (Use your own callsign.) If you're using Morse code, send: "QRL?" No matter what "QRL?" meant in the early days, it now means, "Is this frequency in use?" If a frequency *is* occupied, you should hear a polite, "Yes it is, thanks for asking," or something similar. On CW you might hear "QRL" or the Morse letters "C" or "R."

Even if you get no immediate reply, the frequency may still be in use. This happens most often on 15, 10, and 6 meters, where, because of propagation, two ops may be conversing, but you can hear only one of them. Be patient! Keep your first transmission short just in case.

4. Considerate operating procedures should be the rule, not the exception. Set the best possible example for others. When that DX station says he's "listening for nines," if you're callsign doesn't have a nine, don't transmit, even if a dozen other ops do. When the DX is listening "up five," don't transmit on the DX op's calling frequency.

Repeaters

5. As usual, always *listen* before you key up a repeater. If others are using the machine and you need to make a call, simply say your callsign between their transmissions. When one of the ops acknowledges you, say, "This is NTØZ, I'd like to make a quick call." Wait for the go-ahead, then make your call simply, as follows:

"W1XYZ from NT0Z."

If your friend responds, ask him to move to a simplex frequency where you both can talk. Then, thank the others for letting you make the call and pop over to your new simplex frequency. If your call gets no reply, offer a quick "thanks" and clear off the machine so the others can resume. It's simple. It's common courtesy.

6. Emergencies are a whole different ball game. Interrupt an in-use repeater by saying, "Break," or "Break—emergency." Emergency situations *always* take priority, so don't worry about upsetting anyone's conversation.

7. Whenever you use the repeater, be sure to pause between transmissions so others can break in if necessary. And don't blab on endlessly during "prime time" repeater hours (early morning and late afternoon for most regions).

Exhibiting good radio behavior isn't always easy. Setting a good example may mean that you don't get through. You might miss that DX station. You might not get a chance to work that rare Special Event station. That long-winded op in New Hampshire or Wyoming may blab with his or her friends all morning, and never get around to you. If your operating practices win out, however, your dignity will still be intact, which is more important in the end. And it's more important for amateur radio.

Stay Courteous, Stay In Touch

Don't forget to send your QSL cards, questions, and letters to me at *Popular Communications*, "Ham Discoveries," 25 Newbridge Rd., Hicksville, NY 11801. And please take that step to be a courteous radio operator! ■

The Amateur's Code

All amateurs should strive to be the best operators possible. The Amateur's Code gives you a few good pointers. The original was written by Paul M. Segal, W9EEA, in 1928. This updated version can be found at www.arrl.org/acode.html.

The Radio Amateur is:

CONSIDERATE...never knowingly operates in such a way as to lessen the pleasure of others.

LOYAL...offers loyalty, encouragement and support to other amateurs, local clubs, and the American Radio Relay League, through which Amateur Radio in the United States is represented nationally and internationally.

PROGRESSIVE...with knowledge abreast of science, a well-built and efficient station and operation above reproach.

FRIENDLY...slow and patient operating when requested; friendly advice and counsel to the beginner; kindly assistance, cooperation and consideration for the interests of others. These are the hallmarks of the amateur spirit.

BALANCED...radio is an avocation, never interfering with duties owed to family, job, school or community.

PATRIOTIC...station and skill always ready for service to country and community.

ScanTech

by Ken Reiss, radioken@earthlink.net

strategies and techniques to keep YOU informed

Types Of Two-Way Radio Systems

We've gotten a number of letters recently asking about input frequencies and duplex systems, and as always, trunking. If these terms are old hat to you, please feel free to take this month off and spend more time listening to the frequency of the month. However, if these terms sound like geek...er...Greek, then you've come to the right place.

To get to the heart of the matter, we'll have to spend a few minutes talking about how two-way systems work, and then we can relate that back to your scanning.

Conventional Radio Systems

Let's start with a conventional radio system and work our way into trunking. Basically, we'll be working from the simplest type of system, called simplex, up to the most complicated: trunked radio systems (TRS).

I'm certain that if you've owned a scanner for more than five minutes, you probably have a pretty good handle on what conventional scanning is. If you've been scanning for any length of time, or if you've ever watched television, you'll have a pretty good idea of how conventional scanning works. "What's television got to do with this?", I hear you cry. Television uses channels, just like conventional scanning.

If you want to find the evening news, you turn on Channel 8, or 41, or whatever number it is in your city. When you're finished watching the news, there will no doubt be some mindless program to catch your attention. This is a good time to turn on your scanner and cut your losses. However, tomorrow night, when it's time for the news, or the mindless program you want to watch (hey, there's nothing wrong with entertainment), it will be on that same channel number. They don't change much, except for the occasional reshuffling by the cable company or FCC re-licensing.

Conventional scanning operates the same way. The agency (local police, for instance) applies to the FCC for a "channel" (I know, they have to go through frequency coordinators and a whole raft of other paperwork, but let's keep it simple). The FCC assigns, in due time, a frequency to that agency for their use, and except for certain shared channels or the business band where the rules are a bit different, the agency can expect that the frequency will be for their exclusive use in their geographic area. In fact, it's the job of the regional frequency coordinator to make sure that the same frequency does not get reassigned to another agency that's close enough that they would interfere with each other. That's not a small job with today's crowded bands.

So when we want to listen to that agency, all we need to know is that frequency and punch it into our radio, just like selecting a TV channel, and presto, there they are. The only difference, of course, is that TV channels broadcast on a continuous basis, whereas our public safety agency will only transmit when there's a need.

That's why we have a scanner in the first place. You fill up a bunch of channels in your scanner with frequencies of various agencies around you and you're scannin'. The radio steps from channel to channel waiting for something to happen. When something is found, the receiver opens the squelch so you can hear the action. When the transmission stops, the scan resumes where it left off. We can even get sophisticated and have our scanner check certain frequencies more often than others (priority scan) or, using computer software, develop all sorts of routines the scanner might do based on what frequencies are active at any given time. Of course, this requires a computer-controlled scanner and software to make it work, but it's all conventional scanning. One channel per customer, so to speak.

One great place to hear duplex operations is the ham band. The 2-meter band is full of duplex repeaters that hams frequently "talk around" as well. The "–" symbol above the 4 indicates that the transmit frequency will be lower than the receive frequency, and by default on this band, it's exactly 600 kHz lower; 146.340, or the 34/94 repeater!

If we want to get a little more sophisticated, we may switch to a *duplex* system. On these systems, the base unit transmits on one frequency, while the mobile units respond on another. Many state police agencies use this trick so that the dispatcher can always be heard, even if the response channels are busy.

One major disadvantage to either of these systems is the limited range of VHF where it is commonly used. The mobiles and base can talk to each other (primarily because of the height advantage of the base antenna), but other mobile units that are further away might not be able to hear the response—information that could be critical to a rapid and accurate response when seconds count. In a duplex system, there's no chance of this as the mobiles do not transmit on the base frequency.

A more common way to use a duplex system is to tie the two channels together into a repeater. The repeater listens for signals on one frequency (the INPUT channel) and rebroadcasts them on another (the OUTPUT channel). If you tune to the *output* channel you should hear both the base *and* mobiles as they talk back and forth. More importantly, so should the other mobiles!

On UHF, repeaters are very common and they are almost standard equipment on 800 MHz. On VHF Hi and Lo, they are not quite as common, although the 148- to 174-band is full of them. At one time the input and output frequencies were exactly 5 MHz apart on UHF; unfortunately, that's not the case any longer. Thought 800 MHz does offer some input bands where you can expect to find the input to repeaters about 45 MHz higher, it's not completely a law, either.

Communications Nightmare

Let's play the role of a communications coordinator of a small but growing public safety agency for a few minutes. You've applied for your conventional channel above and gotten a VHF-High band frequency. You've gotten all the equipment installed in several mobile units and everything's working fine. Well, almost fine. You've had your channel for some time, and you notice that the traffic is getting heavier. There's a lot of waiting for open-air time to dispatch calls. Officers are keying up on top of each other trying to get through. And there's way too much car-to-car chatter.

Wouldn't it be nice if we could maybe get a car-to-car channel, and possibly a second dispatch channel? That would work—we'll divide the city in half, North and South (or East and West if you prefer) and have two channels. We were smart and installed radios in the mobile units that have extra channel positions in them, so all we'll need is an extra dispatch console and a couple of frequencies.

So we write off to the FCC and say "we'd like a couple more frequencies." Of course, we can't just write to the FCC and say that, we have to put it on official "we'd like another frequency" forms, and dot the i's and cross the t's, but you get the drift.

The FCC writes back and says, "Gee, terribly sorry, dude, but we've only got frequencies available in your area on UHF." Well, of course, they don't really say "terribly sorry, dude," but they put it in an official government form letter that says, "no such luck" in FCC-ese, so to speak.

Now what? Put UHF radios in all the mobiles to accommodate the new channels? It's an expensive proposition: you'll have to buy new radios for every mobile. How about moving the new "North" sector to UHF and leaving the "South" (you can substitute "East" and West" if you like) on VHF? What if they need to talk to each other? Move everything to UHF? Can you get a third frequency on UHF? Now we have to buy new radios again. Bummer. Maybe we could wait until someone else moves off VHF and grab their frequencies. Perhaps. That could be a very long wait.

One solution might be to use some kind of talk-around. Many repeaters use a CTCSS tone on their input to minimize interference. (See last month's "ScanTech" for a full explanation of this concept.) Some systems are configured such that, by switching to a different channel position on the radio, they transmit and receive on the input frequency, but with no tone, or a different one. This can be used pretty effectively for a car-to-car channel without requiring a separate license and frequency. This is also done sometimes on the output frequency as well, so listen closely.

Trunking

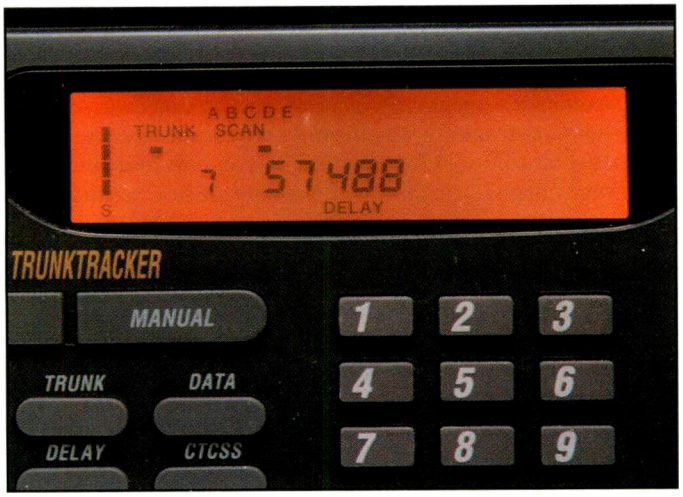
While installing a trunking system *will* mean that you have to buy new radios, it does give you some long-term options that you *can't* get with a conventional system. Part of the rapid move to trunking has been because there weren't any VHF or UHF frequencies available in certain areas, and the 800-MHz trunking frequencies opened up a lot of new channels. Even 800-MHz *without* trunking was the only way some agencies could get new conventional frequencies, so you will find some conventional channels on this band, but they are not common. Yes, we have to buy new radios, but as long as we're going to do that, let's get some with future expandability.

With a trunking system, our communications officer applies to the FCC for a block of frequencies, usually five at a time, although busy systems may need 10, 15, or even up to 30 frequencies. These are frequencies just like you were applying for before, but with a difference...

Now hold it, Dudley, you just said that getting even *two* more channels was going to be a problem. Now, I'm supposed to ask for five to 30? What are the chances of that? I'll bet the FCC has official, "Gee, that was funny, now get serious" forms to send out for these requests.

Well, not exactly. The 800-MHz band was sectioned off to allow trunking systems exclusively in a certain portion of the band. There are also some frequencies available in certain parts of the country in the 760-MHz range. These higher UHF signals do not typically travel as far as VHF and UHF (450-MHz) signals, and so the frequencies can be reassigned to another agency much closer together.

Combine this with the FCC's drive toward more efficient spectrum usage, and you'll more than likely get a "Great, here you go" form. The band is filling up, so someday we may see the



In a trunked system, the frequencies are no longer important. It's the talkgroup that acts as a virtual channel...and there are a lot of them versus the number of actual frequencies used. Lots of agencies like this concept just for that reason.

same problems here as we do on the lower bands, but it will take some time.

So now I have frequencies, what happens next? You need trunking equipment. These are special radios that take advantage of the trunking system to allow for increased efficiency in frequency usage. Remember that we applied for a *block* of frequencies, just like before. They are assigned for our exclusive use, also just like before, but after that, you need to forget all you know about frequencies. They are now almost irrelevant.

Channels!

The conventional system locks each function on a specific frequency. But, listen to your scanner and what do you hear most of the time? Silence. Most public safety nets do not transmit a large portion of the time. So the frequency is sitting there unused until someone decides it's necessary to talk. That's why we listen to these channels with a scanning receiver. All the cars assigned to Channel 3 stay on Channel 3 and hear a lot of nothing, while our scanner skips over that frequency because it's not in use until someone transmits.

What a trunking system does is create "virtual channels"; that is, a channel that looks and acts like a channel—everyone listens to Channel 3 and hears nothing most of the time, but without a designated frequency.

The block of frequencies for which we applied gets used more like "conference rooms" in a sense. One of the frequencies is dedicated to the trunking control system. This is a computer controller that manages the scheduling of these virtual channels.

Suppose we're listening to Channel 3 and nothing is happening—we're listening to silence, so why bother with being on a frequency? We can just monitor the control channel waiting for a command to meet in a conference room. When someone transmits (either the dispatcher or a car), the controller looks for an unused conference room (in this case, it is an actual frequency that isn't busy). Once it locates one, it sends out a command to all radios monitoring Channel 3 to meet in that conference room now. And the radio switches to that frequency and we hear the transmission, just like a regular conventional channel.

All of this finding a conference room and moving all the radios to it takes place in a fraction of a second. On some systems, the radio will emit a beep when the officer pushes the transmit button. That beep is to let them know not to talk until the system is ready and everyone should be in the room.

But the next time you want to talk on Channel 3, that conference room might be busy. No problem, we'll take any available room. So the next transmission might well take place on an entirely different frequency—any of the block of 30 that we could have. The officers in the car and the dispatcher can't tell the difference. It sounds just like Channel 3.

All this technology for normal operations sounds like a lot of trouble and expense to me. Ah, but remember our communications officer got in trouble when he wanted to expand the number of channels in his system. Here's where the trunking system shines. You've already got the block of frequencies assigned, so we don't have to bother the folks at the FCC, or exchange any fancy forms with them. All we do is create another virtual channel and assign some radios to use it. The controller can wait for that one to become active, just like it did Channel 3.

You Ever Listen To One Of These Things?

The trouble for us scanner folks comes in when we try to listen to a trunking system with a radio that's not aware of the coding system or the commands taking place on the control channel. Our *conventional scanner* just goes plodding along from frequency to frequency, catching whatever conversations might be happening in the various conference rooms as we go. So you might hear channel three officers with an exciting pursuit, and then the next conference room could be the dog catcher or some other equally interesting city service. The Channel 3 guys might have had several conversations in various conference rooms by the time you catch up with them again.

Here's where the trunking scanner comes into play. The point is that in order to follow the conversations, you *need to have a radio that knows how the system works*. A trunktracking scanner can follow that control channel information just like the radio in the police car. So you can hear only what happens in conference room 3, if that's what you're interested in. Or you can let it scan the virtual channels that you're interested in just like a conventional scanner. Once it's programmed, you won't be able to tell the difference either, but the programming is a bit different.

The Blocks

Trunking systems were designed so that not only public safety agencies could take advantage of all this high tech, but business users could, too. In fact, many business two-way radio systems are being migrated to trunking-based systems because it helps the owners of the systems increase capacity. One of the things that's advantageous to trunking is its ability to have many different types of users sharing the same system, because they won't know each other is there.

The trunking controller handles this problem is to divide the available channel groups into "blocks." There can be as many as eight blocks (numbered from 0 to 7) in the system, although some configurations might limit this number, or not all blocks may be in use. Within each block, it must be decided if the con-

troller and radios are going to use the Type I or Type II format of communications.

Type II is the newer one, and therefore more versatile. Most systems installed in the last several years have been Type II, and many systems that started out as Type I have been upgraded (particularly for public safety use). But a lot of cities also have Type I radios floating around from the "early days," and might like to use those.

Well, funny you should mention it—that's what is referred to as a Type IIi system. Certain blocks are designated as Type I blocks, and others are designated as Type II blocks. Of course, the controller has to keep up with who's on first, so to speak, but it's a computer with nothing better to do—a piece of cake.

Fleets And Subfleets

These terms get bantered about quite a bit, and a lot of confusion exists regarding their use. Technically, fleets and subfleets are the terminology used to describe a Type I system's blocks and channels. The fleet would normally be a cohesive group (water department, police department, fire department, particular company, etc.), and the subfleets would be the individual channels that were available to those radios. Often the radios would designate the channels by letter, and the users would be totally unaware that there were other fleets sharing their same system.

Talkgroups

The Type II terminology is "talkgroup" to describe a channel. Each talkgroup belongs to a block (you can divide the Uniden decimal number by 8192 to figure out what block a given talkgroup is in, if you care). Each talkgroup represents a channel to the users of the radio. In fact, the user of the radio probably doesn't have any idea if he or she is using a Type I or Type II system. It turns out that the Type II system is more efficient and flexible, so that's what we'd prefer, but a lot of Type I traffic is still out there and going strong.

No matter which system you have (or the combination of the two), the net result is the same, if everything is working correctly. The user has a channel to go to for a particular type of traffic (dispatch, records check, car-to-car, etc.) and they can talk to each other. The communications coordinator can create new channels at any time, assuming the maximum capacity of the system has not been exceeded, without exchanging memos with the FCC. And everybody's happy.

Fleet Maps

One of the reasons I mentioned we'd like to have a Type II system (from a purely scanner point of view) is that the software that runs the radio is set up to default to Type II operation. If your system runs entirely Type II, then you can start trunking right away.

Unfortunately, if you're system runs Type I or Type IIi, then we need a little more information in order to follow the *Type I* traffic, or to lock it out if you don't want to hear it in the search mode. What we need is information about how each of the blocks we mentioned earlier is configured (Type I or II), and if it's a Type I, how are the subfleets arranged?

It turns out that there are only certain ways that they can be arranged, called block sizes, and stored in your scanner as a size code. Put these codes all together and you have a "fleet map" for how your system uses the various blocks, fleets and subfleets, if appropriate, and talkgroups. Other systems besides Uniden deal with this information in completely different ways, but the Uniden system is easy to understand and simple to program.

And there you have it. Trunking provides great benefits to the communications industry by making better use of the limited frequency space available. You'll be seeing more and more of it and on bands besides 800 MHz as time goes on.

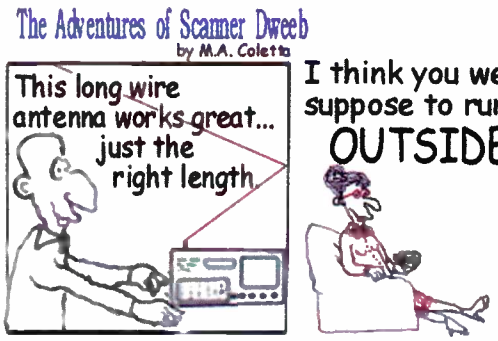
Frequency Of The Month

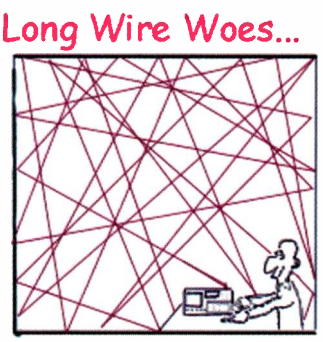
Our frequency this month, in keeping with our trunking theme, will be 154.875. Have a listen and let me know what you hear. Even if you don't hear anything, you can still send that in, and we'll enter your name into the drawing for a one-year subscription to *Popular Communications*. What have you got to lose?

Speaking Of Writing

Your input is always welcome. Send your comments, suggestions, photos, "Frequency of The Month" entries, and anything else you think might be of interest to fellow scanner listeners to Ken Reiss, 9051 Watson Rd. #309, St. Louis, MO 63126, or e-mail to radioken@earthlink.net.

Until next month, Good Listening! ■





by Steve Douglass, webbfeat@1s.net

utility communications digest

news, information, and events in the utility radio service from 30 kHz and beyond

Utility Room Utility Monitoring— How To Monitor The World From Your Kitchenette!

When the war with Iraq started, many friends and relatives asked if they could come over and sit in my kitchen. It was the same way during the events that took place on 9/11 and when the space shuttle broke up on reentry. During severe weather outbreaks or during times of international turmoil, the phone rings off the hook. "Can I come over and listen in?" or "What are you hearing?" they ask.

I don't live anywhere near Baghdad, New York City, or Dallas. Yet tucked neatly away in a corner of my breakfast nook in my tiny apartment is my "Command Center," where I can keep tabs on the state of the world. It's always ready at a moment's notice whenever disaster or breaking news happens. Flowing into my kitchenette is a steady pipeline of information on what is going on in my town, nation, and planet. My wife has nicknamed it "KITCHCOM" for Kitchen Command, but I'd like to think of it as the "War Room with a refrigerator."

Many UTE monitors might be surprised that I can successfully monitor so much in such a little space. It all goes to prove that you don't have to live on an acre of property and have a roof covered in antennas to be able to tap into the river of communications flowing through the air.

