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JULY 2004

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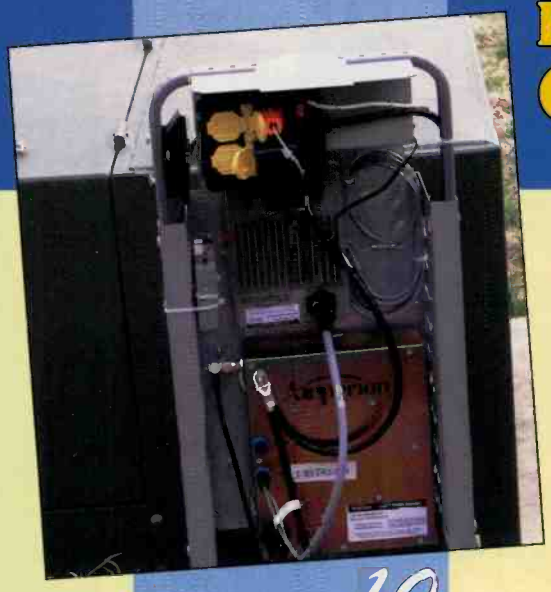

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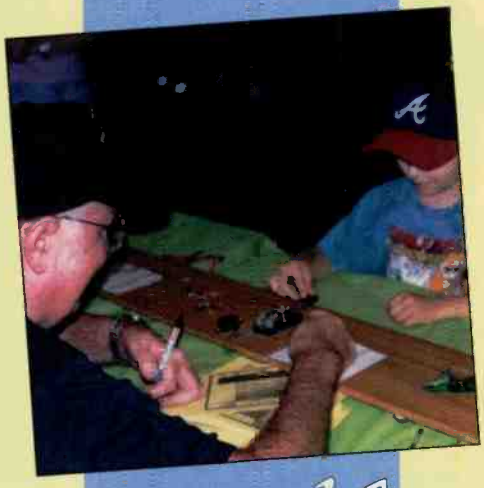

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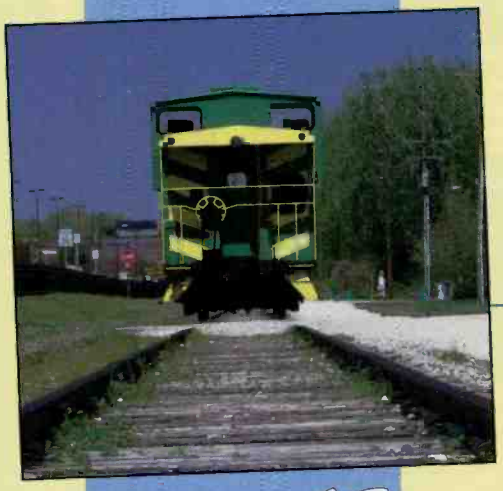

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## Departments



## On The Cover

President George W. Bush departs from the South Lawn of the White House in Marine One en route to Pease Air National Guard Base in Portsmouth, NH. Noted aviation enthusiast and *Pop'Comm* columnist, Steve Douglass, had a close encounter with Marine One near Crawford, Texas. Get the details beginning on page 6 in his article, "A Close Encounter Of The Dubya Kind." (White House photo by Eric Draper)

# washington beat

Capitol Hill and FCC actions affecting communications

by Laura Quarantiello, lauraq@cts.com

## 9/11 Suit Dismissed

A judge has dismissed a dismissed lawsuit against New York City and Motorola over radios that failed on September 11, 2001. The suit, filed by families of 12 firefighters lost in the terrorist attacks, alleged that radios failed, depriving the victims of adequate protection. The suit was dismissed on the grounds that the families of the victims had already made claims with the Victim Compensation Fund and waived claims to damages in civil suits by doing so.

## Spectrum Relocation Plan Goes To Review

The FCC's Wireless Bureau has submitted draft recommendations to the FCC commissioners regarding Nextel and public safety group proposals on how to deal with interference issues in the 800-MHz band. The Commissioners will now review the document and decide on a course of action. They can request proposal changes or vote to accept or deny the proposed order. Nextel has proposed trading 10.5 MHz of spectrum in the 800-MHz band for 10 MHz in the 1.9-GHz band. In addition, Nextel would pay $850 million to reassign all 800-MHz users, in order to solve the interference problems with public safety. Analysts say the Commissioners may focus on how much Nextel will pay to reassign its own and public safety traffic as well as how much spectrum Nextel will receive in return for giving up 10.5 MHz of its spectrum allocation.

## Nighttime AM Digital

The National Association of Broadcasters (NAB) is asking the FCC to authorize AM nighttime IBOC (In-Band On-Channel) operations. NAB Senior Vice President and General Counsel Jack Goodman, in a five-page letter, stated: "Our radio board is very optimistic that AM IBOC will offer AM broadcasters and their listeners near-FM quality within broadcasters' core service areas."

It is hoped that this authorization will move manufacturers to market digital radios. Based on field trials, NAB believes that any additional interference caused to the AM band at night by the introduction of IBOC would primarily affect distant analog skywave signals. The board believes the improvements promised by IBOC for AM is well worth the tradeoff.

## FCC License Cancellations

If you have a Private Land Mobile Radio station license, you should know that the FCC's Wireless Telecommunications Bureau (WTB) has been conducting an audit of the construction and operational status of these stations. The audit includes public safety radio licenses operating below 800 MHz.

FCC rules require construction within a specified time and that stations remain operational in order for the FCC license to remain valid. When a licensee fails to construct its authorized facilities within the requisite construction period or discontinues operation for a period of one year, the license cancels automatically. This isn't exactly news to most people, because the WTB initially sent audit letters to licensees over a six-month period from August 2001 to January 2002 and again in April and May of 2002. The Commission is now moving ahead with the cancellation of licenses that have not responded to the audit. More information, including details on how to find out if your license is at risk, can be found at http://wireless.fcc.gov/licensing/audits/plmrs/index.html.

## LAX Traveler's Information Station

Los Angeles International Airport has been granted a waiver for its Traveler's Information Station (TIS). The station, WNHV296, will increase authorized power at the TIS site from 10 watts to 100 watts. Los Angeles World Airports (LAWA), the owner of the station, asked for the power adjustment in order to better communicate information over a larger geographic area in the event of a terrorist attack or other emergency near LAX. The release said, "If the airport is closed or operations are restricted during an emergency security episode in the future, it may prove imperative to keep people away from the facility, or guide them to alternate locations."

## Portable Electronic Device Study

As reported previously in this column, experts from airlines, aircraft equipment makers, and consumer electronics companies have been meeting to discuss the role portable electronic devices play in aviation interference, specifically as it relates to passengers using such devices on board commercial aircraft. The group is discovering that as so many new products are entering the market so fast, their recommendations will be quite broad rather than tied to specific devices. They hope to issue recommendations to the FAA within the next 18 months.

## Play Nice

Nextel Communications and Verizon Wireless have agreed to settle lawsuits filed against each other over their walkie-talkie cell phone features. Last year, Verizon sued Nextel in federal court, claiming that Nextel engaged in corporate espionage in its testing of prototype "push to talk" features on Verizon's cell phones. Nextel markets the popular Direct Connect feature, which allows phone users to talk to each other with the push of a button. Verizon later offered a similar feature on its phones. ■

# tuning in

by Harold Ort, N2RLL, SSB-596

an editorial

## Who's Watching The Barn Door?

As I was reading Steve Douglass' article about his close encounter with My Prez-a-dant, it occurred to me that there are probably countless similar encounters around the country every day. For example, I'll bet that during the course of a week there are plenty of folks—including the media, naturally—listening to the Secret Service channels, trying to get wind of where My Vice Prez-a-dant is headed after yet another cheeseburger run.

Chasing activity on the federal and military frequencies has been a favorite listening fare of mine, and clearly of Steve's, for many years. Like so many thousands of communications that we've all *listened* to at one time or another, there's always a chance to hear just *one more* that makes the effort worthwhile. I suppose it's a lot like playing the lottery or betting on the ponies; it's hard to stop once you start, and moreover, it's sometimes difficult not to talk about it.

But today, in our post 9/11 world, *talking* can be a problem. Please don't get me wrong. I don't work for the White House, and I don't believe in *more government secrecy*. But it seems to me that we're finding that ordinary citizens like you and me, on the other hand, should be an open book about *our* daily activities, including what we read, listen to, or do on the Internet. If you really think about it, what we're seeing is a 180-degree shift from what's been the foundation of our great country for more than 200 years: government working *for us* and being candid (or at least giving the impression of candor) to a paradox where we've got to watch what we say and do, lest we're branded unpatriotic, or worse.

Case in point: A few weeks ago I was listening to a couple of hams conversing on 2 meters. They were talking about everything from the weather to antennas, when one of them mentioned that he had heard Air Force One (and either support aircraft or support activity) on his scanner. He really hadn't heard anything "secret" or out of the ordinary. He had apparently heard the plane landing at Newark or JFK.

Planes land and take off every day from our three metro airports. And Air Force One also lands here. But, in a moment reminiscent of years ago when a self-anointed CB Channel Master would pop on the air and scold an errant operator for breaking an FCC rule, another operator interrupted their conversation asking them not to discuss what they had heard.

No, this wasn't a Ham In Black (HIB) with dark sunglasses who works in a government building with bars on the windows, but an operator I've talked with many times over the years. Somehow, in his mind, he thought the mention on 2 meters of Dubya's plane landing or taking off was a no-no. Not quite. But it did make me *think* about where we're at in this "war on terra" and how our overall national condition affects radio hobbyists.

It was just a couple of months ago that on nearly *every* newscast, national and local (now, remember at this writing we're two and a half years or so post 9/11), we were reminded that our country was on an elevated ("yellow" if you're keeping track) state of alert, meaning there's a significant risk of terrorist attacks. At the time, whenever someone at the highest levels of one of our illustrious three-lettered agencies determined that those who would do us harm were closer to doing us additional harm, we'd get *that* reminder as well. Meanwhile, I'm sitting there thinking that yellow is yellow. It'd be the same if the level were a step higher.

Suddenly (and one can only guess why, but as you might imagine, I have a couple of ideas) a few weeks ago, for the most part, all that stopped, at least here in the metro-New York area. Honestly, it had gotten to the point where I felt like digging out my old uniform and boots and having the neighbors blow a bugle as our entire block marched to the tune of Howdy Doody and did push-ups in the street at 5 a.m. Now, granted, being in the New York suburbs is different in many ways from being in other parts of the country, but if we've learned *anything* from the events of 9/11 we *should* have learned that terrorists can strike anywhere, anytime. So, it's also common sense that we should be prepared. But just *how* prepared is a question I'll defer to Rummy and Cheney.

You see, when the very government charged with our nation's security keeps hammering home the look-over-your-shoulder message, it not only gets mighty tiring, it also wears on the psyche. Personally, I think we get the message, and average folks like you and me *are* doing our part, but there does come a point where enough is enough. I mean, short of *not using* our radios or not *talking* about what you heard on the morning news, how much more can Johnny and Susy Homelander do in the name of National Security, other than have hourly check-ins with Tom Ridge.