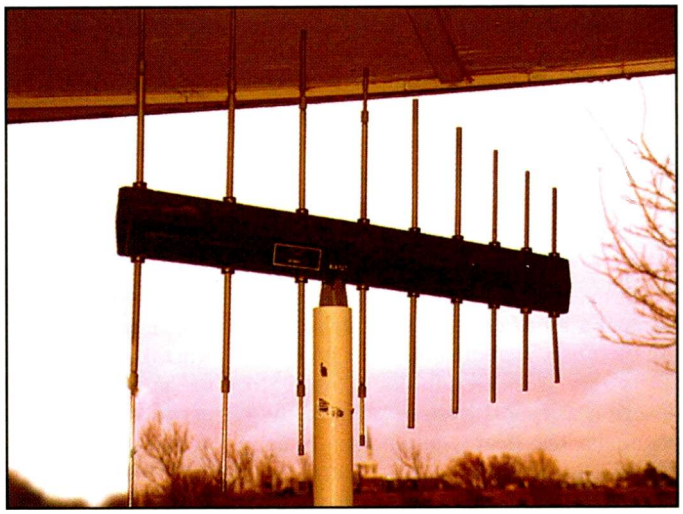
The "ears" of the system are just outside on my crowded balcony and consist of a military surplus UHF antenna, various wideband VHF/UHF antennas, and an "active" HF antenna connected to a metal rain gutter. Interestingly, my landlord and neighbors don't give my antenna farm as much as a second glance. They are well aware that I'm an electronics writer/junkie and also a storm spotter for the city. Most figure the equipment is used to keep tabs on the weather. Besides many of the balconies in my apartment complex are graced with an ever-growing crop of direct broadcasting satellite antennas, so mine are just an extreme form of theirs.

So How Does It All Work?

At the heart of the system is a bank of off-the-shelf scanning receivers, a vintage shortwave receiver, a computerized receiver, a communications system analyzer, two home PCs (and a standard Internet connection), and three cable-connected television sets. Except for the communications analyzer, nothing in my monitoring system is exotic or above the capabilities of the average TV technology junkie. Most everything is off-the-shelf or custom engineered by yours truly.

The Receivers

The main workhorses in my system are a WiNRADiO receiver and Bearcat 780 XLT scanner radio along with an analog shortwave radio, various scanning radios, and two-way radio transmitters. Together this mish-mash of equipment makes it relatively easy to intercept almost any type of communications from 5.3 kHz to 2.5 GHz.

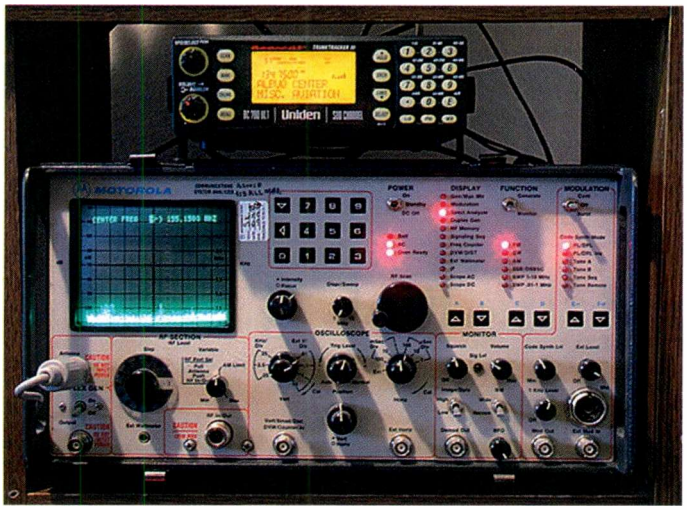


This is the author's compact AS-15405/PRC-41 military surplus antenna used for UHF MILCOM. Although not very big, it acts like a beam antenna many times its size and is a real champion at bringing in those weak signals. (All photos by Steve Douglass)

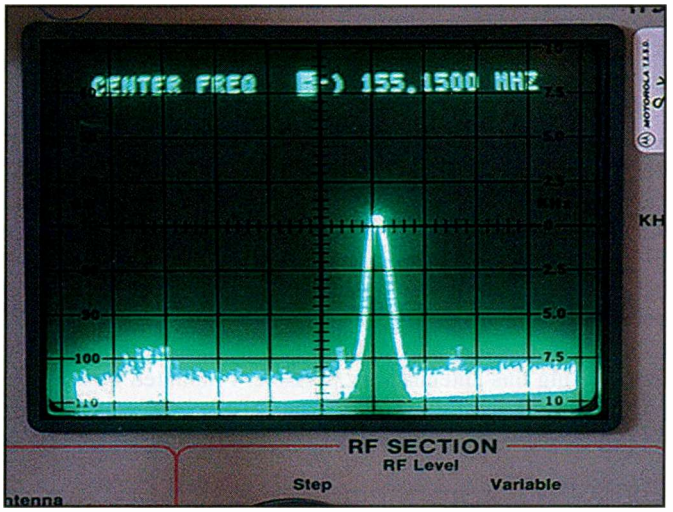
Just in case you've been living in a cave in Afghanistan and weren't aware, WiNRADiO manufactures a suite of PC- and Macintosh-compatible communications receivers that can turn any computer into a powerful and versatile radio communications monitoring station. Consisting of a black box (or a card that you can discreetly install inside your computer), the WiNRADiO receiver is an expandable system with plug-ins and programs (some designed for it by third-party software developers and hobbyists) that range from spectrum analyzers to direction finders. The latter can be very useful to law enforcement agencies in tracking down clandestine communicators, such as drug smugglers or terrorists. There is even a WiNRADiO device that will let you set up a communications interception station in a remote area, which you can monitor and control via the Internet!

My WiNRADiO 1550E has an incredibly large frequency range (from shortwave to microwave) and its reception modes include sideband, CW, AM, FM, and Wideband FM. Although it can be programmed to work like any scanning radio, what makes the WiNRADiO extremely powerful is the RF Spectrum Scope option. Used in conjunction with my Uniden BC-780XLT, the pair becomes a powerful communications intercepting duo.

I use my WiNRADiO to display a graph of the active frequencies in the military UHF aviation and satellite band (225



KITCHCOM's BC-780 sits upon the Motorola R2001D Communications System Analyzer. Together they are a potent pair of communication interception tools.



Close up of the Motorola R2001D Communications System Analyzer scope in action. Spectrum scope can display a 1- to 10-MHz chunk of the radio spectrum in real time.

to 399 MHz). As the receiver tunes through the band, active channels pop up like blades of grass across a graphic chart. I just let the receiver search all day until it finds any active channels. I then enter those frequencies into the highly sensitive Uniden Bearcat 780 XLT for continuous monitoring. With 500 memory channels available you have plenty of places to plug in new frequencies that the WiNRADiO digs up.

Ask any radio hobbyist to name one of the best (and most popular) scanning radios and the answer will be the Uniden Bearcat BC-780XLT. Although it doesn't offer shortwave (1 to 30 MHz) as the WiNRADiO system does, it covers VHF and UHF bands (30 MHz to 1.3 GHz) very well. The BC-780XLT combines computer programming capability with portability as it can be easily programmed via its computer interface and then installed in a vehicle for radio monitoring on the go.

Although the Uniden Bearcat 780 XLT is a champ at monitoring those exotic military channels, I also highly recommend it for scanning Homeland Security agencies as well as regular police, fire, and emergency channels.

Complementing my monitoring system is the venerable Panasonic RF-4900 shortwave receiver. I use it to monitor the U.S. military, UTE stations, and international broadcasts on shortwave. I bought mine at a good price on e-Bay, where many comparable and good-condition used shortwave radios can be found. If you decide to go receiver hunting on e-Bay, just make sure the receiver has SSB reception capabilities or you won't be able to monitor military, amateur radio, or the majority of UTE frequencies.

The "brains" of my radio intercept system is a Motorola Communication Analyzer R2001D. It's an amazing professional tool that can ferret out and analyze any radio signal between 1 MHz and 1 GHz. Unlike the WiNRADiO, this analyzer has a constant real-time spectrum scope that doesn't have to rely on a slow sweep of a band before showing the active channels on its CRT.

My Transmitters

During the severe weather season I can usually be found chasing twisters in the Texas Panhandle. However, there are times when I just can't pull myself away from work, but still want to help coordinate with local weather television storm spotter crews in the area. For this purpose I obtained a license and operate transmitters on VHF and UHF General Mobile Radio Service (GMRS) frequencies used by local spotter groups. Inside my chase vehicle is a *city-provided* VHF transmitter used for talking with my fellow Amarillo Emergency Service spotters on official frequencies.

I also use two Midland land mobile radio GMRS units (one base and one mobile) as a *back channel*. I use this to chat informally with other spotters (see "Into The Storm" elsewhere in this issue) and back and forth with KITCHCOM, where I have a GMRS base station for communicating with my wife (or a number of volunteers). I have no shortage of friends and volunteers who happily man KITCHCOM to monitor severe weather reports on television while connected to local weather radars on the Internet. They then relay critical information about the storm to me and other spotters via the GMRS base station.

Antennas: HF And Beyond

Because of my apartment logistics, a long-wire shortwave was out of the question. My first solution was to try a Citizen's Band 27-MHz steel whip antenna. To make up for the rather short antenna length, I ran the coax to a RadioShack shortwave antenna amplifier. I then grounded the antenna to a metal plumbing pipe with a short run of copper wire. Although the improvised antenna can't compare to a good long-wire dipole, reception above 15 MHz isn't bad, but sensitivity really falls off at lower frequencies. Still I have no problem receiving shortwave powerhouse broadcasters and even some relatively weak military sideband communications.

In light of these shortcomings, however, I decided to experiment. I tried running a very thin, almost invisible, single strand of copper wire to a tree in the apartment compound, about 70 feet away. Unfortunately, the high winds common in West Texas kept breaking the wire and I grew tired of climbing up the tree to repair it. I found a solution staring me in the face, though, when I noticed a metal flashing and gutter running the full length of the apartment complex. I attached a coax to it with an alligator clip, and connected it to my shortwave receiver via a MFJ anten-

na tuner and—bingo—I now have a natural HF antenna over 150 feet long! Signal strengths went through the roof (pardon the pun) on all bands!

For VHF and UHF coverage I use several off-the-shelf scanner antennas available at any electronics communications outlet. For UHF military I found a great MILSURPLUS antenna (AS-15405/PRC-41) at a local salvage shop, and it works wonders on the 225- to 400-MHz military aviation and satellite band. Vietnam War surplus, this is a compact beam antenna only three feet long but capable of amplifying a weak signal 20 dB over a standard dipole antenna. It's directional, but not overly so. In good used condition it cost me only $60, which included a cool carrying case making this antenna very portable. I mounted it on an old photographer's light stand and use an "Armstrong" antenna rotator (a.k.a., my own two hands) to point it in any direction I need.

Transmitting Antennas

It's one thing to run wires to a rain-gutter for shortwave reception, but installing an efficient UHF *transmitting* antenna is another thing altogether. Commercial UHF base station antennas are too big to mount on my tiny antenna-crowded balcony. The solution? I attached a trunk-lip mount NMO magnetic mount UHF GMRS mobile antenna to a surplus television wall-mounting bracket. I then calculated the length of several UHF radials, which I attached to this mount to provide a circular (omnidirectional) ground plane. I was surprised to see that the SWR (standing wave ratio) was very low.

The only problem I have encountered with this setup is that I have to turn off all my scanning radios before I key the mic, because the close proximity of the transmitter wrecked havoc with their sensitive circuits causing the receivers to overload and feed back.

So far there have been no complaints of interference from my neighbors, most likely because the antennas are outside and because I severely limit my transmissions to emergency communications only and resist the urge to chitchat.

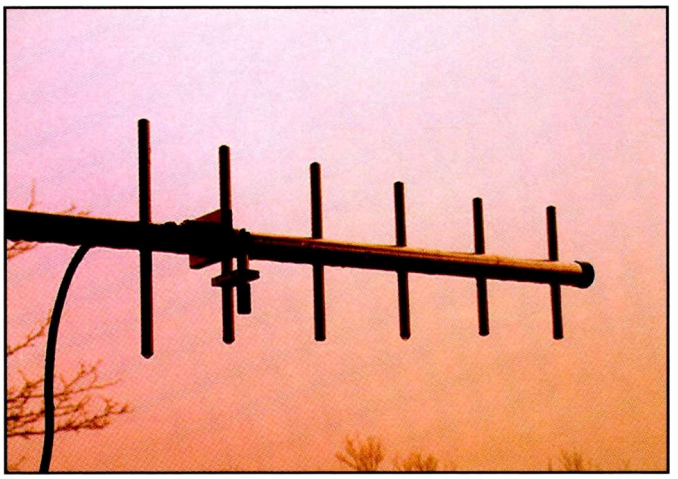
Getting It Wired

All the coaxial cables for receivers run into the mini-monitoring post through a RadioShack wall-through-tube that the previous tenants thoughtfully left in place. This was great because I didn't have to drill any holes in the walls and ruin my chances of getting back my rent deposit.

Electrical cords are kept in check with nylon cable ties with heavy-duty spike and circuit breaker-protected power strips, reducing the risk of short circuits or an overload and a fire. Plus, from time to time the landlady inspects the apartment and I didn't want a mass of tangled cables scaring her to death.

Listening In

My main monitoring interest is in military communications. But to supplement this source of information and to get a balanced picture of what is going on from a global perspective, I also twiddle the dials and search for what other nations' press agencies are reporting. Although news reports from some international shortwave broadcasters are sometimes heavily slanted against the U.S., they also have no compunction about reporting on classified military operations inside enemy countries and can be a good source of inside information.



Here's my compact beam antenna useful for frequencies above 800 MHz. This is a surplus antenna originally designed for 800-MHz trunking radio repeaters. "Compact" is the key word in selecting antennas to be mounted in a relatively small area like an apartment balcony.

Remember that these same broadcasters are also in the propaganda business so their claims are always suspect. However, keeping good records of what you hear on the military frequencies and combining that data with news reports will paint a clearer picture of what's going on in the world. In intelligence circles this is known as COMINT (Communications Intelligence) and provides a big piece of the information puzzle.

This is also where the televisions come in. Each of my three TVs is tuned to one of the 24-hour news networks. During times of conflict they're always on, with the volume turned down but the closed-captioning switched on.

Designing Your Own "KITCHCOM"

So by now you are probably asking how you can accomplish the same without spending a small fortune on receiving equipment and hiring a Ph.D. in electronics to put it all together for you. Fortunately there is a way, but on a smaller scale.

Many of the international shortwave broadcasters also broadcast in real-time over the Internet. Just install the latest version of Real Player, Windows Media Player, and a good MP-3 player on your PC and you're set. Do a search for shortwave broadcasters and you'll find links you can listen to on their sites. The big television networks, such as CBS, NBC, ABC, and CNN, also provide Real Audio (and Real Video) links as well.

But what about listening in on the military chatter online? There are two sites I enthusiastically recommend. To listen in on real-time VHF and UHF military chatter, point your browser to http://www.milAirComms.com/. There you'll find a link that will let you listen in on many military frequencies *live*. You'll also find a listing of military terms and equipment recommendations, just in case you decide you want to try your hand at military radio monitoring. Another site that lets you listen to the military on shortwave (also in real time) is Orexis Communications' (Umea, Sweden) at http://194.165.225.6/. Here you'll find a shortwave receiver you can control yourself and a chat-room that lets you talk to experienced radio monitors who can help explain what you are hearing. You must have a Java applet installed in your browser to do this; there are links on the site that point you to the proper downloads.

Another way to get a good handle on what's being intercepted on the military airwaves is to visit QTH.net and subscribe to a military monitoring news group, such as MILCOM or MILAIR. There you can talk with rabid military monitors or just lurk and read their radio interception posts, which are always fascinating.

Some of you are probably wondering if military monitors reporting to each other on what they hear could be considered compromising to military security. Keep in mind that the military only lets you hear what it wants you to hear. They can pull the plug at any time. Plus many communications that may sound to an eavesdropper like classified information (such as troop movements, etc.) are intended for enemy interception and are deliberate disinformation broadcasts!

In light of this, if in the heat of battle a military unit accidentally broadcasts real classified information, it's usually disregarded as bogus. In fact, it is not uncommon for units to flood the airwaves with bogus information from "phantom" units aimed at confusing an enemy even further. Still, experienced military monitoring hobbyists are aware that they may be posting sensitive information on the Internet and usually delay or edit their reports to reflect their respect for military communications security. None of us relish a visit by the FBI, which we know monitors the discussion groups. Those who do publish sensitive information are usually kicked off the news group by a moderator and banished from posting any information to the group.

MACK Attack

Speaking of war, during the Iraq conflict many of the U.S. Air Force Special Operations Command (AFSOC) MC-130 Combat Talons and AC-130 gun ships took heavy fire as they engaged in missions to drop Special Forces troops north of Baghdad before the official start of hostilities. These forces were essential in securing key assets in advance of the assault on Baghdad. In light of this, AFSOC wants to replace its aging fleet of fixed-winged insertion aircraft with a stealth multi-role aircraft that could also serve as a clandestine troop deployer and tanker for stealth aircraft, such as the F/A22, F-35, and B-2.

Those stealth geniuses at the Lockheed Skunk Works have released a classified design they say will meet the AFSOC's needs. It's known as MACK, an acronym representing M-X, A-X (a regular air lifter), CX (Cargo), and KX, a future refueling tanker.

MACK encompasses significant stealth characteristics, including engines mounted deep inside the fuselage, low observable (LO) material construction with broadband LO characteristics and stealth shaping. The MACK would also be fitted with state-of-the-art electronic self-protection and electronic attack devices to enable it to avoid detection or thwart an attack if one should occur. In other words, if the aircraft is detected and attacked, the MACK will be more than capable in defending itself, or even initiating an attack, against hostile forces with its two formidable retractable cannons, one mounted on the top of the fuselage and one below.

Reader's Logs

Do yourself and me a favor and put your loggings in the format listed below. As an added measure to ensure that your logs will be included, submit them in frequency order from low to highest. We are also now accepting your MILCOM logs from above 30 MHz!

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

2473.5: PBC (Dutch Navy, Goeree): 0108 RTTY 75 bd/850 Hz w/carbs. (RP)

2598.0: VCM (Canadian CG St. Anthony): 0901 USB w/MIBs & gale warnings in EE. (RP)

2582.0: Bermuda Harbor Radio heard at 0039 in USB w/mariner information Bulletins in EE. 24/02 (RP)

2609.0: FUO (FR Navy Toulon): 0111 RTTY 75 bd/850 Hz w/test tape. (RP)

4273.5: FUO (FR Navy Toulon): 0346 RTTY 75 bd/850 Hz w/test tape. (RP)

5263.0: ZORRO (Mexican Army): 0254 USB/ALE TO CICLON (Mexican Army). 24/02. (RP)

5550.0: 0200Z WEST 530 pos rpt w/NEW YORK Radio. (DS2)

5550.0: New York (MWARA CAR-B): 0123 USB w/PP-BIA (accented EE pilot) w/position report. 24/02. (RP3)

5598: 0144Z REACH 697 rpting position and flt ops to SANTA MARIA Radio. (DS2)

5598: 0142Z Air France 653 position rpt and SELCAL chk w/NEW YORK Radio. (DS2)

5696: 0100Z continuing. CAMSLANT Chesapeake wrking many CG assets in explosion/sinking of tanker off Carolina coast. Some CG assets included CG Rescue 1501, 1502, 6031, cutters *Sherwood*, *Altagard* (I think), and 277. (DS2)

5696: 0330Z USCGC EAGLE w/pos rpt to CAMSLANT. (DS2)

5696: 2330Z CG Rescue 1502 rcving traffic from LANTAREA concerning EPIRB from fishing vessel via relay CAMSLANT. (DS2)

6318.5: RT3 (unidentified): 0400 USB/ALE TO HMV (unidentified). (RP)

6318.5: RT3 (unidentified): 0342 USB/ALE TO STK (unidentified). (RP)

6507.0: Olympia Radio, Greek Maritime, tx schedule in EE/Greek: 2200 USB.

6586: 0109Z SKYTOUR 702 snding pos rpt/altitude to NEW YORK Radio. (DS2)

6604: 0155Z GANDER Radio w/aviation WX. (DS2)

6607: 0112Z UNID CW station sending groups of numbers. (DS2)

6628: 0158Z Iberia 6702 pos rpt to SANTA MARIA Radio. (DS2) (LA)

6754.0: Trenton Military: 0331 USB w/volmet. (RP)

6915.0: UNID, very long p/p in Russian, pulse dialing: 2015 USB. (LA)

8047.0: CECOM (U.S. Army Communications & Electronics Command, Ft. Monmouth, NJ): 1834 USB/ALE TO BDLNGB (unidentified National Guard Bureau). (RP)

8056.0: 309 (DLA 309, Defense Logistics Agency, Battle Creek MI): 1743 USB/ALE sounding. 24/02. (RP)

8110.0: O/M (JJ): 0234 USB w/O/M (JJ). 24/02. (RP)

The author's Panasonic RF-4900 and WiNRADiO 1550e, along with several vintage scanners used to monitor local public safety communications.

8297.0: O/M (EE): 1403 USB w/O/M (EE). Chat about riding out some rough WX at sea. Both speakers with U.S. southern accents, probably Gulf of Mexico fishermen. 22/02. (RP)

8434.0: OST (Ostende Radio): 0029 CW/FEC markers. 24/02. (RP)

8434.0: TAH (Istanbul Radio): 0030 CW/FEC markers. 24/02. (RP)

8431.0: TAH (Istanbul Radio): 2343 CW/FEC markers. (RP)

8601.5: O/M (SS) heard at 0319 in USB w/O/M (SS). (RP)

8646.5: FUJ (FR Navy Noumea): 0917 RTTY 75 bd/850 Hz w/test tape. (RP)

8682.0: NMC (CG Point Reyes CA): 0315 Fax w/sea state analysis chart. (RP)

8840.0: O/M (IT) at 0309 in USB w/O/M (IT). (RP)

8957: Shannon Volmet, Ireland with aviation WX in USB at 0115Z. (CG)

8983: 1328Z Auxiliary-Chesapeake rcving flt ops frm CG 2102. (DS2)

9022.2: O/M (CC): 2149 USB w/O/M (CC) in out-of-band activity. (RP)

9007.0: Trenton Military: 0243 USB w/Sentry 23 (E-3B AWACS, Tinker AFB) in pp/Raymond 24 (Offutt AFB) w/formatted report information. (RP)

9075.0: O/M (IT): 0045 LSB w/O/M (IT). Uses NATO phonetics in chat. (RP)

9075.0: O/M (IT): 0045 LSB w/O/M (IT). Uses NATO phonetics in chat. (RP)

10046.0: 4XZ (Israeli Navy Haifa): 0009 CW. Repeats TSTETSTEHHBB. 24/02. (RP)

10100.8: Hamburg Meteo: RTTY 50 bd/450 Hz w/5-digit WX ship reports. (RP)

10100.8: Hamburg Meteo: 1509 RTTY 50 bd/425 Hz w/synoptic WX. 24/02. (RP)

10945.8: CFH (Halifax Military): 0404 RTTY 75 bd/850 Hz w/NAWS. (RP)

10816.5: JIGNGB (unidentified Nat'l Guard Bureau) at 0743 in USB/ALE sounding. (RP)

11205.0: Halifax Military: 1420 USB w/F0P. Halifax Military tells F0P to QSY to A6P (not found). Confirms that 11205 is freq A6N. 22/02. (RP)

11205.0: Smasher (SouthCom Flight Watch Center): 2208 USB w/Evergreen 422 who report landing at Antioquia, Colombia, at 1512Z the departing Antioquia for Sante Fe de Bogota, Colombia. (RP)

11205.0: Unid: 0040 RTTY 75 bd/170 Hz. Possibly Argentine Navy. (RP)

11253: RAF Volmet, England with aviation WX in USB at 0125Z. (CG)

11300.0: KLM 566: 0003 USB calling Tripoli (MWARA AFI-3) w/no response. 24/02. (RP)

11521.7: Unid: 0410 CW w/cut numbers. Probable Cuban illicit. (RP)

12579.0: WLO at 1713 in SITOR in contact w/CBAL (merchant vessel *ALERCE*, Chile). (RP)

12857.5: 6WW (FR Navy Dakar): 0425 RTTY 75 bd/850 Hz. (RP)

13101.0: ERMRIO (Brazil Navy Radio, Rio de Janeiro): 2129 USB/ALE TO NAESPO (Brazilian Navy Aircraft Carrier, *Navio Aerodromo Sao Paolo* (A-12). (RP)

13110.0: WLO at 1306 in USB w/automated voice WX forecasts & announcements. (RP)

13264: Shannon Volmet, Ireland with aviation WX in USB at 1550Z (CG).

13354.0 New York (MWARA NAT-A): 1923 USB w/COTAM 1201 (French Air Force) w/flight routing. (RP)

13993.0: AFA4CU (Air Force MARS, ID as in TX-acting as NCS): 1930 USB w/net check-ins: AFA2DJ; AFA1MM; AFA3QU; AFA2DT; AFA2FK; AFA3WQ. (RP)

14671.0: CER41 (MFA Paris): 1635 USB/ALE TO LECAIRE (French Embassy, Cairo). Also noted on 15921.0; 16320.0. (RP)

14902.0: Aspen Gold 37 (Rocky Mountain Region CAP acting as NCS)heard at 1530 in USB w/Red Robin 194 (Michigan CAP-not heard) w/net check ins; Southwest Region (not heard); North Central Region (not heard); and Hill Cap 49 (West Virginia CAP-not heard). (RP)

15867.0: Service Center (U.S. Customs): 1904 USB w/J26 (not heard-CG HH-60J # 6026 CGAS Elizabeth City) trying help J26 with receiver problems. 24/02. (RP)

16077.0: MVD1 (U.S. Army Corps of Engineers, Mississippi Valley Division): 1246 USB/ALE sounding. 24/02. (RP)

17510.5: Danish Meteorological Institute (DMI) at 1350 Fax w/West Greenland Ice chart. (RP)

17362.0: WLO: 1403 USB w/automated voice announcements. (RP)

17940.0: Houston Radio: 1715 USB w/Air transat 149 (O/M Canadian FF) in pp w/Air Transat Dispatch (Y/L Canadian FF) who passes current WX conditions at Edmonton, Alberta. Air Transat 149 confirms he will be landing on runway 02 at Edmonton and his next stop will be Calgary. (RP)

17940.0: Houston Radio: 1722 USB w/Gemini 709 who reports landing at Santa Fe de Bogata (SKBO). (RP)

18012.0: Circus Vert (CFAP Hqs, Villacoublay): 1850 USB w/Circus Dore (Djibouti) who will call back after COTAM 1861 (French Air Force) takes off. 24/02. (RP)

18012.0: Circus Vert (CFAP HQs, Villacoublay): 1725 USB w/COTAM 1032 who reports take off from Reunion w/10 crew & 30 pax and 4 tons of cargo on 2 pallets. (RP)

18012.0: Circus Vert (CFAP Hqs, Villacoublay): 1855 USB w/Circus Orange (Dakar) who reports landing of COTAM 1864. Circus Vert has trouble hearing Dakar and says he will try to contact him via another method. 24/02. (RP)

19131.0 Flint Base (DEA Air Ops, Dallas, TX): 2102 USB w/Flint 921 and Flint 914 who are flying to Armadillo 100 (unlocated) to the Raytheon FBO there. Flight time is 3 hours 45 minutes. (RP)

19320.0: OLZ88 (MFA Prague): 1630 USB/ALE TO OLZ78 (Czech Embassy, Beijing?). (RP)

20330.0: CENTR8 (Romanian MFA, Bucharest): 1651 USB/ALE TO PPR910 (Romanian Embassy, Brasilia, Brazil). (RP)

20906.0: JIGNGB (unidentified National Guard Bureau) heard at 1754 in USB/ALE sounding. (RP)

20906.0: NBGNGB (Nat'l Guard Bureau, possibly Newburgh/Stewart ARB, NY) 1425 USB/ALE sounding. (RP)

This month's contributors were Lupo Alberto (LA); Chris Gay (CG); and Dwight Simpson (DS2). Thanks to all. ■

global information guide

listening to what your world says every day

by Gerry L. Dexter

VOA Drops Several Languages From European Services

Voice of America listeners in various parts of Europe have lost services in several languages. The VOA has dropped Bulgarian, Estonian, Hungarian, Czech, Lithuanian, Latvian, Romanian, Polish, Slovak, and Slovenian. The Ukrainian service has been cut in half, down to one hour per day, and it looks as though Armenian may be the next to be cut back or dropped entirely.

RFE/RL announced the cessation of service to Bulgaria and other former Soviet satellite countries late last year. But privatization has saved the day—the Bulgarian service has new life as Radio New Europe. The Radio New Europe Foundation, registered in Bulgaria, operates RNE. Though it is run by ex-RFE/RL employees it is otherwise completely divorced from RFE/RL and will get its operating revenue through grants from the Bulgarian government, other organizations, advertising, and perhaps even through the leasing of transmitter time.

Herald Broadcasting, the radio arm of the Christian Science church, has pulled the plug on WSHB, Cypress Creek, South Carolina. The 500-kW station was the last of a trio of high-power outlets the church operated at its peak of radio activity. Herald Broadcasting has been trying to find a buyer for the facility for some time and that effort will continue while the station sits silent.

North Korea is the target of a new clandestine broadcast, which was due to take to the air in late spring. Free North Korea Broadcasting, operated by defectors from the North, planned to broadcast one-hour programs pushing for democracy and human rights in the North. The group hopes to get some of its output picked up by the Voice of America and Radio Free Asia. At some point in the future they will "pursue" shortwave broadcasting aimed at the North.

Radio Nacional Paraguay has been absent from its perch on 9737 for some months now, apparently the result of equipment problems. But it should return soon (if it hasn't already) thanks to a new transmitter, courtesy of the Taiwan government. Radio Nacional will be cooking with 100 kW, presumably on its old, assigned 9735 frequency.

There are indications that, some distance down the road, we may—repeat *may*—see shortwave activity return from Djibouti (formerly French Somaliland). The U.S. Board of Broadcast Governors is looking for a contractor to supply a 50-kW transmitter there, as well as a 40-kW mediumwave transmitter to be installed at the Djibouti government's broadcasting site. The contract would also include new buildings and antenna systems. The BBG stresses that the station would not be owned or run by it or the U.S. government. We'd guess that this is payment for Djibouti's cooperation in the war on terror. But the whole thing is contingent upon the availability of funding, which is akin to going out to buy a little red wagon before you check what's in your piggy bank. Anyway, let's hope the thing clicks.

Radio Zimbabwe has reactivated its long inactive 3306 frequency, which is now being heard comparatively well during North American evenings.

Pirate Ironman Radio issued this QSL to Rich D'Angelo.

BPL (Broadband over Power Lines) is another step closer as the FCC has begun writing rules and regulations governing its use. Everything points to the implementation of this technology as the most devastating force shortwave radio has ever faced.

Bruce R. Burrow in Washington State is our book winner this month with a 2004 edition of *Passport to World Band Radio* now in his shack, courtesy of **Universal Radio**. For a copy of their terrific catalog of radio and related goodies give them a call at 614-866-4267, e-mail them at DX@universal-radio.com, or drop them a line at 6830 Americana Parkway, Reynoldsburg, OH 43068

Remember, your shortwave broadcast station logs are always welcome. Please be sure to double or triple space between items, list them by country, and add your last name and state abbreviation after each log. Also needed are spare QSLs you don't need returned, station schedules, brochures, pennants, photos, and anything else you think would be of interest. And we continue to wonder if any of you are brave enough to send in a shack photo. Don't be so shy!

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

ALASKA—KNLS, **7365** at 1335 mixing with unid station in CC. (Barton, AZ)

ALBANIA—Radio Tirana, **6115** with news at 0251 and **9540** in AA at 2151. (Charlton, ON) **7210** in FF at 2006. (Brossell, WI)

ANGOLA—Radio Nacional, **4950** in PP at 0051. (DeGennaro, NY) 0353 with pops, four time pips at 0400, and then news. (D'Angelo, PA) **11955** in FF at 2023. (Charlton, ON)

ANGUILLA—Caribbean Beacon, **6090** with Dr. Scott sermon at 0014. (Charlton, ON) **11775** at 1305. (Northrup, MO)

ANTARCTICA—Radio Nacional Arcangel, **15476** in SS at 1807. (Charlton, ON)

Contrary to what you might think, these folks aren't heard on WHRI. This QSL is from the old Voice of Free China, now Radio Taipei International. (Thanks to Sheryl Paszkiewicz, WI)

Abbreviations Used In This Month's Column

//	—	Parallel frequency
ABC	—	Australian Broadcasting Corporation
AFRTS	—	Armed Forces Radio Television Service
AFN	—	Armed Forces Network
AIR	—	All India Radio
anncr	—	announcer
anmt(s)	—	announcement(s)
BSKSA	—	Broadcasting Service of the Kingdom of Saudi Arabia
CNR	—	China National Radio
GOS	—	General Overseas Service
ID	—	identification
Int'l	—	international
IS	—	interval signal
Lang	—	language
LSB	—	lower sideband mode
NBC	—	National Broadcasting Corporation
OA	—	Peru, Peruvian
PBS	—	People's Broadcasting Station
Pgm	—	program
RRI	—	Radio Republick Indonesia
sked	—	schedule
SIBC	—	Solomon Islands Broadcasting Corporation
TOH	—	Top of the Hour
unid.	—	unidentified
USB	—	upper sideband mode
vern	—	vernacular (any local dialect or language)
VOA	—	Voice of America
VOIRI	—	Voice of the Islamic Republic of Iran

ANTIGUA—BBC Relay, **5975** at 2248 and **15190** at 1504. (Charlton, ON) **9679** to close at 1332. (Barton, AZ)

ARGENTINA—Radio Nacional, **6060** in SS at 2344. (Charlton, ON) RAE, **11710** in EE at 0205 and **15345** in SS at 2345. (Charlton, ON) 15345 in SS at 2350. (Brossell, WI)

ARMENIA—Voice of Armenia, **9960** at 2040 with IS, anthem, ID, schedule, program preview, news. (Burrow, WA)

ASCENSION ISLAND—BBC Relay, **15400** at 2052 and **21470** at 1508. (Chandler, ON) Family Radio via Ascension, **15195** with religious programming at 2008. (Jeffery, NY) Voice of America via Ascension, **7265** at 0257 sign on and into "Daybreak Africa." (D'Angelo, PA)

AUSTRALIA—ABC Northern Territory Service, Alice Springs, **2310** at 1212 with "Concert Hall" program from ABC Darwin. //2325-Tennant Creek and 2485-Katherine. (D'Angelo, PA) Radio Australia, **6020** in Pidgin at 0950. (DeGennaro, NY) **6080** at 1532 with "The National Interest" (Foss, Philippines) **9580** at 0132 and **21740** at 2105. (Charlton, ON) **11550** via Taiwan in unid language at 2317. (DeGennaro, NY) **11880** with Pacific news at 1914. (Burrow, WA) 1950 with U.S. pops. (Brossell, WI) **12080** at 0915, **13630** at 0830 and **15515** at 0430. (Barton, AZ) 21740 with "ASM" program at 2200. (Paradis, ME) 21740 at 2240. //**13620**, **15240** and **17795**. (MacKenzie, CA) Voice International, **13790** in CC with EE translations at 1425. (Brossell, WI)

AUSTRIA—Radio Austria Int'l, on **6155** in GG heard at 0506. (DeGennaro, NY) **7325** at 0113, **9870** in GG at 0144 and **17865** at 1617. (Charlton, ON)

BELGIUM—Radio Vlaanderen Int., **9590** via Bonaire at 0526. (DeGennaro, NY) **11730** via Bonaire at 2206. Also **15565** (via Bonaire) at 2237. (Charlton, ON)

BENIN—ORTB (p), **5025** with two men in FF heard at 2213. (D'Angelo, PA)

BOLIVIA—Radio Pio Doce, **5952.5** in SS at 0955, multiple IDs at 1000. (D'Angelo, PA) Radio Yura, Yura, **4716.7** at 0950 with chorale and choirs. (Wilkner, FL) Radio Mosoj Chaski, **3310** at 1005 with QQ talks, SS ID at 1015. (D'Angelo, PA) Radio Perla del Acre, Cobija, **4600.3** (p) at 0000. (Wilkner, FL) Radio Santa Ana, Santa Ana de Yacuma, **4650.3** at 1030 with yipping, musica Andina, ID. (Wilkner, FL) Radio Santa Cruz, Santa Cruz, **6134.8** at 1010 with rustic Bolivian vocals, woman anncr, and SS anmts. (D'Angelo, PA) **6135** with songs and music at 1000. (DeGennaro, NY) La Cruz del Sur, La Paz, **4876** in unid language at 1040. (DeGennaro, NY) Radio Unica, **4722.8** with man in SS hosting rustic vocals at 1018. (D'Angelo, PA) Radio San Miguel, Riberalta, **4901.7** at 0958 in SS with ID on the hour and some nice music but really poor modulation. (Montgomery, PA)

BOTSWANA—VOA Relay, **6015** in PP at 0444. (DeGennaro, NY) **7255** at 2219 and **9885** at 0304. (Charlton, ON) 9885 at 0350, news at 0400, then history of Iran. (MacKenzie, CA)

BRAZIL—Radio Nacional Amazonia, **6180** in PP at 1047. **11780** in PP at 1109. (DeGennaro, NY) 11780 at 2300. (Paradis, ME) 2328. (Brossell, WI) Radio Cancao Nova, Cachoeira Paulista, **5045** in PP with frequency anmt at 2329. (Charlton, ON) Radio Senado, Brasilia, **5992** in PP with ID at 1045. (DeGennaro, NY) **5993.2** with sign on at 0858. (D'Angelo, PA) Radio Pioneira, Teresina, **5015** in PP at 0108. (DeGennaro, NY) 2348 to 0201 close with rustic vocals and man in PP. Off with simple ID and no anthem. (D'Angelo, PA) Radio Capixaba, Vitoria, **4935** with religious talk in PP to formal ID at 2358. (D'Angelo, PA) Radio Bare, Manaus, **4895** with pop vocals and PP anncr at 0343, full ID at 0350. (D'Angelo, PA) 0425 with pops and ballads. (Strawman, IA) Radio Brazil Central, Goiania, **11815** with ID and talks in PP at 2333. (Brossell, WI) Radio Difusora Roraima, Boa Vista, **4875** with PP vocals at 0344 to close at 0404. (D'Angelo, PA) Radio Cultura Ondas Tropicais, Manaus, **4845** with national anthem, sign on at 1004. (Alexander, PA) Songs and PP DJ at 1040. (DeGennaro, NY) Radio Difusora Acreana, Rio Branco, **4885** with PP

talks, pops, jingle ID at 0456. Off at 0500. (D'Angelo, PA) 1015 with Brazilian country songs. (DeGennaro, NY) Radio Clube do Para, **4885** with PP talks and music at 1018. (DeGennaro, NY) Radio Brazil Central, Goiania, **4985** at 0057 with PP talk. (DeGennaro, NY) Radio Rio Mar, Manaus, **9695** with ID, regional news in PP at 1030. (DeGennaro, NY) Radio Anhanguera, Goiania, **4915** with PP talk and music at 0037. Also **11830** with news at 2126. (DeGennaro, NY) Radio Alvorado, Parintins, **4965** with rapid-fire news and commercials in PP at 1012. (DeGennaro, NY) Radio Bandeirantes, Sao Paulo, **9645** with PP talk at 0531. (DeGennaro, NY) Radio Educadora, Braganca, **4825** with PP ID at 0941. (DeGennaro, NY) Radio Nacional do Brazil, Brasilia, **9665** with PP interview at 0536. (DeGennaro, NY) Radio Aparecida, Aparecida, **9630** in PP with traditional music at 2030. (Linonis, PA) Radio Difusora do Amazonas, Manaus, **4805** in PP at 1035. (DeGennaro, NY) Radio Educacao Rural, Tefe, **4925** with commercial for Central Electronico at 1053. (DeGennaro, NY) Radio Rural, Santarem, **4765** in PP at 1005. (DeGennaro, NY) Radio Missoes da Amazonia, Obidos, **4865** with religious message in PP at 1046. (DeGennaro, NY)

BULGARIA—Radio Bulgaria, **7500** at 1830 with ID and news. (Brossell, WI) 7500 at 2144, **9400** at 0100, **11900** at 2337 and **15700** in BB at 1118. (Charlton, ON) **7400**//9400 at 0003. (Burrow, WA)

BURKINA FASO—Radio TV Burkina, **5030** heard at 2238 with long FF talk and tribal vocals. (D'Angelo, PA) 0557 sign-on in FF. (Alexander, PA)

CANADA—CBC Northern Quebec Service, **9625** in presumed Inuit with weather and hockey scores at 2200. (Linonis, PA) Radio Canada Int., **5840** via Sweden in AA at 0350. (Brossell, WI)

CHILE—Voz Cristiana, **9635** heard at 2240 with SS religious talk, many IDs at 2258, news at 2300. Closed at 0000. (Alexander, PA) **17680** in SS at 2038. (Charlton, ON) 2230. (Barton, AZ)

CHINA—Music Jammer **9905** covering Radio Free Asia, Palau, at 2318. Also **11790** against RFA-Northern Marianas at 1948. 9Brossell, WI) CPBS (p), **5030** in CC at 1310. (Barton, AZ) **17890** in CC at 2250. (MacKenzie, CA) Xizang PBS, Lhasa, **4920** with Tibetan talks and music, news at 2300. (D'Angelo, PA) **7345** in CC at 2226. (Foss, Philippines) Xinjiang PBS, Urumqi (p) **4980** at 0008 with man and woman talks in presumed Uighur, some vocals. (D'Angelo, PA) Voice of Pujiang, **9705** in CC at 1355. (Brossell, WI) China Radio Int., Kunming, **9440** in CC at 1126 and **11975** via Mali at 2130 in FF. (DeGennaro, NY) **9580** via Cuba at 0109, **9790** (via Cuba) at 0107, **11980** at 1218, **13675** at 0144, **13680** via Canada at 2353, **15725** at 1519, **17720** at 1505. (Charlton, ON) 9585 at 1909. (Burrow, WA) 11900 at 1325. (Northrup, MO) 11975 in CC at 2300. (Paradis, ME) 15215 at 1030. (Ziegner, MA)