It's easy to see, though, how this almost militia-like neighbor-on-neighbor "spying" mentality has blossomed into what it is today. Sure, we've got to be aware of our surroundings and report suspicious or unusual activity to "the authorities." Fact is, though, I've been doing *that* for years; some clown walking the neighborhood looking like he or she is casing the area, or a vehicle parked in an unusual location at a mall, school, or near a government building, prompts me to call the cops.

But in our desire to root out whoever and whatever really caused us to get to the "report suspicious activity" point with such zeal, I hope we don't lose touch with the fact that this is still America. It's still okay to talk about hearing Air Force One landing or taking off, but not okay to publicly mention *specifics* about what you've heard. It's still okay to listen to your local police and firefighters on a scanner, but not okay to publicly talk about a surveillance mission you stumbled upon. It's not okay to get on your two-way radio—whether it's CB, FRS, GMRS, MURS, or ham—and pump out details for the world to hear, about the number of "suits" patrolling buildings where heads of state work or are visiting. It's not okay to publicly point out airport security lapses on your HT while waiting for a flight. Spot a problem or something suspicious? Call the feds or cops on a landline phone.

The common sense rules in these situations are nothing new, but how we *apply* those rules is what matters. I only wish the very rules that apply to *us* applied to the government as they continue to tighten the surveillance noose around the necks of those they serve, all in the name of keeping us safe.

It all boils down to this: Who's watching those charged with watching us? ■

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# our readers speak out

*letters to the editor*

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## VIP Spotlight Winner's Question

**Dear Editor:**

I'm trying to QSL some Colombian stations and have had no reply. What can I make or do to QSL these stations?. The last report to R. Avenida-El Espinal on 1390 kHz I even sent via registered mail!

Ronald Hagensen
Germany

***Dear Ronald:***

*Well, Ronald you've asked a very good question—for which there's no universal answer. Many DXers have good results QSLing such stations by writing the report in the station's broadcast language, enclosing a couple of mint stamps or even a Euro (or US dollar) or two. Sometimes a postcard from your home country or hometown will get the station's attention. Good luck!*

## "One Heck Of An Article"

**Dear Editor:**

I'm writing regarding your "What Am I Bid For This Radio" that appeared in your March issue. It was one heck of an article, one that we should have seen in newspapers across this country. I hope you continue to print the truth, as we don't get it in our controlled press.

My hope, however, is that you don't lose your job and that you continue to be in good health. People who write articles like that are often forced off the road by large trucks.

This is not the same country I thought it was when I was in the Navy during the Cuban Missile Crisis. What's happening to us? How did they hijack our country from us? As to the gentleman who suggested you leave if you didn't like it, tell him he might find himself in a camp someday. From listening to news on shortwave I understand 100,000 people demonstrated in New York this past weekend; I didn't see it on the news or in my local press. What are they afraid of?

An archway into the VMI (Virginia Military Institute) barracks is being dedicated today with the words, "I wish you the decency and the nobility of which you are capable."

Today, I wish you the decency and the nobility of which you are capable.

Dr. David Kaluszka

***Dear David:***

*Thank you for your thoughtful words. Yes, it's a different country, that's for sure. And like everything else people do, we've done it to ourselves by not being outspoken and standing up to those who would have you take it sitting down. I applaud you for your candor.*

## Here's An Idea

**Dear Editor:**

When I was growing up in the 1950s I had a National SW54 receiver and listened to hams, then as I got older I got away from shortwave. Back then most hams built their own equipment.

I use a Sangean ATS 818 with deluxe mods. I put two metal screens in my attic facing north/south and east/west and attached them together and ran the wire to my receiver. Now with the RF gain turned all the way down I have no trouble getting overseas stations, including the BBC, Cuba, France, Germany, Netherlands, Russia, Ireland, and Australia. This might help some people who are looking for a cheap antenna for listening to shortwave radio.

Robert McLean
Quincy, MA

# A Close Encounter Of The Dubya Kind

## *Radio Intrigue In The Most Rural Areas Of Texas!*

**By Steve Douglass, webbfeat@1s.net**

About as rural as it can get, the tiny burg of Ben Hur, Texas, isn't even on most maps. Located some 35 miles east of Waco, Ben Hur is one of those spots in the road that—except for having an unusually memorable name—most travelers wouldn't even look up from the road to notice.

The town flashes by in just a few seconds, a forgettable collection of ordinary farmhouses surrounded by tall Texas oak trees. Not really on the way to anywhere, if you've found yourself in Ben Hur it means you are well off the beaten path, in fact so far off the path that you can't see it cause it's covered by weeds and cow-pies!

And still this author managed to find radio intrigue in this most rural of areas! Let me explain.

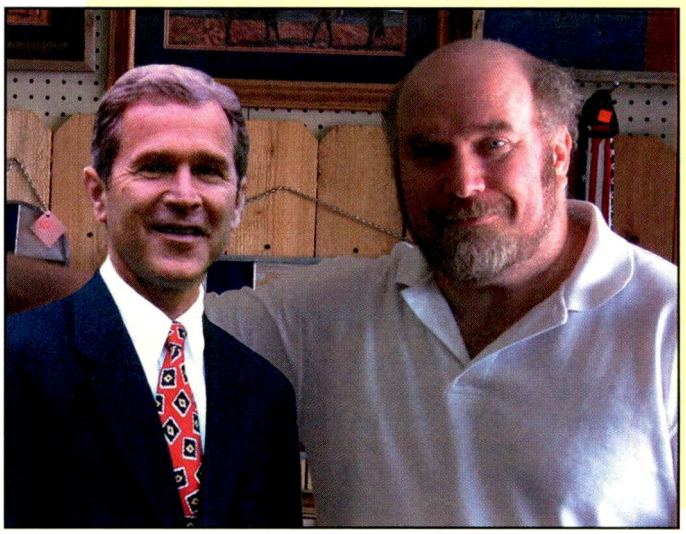
### Anytown, USA, But...

Despite the fact the bass fishing there is excellent (I am a rabid fisherman) and the ambience of the surrounding countryside is a refreshing change from city life, there's not much to do in Ben Hur. So what am I doing there? My wife's parents have a farm in Ben Hur and when we visit, it's an excellent chance to relax, take in a bit of the beautiful Texas scenery (the wild flowers are breathtaking in the spring), and drown some worms in an attempt to land that trophy bass. But being a city boy and a radio monitoring enthusiast or "interceptor," it's not long before I feel the urge to heed the siren's call of the electrified wires, fire up the radio interception gear, and go in search of things "they" don't want you to hear.

However, out in the sticks there isn't much going on, and to put it mildly, the radio pickings in Ben Hur are kind of slim. Oh sure, I can fire up the shortwave rig and listen to the long wires sing. I can tune international broadcasters or military matters on HF. I can even occasionally intercept the serious sounds of a world at war, but sometimes my ears weary of the static-filled transmissions and I long for the high-fidelity FM signals above 30 MHz. But this usually means listening in on the county-mounties as they chase down a herd of loose cows on FM 2219, or hearing "Bubba's drunk and he's being a bad boy again!" calls.

### ...Nearby Lies Crawford

But there is a nearby listening target that I've been longing to take a crack at that promises the first order of magnitude high-level communications: Crawford, Texas. Now I am sure most of you have heard of Crawford, unless you've been living in a cave in Afghanistan. Crawford is the site of the "Western White House" and it's where President George W. Bush hangs his Stetson when he's not running the country.



*Author poses with a Virtual President in the "Red Bull" souvenir shop in Crawford, Texas, after his close encounter with Marine One. (Photo by Teresa Douglass)*

Even though "Dubya" and my wife's family are practically neighbors (Crawford is located about 30 miles west of Ben Hur—that's actually considered just next door in super-sized Texas—we haven't been invited over for a barbeque or accidentally run into each other at the feed store. In fact, on my many visits (and I pass through Crawford on every trip) we have never managed to be in Crawford when the President was at his ranch!

But recently I just happened to be down in Ben Hur when the President made a surprise stop at Crawford, which provided a unique opportunity to monitor the communications surrounding his visit. My first clue that Dubya was in town happened on a Friday night as my wife, Teresa, and my good friend, Ken Hansen, were convoying our way through Waco's rush-hour on Route 6 on our final leg of our most recent trip from Amarillo to Ben Hur.

My wife and I were in our Saturn, driving right behind Ken's pick-up truck towing a long flatbed trailer loaded down with boxes of our stuff that had been languishing in a storage unit back home. Ken's real motive for coming along was to pick up an antique Farmall Model H tractor that he had recently pur-

*Flight formation of Presidential helicopters leaving Crawford, Texas. Which one the President is in is anyone's guess! (Photo by Steve Douglass)*

chased from my father-in-law, Elwood Johnston. (Despite being a telecommunications genius, Ken just loves anything that plows. The older, slower and lower tech, the better. Sometimes it's hard for me to believe that Ken is such an uber-interceptor.)

The tractor, in excellent shape, was parked in Elwood's garage in Ben Hur. Needing the space, Elwood put it on the market. I mentioned it to Ken and he couldn't plunk down his money fast enough. To make a long story short it seemed like a waste to tow an empty trailer the 500 miles down to Ben Hur without anything on it, so I conned Ken into hauling a load of our stuff down to Ben Hur to be stored in the barn. Poor Ken had no idea what he was getting into when he said yes, and he sure was surprised to see that we had over 80 boxes of accumulated junk to load and strap down on his 20-foot trailer.

## Who Cares About This Trailer? Let's Talk About Radio!

By now you may wondering why this useless information? Trust me, the answer will be revealed at the end of this story. But now I must continue.

As usual, I had my trusty Uniden BC 780 XLT receiver scanning away on the dash when it locked up on the Orderwire frequency of **350.550 MHz**. Orderwire is a UHF military WBFM (wideband FM) multi-channel communications system used for high-level communications links between AWACs, E-6 and E-8 flying command posts, SAM (Special Air Mission) flights, and Air Force One and Two and related support aircraft. I listen to Orderwire on a regular basis back in Amarillo, and was somewhat surprised to get a hit so strong on just a cheap magnetic-mount antenna mounted on the trunk of the Saturn. Back home I have to use amplified and specialized antennas to receive these usually weak signals. Whatever was using Orderwire, it was close.

But since I was busy fighting with Waco rush-hour traffic I had no time to listen in. Instead I locked the channel out so I could listen to the local Waco cops working a wreck up ahead that we hoped to avoid.

Later that night as I watched the local news they reported that the President was in residence at Crawford. That must have been the reason for the Orderwire hit. The report said Air Force One landed in Waco about 6 p.m., the same time we were winding our way through Waco. Air Force One probably flew right overhead.

Quickly I reached for my ICOM R-3 receiver and began searching through the published Secret Service frequencies looking for some action. It didn't take long to discover several frequencies in use with what sounded like digital voice scrambling. Figures. I doubted I'd hear anything in the clear on these frequencies especially during these dark days of the war on terrorism when Presidential security is paramount. I was right. The rest of the weekend all I heard was scrambled traffic. After a while I grew bored with hearing nothing and concentrated on fishing, loading Ken's tractor on the flatbed, and visiting with the folks.