CLANDESTINE—Radio Nacional de la RASD, **7460** at 2302 with vocal, end of AA program, SS ID, and continuous music. Sign off ID and closedown anmts at 0001 and short orchestral national anthem. (D'Angelo, PA) SS talk and various waltzes including Blue Danube. (Johnson, IL) Voice of the Tigray Revolution, **5500** at 0405 with regional music. Very weak and serious fades by 0450. (Johnson, IL) 0428 with man in local language and news comments with music between items. At 0430 woman with music program. (Montgomery, PA) Voice of Peace/Voice of Democratic Eritrea, **5500** with sign on at 0357. Fairly strong signal but audio level was very low. (Montgomery, PA) Voice of Biafra, **7380** via South Africa with 2100 sign on, EE talks about Biafra and ID "Voice of Biafra International, coming to you from Washington, D.C." (Alexander, PA) Radio Rhino Int., via Germany, **17870** at1502 with EE and commentary about UN involvement in Uganda. Off at 1557. (Johnson, IL) 1545 comparing Iraq with Uganda and need for regime change there. (Paradis, ME) RFE/RL via Kavala, **9435** in unid language at 1522. (Foss, Philippines) Radio Sawa, **11825** via Sri Lanka in AA at 1810. (Brossell, WI) 2031. (DeGennaro, NY) **15725** via Morocco in AA at 1335. (Brossell, WI) Radio Farda, **11845** in Farsi with U.S. pops and ID at 1815. (Brossell, WI) Radio Free Asia, **13745** via Northern Marianas in CC at 2140 under China Music jammer. (Barton, AZ) Echo of Hope, **6348** at 1146 with man in KK and possible ID "Huimang a me-air" (Montgomery, PA) Radio Marti, **13630** in SS at 2024. (Charlton, ON) Voice of New Sudan, **6985** heard at 0422 with continuous AA music, bells, and fanfare at 0430 and woman with short talks. (Montgomery, PA)

CONGO (Republic)—RTV Congolaise, **5985** with 0430 sign on with local music, opening FF anmts with ID, and FF talk. Mixing with WYFR. (Alexander, PA) 0432. (DeGennaro, NY)

COLOMBIA—La Voz de su Conciencia, Puerto Lleras, **6010** with SS religious talks at 1049. (DeGennaro, NY) Ecos del Atrato, Quibdo, **5019** in SS at 1118. (DeGennaro, NY)

COSTA RICA—University Network, **11870** with Gene Scott at 1225. (Northrup, MO) Radio Universidad, San Jose, **6105** at 1156 with easy instrumental music, man with SS ID at 1202, and into classical music. Also at 0225 with long blocks of classical music. (D'Angelo, PA)

CROATIA—Croatian Radio **6165** in Croatian at 0512. (DeGennaro, NY) **7285** in EE at 0302. (Burrow, WA)

CUBA—Radio Havana Cuba, **6000** heard at 0110, **9820** at 0133, **11760** at 2039, **15120** in SS at 2139 and **15230** in SS at 2133. (Charlton, ON) 9820 at 0400. (MacKenzie, CA) 0545. (DeGennaro, NY) **11655** in SS at 1325, 11760 in SS at 1330 and **11800** in SS at 1300. (Northrup, MO)

CYPRUS—BBC Relay, **9935** in AA heard at 1317. (Brossell, WI) **21660** at 1505. (Charlton, ON)

CZECH REPUBLIC—Radio Prague, **6200** at 2051, **7345** at 0200, **11600** at 2229 and **17485** at 1726. (Charlton, ON) 7345 at 0415. (Barton, AZ) 17485 in unid language at 1629. (Jeffery, NY)

DOMINICAN REPUBLIC—Radio Cima Cien, Santo Domingo, **4960** at 0250 with rapid-fire SS talk and Latin pops. (Linonis, PA) 0254. (Jeffery, NY)

ECUADOR—HCJB, **9745** in SS at 0413. (MacKenzie, CA) **11920** in PP at 0130 and **15115** with free CD offer at 0129. (Charlton, ON) 1245 with "DX Party Line." (Paradis, ME) Radio Centinela del Sur, Loja, **4773.8** at 1113 with long SS political talk, music, ID, commercials, another long talk. (D'Angelo, PA) Radio Oriental, Tena, **4781.4** at 1015 with SS talk, ID, anmts, music. Heavy swisher QRM. (D'Angelo, PA) La Voz del Upano, Macas, **5040** with national anthem at 1040, many IDs, anmts, SS talk, local music. (Alexander, PA) Commercials in SS at 1053. (DeGennaro, NY) Radio Quito, **4919** with ID at 1024, music, commercials. (DeGennaro, NY)

EGYPT—Egyptian Radio/Radio Cairo, **9988** in AA at 1805. (Brossell, WI) **9990** at 2130 with time pips, possible ID, anthem, news. (Burrow, WA) 9990 in AA at 2211 and **11725** with program contents at 0017. (Charlton, ON) **12050** with Middle Eastern music and AA talk at 1715. (Barton, AZ) 2136 with possible drama in AA. (DeGennaro, NY)

ENGLAND—Wales Radio Int., **17625** via England at 1145 with interview and music. (Jeffery, NY) BBC, **12095** at 0057, **15190** in EE at 1505, **15400** via South Africa at 2128, **17640** in EE at 1423. (Charlton, ON) **15180** in AA at 1612. (Jeffery, NY) 15400 at 1825. (Ziegner, MA)

EQUATORIAL GUINEA—Radio Africa, **7190** in unid language at 2256 with ham QRM. (Charlton, ON)

ETHIOPIA—Radio Ethiopia, **9561** at 1646 with interview, music, clear ID at 1700 and into possible FF. Frequency drifts slightly. (Burrow, WA) Radio Fana, **6940** in presumed Amharic at 0310. (Brossell, WI)

FINLAND—YLE/Radio Finland, **13665** in Finnish at 1655 with IS, woman talk. (Barton, AZ) **15400** in Finnish at 0102. (Charlton, ON)

FRANCE—Radio France Int, **6175** in SS at 1005. (DeGennaro NY) **11955** via Gabon in EE at 2252, **15160** with sports news at 1623, **17515** with letters at 2252, **17620** at 1432, **17820** at 1449 and **21580** in FF at 1521. (Charlton, ON)

FRENCH GUIANA—RFI Relay, (p) **15515** in SS at 2107. (Jeffery, NY)

GABON—Radio France Int. relay, **11955** in FF at 1815. (Brossell, WI) 2040 in FF. (Charlton, ON) Africa Number One, **9580** at 2000 in unid language. (Paradis, ME) 2210 in FF. Also **15475** in FF at 1638. (Chandler, ON)

GERMANY—Deutsche Welle, **3395** in GG at 2130. (Paradis, ME) **6075** in GG at 0210, **15205** in EE at 2101, **17810** in EE at

2048, **21780** in FF at 1530. (Charlton, ON) **7400** via Irkutsk, Russia, in GG at 1043. (DeGennaro, NY) Adventist World Radio via Germany, **12105** at 1959 sign-off. (Charlton, ON) Sudwestfunk, **7285** in GG at 0400 with possible news and weather. (Linonis, PA) Deutschland Radio, **6005** at 2223 with woman host and FF pops. ID prior to 4+1 time pips at 2300, then news. (D'Angelo, PA) Evangelische Missions Gemeinden (p) **9860** via DTK facilities at 2220 to 2230 close. Many similar broadcasts and hard to keep them straight. (D'Angelo, PA) Bayerischer Rundfunk, **6085** in FF at 0500 sign on. (DeGennaro, NY)

GHANA—GBC, **4915** at2135 with choir, EE religious talks to 2200 ID and news. (D'Angelo, PA)

GREECE—Voice of Greece, **5865** in Greek at 0412. (DeGennaro, NY) **9935** in Greek at 1317. (Brossell, WI) **12015** in Greek at 2035 and **17705** via Delano in Greek at 1827. (Charlton, ON)

GUAM—Adventist World Radio/ KSDA, **11850** to Asia at 2152 and **11980** at 2008. (Charlton, ON) **17880** in CC at 2255. Continued in Mandarin at 2300, **//11700** and 11850. (MacKenzie, CA) Trans World Radio/KTWR, **9975** at 1405 in unid Asian language. (Brossell, WI)

GUATEMALA—Radio Coatan, San Sebastian, **4780** at 1034 sign-on with religious music, opening SS anmts. (Alexander, PA) Radio Verdad, **4052.5** at 0405 with marimba music and SS talk. Live preacher at 0415 and later "Spiritual Songs" program with EE speaking host. Off with anthem at 0600. (D'Angelo, PA) 0447 with religious music, ID at 0459, and off at 0500. (Montgomery, PA) Radio Buenas Nuevas, San Sebastian, **4779.8**, with SS religious message at 1102. (DeGennaro, NY) Religious talk and folk music at 1230. (Barton, AZ) 2340 with ID and SS talk. (Brossell, WI)

GUINEA—RTV Guineenne, **7125** at 2323 mostly in FF but occasionally in local language. Man with music program, closing anmts and national anthem. Off at 0001. (Montgomery, PA)

GUYANA—Voice of Guyana, **3291** with EZL music, soft-spoken anncr at 0138. (Paszkiewicz, WI) 0320 with female vocals. Also at 0500 with BBC programming. (Montgomery, PA) 0403 with news and commercials. (Brossell, WI) BBC programming at 0700. (Alexander, PA) **5950** with Sunday services at 1038. (Charlton, ON)

HAWAII—KWHR, **17510** with Christian rock at 2207. (Foss, Philippines)

HONDURAS—HRMI/Radio Misiones Internacionales, **3340** at 0245 with SS religious programming, "Radio MI" IDs, and 0300 and 0504 sign-off. (Alexander, PA) (t) at 0340 with man in SS and slow music, modulation is a bit muffled. (Montgomery, PA) Radio Litoral, **4830** at 0100 audible after Radio Tachira signs off. Religious music, SS talk, "Searchlight" EE program at 0430. Off at 0503. (Alexander, PA) 1212 with music and man anncr. (Jeffery, NY) Radio Luz y Vida (t), San Luis, **3250** with man in SS at 0030. (Montgomery, PA)

HUNGARY—Radio Budapest, **9825** at 2203 with news in presumed Hungarian. (Brossell, WI) **9835** at 0207 and **11720** at 1902. (Charlton, ON)

ICELAND—Iceland Radio (Rikisuvarpid) (t), **13865** monitored at 1419 with man/woman anncrs in Icelandic. One mention of Reykjavik. (Montgomery, PA)

INDIA—All India Radio: **4820**-Kolkata, at 0025 with "Song of India" mixing with Tibet PBS and Codar QRM. (Strawman, IA) 4790-Chennai, 0004 with Hindi vocals and talks in Tamil. Closed at 0045. **4840**-Mumbai at 0026 with flute music, 0030 ID and news; **4920**-Chennai at 1227 with Hindi vocals, 4+1 time pips at 1230 and EE ID, news. **4895**-Kuresong, 1220 with vocals, 5+1 time pips at 1230, EE ID and news. 5010-Thiruvananthapuram, 0032 with news in EE, ID, flutes, another ID at 0040 and Hindi instrumentals. (All D'Angelo, PA) **6155**-Delhi, 0200 with ID and music. (Paradis, ME) **9425**-Bangalore, with EE news at 1820. (Brossell, WI) **9445**-Bangalore at 2205, **11620**-Bangalore at 1906 and **13605**-Bangalore at 1906. (Chandler, PA) **9820**-Panaji (Goa) with drums and sitar at 1435. (Barton, AZ) **15050** at 1427 with local music in Hindi. (Montgomery, PA)

INDONESIA—Radio Republik Indonesia-FakFak, **4790** at 1240 with continuous II pops, SCI theme at 1259 and talk in II. (D'Angelo, PA) RRI-Wamena, **4870** at 1225 with II pops, man anncr, apparent ID at 1300 and into news. (D'Angelo, PA)

IRAN—VOIRI, **7190** in EE at 1605 and **11695** in EE at 2008. (Barton, AZ) **9665** in SS at 0041, **11860** in AA at 1930 and **15545** in AA at 1318. (Chandler, ON) **9935** at 0059 with AA talk, woman with short announcements at 0101, then back to male, then both with possible newscast. (Montgomery, PA)

ISRAEL—Kol Israel, **7545** in HH at 0333. (Brossell, WI) **15615** in HH at 1857 and **17535** in HH at 1728. (Charlton, ON)

ITALY—RAI, **9675** in II at 2349 and **21520** in II at 1529. (Charlton, ON) IRRS, Milan, **5775** at 0034 with woman anncr and tentative ID at 0052 after several tunes. Back to music at 0056. It was gone by top of hour. (Montgomery, PA)

JAPAN—Radio Japan/NHK, **6110** via Canada in JJ at 2205, **6120** via Canada at 1139, **6145** via Canada at 0052, **11705** via Canada at 1517, **11730** in JJ at 1415, **11855** via Ascension at 2119. (Chandler, ON) 6120 with news at 1100, **7200//9505** at 1530. (Barton, AZ) **9845** at 1406. (Brossell, WI) 11705 in JJ at 1325. (Northrup, MO) **15355** via Gabon at 1700 sign-on. (Linonis, PA) **17810** in VV/CC at 2325. (MacKenzie, CA)

JORDAN—Radio Jordan, **11690** with western pops at 1615. (Paradis, ME) 1630 with pulse-type QRM. (Linonis, PA) 1653. (Burrow, WA) 2244 with songs. Heavy RTTY QRM. (Charlton, ON) **11810** in AA at 1420. (Brossell, WI)

KALININGRAD—Voice of Russia World Service, **6235** at 2119 to 2200 close; Joe Adamov with mailbag, music program, ID, and close at 2158. (D'Angelo, PA)

KUWAIT—Radio Kuwait, **11990** in EE at 2015. (Charlton, ON) **15110** in AA at 1532. (Jeffery, NY)

LIBERIA—ELWA, **4760** with EE religious talks, choir, at 2151. New program segment at 2200, then sign-off ID and anmts at 2230 and orchestral national anthem. (D'Angelo, PA) 0714 with local EE religious program, ID at 0722, messages from HCJB and U.S.-produced religious programming. (Alexander, PA)

LIBYA—Radio Jamahiriya, **11715** via France at 1926 with EE news, into FF news at 1929, **//11635**. (Alexander, PA) **15220** via France at 1618 in AA. (Jeffery, NY) **15435** in AA at 2115 (*didn't think this was active—gld*), **17625** in AA at 1744, **17880** via France in AA at 1717 and **21675** via France in AA at 0149. (Chandler, ON)

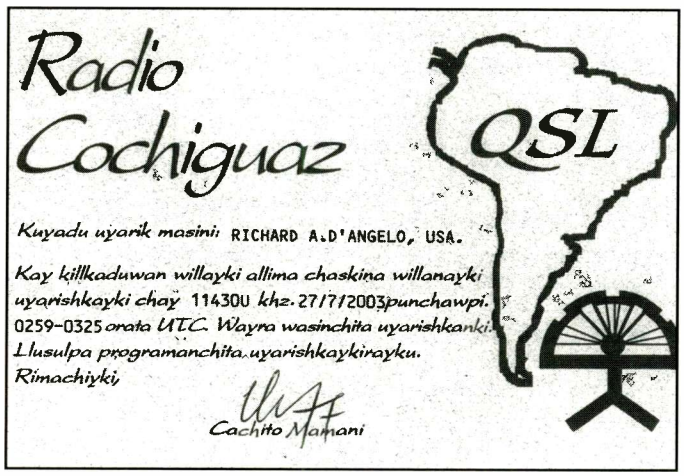
MADAGASCAR—Radio Netherlands Relay, **9895** in SS at 0345. (MacKenzie, CA) **11655** at 1809 and **12080** at 1453. (Charlton, ON) 12080 at 1420 with Sinatra's greatest hits. (Brossell, WI) 1511 with history features. (Foss, Philippines) **17695** with interview in DD at 1642. (Jeffery, NY) RTV Malagasy, **5010** at 0308 with talk by woman in Malagasy, local music, man with ID and speech. (D'Angelo, PA) Tentative at 0343 in unid African language. (Montgomery, PA)

MALAYSIA—Radio Malaysia, **7295** at 1623 with music dedications and "Radio 4" IDs at 1625 and 1650. (Burrow, WA)

MALI—ORTM, **4783.4** at 0555 with guitar IS, march version of national anthem at 0557, man in FF and local music. **//4835** and **5995**. (Alexander, PA)

MAURITANIA—Radio Mauritanie, **4845** at 2345 with talks and AA music. (Brossell, WI) 0029 with vocals. (DeGennaro, NY)

MEXICO—Radio Transcontinental/ XERTA, **4810** at 0207 with easy listening music, man with SS ID and frequency anmt, then pop vocals. (D'Angelo, PA) 0410 with contemporary religious music. Due to the "noise blob" on the high side you must use



Radio Cochiguaz is an unlicensed Chilean station that broadcasts occasionally on 11430 USB, sometimes relaying other foreign pirate broadcasters. (Thanks to Rich D'Angelo)

This view of a street in Warsaw is on a Radio Polonia QSL. The station is infrequently heard in North America these days.

ECSS-LSB as it is completely unreadable in AM or USB. (Alexander, PA) Radio Mil, **6010** at 1110 with SS talks and instrumental music. (DeGennaro, NY) Radio Huayacocotla, **2390** at 0058 with ranchera music and woman in SS, ID, sign off anmts and choral anthem. (D'Angelo, PA) Radio Universidad, **6045** at 0317 with man hosting phone calls and dedications, IDs at 0336 and 0343. Clear until RFI opened at 0358. (D'Angelo, PA) Radio Mexico Int., **9705** at 0315 with continuous local music and occasional SS ID. (Alexander, PA)

MOLDOVA—Voice of Russia, **7180** with news at 0200. (Paradis, ME)

MONGOLIA—Voice of Mongolia, **12015** with mention of "Voice of Mongolia" at 2014. (Charlton, ON) **12085** at 1000 on elections in Tajikistan. (Ziegner, MA)

MOROCCO—RTV Marocaine, **5980** at 0340 with talks and songs in AA. (Brossell, WI) 0428 in AA. (DeGennaro, NY) **15345** in AA at 1748. (Ziegner, MA) 1828. (Charlton, ON) Radio Medi-Un, **9575** in FF at 0036. (Charlton, ON) VOA Relay, **15240** to Africa at 1623. (Jeffery, NY)

NETHERLANDS—Radio Netherlands, **7120** (via Madagascar) in DD at 2133, **15220** at 1603 and **17605** at 2016. (Charlton, ON) **11655** at 1915. (Linonis, PA)

NETHERLANDS ANTILLES—Radio Netherlands Bonaire Relay, **6145** at 0109, **6165** at 0126, **9845** at 0049, **15315** in DD at 2145 and **21590** in DD at 2055. (Charlton, ON) 9845 at 0000. (Paradis, ME) **17810** heard at 2028. (Jeffery, NY)

NEW ZEALAND—Radio New Zealand, **9870** with "Radio National" ID at 1410 and coastal weather. (Brossell, WI) 1530 with program on life in New Zealand. **9885** with Pacific news at 0800. (Barton, AZ) **9870** at 1656 with time pips, ID and regional news. Off at 1750. (Burrow, WA) 9885 at 1029 closing. (DeGennaro, NY) **17675** at 0215. (Charlton, ON)

NIGERIA—Voice of Nigeria, **15120** at 1544 with talk, music, program promos. (Jeffery, NY) 1830 on rebels in Nigeria. (Brossell, WI) 1835. (Charlton, ON) 1915 on spread of Islam in Nigeria and West Africa. (Linonis, PA)

NORTHERN MARIANAS—KFBS/Far East Broadcasting, Saipan, **11580** with talks and religious songs in CC heard at 1410. (Brossell, WI)

NORTH KOREA—Voice of Korea, **11335** to Europe at 1500. UTE QRM. (Paradis, ME) 1900 with IS, ID, anthem, news. (Burrow, WA) **11735** at 0111 and **15245** in FF at 1910. (Charlton, ON)

PAKISTAN—Radio Pakistan (t) **5080.3** at 1600 in EE with Pakistani and international news and comment. Many mentions of Pakistan. Unreadable by 1630 but still there. Also tentative on **9395** at 1559 with what may have been their IS. Off at 1614. (Burrow, WA) **9885** at 1415 with local music and talk in presumed Urdu. (Brossell, WI)

PAPUA NEW GUINEA—Radio Milne Bay, Alotau, **3365** at 1209 with woman anncr in EE and Pidgin, news by man at 1210. (D'Angelo, PA) Radio Simbu, Kundiawa, **3355** at 1143 with country hosted by a man in EE and Pidgin, closing anmts at 1200, conch shell and brief anthem. (D'Angelo, PA) Radio East New Britain, Rabaul, **3385** at 1144 with commercial, woman in EE and Pidgin, rock vocals and commercials. Off in mid-song at 1202. (D'Angelo, PA) NBC Karai Service, **4890** at 1240 with mix of island music and pops with man taking phone calls, weather for Port Moresby, ID as Karai National Radio prior to 1300 news. Then regional weather and simple "NBC News" ID. (D'Angelo, PA)

PERU—*(All stations use Spanish unless otherwise noted [QQ stands for Quechuan language]. OA stands for local music. Frequencies tend to vary.)* Radio Horizonte, Chachapoyas, **5019.9** at 1120 with ad string, OA vocals, ID and TC at 1133. (D'Angelo, PA) Radio Poderosa, Huancabamba, **6356** at 0047 with talk, OA music, ID, and off at 0141. (D'Angelo, PA) 0157 to 0212 close, which is later than normal. (Wilkner, FL) Radio Melodia, Arequipa, **5906.4** at 0940 with OA music, talk, ID. (Alexander, PA) Reina de la Selva, Chachapoyas, **5486.7** at 1053 with talk, anmts, ads, OA vocals. (D'Angelo, PA) Radio Los Andes, Huamachuco, **5030** at 1012 with OA vocals, man host with frequent TCs, and occasional IDs. (D'Angelo, PA) 1100 with "Radio Andes" shouted ID by hyper anncr. (Wilkner, FL) Radio San Nicholas, Mendoza, **5471** at 1030. (Wilkner, FL) Tentative at 1106 with flute music, man anncr with possible opening ID, OA vocals. (D'Angelo, PA) Radio Santa Monica, Cusco, **4965** at 0950 with OA vocals hosted by a man. (D'Angelo, PA) Radio Union, Lima, **6115** at 0820 with non-stop talk, some OA music. (Alexander, PA) Radio Bolivar, Bolivar, **5460.2** with OA music at 1030. (Wilkner, FL) Radio Luz y Sonido, Juliaca, **3235** at 1040 with OA vocals and fast talking man announcer. (D'Angelo, PA) Radio Quillabamba, Quillabamba, **5025** at 1020 with OA music, talk, IDs. Mixing with Rebelde. (Alexander, PA) 1045 with Rebelde absent "programa del todos Peru...onda corta banda de...metros, Radio Quillabamba, program mundial." Several IDs over classical music. (Wilkner, FL) 1047 with OA vocals. (D'Angelo, PA) Radio del Pacifico, Lima, **4975** at 1114 with SS and QQ alternating prayer. (DeGennaro, NY) Radio Cultural Amuata, Huanta, **4955** at 1043 with SS/QQ religious talks and brief music segments. (D'Angelo, PA) 1104. (DeGennaro, NY) Radio Tarma, Tarma, 4775 with songs and talk at 1033. (DeGennaro, NY) La Voz de la Selva, Iquitos, **4825** with music, news, and ID at 1034. (DeGennaro, NY) Radio Ancash, Huaraz, **4991/4992** at 0925 with OA, anmts, and ID. (Alexander, PA) 0931 man hosting rustic vocals with IDs, TCs. (D'Angelo, PA) 1048. (DeGennaro, NY) Radio La Hora, Cusco, **4855.6** in QQ at 1034. (DeGennaro, NY) Radio Huanta 2000, Huanta, **4878** with news at 1028. (DeGennaro, NY)

PHILIPPINES—Radio Philipinas, **11730/11890/15190** in Tagalog at 1731 with

talk, ID at 1732. (Burrow, WA) **15190** with long-winded Tagalog talk at 1920, EE ID at 1929 and sign-off anmts. (D'Angelo, PA) Radio Veritas Asia, **9520** in CC at 1037. (DeGennaro, NY) VOA Relay, **9790** in with presumed news in CC at 1403. (Brossell, WI) **11730** in Tagalog at 1339, **17820** at 2157. (Charlton, ON) 17820 at 2312, // **9770**, **9890**, **15185**, **15290**, **17735**—all via Philippines. (MacKenzie, CA) FEBC, **9500** in CC at 1035. (DeGennaro, NY)

PIRATES—KIPM, **6950 USB** at 1500 with Alan Maxwell and an episode titled "Seed From Space." (Marlin, MO) Ragnar Radio, **6925 USB** at 0110 with funny songs, some hard rock, and claimed to send a digital picture. The words "shortwave acoustic assault" were included in their ID. Promoted dates and times of future broadcasts. (Smith, IL) WHYP, **6950 USB**, at 2203 with Beatles parody. (D'Angelo, PA) Grasscutter Radio/Sunshine Radio, **6925** at 2123 with a joint broadcast. Grasscutter playing the Beach Boys. After an ID moved to Sunshine Radio programming which was a continuous collection of oldies. Gave e-mail as grasscutterradio@yahoo.com for both stations. (D'Angelo, PA) 2255 with frequent references to both stations. (Johnson, IL) KAOS, **6925** at 0411 with rock tunes and "Joe Mamma" with ID at 0414 and at 0421 close with Belfast, NY address. (D'Angelo, PA) Undercover Radio, **6925** at 0142 with Dr. Benway asking for input at UndercoverRadio @mailcoom. (Johnson, IL) James Bond Radio, **6925** at 2350 with Peter Gunn TV theme as well as other old TV series, "Bhaaand OND, James Bond, Nerves not shaken" and other themes from Bond movies. Off at 0041. (Johnson, IL)

PORTUGAL—RDP Int., **9715** in PP at 0049 and 2154 in PP at 2054. (Charlton, ON) **21655** in PP at 1900 to South America. (Linonis, PA)

ROMANIA—Radio Romania Int., **9510** with news at 0107 and **17805** at 1452. (Charlton, ON) **9570** at 1730. (Burrow, WA) **11765** at 2022 and **11790** in Romanian at 1552. (DeGennaro, NY)

RUSSIA—Voice of Russia, **6235** (via Kalinigrad) at 2132 with continuous music, woman at 2156, EE ID by man at 2158 with times and frequencies, off at 2159. (Montgomery, PA) **7180** (via Moldova) at 0205, **7300** at 2151, **9765** at 0213, **12055** at 1417, and **17645** at 1456. (Charlton, ON) **7300** with news at 2100. (Paradis, ME) **12010** in RR at 0338. (MacKenzie, CA) **21485** in FF to West and Central Africa at 1830. (Linonis, PA)

RWANDA—Radio Rwanda, (p) **6055** at 2020 after Turkey signs off with U.S. and Afro-pops, vernacular talk, instrumental anthem at 2055 and choral version at 2057. Off at 2100. (Alexander, PA) 2041 in FF. Main anncr with station ID and sign off anmts at 2056, marching band version of national anthem at 2058, four time pips at 2100 and off. (D'Angelo, PA) Deutsche Welle Relay, **15145** in FF at 1606. (Jeffery, NY) **15410** at 2104 and **17800** at 2047 in GG (Charlton, ON) **17860** in GG at 2305. (MacKenzie, CA)

SAO TOME—VOA Relay, **9830** in FF at 1930. (Brossell, WI) **11915** with ID at 0330 and into unid language. (MacKenzie, CA)

SAUDI ARABIA—BSKSA, **9555** in AA at 1949. (DeGennaro, NY) **9870** in AA at 1805. (Brossell, WI) **9870** at 2221 and **15435** at 1521, both in AA. (Chandler, ON)

SEYCHELLES—BBC Relay, **9770** at 0209 and **17885** at 1347. (Chandler, ON) **11730** in unid African language at 0408. (Brossell, WI)

SINGAPORE—BBC Relay, **7160** at 1445. (Barton, AZ) **9740** at 1359 with ID, time pips, another ID and into news. (Brossell, WI) 1312. Poor. (Jeffery, NY) Mediacorp Radio, **6150** with soft rock, ID at 1600 "Mediacorp Radio—News radio 938." Then schedule and off. (Burrow, WA)

SLOVAKIA—5930 with ID "You are listening to Radio Slovakia International" at 0113. **6190** at 0104, **7230** with ID at 0159 and **9940** with news at 0105. (Chandler, ON)

SOUTH AFRICA—3345 at 0256 sign on with IS, EE ID sequence and into news. //**9770**, both poor. (Alexander, PA) 0322 with ID 0325, news. (Montgomery, PA) **15265** with news at 1830. (Brossell, WI) 1730 in FF. **15295** at 2037, **17770** at 1506, **21490** at 1519 and **21760** at 1452. (Chandler, ON) Radio Sondergrense, **3320** at 0028 with mix of EE, GG and FF vocals and male anncr in Afrikaans, ID, and news at 0300. (D'Angelo, PA) Tentative at 0300 in Afrikaans with pops and possible commercials. (Linonis, PA) Educational Development Center "Mustaqbal," **17565** at 1203 with Somali talks, Horn of Africa music, mention of EDC at 1229, then woman with EE anmts. (D'Angelo, PA) BBC via Sentech, **3255** at 0317. (Montgomery, PA) Adventist World Radio via Sentech, **12005** with FF talks and religious music at 2002. (Brossell, WI)

SOUTH KOREA—Radio Korea Int., **3955** via England at 2200. (Paradis, ME) **5975//7255** at 1635 with Korean language lessons, educational news, ID, "Wonderful Korea." (Burrow, WA) **9560** (*via Canada—gld*) at 0145, **9650** via Canada at 1112, **15385** at 0009. (Chandler, ON)

SPAIN—Radio Exterior de Espana, **5970** via Costa Rica in SS at 1058. (DeGennaro, NY) **6040** with multi-lingual greetings at 0340, then into SS. (Burrow, WA) **6055** in SS at 0121, **9595** in EE at 2220, **15290** in EE at 2035, **17595** in SS at 0131. (Chandler, ON) **21700** with language lessons at 1530. (Linonis, PA)

SRI LANKA—SLBC, **9770** with EE ID at 0130. Also **15475** in EE at 1526. (Chandler, ON) Deutsche Welle Relay, **9815** with ID at 2315. (Brossell, WI)

SUDAN—Sudan National Radio Corp., **7200** at 0226 with AA talks and music. (Chandler, ON) 0427 with man in AA underneath Radio Cairo. After Egypt closed at 0430 Omdurman in the clear with talks in AA, apparent ID at 0440, and then vocals. Smothered by DW opening at 0500. (D'Angelo, PA)

SWAZILAND—Trans World Radio (t), **3200** at 0313 with woman and long talks in unid language. Not parallel **3240**. 3240 at 0314 with man in long talks in unid language. Complete ID and address heard at 0329, ID again at 0330 (Montgomery, PA)

SWEDEN—Radio Sweden, **9495** via Canada in Swedish at 0223, **13795** at 1955, **15220** at 2121, **15515** at 1737, **17485** in Swedish at 1549, **17505** in Swedish at 1419, **17840** in Swedish at 0133, **18690** in Swedish at 1500. (Charlton, ON)

SWITZERLAND—Swiss Radio Int., **9885** in II at 2308. (DeGennaro, NY) **11660** (*via French Guiana—gld*) at 0158 with address and sign off. **17660** via French Guiana at 2000 with ID, address, African news. (Charlton, ON) **15220** (*via French Guiana—gld*) in FF at 1915. (Linonis, PA) 17660 via French Guiana at 2014. (Jeffery, NY)

TAIWAN—Radio Taiwan Int., **5950** via Florida at 0225, **9335** via Florida at 2210, **9680** via Florida at 0207, **15265** in CC at 1500, **15600** via Florida in CC at 0002. (Chandler, ON) Central Broadcasting System, **11500** in EE at 1702. (Burrow, WA) **11635** in CC at 2330. (Paradis, ME) Radio Australia via Taiwan, **11550** in unid language at 2222. (Brossell, WI)

THAILAND—Radio Thailand, **7160** at 1315 ending JJ service, chimes, and into Mandarin with mentions of Radio Thailand and Udon Thani. (Strawman, IA) **7285** with woman in Thai at 1037. (DeGennaro, NY) **9535** at 1900 coming on with jazz, chimes, IS, ID "HSK9—Radio Thailand World Service." (Burrow, WA) **9560** at 1415. (Barton, AZ) **9810** at 1250 and **15395** at 0038. (Charlton, ON) VOA Relay, **6110** at 1447. (Foss, Philippines) **9555** with country tunes at 1350. (Brossell, WI)

TUNISIA—RT Tunisienne, **7225** with anthem and into AA at 0300. (Barton, AZ) **7275** in AA at 0415, **12005** in AA at 2000. (Brossell, WI) **9720** in AA at 2000. (Paradis, ME) 0213. (Charlton, ON) 12005 at 2015. (Foss, Philippines)

TURKEY—Voice of Turkey, **6020** with ID at 0402 and news. The woman anncr talks in a run-on monotone. (Montgomery, PA) **6055** at 2015 to 2019 close. (Alexander, PA) **9655** at 2300. (Paradis, ME) 9655 at 2325, **9785** at 1828, **12000** at 2211, **17830** at 1317, all in EE. (Charlton, ON) **11730** in AA at 1548. (DeGennaro, NY) **15155** with piano IS at 1337 and ID "This is the Voice of Turkey—You are tuned to the Voice of Turkey from Ankara." (Brossell, WI) **15350** in TT at 1500 with Sufi and traditional music. (Ziegner, MA)

UKRAINE—Radio Ukraine Int., **5905** at 0400 with ID. (Burrow, WA) 0418 with news. (DeGennaro, NY) 0234 and **9810** at 0030. (Charlton, ON)

UGANDA—Radio Uganda, **5026** at 0415 with ID at 0432. (D'Angelo, PA)

UNITED ARAB EMIRATES—UAE Radio, Dubai, **15395** with Arab history and culture at 1600. (Paradis, ME) **21605** in AA at 1620. (Charlton, ON)

UNITED STATES—AFN/AFRTS, Key West, **12133.5** with live sports at 2340. (Brossell, WI)

UZBEKISTAAN—Radio Tashkent, **9715** in Uzbek at 0153. (Charlton, ON)

VATICAN CITY—Vatican Radio, **7305** in FF at 0233, **13765** in EE to Africa at 2001 and **17515** in FF at 1728. (Charlton, ON)

VENEZUELA—Radio Amazonas, Puerto Ayacucho, **4939.7** in SS at 1101. (DeGennaro, NY) 0140 with pops and promos with heavy reverb. (Strawman, IA) Radio Tachira, San Cristobal, **4830** at 2250 with lively LA music, ad string at 0000, jingles, ID. Off at 0100 exposing a very weak Radio Litoral. (Alexander, PA) 0018 with SS interview with a sports personality. (DeGennaro, NY)

VIETNAM—Voice of Vietnam, **5035** at 1308 with Hmong service, local music, and anmts. (Strawman, IA) **6175** via Canada at 0118. (Charlton, ON) **9730** with Vietnam news at 1901. (Burrow, WA)

YEMEN—Republic of Yemen Radio, **9779.7** at 1800 with flute IS, anthem, possible ID, news to 1805, western pops to 1813, and more music, clear ID at 1837. (Burrow, WA) **9780.4** with EE programming from 1800 to 1900. (Alexander, PA)

ZIMBABWE—ZBC, **3306** heard at 0102 reactivated and //**4828** which is usually better. 4828 at 0123 with African music, unid language, man anncr between tunes. (Montgomery, PA) 0245 to past 0410 with Afro pops and folk music, vernacular talk, DJ, phone talk, drums at 0400. (Alexander, PA) 0425. (Strawman, IA)

ZAMBIA—Radio Zambia/Radio One, **4910** at 0237 sign on. Open carrier, Fish Eagle IS at 0240, choral anthem, ID and sign on anmts in local language with many clear mentions of Zambia. Then mix of local music and EE talk segment with ID. Also at 0403. (D'Angelo, PA) 0400 sign on with Fish Eagle IS, EE ID, and into Swahili. (Linonis, PA) 0358 in unid language. (DeGennaro, NY) 0430 in unid language. (Paradis, ME) **6165** at 2153. (Charlton, ON) Christian Voice, **4965** at 0148 with religious music, anncr with what sounded like an Aussie accent, ID at 0203 as "Radio Christian Voice." (Montgomery, PA) 0210 with religious music and interviews, station promos, and "Voice International" IDs. Off at 0255. (Alexander, PA)

Greetings To Our Amateur Radio Friends At The Dayton Hamvention!

Pop'Comm's "Global Information Guide" is the most complete monthly rundown you'll find anywhere of "What's On" the shortwave broadcast band! This month, for instance, we processed nearly **600** reporter loggings (594) covering transmissions of 238 broadcasters in 110 countries! If you enjoy this area of the radio hobby along with your ham activities we'd be delighted to add your name to our list of first-rate shortwave broadcast monitors reporting to this column!

And once again, order is restored! An Everest of thanks to the following good folks who did the right thing this time: Stewart MacKenzie, Huntington Beach, CA; Tricia Ziegner, Westford, MA; Jack Linonis, Hermitage, PA; Robert Wilkner, Pompano Beach, FL; Sheryl Paszkiewicz, Manitowoc, WI; Bill Finn, PA; Bruce R. Burrow, Snoqualmie, WA; Bob Chandler, Windsor, ON; Cero DeGennaro, Feura Bush, NY; Paul Johnson, Galesburg, IL; Rick Barton, Phoenix, AZ; Richard D'Angelo, Wyomissing, PA; Robert Brossell, Pewaukee, WI; Fred Marlin, Springfield, MO; Dave Jeffery, Niagara Falls, NY; Marty Foss, Guinayangan, Philippines; Mark Northrup, Gladstone, MO; Jacob Smith, Decatur, IL; Brian Alexander, Mechanicsburg, PA, Ray Paradis, Pittsfield, ME and Robert Montgomery, Levittown, PA. Thanks to each one of you and, until next month, good listening! ■

computer-assisted radio monitoring

by Joe Cooper, joe@provcomm.net

Digital Control—Part IV

Welcome back to the continuing dissection of Ten-Tec's black box radio, the RX320/D. This radio, which has no external controls other than an on/off power switch, is completely dependent on being connected to a personal computer in order to operate.

What makes this radio so interesting is that when you take off the cover and look inside you find that the main components are all contained on a small number of integrated circuits (ICs). The most important point about these circuits is that the one that does most of the work is actually a small computer, not unlike the personal computer you connect to the radio in order to run it.

It's been an interesting journey that we've been on so far. We've gone from looking at the RX320/D's performance and operation characteristics, to a fairly detailed look at the IC used to create the set's digital signal processing (DSP) circuitry. So far, the most important point that's been made is that the primary IC used in the RX320/D relies on two types of software in order to operate.

The first piece is an internal software program that is built into the radio via a special memory chip called an EPROM (for erasable programmable read only memory). This software is used by the radio's ADSP-2101 chip (the small computer I mentioned earlier) to define the virtual radio circuits. Since it's stored in a semi-permanent state, however, it's called firmware (it's pretty firmly in place). Its code was written by the engineer at Ten-Tec who designed the radio.

The second piece of software is the control software that you run in your personal computer. While the control software can have many different forms and appearances on your personal computer's screen, in all cases its primary task is to send command codes to the RX320/D's central processing unit (CPU).

These command codes control the operation of a set of seven DSP functions that the ADSP-2101 chip is programmed to perform using the firmware. The following table sets out what these functions are:

Function	Command Code Variable
Mode	AM, USB, LSB, CW
Frequency	100 kHz to 30 MHz
BFO Offset Frequency	0–2000 Hz
Audio Filter	300 cycles to 8,000 cycles
AGC Control	Slow/Medium/Fast
Line-in Level	0–63
Speaker Output Level	0–63

The command set also controls two requests for information that the ADSP–2101 can respond to with information displayed on your computer screen. These are:

Request	Response
Signal Strength	0–10,000
Firmware Version	VER XXX, where "X" equals a numeric value

As I outlined in the last column, the actual command code used is very simple, being a combination of a letter, a number, and a carriage return. A letter represents each function (e.g., the letter "M" represents "Mode"), and a letter and number, or a range of numbers, represent fixed functions (M0 = AM mode, M1 = USB mode).

So when the control software on your personal computer is operating and connected to the RX320/D via its serial cable, it is the command codes that are being passed to the radio. Likewise, when a request for the signal strength is made, the response comes back from the radio via the serial cable to the personal computer and is displayed there in the control software user interface (what you see on the computer screen when you run the program).

That's all very fine and good, but how exactly does that command code get generated, then directed into the serial cable, and within the personal computer? I'll answer those questions in this column by looking directly at how a software program does this, using a simple example of control software to run the RX320/D.

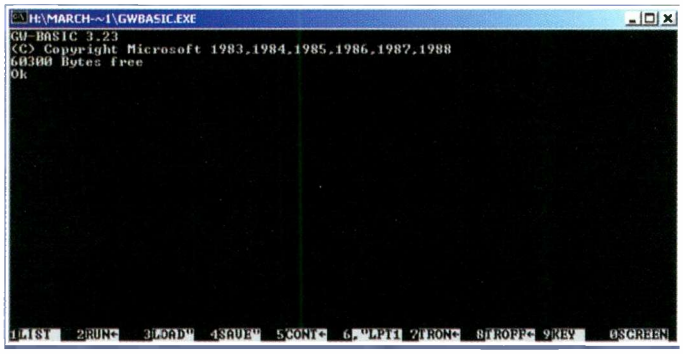
This control software is written in the BASIC (Beginners All-Purpose Symbolic Instruction Code) programming language and is available for free from Ten-Tec, along with a great deal of support information. What makes it particularly valuable for our purpose is that the program does not come in a compiled form (that is, as an independent software program). Rather it is provided in its "raw" form of lines of code. This is good because it allows us to see exactly how the program was written, and it also allows us to modify it if we wish. To run the code as a program you need a BASIC interpreter, and I'll provide you with information on how to download one from the Internet for free.

So first, let me provide you with a bit of background information about BASIC programming, then introduce you to the BASIC program that we're going to use to control the RX320/D.

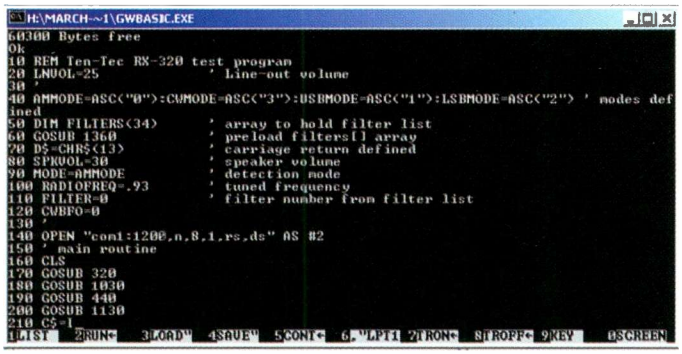
What Is BASIC Programming?

In putting together the information for this column, my goal was to provide someone who's used to operating a computer (e.g., working in the Microsoft Windows operating system and running software programs within it) with a good understanding of what takes place when they are running a typical RX320/D control program. I won't be teaching you computer programming in detail, but you will be able to create and run a very simple command program for controlling the RX320/D from within Windows. To keep things simple, I will be using the aforementioned software program written in BASIC to illustrate the programming technique.

BASIC was originally developed at Dartmouth College in 1964 and was first used on big mainframe computers. At that time the main programming language was FORTRAN, which was very complicated given the fact engineers and scientists originally designed it for their use.



This is what you see when you run the GWBASIC interpreter program. As you can tell, it's been around for a while, but it works. The key points here are that the "OK" shown on the screen means just that—everything is working fine. You can now use the function keys on your keyboard to "load" and "run" the BASIC program.