Three days and a good stay later, we woke up early Monday morning so we could make the long nine-hour drive back to Amarillo. The tractor loaded, Ken took off ahead of us. We kept in touch via our handheld GMRS UHF communicators.

## What's That Whirling Noise?

Back on Highway 6 we again wrestled with the rush-hour traffic as we drove through Waco. I radioed Ken and asked him if he wanted to take a quick side-trip to Crawford to see if by a slim chance we could grab a glimpse of the President leaving Crawford. Ken said yes.

Just like us, I figured the President would be heading "home" soon, so I switched on my BC-780 hoping to hear some communications regarding the President's departure. Instantly I was rewarded with what sounded like a CAP (Combat Air Patrol) on **272.700 MHz**. No callsigns were heard, but it sounded like fighter aircraft talking to an AWACS controller stating, "All aircraft had finished tanking and they were now cleared to the operations area." The AWACS (SENTRY 31) vectored the fighters to the "restricted airspace" around Crawford and began passing radar coordinates on civilian aircraft in the area. He then told the fighters that "MAXIM ONE" flight had left Waco airport and was enroute to the LZ (landing zone).

Just west of Waco we decided to top off our fuel tanks, so we stopped at a gas station at the intersection of Highway 6 and the Crawford Highway. As we fueled up I was alerted by a high-pitched whirling noise coming from the direction of Crawford. I looked up to see a bright-red Aerospatiale Gazelle helicopter approaching our position. It flew over us at high speed, did a quick high-speed turn, slowly hovered for a moment over the intersection, and then flew slowly back down the highway toward Crawford.

Ducking inside the car for a moment I heard on 272.700 MHz (I'm paraphrasing here), "Sentry this is MAXIM FLIGHT. We are 10 miles out of Crawford. ETA three minutes." The AWACS radioed back, "You are cleared into Crawford. CAP is in place, above you and should not be a factor."

Then I heard a low rumble that began to vibrate the car. I stepped outside and looked to the East and saw four large helicopters flying directly at us. As they neared it was easy to see that there were two Black Hawk helicopters and two large Sikorsky VH-3D Sea Kings, all painted in Marine One colors.

Within seconds, flying only about 100 feet above us, they sped toward Crawford. We finished fueling and headed down

the highway to Crawford hoping to get there before the President vacated the area. My hope was to get a few snapshots of the helicopters leaving. I led our mini convoy with Ken following us with tractor in tow. On the scanner I could hear the CAP above talking with the AWACS, stating that they had a "Bullseye" on MAXIM FLIGHT and could see them landing at the ranch.

The AWACS controller responded with more radar reports and vectors concerning civilian aircraft traffic in the area and surprisingly also reported on vehicular traffic on the highway headed in to Crawford. Could they be tracking us I wondered? I didn't know about my Saturn, but I was sure Ken's tractor had a huge radar cross section!

Then I heard MAXIM LEADER say on 272.700 MHz, "One is off!" This indicated to me that Marine One, with the President on board, must have just taken off. I radioed Ken with what I was hearing and told him we should pull over so I could get some pictures of the helicopters as they flew by. Seconds later we spotted the helicopters off to our northwest about five miles away. I radioed Ken on our GMRS handhelds and pointed in the direction they were flying from.

Ken noticed that they were flying much higher than they were when they flew into Crawford (at about 7,000 feet) versus the ground-hugging map-of-the-earth approach we had witnessed earlier. I commented that this must be because the President was now on board with the extra altitude being a safety precaution. We also noted that the President could have been on any one of the choppers and not necessarily the Sikorskys, so we had no idea which was actually Marine One.

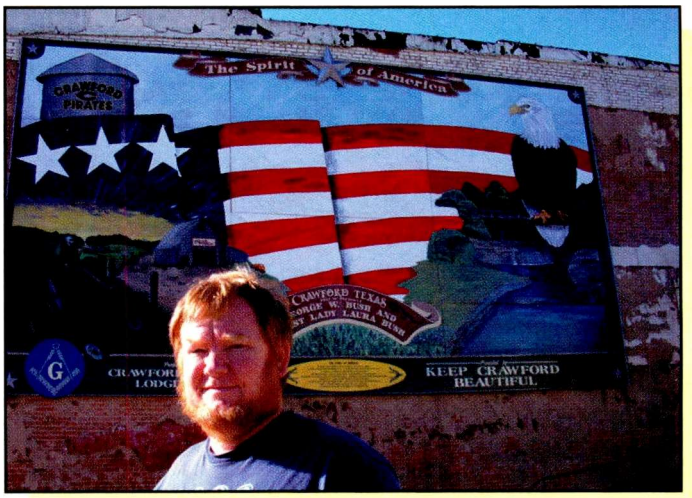
Way up above we heard the rumble of jets and caught sight of what looked like three F-16s flying circles at high altitude. Later I would learn that they were fighters from Cannon AFB, New Mexico.

Then we did something that in hindsight was pretty stupid. I won't quote exactly what we said, but in general we were commenting on safety issues surrounding the transport of the President and what we thought were glaring security holes. And then it hit me. This was a topic that we probably shouldn't be discussing on a radio. I suggested to Ken that someone might be listening and we'd better knock it off. I just hoped that anyone who might be listening realized it was a couple of guys just "spit-balling" and who meant nothing by it.

The helicopter formation never flew directly over us but passed to our north by about three miles. I used my telephoto zoom to capture the photo on the previous page. After we lost sight of them off to the east, presumably as they arrived at Waco airport, we jumped in our vehicles and went into Crawford.

As we entered Crawford, we noticed the town was swarming with Texas Department of Public Safety (DPS) patrol cars and black Ford Excursions all sporting antenna farms on the roof. They seemed to be looking for something or someone. One DPS car stopped in the middle of an intersection, sat there for about 30 seconds, did a U-turn, and sped off in the opposite direction. It occurred to me that they very possibly could have been looking for us and may have been monitoring our transmissions. This indicated that either they had a listening post in Crawford or we could have been eavesdropped on by the circling AWACS!

It's not an unlikely scenario. I had mixed feelings about this. If indeed this was the case then it gave me renewed confidence in the security surrounding the President. But it also worried me a bit because I wasn't looking forward to a body-cavity search.




*Ham radio, monitoring, and tractor enthusiast Ken Hansen, WB5QLI, poses in front of a mural just miles from the Western White House in Crawford, Texas. (Photo by Steve Douglass)*

I envisioned a state trooper pulling my Saturn over and noticing the scanner on my dash filled with military and Secret Service frequencies! I'm pretty sure in this post 9/11 world a Secret Service agent tasked with keeping the President safe would see us as nothing more than subversives, even though we were just "radio monitoring enthusiasts." At this point in my life I really didn't want to spend hours explaining to some humorless agent what we were doing in Crawford with eavesdropping equipment and blabbing on our walkie-talkies about what we thought were obvious holes in Presidential security.

## We Come In Friendship!

I have been writing on monitoring military and government communications for some time now and I'm sure my X-file is growing thick. I don't want it to grow any thicker. In fact, I almost considered not writing about this incident, knowing that it might raise some eyebrows in certain offices. I still may spend some sleepless nights, anticipating the inevitable visit from furrowed-browed government-guys, wearing serious suits and sunglasses, attached to agencies bearing three-letter initials and asking lots of questions I'd rather not answer. *Then again*, I thought, that too would make for an interesting story either for my "Utility Communications Digest" column or as a *Pop'Comm* feature!

But just in case some of our friends in the government might be reading this, let me state for the record that radio communications hobbyists mean no harm. In any event, you are probably wondering by now where Ken's tractor came into this story? Suffice it to say that two guys and a gal towing an antique Farmall tractor don't exactly fit a terrorist profile, so we were able to go about our business unnoticed by the roving security patrols. Hmm? I think I just discovered another security hole.

After it was all over we managed to shop for souvenirs in Crawford without being arrested. We even had our pictures taken with Dubya! Well, it may not have been the actual leader of the free world and just a life-sized photograph, but because of our close encounter with Marine One we still we felt as if we had gotten close to our President! ■

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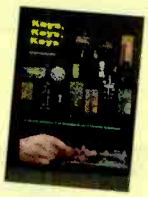

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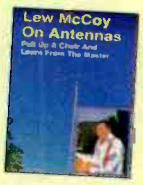

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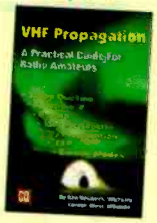

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# BPL—An Unwanted Earful

## *Coming Soon To A Radio Near You—A Speakerful Of BPL Noise!*

**By Rich Arland, K7SZ**

The single most important issue today that will affect all of us who use the radio hobby to keep abreast of current issues and/or provide communications in times of disaster is BPL, which stands for Broadband over Power Line. It's a carrier-current system used to deliver Internet data to homes and businesses using overhead local power lines as the transmission medium.

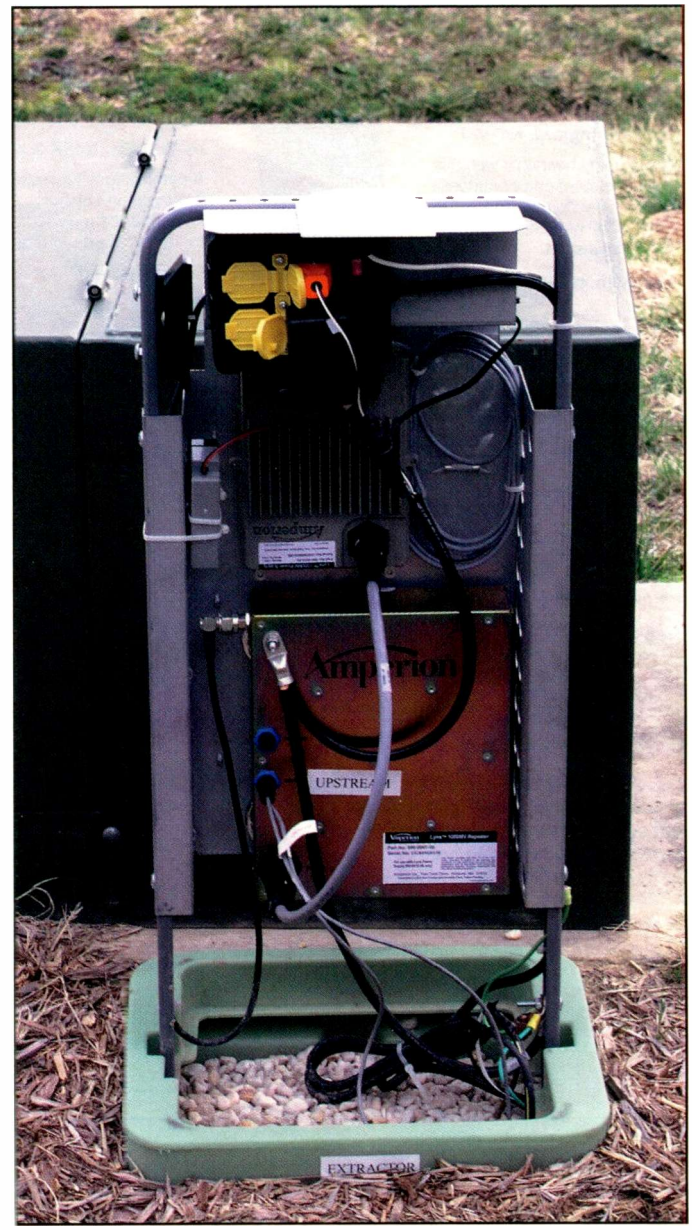
In an effort to increase the availability of the Internet to more potential customers over a wider geographical area, many power companies throughout the United States are entertaining the idea of offering high-speed Internet access to large areas of the country using the existing AC power lines as carriers. The emphasis here is on rural areas, where digital subscriber line, satellite, and cable modem access is severely restricted or, in some cases, non-existent. BPL signals will be carried over your "local" power lines.