This is what you see after you've loaded the BASIC program and listed the contents. As you can see the line numbers are in steps of 10, and each line has one command. It's really not that difficult to follow once you've learned what to look for.

The goal in the creation of BASIC was to give "ordinary" people a language for their own use, so it was designed to be:

- general purpose rather than specialized
- easy to use
- expandable
- interactive
- possible to debug
- efficient
- hardware independent
- Operating System independent

After several attempts to create an easy-to-use programming language, BASIC was developed. The first BASIC version had only 14 commands, but it fit the bill for being easy-to-understand and usable by people without specialized training in computers or programming.

BASIC was notable because each line of code had one command, and the program's flow of information could be traced backwards and forwards as each line had its own number, as we will see. More importantly, BASIC has never been copyrighted and is still in the public domain. As a result there are many different variants of BASIC, but they all follow the same basic (pardon the pun) flow and structure.

For our purpose I'm going to be using an old and reliable version called GWBASIC to show you how to create your control software. The GW (which stands for Gee-Whiz) version was released in the early 1980s by Microsoft and is identical to IBM's BASICA, which came with the original IBM PC.

(As a short aside, Microsoft's founder, Bill Gates, will be remembered in the computer history books for having created a significant new version of BASIC in 1975, which he called Altair. It was the last real bit of programming he designed, because he soon decided to turn his attention to the more profitable business of running a successful computer company. And the rest, as they say, is history).

An interpreter for running GWBASIC (called simply enough GWBASIC.EXE) is still available today for free on the Internet and can be downloaded from http://www.geocities.com/KindlyRat/GWBASIC.html (along with several other sources that you can find using your favorite search engine).

Please note that even though this is a software program that dates back to the days before Microsoft Windows, you can still run it in any version of Windows, including XP. It will run in its own window, though you will not be able to use your mouse pointer to run it (that's done through your keyboard's function keys).

Getting The Necessary Files

The source of the programming code I'll use is available by downloading the RX320 Programmer's Reference Guide (or PRG), which is available in PDF format. (PDF, or Portable Document Format, is a file format used to distribute documents). This file is found at http://www.rfsquared.com/rx320/rx320main.htm and is downloadable by clicking on a link provided there. When you've finished downloading you'll find that you've actually ended up with two files. The first is the PRG, called rx320prg.pdf. You can view or print the file using an Adobe Acrobat Reader (also available for free at the same website where you found the guide).

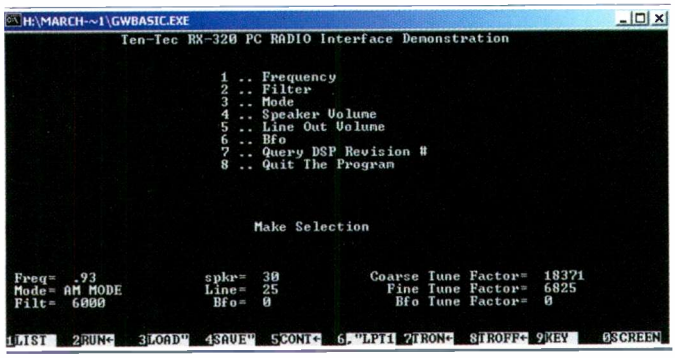
If you check the next file you'll discover that it is an ASCII (text) file containing a complete BASIC program, called TTRCX3.BAS, for running the RX320/D. Ten-Tec's engineers used the program to test the operation of the RX320 to make certain that it was functioning properly. It's not very fancy and certainly is not the best way to control your radio, but as a teaching/training tool it's a great place to start.

I'll go through this BASIC program to show you the code it contains, how that code is used to send command codes to the RX320/D, and how you can modify the program to make it perform some additional functions. We'll do this over two columns, with this first column being an introduction to the structure of the BASIC control program and how to run it in the BASIC Interpreter. In next month's column I'll outline how some of the more complicated functions in the program operate and show you how to modify it to add one more feature.

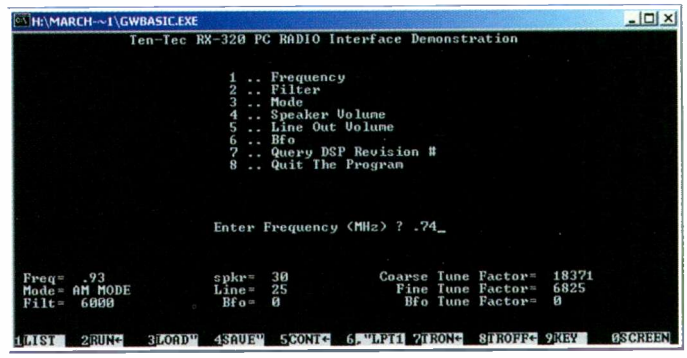
One important thing that I should mention here is that even if you don't own an RX320/D you can still run the GWBASIC interpreter and then run the BASIC controller program in order to explore or experiment with it. Remember that what I'm outlining here for the RX320/D is also applicable to other computer-controlled radios, although they may use a different set of command codes. So what's being presented here is most likely applicable to your own radio. Now let's get down to business and learn how computer software actually runs the RX320/D.

Getting Started

To start off let's take a look at the BASIC program that we are going to be using with the BASIC interpreter. If you look at



So this is what you get when you "run" the software code. This is the user interface of the program. The program first runs a set of default values, which gets the radio running. You can then change those values by following the instructions on the screen.



Here's what takes place on the screen when you enter a numeric value. The screen changes slightly and you get to enter a new value, which in this case is the frequency you want to listen to (in MHz). Once that new value is put into the software and the Enter button is pushed, a series of calculations is made, the results of which are sent off to the RX320/D via its serial cable. Again, follow the flow of information in the BASIC software code provided so you can see what's taking place in the computer as each software step is taken.

the sidebar entitled "TTRCX3.BAS—BASIC Program..." and you will see the complete listing of the code found in the file TTRCX3.BAS.

Now, if you're not familiar with programming, don't throw up your hands and give up at this point. As I said, you won't learn how to be a programmer in one column, but you can use this as an opportunity to get started becoming one. It's not as difficult as you might think.

If you are not familiar with elementary programming, check with your local library or used bookstore to find a good beginner's book on BASIC (not Visual BASIC, which is a more advanced form of programming). Likewise, there are many websites on the Internet that will teach you BASIC programming, including,

http://www.codepedia.com/1/BeginnersGuideToBasic
http://colloquia.springrose.com/BlastOff.htm

If you go through those two websites step by step you'll be able to understand the command and structure of the BASIC program I'm introducing here.

To help you in understanding how the program works, you should first print out a copy of the file contents so you can make notes directly on the printout. The best way to understand any software code is to break it down into its primary functions according to the lines of code, using the line numbers to demark where things begin and end. With the TTRCX3.BAS file, you will find that there are nine main sections of code that run the program (see the Table for an outline of those sections). Make dividing lines on the paper printout following the example on the Table. Next, when you perform a function by selecting a value (such as Mode), make note of what happens in the programming code by following the flow of information.

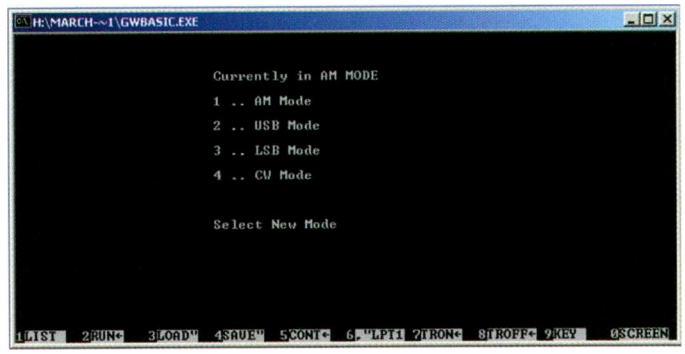
The most important aspect of this flow is represented by the following four lines of code:

170 GOSUB 320 (calculate the tuning factor)
180 GOSUB 1030 (turn all inputted values—both default and user selected—into hexadecimal and send to radio)
190 GOSUB 440 (display the menu of items to be selected)
200 GOSUB 1130 (display the current values being used to operate the radio)

Which is followed by,

210 C$=INKEY$: IF C$="" GOTO 210

This is followed by a series of lines of code that allow you to choose a number from 1 to 8 to select one of the eight functions



Sometimes when you change a value you'll see an entirely new screen appear. Can you trace out how the software does that, and then returns you to the original menu?

you can use to control the RX320/D. Selecting a number runs a subroutine. If you choose the number "1," for instance, it runs,

220 IF C$="1" THEN GOSUB 570:GOTO 150:ELSE

Which takes you to line 570, which runs,

570 LOCATE 16,25: INPUT "Enter Frequency (MHz) ";RADIOFREQ
580 RETURN

Here you enter the frequency you wish to use, after which you return back to where you started. If you make the wrong selection, you will also be sent back to where you started (the default screen asking you to make a selection).

Probably the most important task that the software has is getting the input data (both default and what you provide it with) into the radio. This is done via the serial port, and there are several lines of code that are involved.

The first line defines the serial port,

140 OPEN "com1:1200,n,8,1,rs,ds"
AS #2

That line instructs the computer to "Use serial port 1, set it to a data flow rate of 1200 baud, and set the parity of the data flow to no parity bit, 8 start bits and 1 stop bit, plus define it as printer number 2 so it doesn't conflict with any other printing device".

So let's say that you wanted to change the speaker volume. The line of code that does that is,

```
1100 C$="V"+CHR$(127)+CHR$(63-
   SPKVOL)+D$:PRINT #2,C$;
```

Where "V" is the code for speaker volume, CHR$(63-SPKVOL) is the desired level, and D$ is the carriage return (or Enter). The line ends with an instruction to "print" (that is, send the information to the radio via the serial cable) the resulting value of C$. So when the control software reaches that line, all of the input values are "plugged" into it, the calculation is made, and the result is sent off the RX320/D, which "reads" it and sets the speaker output to the desired level.

Again, the best thing to do is to sit down with the program code printed out, break it down into the nine sections, and then follow the flow as you actually run the program and hear the results on the RX320/D, if you have one.

So let's run the program.

Using BASIC

When getting started, first make certain that you have your RX320/D hooked up properly to your computer via the serial cable. Make sure that you're plugged into the correct serial port if you have more than one. Next, make certain that you have the BASIC interpreter (basic.exe) and software program (TTRCX3.BAS) in the same software directory. Run the interpreter by either using the "run" function found when you click "Start" on the Windows toolbar, or by clicking on the file twice using the Window's Explorer program. Once you've done that you will see a window appear with the GWBASIC program running. You now need to "load" the lines of code into the Interpreter in order for it to "run."

There are two ways you can do that. First you can use the "LOAD command that is activated by pressing the F3 function key on your keyboard. Remember that you'll have to type in the name of the file to run, so it will look something like this,

```
LOAD"C:\Basic\TTRCX3.BAS
```

Also remember that you may have the file placed in a different drive or directory than the one I've used here. Once you've loaded the program you can run it using the F2 function key. You will immediately see the opening screen, and if the RX320/D is turned on, you will hear sound coming out of the speaker.

Table. TTRCX3.BAS Main Sections

Lines	Function	Comment
10-130	Set Default Values	This sets up the radio with a default frequency (930 KHz), mode (AM), speaker volume (medium) etc. when you start the software.
140	Open the COM (serial) port	This tells the software to use COM1 (serial port 1) to communicate with the RX320/D.
150–310	Main Routine	This is the "engine" of the program that is used to gather up all of the necessary information needed to display information on the screen.
320–430	Tuning Factors	This is a set of calculations used to tune the RX320/D to a particular frequency using a PLL (Phase Locked Loop) tuning circuit.
440–660	On Screen Menu	This sets up the text that appears on the screen that you use to control the RX320/D (e.g. what to select).
670–1020	Input values	When you type in a requested value (Frequency, Speaker volume, Mode, etc.) this part of the program checks to see what value you have chosen.
1030–1120	Send value to Radio	A set of formulas convert the Tuning Factors and Input values you have placed into the software into Hexadecimal code, which is then sent to the radio via the serial cable.
1130–1400	Display current values	Displays all of the current values that are being used in the operation of (Frequency, Speaker volume, Mode, etc.) of the RX320/D
1410–1460	Data Values	A stored set of data values for the DSP filter (300 to 8000 Hz) which are represented by a number from 0–33 in the menu.

This table breaks down the nine main sections that make up the TTRCX3.BAS program. To understand how the program works, go to each section and follow the flow of the code, using the GOTO and RETURN statements as your starting and stopping points. This is the best way to learn BASIC programming if you're new to it.

You can now begin to experiment with the operation of the radio by changing settings, remembering to look at the printout of the software code to follow the flow of information taking place with in the program. Also make notes if you are having problems loading the code.

As an alternative, open up the TTRCX3.BAS file in a text editor, such as the Notepad program found in Microsoft Windows. Highlight all the lines of code and then copy it into memory using the Ctrl C (Copy) command. Then place your mouse pointer after the "OK" in the GWBASIC programs so you see a flashing cursor, then click on your right mouse button. You'll then see the lines of code being copied onto the screen. When the transfer of information has been completed, press your enter key so that you see the "OK" again. Press the F2 function key so that the program will run.

You may also want to try changing some aspects of the original program to see what effects that may have on how things appear on the screen. (You may also want to fix up some of the spelling mistakes that have crept into the displayed text).

As with all experiments, keep notes of what happens and don't forget to make back-ups of the original code and the modifications you make, but under a file name that's different fromthe original.

And above all, learn and have fun while doing all of this.

Wrapping Up

Next month I'll be taking a more detailed look at just what is taking place in the BASIC program I've introduced to you. I'll also provide you with a more detailed look at how calculations are

made and used in more complex functions, such as the PLL (Phase Locked Loop) tuning.

I'll also be looking at how the programmers take the programming principles used in BASIC and apply them in other situations, such as with the graphics used to simulate knobs, buttons, and dials found in many popular Windows-based control programs for the RX320/D.

Lastly, I'll take a brief look at other computer-controlled radios and how you can apply to them the principles outlined in this series of columns. As you have seen here it's really not that difficult, and in the case of Ten-Tec's RX320/D you're encouraged to try your hand at developing your own control software with the downloadable reference material they provide for free.

If you wish e-mail me with any questions, please use carm_popcomm@hotmail.com. As mentioned before, I cannot answer general questions on computers, but I will be more than happy to help you with any issues raised in the columns. You can write to me at "Computer-Assisted Radio Monitoring," PMB 121-1623 Military Rd., Niagara Falls, NY 14304-1745.

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. Don't worry about your writing, as I'm more than happy to help you by editing it.

So again, please take time to write a letter to one of our service people in Iraq to offer them your thanks and support, remembering that they have been in that combat role for over a year now. ■

TTRCX3.BAS—BASIC Program For Controlling The Ten-Tec RX-320/D

An ASCII text version of this program is available for download from Ten-Tec at: http://www.rfsquared.com/

```
10 REM Ten-Tec RX-320 test program
20 LNVOL=25 ' Line-out volume
30 '
40 AMMODE=ASC("0"):CWMODE=ASC("3"):USBMODE=ASC("1"):LSBMODE=ASC("2") ' modes defined
50 DIM FILTERS(34)      ' array to hold filter list
60 GOSUB 1360 ' preload filters array
70 D$=CHR$(13)          ' carriage return defined
80 SPKVOL=30 ' speaker volume
90 MODE=AMMODE      ' detection mode
100 RADIOFREQ=.93      ' tuned frequency
110 FILTER=0    ' filter number from filter list
120 CWBFO=0
130 '
140 OPEN "com1:1200,n,8,1,rs,ds" AS #2
150 ' main routine
160 CLS
170 GOSUB 320
180 GOSUB 1030
190 GOSUB 440
200 GOSUB 1130
210 C$=INKEY$ : IF C$="" GOTO 210
220 IF C$="1" THEN GOSUB 570:GOTO 150:ELSE
230 IF C$="2" THEN GOSUB 770:GOTO 150:ELSE
240 IF C$="3" THEN GOSUB 590:GOTO 150:ELSE
250 IF C$="4" THEN GOSUB 890:GOTO 150:ELSE
260 IF C$="5" THEN GOSUB 940:GOTO 150:ELSE
270 IF C$="6" THEN GOSUB 990:GOTO 150:ELSE
280 IF C$="7" THEN GOSUB 1260:GOTO 150:ELSE
290 IF C$="8" THEN GOTO 310
300 GOTO 150
310 CLOSE:END
320 ' Tuning Factor Calculations
330 IF MODE=AMMODE THEN MCOR=0
340 IF MODE=CWMODE THEN MCOR=-1
350 IF MODE=USBMODE THEN MCOR = 1
360 IF MODE=LSBMODE THEN MCOR= -1
370 FCOR = FILTERS[FILTER]/2+200
380 ADJFREQ=RADIOFREQ-.00125+(MCOR*((FCOR+CWBFO)/1000000!))
390 CTVAL=INT(ADJFREQ*400!)
400 FTVAL=INT(((ADJFREQ*400!)-CTVAL)*2500!*5.46)
410 CTVAL=CTVAL+18000
420 BTVAL=INT((FCOR+CWBFO+8000)*2.73)
430 RETURN
440 ' Menu
450 'CLS
```

```
460 LOCATE 1,15: PRINT "Ten-Tec RX-320 PC RADIO Interface Demonstration"
470 LOCATE 4,20: PRINT "        1 .. Frequency "
480 LOCATE 5,20: PRINT "        2 .. Filter"
490 LOCATE 6,20: PRINT "        3 .. Mode"
500 LOCATE 7,20: PRINT "        4 .. Speaker Volume"
510 LOCATE 8,20: PRINT "        5 .. Line Out Volume"
520 LOCATE 9,20: PRINT "        6 .. Bfo"
530 LOCATE 10,20: PRINT"        7 .. Query DSP Revision #"
540 LOCATE 11,20: PRINT"        8 .. Quit The Program"
550 LOCATE 16,25: PRINT"        Make Selection "
560 RETURN
570 LOCATE 16,25: INPUT "Enter Frequency (MHz) ";RADIOFREQ
580 RETURN
590 CLS:
600 GOSUB 730
610 LOCATE  4,25: PRINT "Currently in ";MD$
620 LOCATE  6,25: PRINT "1 .. AM Mode"
630 LOCATE  8,25: PRINT "2 .. USB Mode"
640 LOCATE 10,25: PRINT "3 .. LSB Mode
650 LOCATE 12,25: PRINT "4 .. CW Mode"
660 LOCATE 16,25: PRINT "Select New Mode"
670 C$=INKEY$:IF C$="" GOTO 670
680 IF C$="1" THEN MODE=AMMODE
690 IF C$="2" THEN MODE=USBMODE
700 IF C$="3" THEN MODE=LSBMODE
710 IF C$="4" THEN MODE=CWMODE
720 RETURN
730 ' convert MODE code to text name of mode
740 IF MODE=AMMODE THEN MD$="AM MODE" : IF MODE=LSBMODE THEN MD$="LSB MODE"
750 IF MODE=USBMODE THEN MD$="USB MODE" : IF MODE=CWMODE THEN MD$="CW MODE"
760 RETURN
770 ' FILTER SELECTION SUBROUTINE
780 CLS:
790 FOR N=0 TO 10
800 LOCATE N+1,20: PRINT N;" ";FILTERS[N]
810 LOCATE N+1,40: PRINT N+11;" ";FILTERS[N+11]
820 LOCATE N+1,60: PRINT N+22;" ";FILTERS[N+22]
830 NEXT N
840 LOCATE 12,60: PRINT 33;" ";FILTERS[33]
850 LOCATE 16,25 : INPUT "Enter Filter Number (0-33) ";FILTER
860 IF FILTER <0 GOTO 850
870 IF FILTER >33 GOTO 850
880 RETURN
890 ' SPEAKER VOLUME
900 LOCATE 16,25:INPUT "Speaker Volume Setting (0-63) (soft->loud) ";SPKVOL
910 IF SPKVOL<0 GOTO 900
920 IF SPKVOL>63 GOTO 900
930 RETURN
940 ' LINE OUT VOLUME
950 LOCATE 16,25: INPUT "Line Out Volume Setting (0-63) (soft->loud) ";LNVOL
960 IF LNVOL<0 GOTO 950
970 IF LNVOL>63 GOTO 950
980 RETURN
990 LOCATE 16,25: INPUT "Enter Bfo Frequency (0-2000Hz) ";CWBFO
1000 IF CWBFO<0 GOTO 990
1010 IF CWBFO>2000 GOTO 990
1020 RETURN
1030 'SUBROUTINE TO FORMAT CALCULATED PARAMETERS AND SEND TO RADIO
1040 NH=INT(CTVAL/256):NL=CTVAL-NH*256
1050 FH=INT(FTVAL/256):FL=FTVAL-FH*256
1060 BH=INT(BTVAL/256):BL=BTVAL-BH*256
1070 C$="W"+CHR$(FILTER)+D$:PRINT #2,C$;
1080 C$="N"+CHR$(NH)+CHR$(NL)+CHR$(FH)+CHR$(FL)+CHR$(BH)+CHR$(BL)+D$:PRINT #2,C$;
1090 C$="A"+CHR$(127)+CHR$(63-LNVOL)+D$:PRINT #2,C$;
1100 C$="V"+CHR$(127)+CHR$(63-SPKVOL)+D$:PRINT #2,C$;
```

```
1110 C$="M"+CHR$(MODE)+D$:PRINT #2,C$;ELSE
1120 RETURN
1130 'display current settings
1140 GOSUB 730
1150 LOCATE 20,2 : PRINT "Freq= ";RADIOFREQ
1160 LOCATE 21,2 : PRINT "Mode= ";MD$
1170 LOCATE 22.2 : PRINT "Filt= ";FILTERS(FILTER)
1180 LOCATE 20,25: PRINT "spkr= ";SPKVOL
1190 LOCATE 21,25: PRINT "Line= ";LNVOL
1200 LOCATE 22,25: PRINT " Bfo= ";CWBFO
1210 LOCATE 20,45: PRINT "Coarse Tune Factor= ";CTVAL
1220 LOCATE 21,45: PRINT "  Fine Tune Factor= ";FTVAL
1230 IF MODE=AMMODE THEN BTVAL=0 ' btval is ignored by RX-320 in AM MODE
1240 LOCATE 22,45: PRINT "   Bfo Tune Factor= ";BTVAL
1250 RETURN
1260 ' Get DSP VERSION #
1270 IF LOC(2)<>0 THEN INPUT#2,C$ ' read port first to empty any old data
1280 C$="?"+D$:PRINT#2,C$;
1290 GOSUB 1430
1300 IF LOC(2)=<7 THEN GOTO 1300
1310 VER$=INPUT$(LOC(2),2)
1320 LOCATE 16,26: PRINT "DSP REPORTS ";VER$
1330 LOCATE 18,26 : PRINT "Press Any Key To Continue"
1340 C$=INKEY$:IF C$="" GOTO 1330
1350 RETURN
1360 ' load filter array
1370 FOR N=0 TO 33 STEP 1
1380 READ FILTERS(N)
1390 NEXT N
1400 RETURN
1410 DATA 6000,5700,5400,5100,4800,4500,4200,3900,3600,3300,3000,2850,2700,2550,2400,2250,2100,1950,1800
1420 DATA 1650,1500,1350,1200,1050, 900, 750, 675, 600, 525, 450, 375, 330, 300,8000
1430 ' DELAY ROUTINE
1440 FOR D=1 TO 20000
1450 NEXT D
1460 RETURN
```

Tuning In *(from page 4)*

It's a good point on paper, at least. Fact is, I know *many* hams and SWLs that have all but given up on the hobby because of noise traced directly to powerlines. And, no, they're not all in urban areas. Newsflash for the FCC: Most folks can't just "orient their antennas" when a new noise problem arises—hence all the books and articles about tracking down interference and *eliminating it at the source*, if possible.