Unlike cable TV where the cable itself is shielded, BPL causes major interference in your neighborhood, because the "transmission lines" are in your front or back yard! BPL also uses a large portion of the radio spectrum (2 to about 80 MHz), a portion of spectrum radio enthusiasts have used for years to effectively transmit low-power signals around the world.

On the surface, the idea of using the existing power grid to act as a carrier for digital data is not a bad one. Unfortunately, there are a multitude of technical hurdles to overcome to make this new medium workable. The idea of sending information over existing power lines dates back 40 to 50 years. Do you remember the "carrier current" intercoms that were popular 30 years ago? The specially designed base and slave intercom stations used the existing AC building wiring to send signals and audio information between intercom units without the need to run extra wiring. On a closed-loop/local level, this technology works extremely well. Problems occur when you try to implement wide-area coverage, like that needed for Internet connectivity to a huge section of the population.

Several BPL field trials are being conducted in the United States using both ground- and pole-mounted equipment, like that shown in the photos. Where these trials are taking place the interference ranges from moderate to extreme.

The technology needed to overcome these extremely complex problems is only one part of the equation. The interference issues associated with BPL is another. Actually, the technological issues are taking a back seat to the interference issues, pri-




*Here's a rare view of an open ground-mounted pedestal used by Progress Energy, a North Carolina-based energy provider. The company is engaged in a trial of BPL equipment manufactured by Amperion in the Raleigh, North Carolina area.*


*This pedestal, in North Carolina, is in the tall, lighter green box with its cover on.*

marily because of the activities of the American Radio Relay League (ARRL), the national organization representing amateur radio, located in Newington, Connecticut (www.arrl.org).

The ARRL has raised over $300,000 from approximately 5,600 of its members to fight the acceptance of BPL. This money is a drop in the bucket when compared to the hundreds of millions of dollars that have been amassed by the power companies and technology developers bent upon shoving BPL through the FCC's "BBRT" (Big Box of Red Tape).

BPL is making national and international news. In a recent *Wall Street Journal* article about BPL (March 23, 2004, page A1), the *WSJ* reporter was less than kind to the ham radio fraternity in general and the ARRL in particular. Categorizing hams as a bunch of old fogies enjoying an arcane hobby that has long since run its course, the article went on to point out the tremendous impact BPL would have on urban and rural areas of the country by providing high-speed Internet connectivity at modest prices. This "modest price" issue is one which is entirely relative, based upon your current ISP (Internet Service Provider) and what you consider "modest."

The *WSJ* article fell well short on more than one point, however. In addition to "down talking" the ham radio population of the United States, the article went on to quote statements by one of the FCC engineers, who stated that the interference problem was virtually "non-existent." This same individual complained about having to deal with the whining ham radio operators and the ARRL, and didn't understand what all the fuss was about. Anyone with even a modicum of electronics training and/or a ham license reading the *WSJ* article would quickly spot the technical weaknesses and the utter nonsense espoused by the FCC engineer.

## The Nitty-Gritty Of BPL

BPL uses one of four methods to place digital data onto existing AC power lines that are part of the National Power Grid (a section of which failed last year, leaving much of the East Coast dark!). These modulation/multiplexing schemes all have one thing in common: they use frequencies in and around the HF portion of the spectrum.

HF resides between 3 and 30 MHz and is the portion of the radio spectrum that allows international communications by way of bouncing (refracting/reflecting) RF energy off the various layers of the ionosphere. Without the ionosphere, HF propagation (the ability to bend signals to cover vast areas of the Earth's surface) would not be possible. That means shortwave listening and HF amateur radio would not be possible.

The carrier medium in this latest FCC brain storm is the existing U.S. power grid. The industry's story goes like this: Modulate the power lines with Internet data that cover the majority of the HF spectrum and you can claim to provide high-speed Internet access to the masses. Now here comes the rub: The interference generated by the modulation/multiplexing schemes will radiate like crazy over the power lines. After all, the power lines are nothing more than long runs of wire, which strangely resemble antennas. So why is it so difficult for the FCC engineers to get their minds around the concept that this RF energy will radiate like mad from these power lines? Instead, they bury their collective engineering heads in the sand and fail in their job to let the Commissioners know the down side of BPL.

## Shortwave And Ham Activities Affected

For over 40 years I have been an avid shortwave listener and a proponent and practitioner of QRP (amateur radio operation under 5 watts). QRPers, those who practice the art and science of low-power communications, know very well that it does not take huge amounts of RF energy to communicate all over the world. It only takes efficient antennas—big, looooong, efficient antennas. Looooong, like in AC power lines? Hmmm, we're not talking rocket science here, folks.

The idea of not being able to pursue my SWL hobby and ham radio is not acceptable. Fact is, you don't have to live a mile or less from power lines to encounter BPL's wrath. Remember how those low-power signals from radios use the ionosphere to be heard hundreds or thousands of miles away? The same concept is true for overhead power line BPL signals. Suddenly the BPL problem isn't just a local or regional problem, or even an American problem!

The FCC accepted comments on BPL and was deluged with e-mails and letters, mainly from ham radio operators, and to a lesser degree from FEMA (the Federal Emergency Management Agency) and the NTIA (National Telecommunications and Industry Association), concerned about the interference aspects of BPL. After all, left unchecked, BPL could easily spell the end of HF communications as we currently know it. Certainly it will adversely impact QRP operations on HF, with the QRP signal being several decibels *lower* than the BPL data levels! Trying to DX any weak SW stations will also be next to impossible.

*Here's a photo of a pole-mounted "Extractor," made by Amperion and used in the Progress Energy trial near Raleigh, North Carolina. The vertical "rod" or bar attached to the side of the cabinet is an 802.11b "WiFi" antenna. This Extractor picks the data off the BPL signal and converts it to WiFi for a hop across the street where it's re-injected into the underground power line as BPL to be distributed around the neighborhood. The Extractor is coupled to the power line by induction at those clamps hanging on the line on the right side of the picture. There is no physical, electrical connection to the line. Amperion says that the hardware can be attached to a live power line with normal precautions.*

Okay, let's look at another licensed service that is a *major* user of the HF spectrum. FEMA has a number of HF frequencies for disaster relief coordination efforts. With the emphasis that our federal government is placing on Homeland Security, it is hard to believe that FEMA disaster relief efforts might be jeopardized by BPL. But they will, indeed.

One interesting aspect to note is that the major user of the HF spectrum, namely the Department of Defense, has not weighed in on this issue. This is nothing short of amazing, since a significant increase in HF interference levels would have an adverse impact on flight-following, SAR (Search & Rescue) operations, Homeland Security, and a host of other military HF communications.

In a recent NPRM (Notice of Proposed Rule Making) the FCC kept the existing interference standards under Part 15 (that portion of the FCC rules and regs that governs things like BPL) and reiterated assurances to the ham radio community that, as a licensed service, their rights would be protected under any change of Part 15. While this sounds comforting on the surface, one wonders whether or not the enormous pressure from the "high rollers" who are footing the bill to build the BPL infrastructure might not move the FCC in another direction. One must look back only 18 years to the Electronic Communications Privacy Act of 1986, and the heavy lobbying by the cell phone industry as a prime example of "money talks and BS walks."

## Interference That Works Both Ways?

While hams have been very vocal about being interfered with by BPL data streams, my take on this interference problem is exactly the opposite. This interference thing can work both ways. Radio amateurs, and anyone else who is a licensed user of the HF spectrum, have the potential to easily interfere with BPL data, especially when using power levels in excess of 100 watts.

Envision this: You have a football stadium that will hold 40,000 fans. Two of these fans are ham radio operators and the rest are BPL subscribers. The two *federally licensed* hams are interfering with the 39,998 other fans (BPL subscribers). Now who do you think is going to be singled out by the power companies, ISPs, and the FCC for "special" attention and enforcement? Why, the two hams, of course; after all, this is *Amerika*, where the majority rules, except under "special" circumstances, like political correctness and certain governmental programs.

## But Even More Important...

So far we've talked about the interference aspects of BPL. Let's take a quick look at the *security* aspects. BPL will radiate over the power grid. How safe are your Internet transactions from unauthorized interception by hackers, the federal government, and others who might have malicious intent? Answer: you are not secure at all unless you utilize some form of encryption. And now, with the Patriot II Act, if you utilize any form of encryption that could be construed as a way to circumvent official government monitoring of your actions you will receive a rather nasty sentence if convicted of a crime under Patriot II. Don't think for one second that our government can't (and hasn't

## FCC Denies ARRL Extension Request

In its infinite wisdom, the Federal Communications Commission has denied the League's request to extend the deadline for comments and reply comments in the BPL Notice of Proposed Rule Making (NPRM) in ET Docket 04-37.

All is not lost, however, as you can still write to your Congressional Representatives expressing your concerns about BPL. It might also help if you contacted your local media and show them a copy of this article!

*Here's a pole-mounted "injector." All the pole-mounted boxes look the same: injector, repeater, and extractor.*

in the past) manufactured evidence against innocent citizens. This makes "war driving" in search of open microwave WiFi (wireless fidelity) systems pale in comparison. Think about this if you have any reservations about becoming involved in fighting BPL.

## What You Can Do

By the time this article is in print the FCC will not be accepting any further comments from the public on BPL. So now what can you do? The FCC is funded by Congress. They *do* listen to the folks who write their paychecks, believe it or not. Write your respective Representatives in both houses and express your concern about BPL. One word of caution: *Be polite, be courteous, and don't rant and rave.* Form your thoughts and pen them *intelligently* and with *restraint.*

If you'd like more information about BPL, including how it sounds on a radio, and what *you* can do to enlighten folks about its adverse effects—not only as it relates to your radio monitoring, but also to CB, public safety, and government communications—visit the *Popular Communications* website at www.popular-communications.com. You can also hear what one provider's BPL signal sounds like on HF by going to http//www.cq-vhf.com/BPL.html. Don't wait until BPL is deployed! ■

# Showcase Your Radio Group At The County Fair

## *Five Easy Steps For Success To Bring Fairgoers To Your Booth*

**By Gordon West, WB6NOA**

County fairs throughout the country are a *perfect* opportunity for you to showcase radio to the public. With our country's focus on Citizen Emergency Response Teams (CERT), most county fairs would welcome your 10- or 20-foot exhibit booth demonstrating emergency communications. If you're a member of any of the following, it's a sure winner for your local fair:

CERT teams with Family Radio Service (FRS)
Radio Emergency Associated Communications Teams (REACT) and Global Mobile Radio Service (GMRS)/Multi-Use Radio Service (MURS)
Civil Air Patrol and Coast Guard Auxiliary radio teams
Amateur Radio Emergency Service (ARES) groups
Scanner and shortwave listener organizations
American Red Cross radio volunteer groups

### Steps For Success

We've put together these five easy steps to help you plan and implement a successful display. Remember, though, there's no such thing as a universal, set-in-stone approach; you may have to change your demo to fit the organizer's needs.

**Step 1.** Do you want to spend a week or two at a fair presenting emergency radio communications to fairgoers? If none of your groups in the area have an interest or want to commit themselves to take a day at the fair, stop planning NOW. It takes enthusiasm and a genuine desire to showcase radio's benefit to the nation! But if your community has eager emergency radio responders, most would LOVE to show off their uniforms and all of their capabilities at a county fair. If the enthusiasm is high, start planning for an emergency radio booth.

**Step 2.** Do some research with those radio operators who have attended the fair in the past. See if they have an old events program or can recall any other radio group demonstrating emergency communications. The fairgrounds won't accept an application for a duplicate-type public service group.

**Step 3.** Make sure you have the necessary lead time before your local county fair begins. State fairs require a minimum of six months of pre-planning for a booth. County and local fairs may accept new exhibitors up to a month before the fair begins. Are you in time?

**Step 4.** You're in! Your local fair administrators have accepted your public service emergency communications booth idea, and now it's time to designate a single liaison between the different emergency radio groups and fair staff. Do you get the booth free, or is there a slight charge for public service exhibitors? Is there an insurance requirement? If so, could they tell you what the other public service groups are doing for the insurance requirement? Ham radio clubs that are members of the American Radio Relay League can receive short-run local fair insurance at a reasonable rate.


*The big antenna marks your spot! Fairgoers will flock to your booth with an antenna like this one!*

**Step 5.** You've scored the booth, have plenty of insurance, have lined up different emergency group members for staffing shifts. Now it's time to plan the THEME. A tie-in with your local CERT recruitment folks will benefit your local public safety agency that conducts the CERT program. REACT teams could partner up with those agencies they serve with on call-outs and put a display together. The same is true for ham radio groups: If they're involved in RACES or ARES, some good themes can be developed at the booth to demonstrate emergency radio to its fullest—all from volunteers.

### Booth Attention Getters

I would recommend a front table with CW keys and oscillators. Now I realize that Morse code is not used all that much for your local community emergency radio preparedness, but the

code keys are a real attention grabber. Have the kids and the adults send their first name in CW for a simple little certificate.

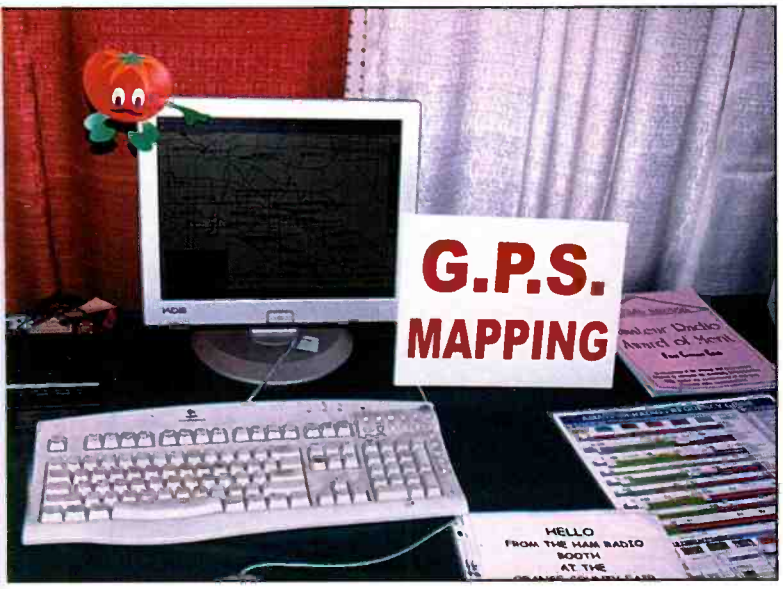
Have live radios in the booth, with microphones removed. If you have scanners, program some hot scanning channels. For GMRS, showcase some of the more active GMRS repeaters that might carry emergency radio training nets. Ham radio operators will tie in VHF/UHF equipment to monitor local repeaters.

All of this live radio in the booth requires an outside antenna system. Many of the adjacent booths will be running computers, so an inside antenna will lead to some very noisy reception. If you can get a booth next to a hole in the wall to get coax out to an antenna system, your demonstration will be much better. But keep in mind that any fairground will have plenty of electrical equipment powering the rides. If you plan to install a high-frequency station, be prepared for an abnormally high noise level.

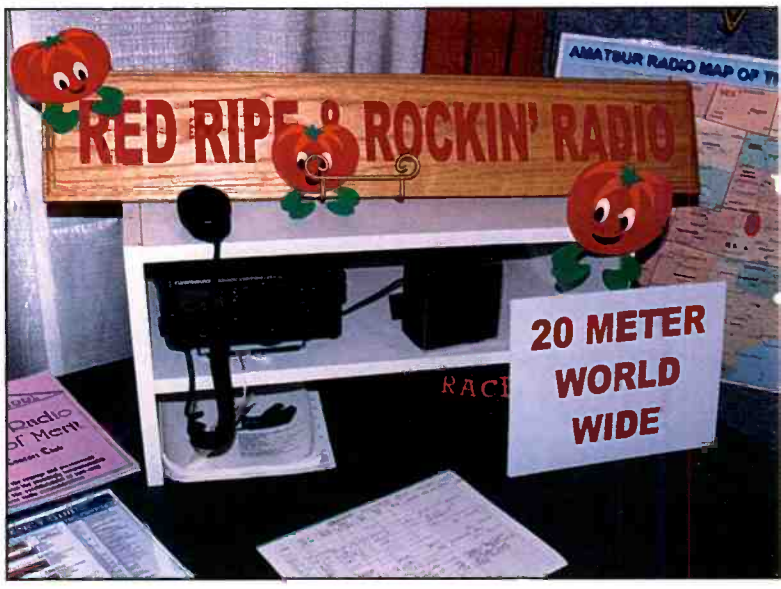
Another attention getter would be ham radio's Automatic Position Reporting System (APRS), maybe with a map of the local area and callsigns popping up. The computer demonstrates that your volunteer radio team has the latest in equipment, and the APRS demo is a nice tie-in with explanations about the global positioning system that most fairgoers already know about.

Have a booth "station" that ties into a handheld with an external microphone, tuned into one of the MURS channels. Tie in with another station *locally* and put some of the fairgoers on the air! This

*Kids will stop by your booth to use the CW key "station" to "send" their names in Morse code to receive a special certificate.*




*The live APRS demo is a popular fair attraction.*




*Each station is hooked up to an outside antenna. Here visitors can listen to live worldwide amateur radio 20-meter conversations.*

demonstrates the absolute wireless capabilities of your volunteer emergency radio system. Maybe give them some sort of small certificate for taking part in the two-way demo.

A ham radio or shortwave high-frequency receiver always draws a crowd. Tune into some exciting shortwave broadcasts. Find a high-power shortwave station for best results. Ham radio high frequency is fun to monitor, but you'll constantly need to chase the stations up and down the dial for clear reception.

## Handouts And Follow-Ups

Your emergency radio booth should have a file box filled with handouts containing local emergency group contact information; after all, part of your booth duty should be the recruitment of radio volunteers. Also, after your display of live equipment, many fairgoers may wish to purchase their own FRS or MURS radio as part of a CERT team, or they may want to join a CERT team, or to study for their ham radio ticket. Don't let them leave the booth without something in hand showing them their next step.

Finally, have a logbook sign-in for licensed radio operators who just happen to come across your emergency radio booth. Have them write in their e-mail address if they would like more information about some of the groups they see demonstrating radio. Ham radio operators will be attracted to the booth by the CW keys. Emergency radio operators will be attracted by those volunteers in their emergency radio uniforms. Or maybe they'll be attracted to the booth by all the radio equipment they hear crackling with excitement in the back of the booth. Just make sure they don't leave empty handed.


*Radios on display, including CB, ham, marine VHF, and scanners are big crowd pleasers.*

## In Giving You Also Receive

Your one or two week-long emergency radio booth fair experience should have some interesting rewards. After the event, about every other day you will find someone wanting to donate equipment to your emergency group. One day it might be a "boat anchor"; another day it might be near-new two-way radios.

You will be pleasantly surprised at how many words of thanks you'll get and the ongoing results of your efforts. Let me know how your event worked out, and don't forget to send in some photos that We'll use right here in *Pop'Comm*! ■

# Survey Results

## *What You're Telling Us About* Pop'Comm *And Your Radio Hobby!*

**By Harold Ort, N2RLL, Editor**

This month, in an effort to report on as many survey results as possible and still give you a fair representation of what you're telling us, we'll be presenting the results in a much different format than usual. Again, we sincerely thank you for taking the time to complete the survey cards and send them our way!

Please note that there's always a small margin of error. As an example, let's say one month we received 112 survey cards, 104 of you might have answered the first question, not the second, etc. So, the percentages below in each instance won't always add up to 100, but we strive to bring you the most accurate results possible without enlisting the help of a NASA computer!

Our survey drawing winners this month were **Emmitt Clark, WB3CCW**, of Pennsylvania and **Ken Knight, NØYGM**, of Colorado. Both will receive a free one-year *Pop'Comm* subscription (or extension). Congratulations to both of you!