Since the FCC is doing the industry's bidding, I thought it appropriate to see what they say about interference. There, on the FCC's own official website at http://www.fcc.gov/cgb/consumerfacts/interference.html, is a Consumer Fact Sheet that says,

A simple method of determining the location of electrical interference is by using a portable AM radio tuned to a quiet frequency at the lower end of the dial. If you hear static or a buzzing sound, check to see if it corresponds with the interference to your equipment. The closer you get to the source of the interference, the more intense the static will be. If you cannot locate the interference source in your own house, check with your neighbors to see if they also receive interference. The house that has the worst interference will most likely be the source of the interference. If you can determine that the electrical interference is not caused by any device in your home or a neighbor's home served by the same transformer, contact the customer service department of your local power company. Most power companies will investigate the problem and take steps to correct it.

I think I'll read that again. Okay, so just what *is* the FCC saying? Once again, we've got to do their work for them, but at least we've got the sense to put the horse in the right place.

And what about those *emergency* situations that can and will happen when we least expect them. Should emergency responders simply "orient their antennas" to work around BPL noise? Hardly.

That's what this battle is all about in the final analysis: eliminating the interference at the source. But in this case it's like tracking the noise source to the whoopee cushion on the Chairman's leather chair. Who among us will walk in and pull his plug to put *us* out of our misery, especially if you've got to alternately crawl and tiptoe through a maze of discarded BPL interference reports from the ARRL?

This whole BPL mess and careless attitude of the power industry reminds me of the drivers who take their sweet time moving to the side of the road as the ambulance with flashing lights and screaming siren bears down on their tail. No problem. It doesn't affect them unless the ambulance is racing to help their son or daughter a mile down the road. Then the emergency suddenly becomes very personal.

No problem for BPL proponents either—*unless* the interference caused by their own hand prevents that ambulance crew from ever hearing the dispatcher in the first place. Don't you think it's high time for the FCC and industry to climb out of bed and stop putting the Almighty Dollar ahead of our public safety? It's time to pull plug on business as usual.

You have until June 1 to file a "reply comment" with the FCC. Go to http://gullfoss2.fcc.gov/ecfs/Upload where you'll find BPL Docket 04-37 at the top of the page. ■

v.i.p. spotlight

how you got started in radio

Congratulations To Doug Griffiths Of Schenectady, New York!

Here's our June "VIP Spotlight" winner, Doug Griffiths, at the WFNY studios in Gloversville, New York.

Another view of Doug's radio collection.

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

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

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

All we can say is, "Oh, man, that's a lot of radio equipment!"

Our June Winner: Doug Griffiths

Doug tells *Pop'Comm*,

I live in Schenectady, New York, and have been a *Pop'Comm* reader for many years. In the late 1950s I had a serious accident with my hand, and a DJ on a Saratoga, New York, radio station played music and talked to me on the air to help keep me alive. That was my start in radio.

In the late '60s I did some DJ work, started DXing CB, and whatever else involved radio. In 1995 I took my ham test and became N2POW. A year or so ago, a new radio station in Gloversville, New York, AM 1440 WFNY was testing, and I was the first caller to give a signal report. I made friends with Mike O'Neil, the general manager of the station. We talked several times a week. Now, on Sunday evenings I do an on-air show with Mike."

I've gotten quite a collection of radios over the years, not all of which are in the pictures. My basement looks like my radio room. I have 25 GE Super IIs, 16 scanners, eight shortwaves...I could go on! ■

By Bill Hoefer, flacap388@hotmail.com

Monitoring Dayton, Ohio, Area Airports!

Each year we have special assignments issued to us by our fearless Editor. This year mine covers Dayton, Ohio, site of the annual nirvana for ham radio enthusiasts, the Dayton Hamvention. While the majority of hams making their pilgrimage to Dayton will be utilizing ground transportation, in the form of cars, pick-ups, SUV, or even rail, many will be coming in via commercial aircraft. So what better time, while waiting to retrieve your bags (and hoping your 2-meter HT is still in the bag and intact) to use your portable scanner and listen to what I listen to: air traffic control (ATC).

What's presented in the column this month is a rather comprehensive listing of the ATC frequencies for Dayton and the surrounding areas. The majority use 122.7, 122.725, 122.8, 122.9, 123.0, and 123.05. Those operating with control towers almost invariably utilize 122.95, regardless of their location in the country. I'm not including the names of the smaller airports and their UNICOM/CTAF frequencies. What I *am* including is a list of the major airports within a roughly 100 mile radius of Dayton (DAY). No doubt I will have left out a deserving airport, and for that I apologize in advance.

One very important observation, however, is that in this time of heightened security someone walking in an airport with a handheld scanner monitoring aviation may—may, that is—be viewed with some trepidation, so make sure you have your ham license handy. Ham or not, please defer to common sense.

While monitoring aviation at the Fargo, North Dakota (FAR) airport I also monitored the local NOAA frequencies. It was eye opening to notice that most people had no idea NOAA frequencies even existed. Many people I talked to asked me where these scanner radios came from. It opened the door to the communications hobby to them and perhaps even piqued their interest in ham radio. However, you may want to operate your scanner in a covert manner, not drawing attention to yourself, no matter how legal your scanning is.

The majority of the flying will be into the James M. Cox Dayton International Airport (DAY). The Dayton airport is the 83rd busiest airport in the country, having two parallel runways (6L/24R, 6R/24L) and one crossing runway (18/36). Like many airports animals abound nearby and though not an everyday occurrence, deer and coyotes, as well as numerous birds can present a problem. During my tenure I've had to deal with deer, fox, blackbirds, various snakes, dogs, cats, badgers, moose, and even a milk cow. (Long story.)

Frequencies you may encounter at Dayton are:

Local Control (LC)	119.9
Ground Control (GC)	121.9
Clearance Delivery (CD)	121.75
Automated Terminal Information Service (ATIS)	125.8
Approach Control (Apch)	118.0, 118.85, 126.5, 127.65, 134.45
Flight Service Station (FSS)	122.2, 122.55

Other airports, in alphabetical order:

Cincinnati Municipal Airport, Lunken Field (LUK) (Federal Contract Tower)

LC	118.7, 133.925
GC/CD	121.9
CD (when tower is closed)	124.9
ATIS	120.25
Apch	121.0
FSS	122.4

Cincinnati/Northern Kentucky International Airport (CVG)

LC	118.3, 118.97
GC	121.3, 121.7
CD	127.175
ATIS	134.375 (Arr), 135.3 (Dep)
Apch	119.7, 123.875, 126.65, 128.7
FSS	117.3 (Trmt), 117.3 (Rcv)

Columbus, Bolton Field (TZR) (Federal Contract Tower)

LC	128.1
GC	121.8
AWOS-3	135.925
Apch	132.3

Columbus, Ohio State University (OSU) (Federal Contract Tower)

LC	118.8
GC/CD	121.7
ATIS	121.35
Apch	120.2

Columbus, Port Columbus International (CMH)

LC	132.7
GC	121.9
CD	126.3
ATIS	124.6
Apch	118.2, 119.15, 125.95, 132.3
FSS	122.2, 122.3

Columbus, Rickenbacker International (LCK)

LC	120.05, 358.5
GC	121.85, 257.8
AWOS-3	132.75
Apch	119.15, 279.6
Cmd Post	286.2
ARNG Ops	142.6, 228.8

Springfield, Beckley Municipal (SGH)

LC	120.7, 383.1
GC	121.7, 261.1
Apch	118.85, 327.1
178 FW Ops	324.7

Wright Patterson AFB (FFO)

LC	126.9, 281.45

GC	121.8, 335.8
ATIS	124.475, 269.9
Apch	118.85, 269.275
PTD	122.85, 372.2
445A W AFRC Cmd Post	349.4

And in Indiana:

Fort Wayne International (FWA)

LC	119.1
GC	121.9
ATIS	121.25
Apch	127.2, 132.15, 135.325
FSS	122.2, 122.45

As I said above this is not an all-inclusive list, and Air Route Traffic Control Center (ARTCC) frequencies are not included. But this is a good beginning. I do have one little heads-up on some "radio shorthand," to coin a phrase. If you're monitoring the local control frequency at these airports and you hear the controller tell the pilot, "contact ground point nine," this means that the pilot is supposed to tune to 121.9. The shortened frequency is always, without any exception, based on the 121-MHz segment. If the ground frequency at any airport is not between 121.0 and 121.95, then the whole frequency must be spelled out (i.e., 120.8 would be pronounced as "contact ground one two zero point eight").

Enjoy the Dayton Hamfest and I hope to, someday after my daughter and her family return from Germany, attend the fest and perhaps represent *Pop'Comm* while there.

Next month, a whole slew of frequencies! See you then, and enjoy the show! ■

Our Readers Speak Out *(from page 3)*

How can the resulting amateur service be considered technical if including basic RF safety questions on the "Novice" written exam would make it too difficult?

I encourage all amateurs to study the details of this proposal and express their opinions to the ARRL and to the FCC during the comment period.

Walter Fair, Jr., W5ALT

George In Trouble

Dear Editor:

It seems to me that Nextel thinks they own the rights to the PTT, when push-to-talk has been a basic function on any two-way radio for many years. Now Verizon phones have it and I think it's a great item. But does this mean that no one can have a PTT button on their two-way radios? If Nextel owns the rights to it I may be in trouble—all my radios have a PTT button on them. Large companies have very deep pockets and they can do what they want. They are like the Ways and Means Committee—if they don't get their way, they have their means.

When I was growing up I used to see trucks with a sticker on them saying "two-way radio-equipped"—now they all carry Nextel phones. I used to pick up and deliver parts for a company in Fort Worth and I carried a Nokia cell phone so they could stay in contact with me in case I had to pick up a sales rep at DFW Airport. I could not go into a business without seeing a man carrying a cell phone or a two-way radio on his belt.

George E. Speck
Forest Hill, Texas

the propagation corner

by Tomas Hood, NW7US,
pc-prop-man@hfradio.org

up-to-the-minute forecasts helping you get the most from the radio spectrum

Tropospheric Propagation And VHF DX

Propagation on VHF and higher frequencies is typically thought of as "line-of-sight." Is it possible to receive these signals beyond the horizon?

Most propagation on VHF and above occurs in the troposphere. There are a number of well-documented modes of tropospheric propagation. The most common is line-of-sight propagation, which can, depending on the height of the transmitting and the receiving antennas, extend to about 25 miles. When you hear police, fire, or amateur communications from your local area, you are hearing typical line-of-sight tropospheric propagation.

Diffraction, where radio waves are somewhat bent back toward the earth, is a mode that allows the VHF/UHF signal to follow the curve of the earth out beyond the horizon, to about 70 miles. Knife-edge diffraction in mountain areas is a better-known but special case of diffraction.

Another mode that extends the line of sight to about 70 miles, is *refraction*, where radio waves are bent towards the earth due to the changing density, temperature, and humidity of the atmosphere. This slight bending of radio waves is similar to the bending you see when you dip a pencil into a glass of water. The refractive index of water is different from the refractive index of air. The object seems to bend once it enters the water because of the differences in the speed of the light waves through the different densities of each medium. Diffraction and refraction of radio waves combined extends the line-of-sight range, but signals will experience a lot of fading.

Troposcatter

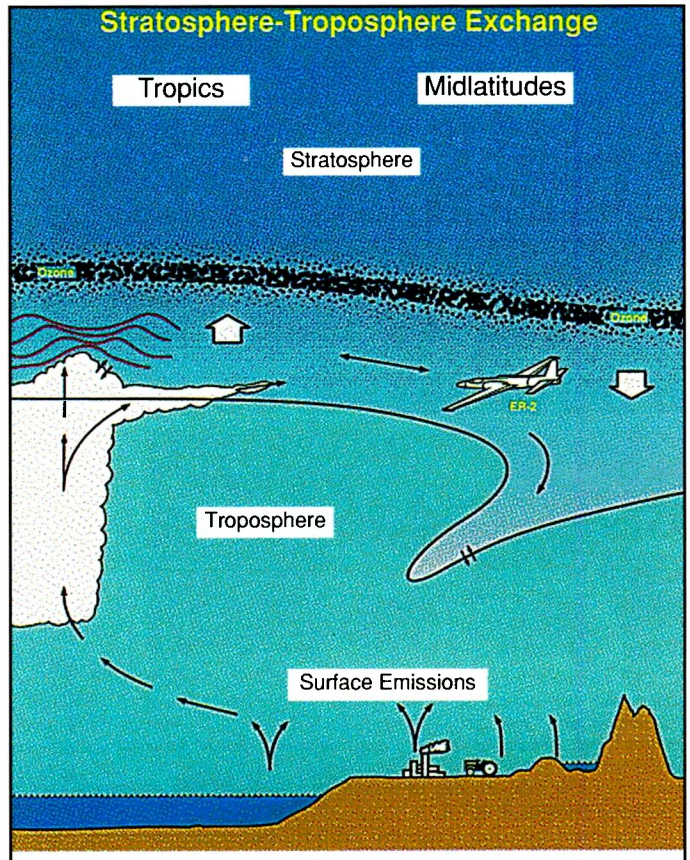
"Troposcatter" is yet another VHF/UHF mode of propagation. This mode can extend the range of the signal up to hundreds of miles. This mode requires higher power and high-gain antennas in order to ensure reliable communication. It relies on the scattering of the radio signal off of many small disturbances and areas of differing refractive indexes.

While serving in the United States Army as a Signal Corps communications, I had the opportunity to work with microwave communications using this method of propagation. Using two diversity receivers, and over 1000 watts, we would create a microwave radio link between two very distant locations. The transmitted microwave signal would be "shot" in a very high-gain, somewhat narrow beam slightly above the ground plane, but not at too high of an angle, in the hope that the radio waves would be scattered by temperature and humidity gradients, forward toward the distant station. The receiver would then "vote" between two receiving dish antennas for the maximum signal. It required a lot of patience and the use of an HF working channel to iron out the fine tuning, because finding the "scattered" signal could be like looking for a needle in a hay stack. Once we had locked the signal, we had to maximize it for a reliable circuit. If we had major changes in weather, however, we would have to work on keeping the connection alive.

DXing troposcatter is not an easy task for VHF weak-signal hobbyists. To maximize the signal, you would need to use high-gain antenna systems, perhaps with diversity feeds and a voting receiver, and you would have to have them pointed at the scatter region. Nevertheless, there are often times when the VHF DXer will hear troposcatter-mode signals from DX stations.

Rare Tropo Modes Of Propagation

There are the rarer modes of tropospheric propagation, like *temperature inversion* propagation and *tropospheric ducting*.



The troposphere is the lowest layer of our atmosphere and is where much of the daily weather occurs. When there is a lot of movement within the troposphere, eddies and currents of air can create the conditions needed for tropospheric refraction and scattering. Natural emissions from oceans and lakes, as well as emissions resulting from human activities, are produced at the earth's surface and injected into the troposphere and stratosphere by cumulus clouds (left). Large-scale upward (stratosphere tropics) and downward (stratosphere mid-latitudes) motions are driven by stratospheric wave motions, some of which are produced just above the cumulus clouds. Other wavelike motions are responsible for the transfer of air from the tropical to the mid-latitude stratosphere. Stratospheric air is returned to the troposphere by folds in the stratosphere's lower boundary (right).

The author's troposcatter military communications setup during an Army field assignment in Germany.

Temperature inversion propagation can extend the signal out to about 150 miles or so. When temperature and humidity suddenly increase at greater heights, it could can radio waves to be reflected back to earth. Ducting via the troposphere can propagate signals great distances, like from Hawaii to California. In tropospheric ducting, radio waves are trapped in a type of natural wave-guide between an inversion layer and the ground or between two inversion layers. Ducting causes very little signal loss, and often signals are only heard at each end of the wave-guide.

The Troposphere

The troposphere is the lowest layer of our atmosphere, bounded below by the earth's surface and above by the tropopause. It extends from the earth's surface to a height of slightly over seven miles. Most of the earth's weather phenomena occur in this region.

The troposphere is divided into three layers: the lower troposphere that extends up to about two miles above ground, and the middle and upper troposphere from two miles up to the tropopause at eight to 12 miles above ground.

The lower layer of the troposphere can contain ducts created by inversion layers and is the most common location for convective cells formed by solar warming of the ground and the atmosphere immediately above it. This is by far the most active layer and changes in the radio refractive index are greatest here.

The higher layer of the troposphere has less turbulence so is less useful in scatter propagation. Any ducts which form in the upper layer of the troposphere cannot normally be used for radio wave propagation (except with aerial antennas) as the radio waves enter the ducts at too great an angle to be retained within them; they simply pass through.