**Q. When using a scanner in public I use a headset:**
Yes: 19%
No: 46%
Sometimes: 34%

**Q. I use an external preamp or attenuator on my scanner:**
Yes: 15%
No: 80%

**Q. I use a surge/spike suppression device so my radio equipment and computer is protected from harmful electrical surges:**
Yes: 74%
No: 23%

**Q. I have a lightning protection device on my outside antenna:**
Yes: 40%
No: 46%

**Q. I paid approximately this amount for my surge/spike suppression device:**
$25: 39%
$50: 18%
$75–$100: 15%
$100–$150: 4%
More than $200: 7%

**Q. Spending money on quality surge suppression devices is important to protect my electronic equipment from surges:**
Yes: 57%
No: 4%
Maybe: 33%

**Q. I've lost valuable electronic equipment because it got zapped with a powerline surge/spike:**
Yes: 28%
No: 70%

**Q. I do most of my radio listening and talking...:**
Daytime at home or on the road: 24%
At work: 10%
At home, early evenings right after work: 40%
At home, most of the evening: 35%
Only on the road, typically when traveling on business: 28%
Only on the road, traveling for pleasure: 4%
At home, during the day right after work: 5%
Mostly weekends, during the day: 12%
Mostly weekend evenings: 10%

**Q. I'm a ham and my family complains about radio interference to their home entertainment systems or phone:**
Yes: 18%
No: 12%

**Q. I'm a CBer and my family complains about radio interference to their home entertainment systems or phone:**
Yes: 0%
No: 1%

**Q. I've tried to remedy the interference problem by doing the following:**
Using a high- or low-pass filter: 1%
Using ferrite chokes: 2%
Reducing my operating power: 2%
Changing my operating hours: 16%
Grounding my equipment: 0%
Moving my antenna: 1%
Buying different home entertainment equipment: 2%
Only operating mobile: 3%
Changing operating frequencies: 37%
I haven't done anything: 7%
Contacted the ARRL: 7%

**Q. At my home monitoring post I experience RFI (radio frequency interference):**
Yes: 45%
No: 24%
Sometimes: 35%

**Q. I was able to determine the source of the RFI and it was in my own home/apartment:**
Yes: 35%
No: 65%

**Q. The problem was in my own home/apartment, and I used the following method to find the source of the RFI:**
An MFJ Line Noise Meter or similar device: 30%
Alternately turning on and off circuit breakers in my house while listening to the radio: 28%
Turning appliances on and off while listening to the radio: 18%
Using a portable radio to track the source of the noise: 40%

**Q. The problem was:**
My computer/monitor: 14%
A light dimmer switch: 24%
Fish tank heater: 9%
Electric blanket: 4%
Old incandescent light bulb: 4%
Fluorescent light fixture: 23%
Fax machine: 2%
TV or VCR: 3%
Answering machine: 1%
Doorbell: 2%
Arcing wall outlet: 1%

**Q. My RFI problem was traced to outside my home:**
Yes: 35%
No: 28%
It's in my neighbor's house: 13%
It's a nearby telephone pole: 15%
I don't know the source: 8%

# ScanTech

by Ken Reiss, radioken@earthlink.net

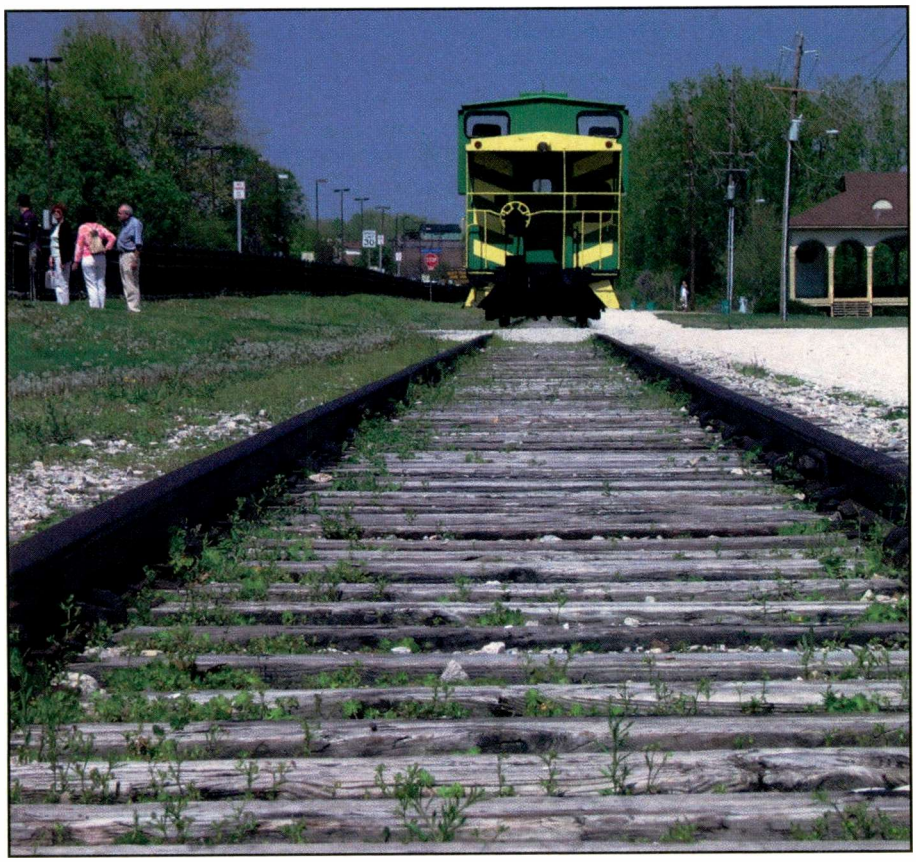
strategies and techniques to keep YOU informed

## Monitoring The Rails And Waterways: Frequencies, Tips, And Techniques!

Many radio users have dedicated frequencies within the spectrum for their use. This is particularly apparent with the marine, aviation, and railroad services. Over the past several years, many of the "hard and fast" frequency allocations have been blurred considerably in an effort to shift frequencies from services where they were not being well utilized to services that were overcrowded in a particular area.

This reallocation has been geographical and depends entirely on what services are in your area and what frequencies might be available. With some careful searching and research, frequency coordinators have been able to license many frequencies that are outside their "service," which again blurs the lines for those of us trying to find those new frequencies.

One area where this has not happened, at least not to any great extent, is within the railroad service. Railroads have allocated VHF frequencies which have been in use for many, many years. There was a proposal to move the railroads to another band at one time, but it was dropped because of strenuous objections from the railroad industry itself. The cost of new equipment for different bands on a nationwide basis is staggering. (On the other hand, the aviation service is *currently* under siege, as the entire air traffic control system is being evaluated for upgrades, but I would expect that it will be many years before any changes actually occur—if they ever do.)



*Since the caboose has become virtually extinct, there's an increased reliance on automated devices to monitor critical train functions, many of which use radio to report their data.*

I have read that there is another push to move the railroads to trunked radio. The problem is that the railroads have a lot of territory to cover. Putting up repeaters and trunking controllers along the thousands of miles of railroad track would be a tremendous undertaking. Perhaps some compromise solution, such as using satellite-based radio or the public cellular system, which is much more likely to have continuous coverage than a private, built-from-scratch system, will eventually be used. But I wouldn't hold my breath, either.

There are, however, some railroad frequencies *outside* the official railroad band. These are used by railroad police, yard workers, and others in instances where they do not have to communicate with the trains or other people running the "operations" side of things. Most of these out-of-band allocations are really nothing more than business band licensees in another part of the spectrum. You can look for these channels in the UHF and other VHF portions of the spectrum, particularly in large metropolitan areas where there is likely to be a lot of auxiliary operations. As with all businesses, lots of communications are being conducted via cell phones, too.

### What, Where, And How

When monitoring trains, one easy thing to look for is the radio alarm detectors, or RADs. These are automated systems that watch a train as it passes to look for problems; the systems then broadcast their findings on the radio. You'll sometimes hear a count of the axles, any defective wheel boxes, or items hanging down from the train that shouldn't be there, and also frequently the speed of the train in an automated voice. The crew will usually acknowledge these broadcasts as well. If you can hear one of these detectors, it will tell you two things. The first is that you're close enough to railroad operations to hear any traffic that might be passing by. The second is that there *is* a train close by!

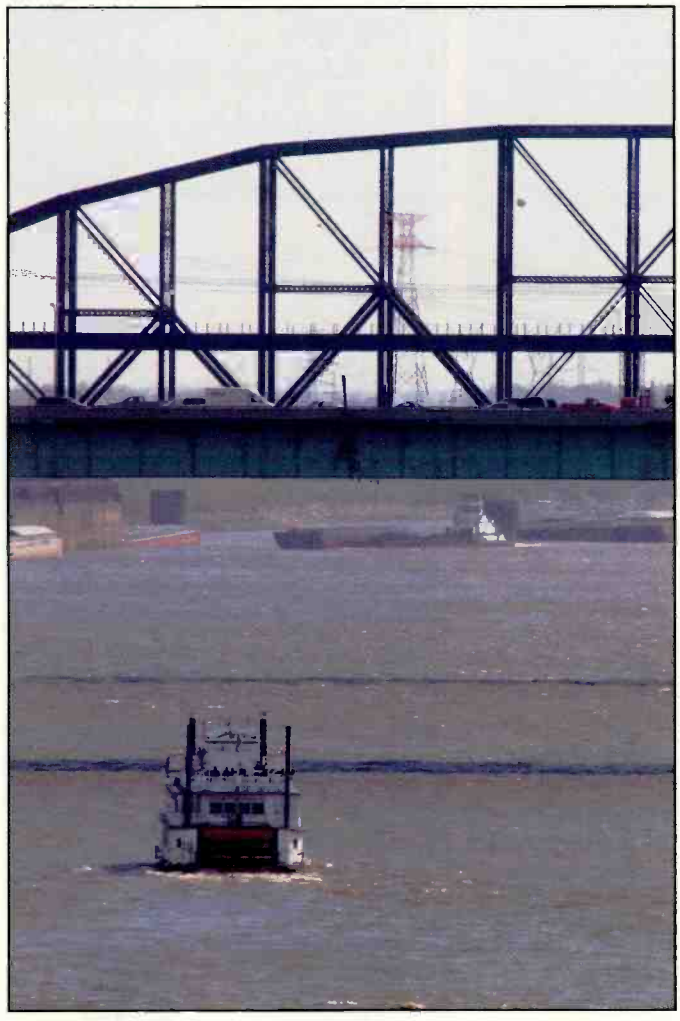

*Older receivers like this Bearcat 300 had "service search" buttons right on the front panel. Unfortunately, it's not really practical these days since many services, such as police and fire, can request to be licensed on any unused frequency in their area.*

But if you can't hear a RAD transmitter, don't despair. You may still hear plenty of activity from other railroad operations, such as yard traffic and other routine exchanges on long-haul tracks that pass within radio range of your location. They don't talk a whole lot on the open road, so you may have to listen for a while if you don't have a major operation nearby. You might decide that railroad monitoring isn't for you, if that's the case. But, as they say on TV, "wait, there's more!"

Another frequency to plug in to your scanner is **457.9375**. This is a nationwide frequency used by most railroads for EOT (End of Train) telemetry modules. Since there are no longer any cabooses on trains, these devices monitor the status of air pressure and other things at the far end of the train and transmit a signal approximately every 40 to 45 seconds, even if the train is not moving. They only transmit data, so you won't get too excited, but their presence does indicate a nearby

## Table 1. AAR (Association Of American Railroads) Channels

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 7 | 160.215 | 30 | 160.560 | 53 | 160.905 | 76 | 161.250 |
| 8 | 160.230 | 31 | 160.575 | 54 | 160.920 | 77 | 161.265 |
| 9 | 160.245 | 32 | 160.590 | 55 | 160.935 | 78 | 161.280 |
| 10 | 160.260 | 33 | 160.605 | 56 | 160.950 | 79 | 161.295 |
| 11 | 160.275 | 34 | 160.620 | 57 | 160.965 | 80 | 161.310 |
| 12 | 160.290 | 35 | 160.635 | 58 | 160.980 | 81 | 161.325 |
| 13 | 160.305 | 36 | 160.650 | 59 | 160.995 | 82 | 161.340 |
| 14 | 160.320 | 37 | 160.665 | 60 | 161.010 | 83 | 161.355 |
| 15 | 160.335 | 38 | 160.680 | 61 | 161.025 | 84 | 161.370 |
| 16 | 160.350 | 39 | 160.695 | 62 | 161.040 | 85 | 161.385 |
| 17 | 160.365 | 40 | 160.710 | 63 | 161.055 | 86 | 161.400 |
| 18 | 160.380 | 41 | 160.725 | 64 | 161.070 | 87 | 161.415 |
| 19 | 160.395 | 42 | 160.740 | 65 | 161.085 | 88 | 161.430 |
| 20 | 160.410 | 43 | 160.755 | 66 | 161.100 | 89 | 161.445 |
| 21 | 160.425 | 44 | 160.770 | 67 | 161.115 | 90 | 161.460 |
| 22 | 160.440 | 45 | 160.785 | 68 | 161.130 | 91 | 161.475 |
| 23 | 160.455 | 46 | 160.800 | 69 | 161.145 | 92 | 161.490 |
| 24 | 160.470 | 47 | 160.815 | 70 | 161.160 | 93 | 161.505 |
| 25 | 160.485 | 48 | 160.830 | 71 | 161.175 | 94 | 161.520 |
| 26 | 160.500 | 49 | 160.845 | 72 | 161.190 | 95 | 161.535 |
| 27 | 160.515 | 50 | 160.860 | 73 | 161.205 | 96 | 161.550 |
| 28 | 160.530 | 51 | 160.875 | 74 | 161.220 | 97 | 161.565 |
| 29 | 160.545 | 52 | 160.890 | 75 | 161.235 | | |



*Even if you don't have a major waterway nearby, you may still find activity on the marine bands.*

## Frequency Of The Month

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

This month, let's focus on a marine frequency since we're on the topic. Give **156.450** a listen and send in what you hear. We'll enter your name (even if you don't hear anything) into the drawing for a free one-year subscription to your favorite radio magazine (as long as that's *Popular Communications*, of course). Send in your loggings to radioken@ earthlink.net, or via snail mail to Ken Reiss, 9051 Watson Rd. #309, St. Louis, MO 63126.

train. The modules operate at about 2 watts, so you can hear them from as far as four miles under ideal conditions. This distance, however, can be severely limited by a number of factors, including buildings or trees between you and the tracks.

One more set of nationwide frequencies for data is **452.925/457.925** and **452.950/457.950**, which are used for locomotive speed control near some yard operations. Put them in your scanner and see what you come up with!

One final note about railroad frequencies. The AAR (Association Of American Railroads) channels shown in **Table 1** give both the channel designation and the frequency. Put the frequencies into your scanner, but be aware that the railroads will refer to the channels by number. Sometimes they mention the number on the channels (most railroads are using synthesized radios these days, which can cover all of the channels in the band), or with older equipment, operators may just refer to the channel number on that particular radio. When using the synthesized radios, the channels are referred to in pairs. The first number is the *transmit* channel and the second is the *receive* channel. Often,

## A Reader's Aviation Question Answered

Since we spent this month scanning trains and boats, let's also answer a quick airplane question about the mysterious ARINC (Aeronautical Radio, Inc.). Here's what *Pop'Comm* reader Phil wants to know:

*Q*. I have expanded my scanning to include airline traffic. I've got a grip on most of the band, but the ARINC frequencies have been trouble. I live in Toledo, Ohio, and hear a lot of traffic on the ARINC frequencies. Instead of searching, I'm trying to find the specific frequencies that can be heard in my area. I have been keeping a log of which ones I hear, but it seems to be different ones every time I search. Should I keep searching and add them to a bank or are there specific frequencies for my area? I can only hope. I get the feeling that the whole thing is random.

*A*. Well, it's not random, but it certainly can be confusing. ARINC is a company that's owned by the airlines and deals with some of the very complicated communications that are required to run an airline and fly planes safely. If you've listened to the planes on shortwave reporting positions and other information, you're familiar with part of what ARINC does.

The other part is not quite so obvious. They are licensed all over the country for lots of aviation band frequencies. Many of these are the so-called "company" channels used for the planes to talk back to their maintenance operations and such, which are often way out of range for VHF frequencies. ARINC operates a set of connected transmitters that can be patched together as necessary to facilitate the conversation.

So what you're hearing, Phil, is ARINC picking a transmitter that's on the ground near where the plane is and patching that through to "San Francisco." The transmitter they pick will determine the frequency that gets used. Often, if the conversation lasts a while, you'll hear them come in and ask them to move to a new frequency—one that's in range of where they've flown to during the conversation. The transmitters are staggered all over the country so that frequencies can be re-used, and if the plane is high enough it may be able to stay on the same frequency even though the ground transmitter changes to one several hundred miles away.

We'll come back and revisit aviation services in more detail soon, I promise.

## Table 2. Marine Frequencies

| | | | | | |
|---|---|---|---|---|---|
| 6 | 156.300 | Intership Safety | 66 | 156.325 | Port Operations |
| 7 | 156.350 | Commercial | 67 | 156.375 | Commercial |
| 8 | 156.400 | Commercial | 68 | 156.425 | Non-Commercial |
| 9 | 156.450 | Commercial | 69 | 156.475 | Non-Commercial |
| 10 | 156.500 | Commercial | 70 | 156.525 | Non-Commercial |
| 11 | 156.550 | Commercial | 71 | 156.575 | Non-Commercial |
| 12 | 156.600 | Port Operations | 72 | 156.625 | Non-Commercial |
| 13 | 156.650 | Navigational | 73 | 156.675 | Port Operations |
| 14 | 156.700 | Port Operations | 74 | 156.725 | Port Operations |
| 15 | 156.750 | Environmental | | 156.775 | |
| 16 | 156.800 | Distress-Calling | | 156.825 | |
| 17 | 156.850 | State Control | | 156.875 | Oil Tankers |
| 18 | 156.900 | Commercial | | 156.925 | Non-Commercial |
| 19 | 156.950 | Commercial | | 156.975 | Commercial |
| 20 | 157.000 | Port Operations | | 157.025 | Commercial |
| 21 | 157.050 | Coast Guard | | 157.075 | Coast Guard |
| 22 | 157.100 | Coast Guard | | 157.125 | Coast Guard |
| 23 | 157.150 | Coast Guard | | 157.175 | Coast Guard |
| 24 | 157.200 | Marine Telephone | | 157.225 | Marine Telephone |
| 25 | 157.250 | Marine Telephone | | 157.275 | Marine Telephone |
| 26 | 157.300 | Marine Telephone | | 157.325 | Marine Telephone |
| 27 | 157.350 | Marine Telephone | | 157.375 | Marine Telephone |
| 28 | 157.400 | Marine Telephone | | 157.425 | Commercial |
| 65 | 156.275 | Port Operations | | | |

these will be the same number, such as 3030, which means they are transmitting and receiving on Channel 30 (simplex operation). This four-digit number is often referred to as the "window" number and is what the operator sees in the window of his radio.

With 97 frequencies to monitor, you'll need at least one of your scanner's banks. Many railroad fans prefer a dedicated railroad monitoring scanner. Put the frequencies in your radio and see what's there before you decide how serious you want to get about monitoring them. It can be fun, and it's certainly different from listening to another license plate check!

## Maritime Monitoring

The maritime world also has a set of standard VHF allocations. Some of the frequencies, like Channel 16, have even been standardized as to their use. Channel 16 is the emergency calling channel, the frequency used by boaters and ship operators alike. Local operators, the Coast Guard, and other maritime services use other frequencies, either by assignment or local agreement.

In larger ports, base operators are assigned a channel (or it's done by agreement). If you need the services of that port operator, you call on that channel, or call on Channel 16 and someone will direct you to the correct channel. In smaller ports, it can become almost a free-for-all to find an open channel.

In addition to the maritime operators, many "pirate" broadcasters use maritime frequencies for land-based operations, because of the ease and widespread availability of the equipment. Most maritime supply stores and many sporting goods stores and other outlets that sell even a few electronic products have marine band handheld radios available for a modest price.

On larger ships, handheld radios are often used on a quiet channel for person-to-person communications within the ship. Some of these operations are moving to Family Radio Service (FRS) radios since they are so widely available and affordable, but if the crew has the need for legitimate communications with other maritime users (such as talking to dock personnel during docking operations), they may well use one radio for everything. Even large handhelds don't generate much over 5 watts, so the range will be limited, but you can hear some interesting conversations if you're close enough to—or on—the ship!

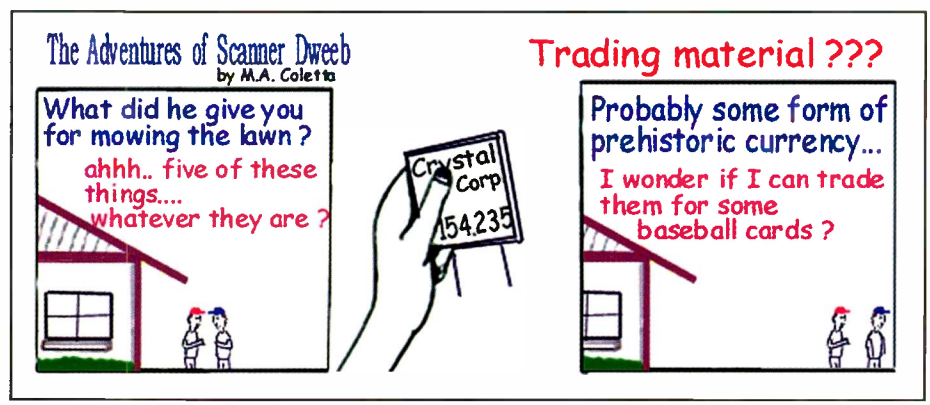
Another great place to hear lots of radio traffic is at a lock facility on a river. For example, I'm in St. Louis, and right on the Mississippi there are locks within range of my scanner. Most of the traffic is routine operations, until something out of the ordinary happens.

My advice for monitoring the marine band would be to put all the marine frequencies (see **Table 2**) into your scanner and then see what pops up as active. Some of it you'll find interesting; some you won't. Once you decide what's worth listening to, you can take out the rest, or leave them programmed in so you can check back a few times during the year. Maritime radio tends to be a very seasonal affair in many parts of the country, so what's dead today might very well be good entertainment tomorrow.

Even if there's no water within miles of you, there may still be some traffic to be heard. Illegal operations on the marine band were fairly common up until a few years ago when the General Mobile Radio Service (GMRS) and FRS radios became more widely available. Plug in the frequencies and see what you hear before you write off the whole band.

## What's On Your Scanner?

What are you hearing on the railroad and marine bands? Don't forget that "ScanTech" needs your input, so send me information about what you're listening to, along with photos of your setup! ■



# global information guide

listening to what your world says every day

by Gerry L. Dexter

## The Bell Tolls For Swiss Radio International, And More

That bell in that tall dark tower over there is tolling again, this time announcing the demise of Swiss Radio International come the end of October. Even though we knew this was coming, it doesn't make it easier to take. "The Two Bobs" (Zanotti and Thoman) who used to host the "Swiss Shortwave Merry-Go-Round" program, spent years talking down their own medium. Swiss authorities eventually got the message and proceeded to close two of the three in-country transmitter sites (Lenk and Schwarzenburg) in favor of relays via French Guiana and the like, leaving only a single 500-kW unit active (at Sottens) which will now be sold.