Under perfect conditions, the troposphere is characterized by a steady decrease in both temperature and pressure as height increases. However, the many changes in weather phenomena cause variations in humidity and an uneven heating of the earth's surface. As a result, the air in the troposphere is in constant motion, causing small turbulences to be formed. These turbulences, or eddies, are most intense near the earth's surface and gradually diminish with height. They

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 (Kp > 5 or Ap > 20) means 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 2004 - Flux = 91, SSN = 34 - Created by NW7US

UTC TO/FROM US WEST COAST	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CARIBBEAN	23	23	22	22	21	19	17	16	15	14	13	12	13	15	16	18	19	20	21	21	22	22	23	23
NORTHERN SOUTH AMERICA	30	30	29	27	25	23	21	19	18	17	16	15	15	18	20	22	24	26	27	28	29	29	30	30
CENTRAL SOUTH AMERICA	28	25	23	21	20	18	17	16	15	15	14	17	17	19	22	24	25	27	28	29	30	30	31	30
SOUTHERN SOUTH AMERICA	24	17	16	15	14	14	13	13	13	13	12	12	12	17	19	21	23	25	26	27	28	29	29	27
WESTERN EUROPE	14	13	12	11	11	10	14	14	13	12	11	13	16	18	19	20	21	21	21	21	20	19	18	16
EASTERN EUROPE	10	9	9	9	13	16	14	13	12	12	11	10	14	16	18	19	20	20	19	18	17	15	11	10
EASTERN NORTH AMERICA	27	26	26	26	25	24	23	21	19	17	16	16	17	19	21	22	23	24	25	25	26	26	27	27
CENTRAL NORTH AMERICA	15	15	15	14	14	14	13	12	11	10	10	9	9	10	11	12	12	13	14	14	14	14	15	15
WESTERN NORTH AMERICA	8	8	8	8	8	7	7	7	6	6	5	5	5	5	5	6	6	7	7	7	7	8	8	8
SOUTHERN NORTH AMERICA	24	24	24	24	23	23	21	19	18	16	15	14	14	14	16	18	19	20	21	22	23	23	23	24
NORTHERN AFRICA	18	16	15	14	13	13	15	14	13	12	12	14	16	18	19	20	21	21	22	22	21	21	21	20
CENTRAL AFRICA	19	17	16	15	14	15	15	14	13	12	11	13	16	18	19	20	21	21	22	22	22	22	22	20
SOUTH AFRICA	15	15	14	14	13	13	15	20	18	18	18	18	19	21	22	23	23	24	25	21	20	18	17	16
MIDDLE EAST	15	15	15	15	16	17	14	13	12	12	11	10	15	17	18	20	20	21	21	21	20	19	18	17
JAPAN	20	21	21	21	21	21	21	20	19	18	17	15	14	14	14	16	14	14	14	15	17	18	19	20
CENTRAL ASIA	21	22	22	22	21	21	21	20	19	18	16	15	14	13	13	16	17	17	16	15	15	16	18	20
INDIA	19	19	19	20	19	18	16	14	13	12	11	11	10	10	10	9	9	9	9	12	15	16	17	18
THAILAND	18	19	21	22	21	21	20	19	18	16	15	14	13	12	13	16	17	19	17	16	15	14	14	16
AUSTRALIA	31	31	31	31	31	31	30	29	27	23	21	20	18	17	16	15	15	14	14	13	17	23	27	29
CHINA	19	20	20	21	21	21	20	19	17	16	14	13	12	12	13	16	17	16	16	16	16	16	18	18
SOUTH PACIFIC	30	31	30	30	29	27	24	17	16	15	14	14	13	13	13	13	12	12	12	21	25	28	29	30

UTC TO/FROM US MIDWEST	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CARIBBEAN	26	26	25	25	23	21	19	18	16	15	14	14	15	17	19	21	22	23	24	24	25	25	26	26
NORTHERN SOUTH AMERICA	27	27	27	25	22	20	19	17	16	15	14	14	14	17	19	21	23	24	25	26	26	27	27	27
CENTRAL SOUTH AMERICA	28	25	23	21	20	18	17	16	15	15	14	16	18	21	23	24	26	27	28	29	30	30	30	30
SOUTHERN SOUTH AMERICA	23	17	16	15	14	14	13	13	13	13	12	12	14	19	21	23	25	26	27	28	29	30	28	26
WESTERN EUROPE	16	14	13	12	12	11	13	14	13	12	15	16	18	19	20	20	21	21	21	21	21	20	19	18
EASTERN EUROPE	11	10	10	9	9	14	14	13	12	11	13	16	18	19	20	21	21	21	20	19	18	17	15	11
EASTERN NORTH AMERICA	19	19	19	18	18	17	15	14	13	12	11	11	12	14	15	16	17	17	18	18	19	19	19	19
CENTRAL NORTH AMERICA	9	9	9	9	8	8	7	7	6	6	5	5	5	6	7	7	8	8	8	8	9	9	9	9
WESTERN NORTH AMERICA	15	15	15	15	14	14	14	13	11	10	10	9	9	10	11	12	12	13	14	14	14	15	15	15
SOUTHERN NORTH AMERICA	17	17	17	16	16	15	14	13	12	11	10	9	9	11	12	13	14	15	15	16	16	16	17	17
NORTHERN AFRICA	21	20	18	17	16	16	16	15	15	15	16	17	18	19	20	20	21	21	21	21	21	21	21	21
CENTRAL AFRICA	19	17	16	15	14	14	16	15	15	15	16	17	18	19	20	20	21	21	21	22	22	22	22	20
SOUTH AFRICA	15	14	14	13	13	13	13	21	19	18	18	19	22	24	26	27	28	28	26	21	19	18	17	16
MIDDLE EAST	16	14	14	14	15	16	15	14	13	12	15	17	18	19	20	21	21	22	21	21	21	20	19	17
JAPAN	20	21	21	21	21	20	19	18	16	15	14	13	13	15	17	16	15	15	15	16	17	18	19	20
CENTRAL ASIA	21	22	21	21	20	20	19	17	16	14	13	12	13	15	17	18	19	18	16	15	15	16	18	20
INDIA	13	15	17	18	18	16	14	13	12	11	11	13	16	18	18	17	15	13	10	10	9	9	9	9
THAILAND	18	19	21	20	20	19	17	15	14	13	12	12	13	16	18	19	20	19	18	16	15	14	14	16
AUSTRALIA	31	31	31	31	31	30	30	27	25	22	20	19	17	16	15	15	14	14	13	13	18	24	27	29
CHINA	19	20	21	20	20	19	17	15	14	13	12	11	14	16	18	18	17	15	14	14	14	16	17	18
SOUTH PACIFIC	30	30	30	29	28	26	22	16	15	15	14	14	13	13	13	12	12	12	12	22	26	28	29	30

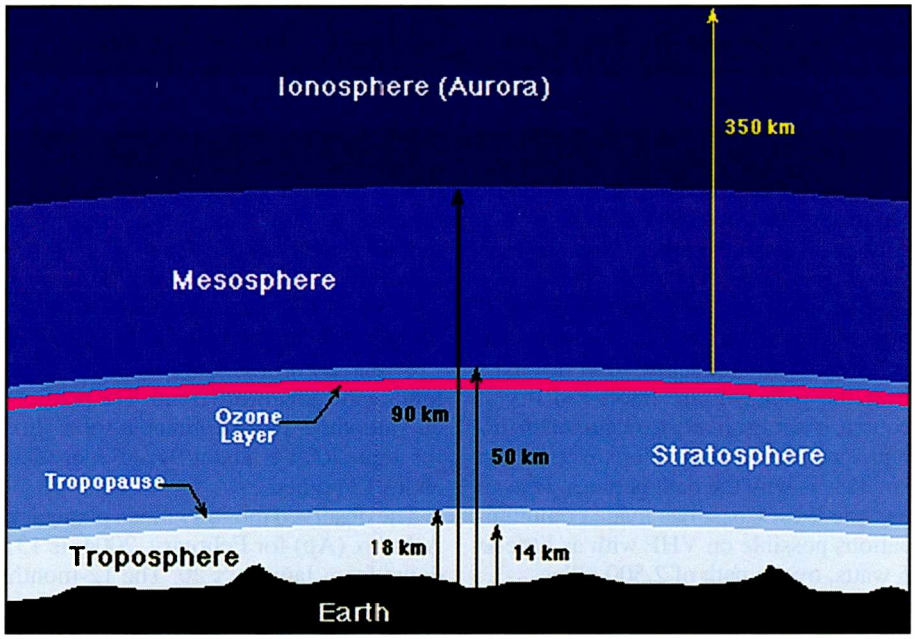
UTC TO/FROM US EAST COAST	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CARIBBEAN	21	21	20	19	17	16	14	13	12	12	11	11	13	15	16	17	18	19	19	20	20	21	21	21
NORTHERN SOUTH AMERICA	24	24	23	21	19	18	16	15	14	13	12	12	14	16	18	20	21	22	22	23	24	24	24	24
CENTRAL SOUTH AMERICA	28	25	23	21	19	18	17	16	15	14	14	17	20	22	24	25	26	27	28	29	29	30	30	29
SOUTHERN SOUTH AMERICA	21	17	16	15	14	14	13	13	13	13	12	12	18	21	23	25	26	27	28	29	30	29	28	25
WESTERN EUROPE	17	16	15	14	13	12	13	14	14	14	16	17	18	18	19	19	20	20	20	20	20	20	19	18
EASTERN EUROPE	13	12	11	10	10	14	14	14	14	15	17	18	19	20	20	21	21	21	20	19	18	16	14	
EASTERN NORTH AMERICA	9	9	9	9	8	7	7	6	6	5	5	5	6	7	7	8	8	8	9	9	9	9	9	9
CENTRAL NORTH AMERICA	20	20	20	19	19	17	16	14	13	12	12	12	13	15	16	17	18	18	19	19	20	20	20	20
WESTERN NORTH AMERICA	27	27	26	26	25	25	23	21	19	17	16	16	17	19	20	22	23	24	25	26	26	26	27	27
SOUTHERN NORTH AMERICA	21	21	20	20	19	17	16	15	13	12	12	11	12	14	15	17	18	18	19	20	20	20	21	21
NORTHERN AFRICA	22	20	18	17	16	15	15	16	16	16	19	20	22	23	24	25	25	26	26	26	26	26	25	24
CENTRAL AFRICA	19	17	16	15	14	14	16	16	16	16	18	20	22	23	24	25	25	26	26	26	25	25	22	20
SOUTH AFRICA	15	14	14	13	13	13	13	18	17	16	18	20	22	24	26	27	28	28	26	21	19	18	16	16
MIDDLE EAST	19	18	16	16	16	16	15	14	14	15	16	18	19	19	20	21	21	21	22	22	22	22	22	21
JAPAN	20	21	21	20	19	18	17	15	14	14	14	15	17	18	18	16	15	15	15	16	17	18	19	20
CENTRAL ASIA	21	21	20	20	19	17	16	14	13	13	14	16	17	19	20	20	20	19	17	16	15	15	18	20
INDIA	10	9	9	9	14	15	14	13	13	14	16	17	19	20	20	20	19	19	18	17	15	12	10	10
THAILAND	17	19	20	19	17	16	14	13	12	13	15	17	18	19	20	21	21	20	18	17	16	15	14	15
AUSTRALIA	31	31	31	30	30	28	25	23	21	20	18	17	16	16	15	14	14	13	13	13	19	25	28	30
CHINA	19	20	20	19	18	16	15	14	13	13	15	17	18	19	19	18	17	15	14	13	13	15	17	18
SOUTH PACIFIC	30	30	29	28	27	24	19	16	15	14	14	13	13	13	13	12	12	12	12	23	26	28	29	29

have a refractive quality that permits the refracting or scattering of radio waves with short wavelengths. This scattering is what provides enhanced communications at VHF and higher frequencies.

In the relationship between frequency and wavelength, wavelength decreases as frequency increases, and vice versa. Radio waves of frequencies below 30 MHz have wavelengths longer than the size of normal weather eddies. HF radio waves are, therefore, affected very little by tropospheric turbulences. On the other hand, as the frequency increases into the VHF range the wavelengths decrease in size. If the wavelengths are small enough, they become subject to tropospheric scattering. The most usable frequency range for tropospheric scattering is from about 100 MHz to 10 GHz.

Above the tropopause, changes in temperature and water content are very small indeed, resulting in very little alteration in radio refractive index. Therefore, there can be little scatter or refraction, and no real assistance to propagation until the *E* layer and meteor trails are attained, at above 60 miles or so.

David Dunham, WA1CUH, has recently proposed that refraction of VHF and higher frequencies might exist in the ionized ozone, or the *D* layer, in the stratosphere (see, "Ozone layer propagation: Pondering the possibility," *CQ VHF*, January 1999, 32–38). David has produced evidence indicating that stability and low wind speeds in the troposphere and stratosphere could result in very little scatter until the radio waves reach the *D* layer.



The atmospheric layers showing the troposphere at the lowest altitudes. This is where most VHF and above propagation takes place.

Tropospheric Ducting

The term "tropospheric ducting" refers to the stratification of the air within the troposphere. When layers form within this region of air, the refractive index between each layer causes a refraction of VHF and UHF radio waves. If the layers form in just the right way and at the right height, a natural wave-guide is created. A tropospheric duct develops.

As with most matters of propagation, it is not always possible to determine whether tropospheric propagation is ducting or non-ducting. Ducting usually has characteristics similar to sporadic-*E* (*Es*) propagation in that the distant station will be noticeably stronger than closer stations that are not accessible by the duct. Tropospheric ducting results in surprisingly strong signals for the distance involved. Ducting is typically very geographically selective. Normally stations working a duct are quite close together in space, at both ends of the duct.

Tropospheric ducting requires low-angle entry into the duct. If your signal's takeoff angle is high you are not likely to be able to use the duct, as the radio waves will shoot straight out of the upper side of the duct. Ducting also uses only the lowest part of the troposphere. Ducts are most common below one mile, and very rarely accessible above two miles. If you have a mountain in the way, then look for something beyond simple ducting.

Ducting is most likely to occur over water, during high-pressure, anticyclonic, conditions, when the air is relatively still. It is unusual at longer wavelengths because the ducts have to be larger to be effective. You'll be very lucky to observe any tropospheric ducts on low VHF, like 6 meters.

Another important issue involving propagation across the VHF bands is determining whether the effect is ionospheric, such as by *Es*. Generally, *Es* will be much stronger on similar bearings when you listen to lower frequencies. If there is no sign of any enhancement of propagation on lower VHF frequencies, you can usually be quite confident that the mode was tropospheric.

The summer season in the Northern Hemisphere is when most tropospheric ducting occurs. On a normal spring day, air pressure, temperature, and water vapor in the air decrease with height. The weather is relatively cool and breezy. Signals on VHF and above are from local sources and reception is "normal." But late in the summer, the weather is much hotter, with slow-moving high-pressure systems spanning several states and causing stagnant air masses. You can see a layer of brown haze in the air above, containing smoke and smog that has become trapped in a stalled air mass. This is a good visual cue that stratification has occurred, and the chances of you working tropospheric ducting are high.

Some amazing stories are told of oil rigs and cities over 75 miles away that can be seen during these hot summer periods. This is well beyond normal line of sight. What's more incredible is that, through a trick of optics, these objects are seen upside down! Light is being ducted far beyond the horizon, trapped between the boundaries of the stratified layers. If the radio wave is small enough (the frequency is high enough), they too can be ducted far into the distance.

Tropospheric ducting forms each year between Hawaii and the West Coast of the United States, and from San Francisco to Los Angeles, Denver to Dallas, Texas to Florida, the Great Lakes to the eastern seaboard, from the Great Lakes to Texas, Nova Scotia to Miami, and from the

Midwest to the Southeast. The most common region for high-pressure systems, where ducting is most likely to develop, is between 30 and 45 degrees latitude above and below the equator. Most of the United States, as well as the regular summertime highs of the Pacific and Atlantic regions, favor tropospheric ducting.

If your local weather forecast map shows 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 are 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 occurs also over the Atlantic. There is a great resource on the Internet that provides a look into current conditions. Bill Hepburn has created forecast maps 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 is 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 opening. The duct may, however, move slowly, causing you to hear one signal well for a few hours, only to have it fade out and another station take its place, from another area altogether.

Current Solar Cycle 23 Progress

The Royal Observatory of Belgium reports that the monthly mean observed sunspot number for February, 2004, is 46, up from January's 37. The 12-month running smoothed sunspot number centered on August, 2003, is 60, down from July's 62. The lowest daily sunspot value during February, 2003, was recorded on February 17, with a count of 18. The highest daily sunspot count for February was 67 on February 27. A smoothed sunspot count of 32 is expected for June, 2004.

The Dominion Radio Astrophysical Observatory at Penticton, BC, Canada, reports a 10.7-centimeter observed monthly mean solar flux of 107 for February, 2004, down from January's 114. The 12-month smoothed 10.7-centimeter flux centered on August, 2003, is 128, slightly down from July's 130, continuing the downward trend. The predicted smoothed 10.7-centimeter solar flux for June 2004 is about 91, give or take about 17 points.

The observed monthly mean planetary A-Index (Ap) for February, 2004, is 13, down from January's 20. The 12-month smoothed Ap index centered on August, 2003, is 22, about the same as for July. Expect the overall geomagnetic activity to be quiet to active during most days in June.

HF Propagation

June is a month of typical summertime radio propagation on the shortwave (HF) bands. Solar absorption is expected to increase, as we move into a period of seasonally high absorption levels. This causes 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 a rare event. North and south paths may still be hot, especially around sunrise and sunset. Nineteen and 16 meters will be the most reliable daytime DX band, while 19 and 22 may offer some nighttime openings during periods with higher flux levels. Because we are well into the decline of the current solar cycle, Cycle 23, I don't expect a lot of long-range DX on the highest HF bands. Some *Es* will make reception of signals possible, though.

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.

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 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 of 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 major solar flare activity and Coronal Mass Ejections (CMEs), though these will not happen as often as in the past few years. Solar flare events will generally shut down HF, starting first with the lower bands (120 to 19 meters). CMEs will cause geomagnetic storminess, degrading higher latitude signal paths more than middle and low latitude paths. Thunderstorm noise and other natural static noise will increase considerably during June and the summer months, masking exotic DX signals.

VHF Conditions

June should be a good month for ionospheric openings on the VHF bands. An increase in *Es*, with some continued transequatorial (TE) propagation will keep the VHF enthusiast happy. Solar activity is not expected to be high enough to support *F* layer DX on VHF or higher.

Es ionization is expected to increase considerably during June and into July, and fairly frequent low-band VHF short-skip openings should be possible. These are likely to occur over distances of approximately 1,000 to 1,400 miles. Although *Es* openings can take place at just about any time, the best time to check is between 10 a.m. and 2 p.m. and again between 6 and 10 p.m. local daylight time.

During periods of intense and widespread *Es* ionization, two-hop openings considerably beyond 1,400 miles should be possible on 6 meters. Short-skip openings between about 1,200 and 1,400 miles may also be possible on 2 meters.

A seasonal decline in TE propagation occurs during May, though by June an occasional opening may still be possible on the low VHF bands toward South

America from the southern tier states and the Caribbean area. 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.

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. If you want to use your cell phone or other WAP device to access the latest propagation information on the solar flux, Ap reading, and so forth, check out http://wap.hfradio.org/, the wireless version of my propagation site.

I hope to hear from you. Send a letter to me at *Popular Communications*, "The Propagation Corner," 25 Newbridge Road, Hicksville, NY 11801 or e-mail me at pc-prop-man@hfradio.org. Until next month, 73! ■

ADVERTISERS' INDEX

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loose connection

radio communications humor

by Bill Price, N3AVY, chrodoc@earthlink.net

Antennas, Nostrils, And Parking Lot Attendants

Okay, I'm already known as weird and off-the-wall, and for those of you who haven't quite made up your minds yet, this should clinch it. Harold "*Can't you re-use that stamp?*" Ort, our fearless and dedicated editor, has asked that we include some memories of Dayton in our columns. He should be particularly pleased that an amateur radio product manufacturer for which I once worked has changed most of the upper-echelon, sparing us both from fisticuffs and other unpleasantries as I drag a few skeletons from their hiding places.

Remember that I, too, am a ham, and a scanner person, a CBer, and an avid SWL. Although Dayton has been formally called a "Hamvention," it is also well attended by members of other radio hobby disciplines and those who are interested in several different branches of radio communications. Even though I might be the world's least-active ham, I still love listening to any kind of radio, any time of day or night. No matter—I readily admit that most radio people, including *moi*, are a bit whacko.

I'm not old enough to have attended the great event in the HARA Arena (and its attendant parking lot, and parking lot attendants) before amateurs were licensed to use the 2-meter band. In retrospect, I pity the poor lunatic who had the job of wearing an aluminum (or maybe steel in those days) hard-hat with a 6-meter quad or Yagi mounted atop his fedora. Must have been tough navigating the hallways, the arena, and the flea market in the parking lot. A real neck-breaker, to be sure, but there has never yet been a "Dayton," as the event is called, without someone wearing an antenna on his head.

Even 2 meters makes a sizable antenna, either as a quad or a Yagi, to mount on one's headgear, but as the torch is passed in Washington (sometimes) every four years, and at the Olympic games every four years, so it is passed annually at the Dayton Hamvention—from a retiring wearer of the head-mounted antenna to the next person so willing to make a fool of himself. I've never actually seen the ceremony, but I believe it takes place each time a new and higher-frequency band becomes allocated for amateur use and as the use of that band becomes practical, with the advent of new equipment and technology. On my last trip to Dayton, I saw a truly manageable (but still ridiculous-looking) helmet-mounted quad. And I believe, judging by its size, it was designed for the 1296-MHz band. Be still my heart.

I'm sure that you too, if you attend, will see at least one hard-hat-mounted antenna during your walks through the hallways and aisles, and note that the wearer is dead-serious about his antenna farm.

So, you wanna know some *other* secrets about Dayton? I thought you'd never ask. First of all, Norm is there. He's been attending these for as long as he's been able to afford transportation and lodging, and in his more recent past, he's been attending as an exhibitor. That's *exhibitor*, not exhibitionist. There's a difference. Norm is a gentleman, through and through. If you dig back into your stacks of *Pop'Comms*, you'll find mention of Norm and his loyal dog, Chump (now a dearly missed silent paw) engaged in such activities as erecting a huge antenna in the attic of a barn-turned-apartment-building, soldering in a New Hampshire winter, in the wind, on a roof, with a 40-watt iron, and driving (well, actually *Chump* was driving) his enormous station wagon into a shallow lake.

Only a very few of you might decipher Norm's true identity, and perhaps approach him in Dayton and ask, "Are you that Norm-fella that Bill Price writes about?" Even fewer of you might actually get a hushed reply of "yes," and be sworn to secrecy at the same time. Norm's a true friend, and worth knowing.

Now I also worked on the floor at Dayton, standing beneath a slew of hand-polished aluminum that reached way up to the very pinnacle of the arena. Working that antenna booth was a job for either a real wise guy or a nose-doctor. I was, and still am, one of those two things.

When a person stands at the front of that booth and looks up towards the antenna, always with a slight questioning expression on his face, a worker in that booth is privileged to be able to study the onlooker's nostrils—and from a most amusing vantage point. I think I was able to see all the way up to one person's *brain* back in 1989 or so. One fellow, unbeknown to those outside the antenna business, had actually trained his nostril hairs into a rather handsome moustache, but I digress. And even though Dave Barry has made a fortune with the word, Harold asked me not to use the word "booger."

Another unique view shared only by Dayton antenna salesmen is the open-mouthed gape, caused by the throat pulling downward on the chin and lower lip when a person stares skyward. No matter how sophisticated the person prior to his examining those beams, once he starts looking upward, he becomes nothing more than another flared-nosed gopher to those awaiting his questions. There are moments when several of us on the floor have been doubled over at this sight while these gaping beavers didn't have a clue that it was *they* who were the subject of all the laughter.

As I spill this year's final plate of beans about inside happenings at the early home of the Wright Brothers, I wonder if any of you know just what company's employees (and at one time, their owner and management) wore red and white striped vests while working their exhibits. Yes, my vest was the largest ever made, and was later shipped off to Tucson to guide hot-air balloons to their landing places when I left the company.

It was one of the oldest, but kindest, gentlemen I had ever seen at Dayton who approached a captain of the antenna industry in the flea-market, buttonholed him, and said, "Sonny, you guys have been doing a GREAT JOB handling the parking this year," while I and another of his minions hid under a vendor's table to avoid being fired for laughing so hard. Captain industry was not amused.

Ed. Note: Bill can be reached in Cowfield County, Virginia, for comment, abuse, suggestions, fashion advice, or just digging up dirt on Norm, at chrodoc@earthlink.net.

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