If it will make you feel better, you have our permission to treat yourself to some chocolate. One thing though—make it a Hershey or a Mars product!

### New Shortwave Stations!

Radio Peace is a new one in Africa. Based in the Sudan, the station is beaming Christian programming into the southern part of that country. If you're good (and you live in EST-land) you might well pick this one up on **4750** as it signs on at 0230.

Radio Pedar (Father) is a new Farsi language broadcast aimed at Iran and produced by Channel One TV based in California. It is aired over Merlin transmitters in the UK and is on the air from 1830 to 1930 on **9740**.

The long-awaited arrival of private shortwave broadcasting in Papua New Guinea may have come to pass by the time you read this. Wantok Radio Light in Port Morseby should be broadcasting on a tropical band frequency by now, relaying its own local FM outlet. Among the partners in this new Christian effort is HCJB.

### Relay Stations!

The ever-growing maze of shortwave broadcast relay combinations has increased again. Transmitters in Santiago, Chile—likely those operated by Voz Cristiana and, before that, by La Voz de Chile—are now relaying the BBC. This transmission is on **17605** from 1900 to 2030, beaming to Brazil and the South Atlantic. Also in this current broadcast season, the BBC is being relayed by Irkutsk, Russia, for the Indian subcontinent on **17710** from 0230 to 0300.

Another relay addition is Radio Thailand, now being aired over VOA transmitters at Greenville from 0030 to 0130 and Delano from 0300 to 0400, both on **5890** and both airing a half-hour in English followed by a half-hour in Thai.

### VOA Cutbacks

The current broadcast season has brought significant cuts in VOA English, thanks to budget reductions. Gone are the 0000 to 0200 evening transmissions to the Americas, as are the 0300 to 0600 segments to Africa on weekends. English to the Middle East and North Africa changes from 0400 to 0700 to 0300 to 0500 and the 1600 to 2100 segment is cut to 2100 to 2200. Broadcasts to the Pacific at 1900 to 2000 and 2100 to 2200 have been dropped entirely. The 0200 to 0300 Saturday/Sunday broadcast has also been dropped. All together the VOA "News Now" format in English has been cut to 18 and a half hours per day during the week and an hour less than that on weekends. Another round of cuts will occur when the next broadcasting schedule takes effect in October.

### This Month's Book Winner

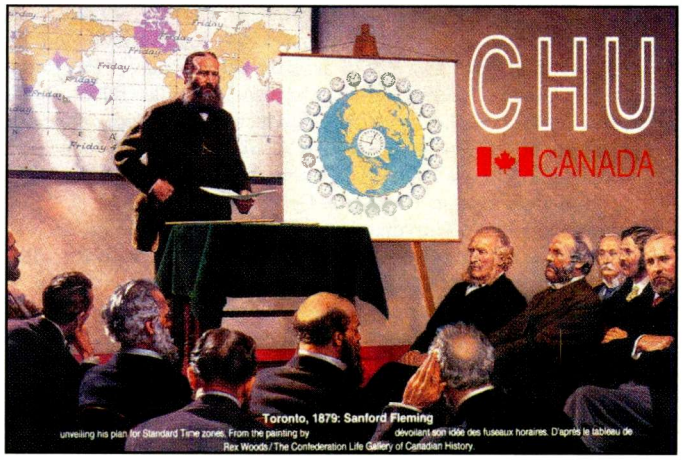
To show our appreciation for your loggings and support of this column, each month we select one "Global Information Guide" contributor to receive a free book. Readers are invited to send in loggings, photos, copies of QSL cards, and monitoring room photos to me at *Popular Communications*, "Global Information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

**Rick Barton** of Phoenix, Arizona, is our book winner this month. Rick has received a copy of the invaluable *Cop Talk—How to Listen In on Law Enforcement Communications* by Laura Quarantiello, published by Tiare Publications (www.tiare.com/coptalk.htm). And thank you, Rick, for your steady support.

### South American, Central America, And Mexican Station News

La Voz del Upano in Macas, Ecuador, has been reactivated on **4870** with a full ID of "Radiodifusora Catolica Cultural Voz


*Ray Paradis got a very fast reply from Radio Sweden.*




*Canadian time station CHU uses this card depicting Sanford Fleming unveiling his plan for standard time zones.*

**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 |

del Upano," and it seems to be carrying the programming of Radio Maria (as does La Voz del Napo, 3280). It also seems to be running on a near 24-hour-a-day basis, since it's being noted early in the mornings and deep into the evenings as well.

Paraguay's Radio Nacional has returned to the air with a new 100-kW transmitter but, oddly, is still off their nominal **9735** spot. Like the earlier unit the new one resides closer to **9737**.

Also back on the air is Radio Melodia, Colombia, on **6140**, often IDing as "La 730"—the station's mediumwave channel—which is likely what the shortwave outlet is carrying.

We learned that Radio Miskut in Nicaragua (**5770**) has been off the air for close to a year due to transmitter problems. Apparently they intend to repair it and return, but we wouldn't expect that to happen very soon.

It's "via con dios" to Radio Mexico International, which has discontinued shortwave activities. The station had offered a nice variety of music and some programming in English. Eventually it even got two of its three planned frequencies in use. Several other Mexicans continue to be active, however, with Radio Educacion (**6185**) the most commonly heard.

Sometime during the current broadcast season we can expect still another new U.S. religious broadcaster to take to the air in the form of KIMF in Pinon, New Mexico (operated by the International Fellowship of Churches, based in Rancho Cucamonga, California). It's scheduled to operate from 2200 to 1800 on **5835** and from 1600 to 2300 on **11885**.

## Shipboard Station

WBCQ (**7415**) has plans to do some broadcasts from shipboard (and may even have already done so). A new "lightship/radio boat," the *Katie*, has been fitted with a studio, and broadcasts are planned over WBCQ's regular land-based transmitter. The ship will also have an amateur radio station. Of course, we've been hearing about a shipboard radio station from this owner for years, so you probably won't want to rush out and rent a tuxedo in preparation for the inaugural ball just yet.

## Your SW Logs

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. How about contributing your shack photo for publication in the "Global Information Guide"? 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 is assumed to be in English (EE).

**ALASKA**—KNLS, **7365** in CC at 1319. (Jeffery, NY)

**ALBANIA**—Radio Tirana, **6115** at 0250 with news, ID, IS. (Harnett, FL)

**ANGOLA**—Radio Nacional, **4950** in PP at 0244. (DeGennaro, NY) **9720** in PP at 0136. (Charlton, ON)

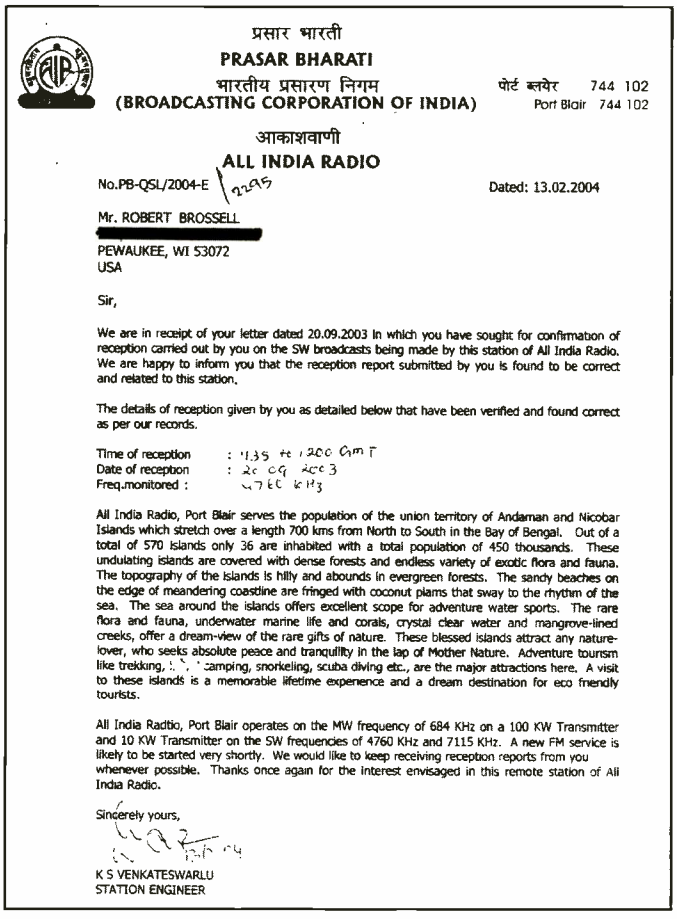
**ANTARCTICA**—Radio Nacional Arcangel, (t) **15476** with snippets of audio at 2050. (Strawman, IA) 0030 with news in SS and possible weather. Lots of fading and no clear ID. (Linonis, PA) (*Not normally active at this hour.—gld*)

**ANTIGUA**—BBC Relay, **5975** from as early as 2200. (Michael, OH) 0457. (Little, NC)

**ARGENTINA**—Radio Nacional, **6060** with SS ID at 0951 and news in SS. (DeGennaro, NY) RAE, **11710** at 0035 with music and talk, many mentions of Argentina. ID with time pips at 0200 and into EE. (Burrow, WA) 0050 in SS. (Linonis, PA)

**ARMENIA**—Voice of Armenia, **9960** at 2040 with anthem, ID in EE and GG, frequencies and news to 2050. (Brossell, WI) 2053 with Armenian news. Off at 2100. (Burrow, WA)

**AUSTRALIA**—Radio Australia, **5995** with news at 1601. (Foss, Philippines) **6020** in EE and Pidgin at 1042. (DeGennaro, NY) 1315 with C/W and mention of ABC. Also on **9870** at 1310. (Northrup, MO) **9580** at 1100. (Michael, OH) 9580/**9590** at 1350. (Brossell, WI) 9590 at 1400 with domestic ABC programming. (Linonis, PA) **15515** at 2145. (Barton, AZ) **21740** with "Asia Pacific" at 2245. (Paradis, ME) 2348. (Charlton, ON) Voice International, **15150** in Mandarin at 1510. (Strawman, IA)



प्रसार भारती
**PRASAR BHARATI**
भारतीय प्रसारण निगम
**(BROADCASTING CORPORATION OF INDIA)**

पोर्ट ब्लयेर 744 102
Port Blair 744 102

आकाशवाणी
**ALL INDIA RADIO**

No.PB-QSL/2004-E \ 2295 Dated: 13.02.2004

Mr. ROBERT BROSSELL
[redacted]
PEWAUKEE, WI 53072
USA

Sir,

We are in receipt of your letter dated 20.09.2003 in which you have sought for confirmation of reception carried out by you on the SW broadcasts being made by this station of All India Radio. We are happy to inform you that the reception report submitted by you is found to be correct and related to this station.

The details of reception given by you as detailed below that have been verified and found correct as per our records.

Time of reception : 1135 to 1200 GMT
Date of reception : 26 09 2003
Freq.monitored : 4760 KHz

All India Radio, Port Blair serves the population of the union territory of Andaman and Nicobar Islands which stretch over a length 700 kms from North to South in the Bay of Bengal. Out of a total of 570 islands only 36 are inhabited with a total population of 450 thousands. These undulating islands are covered with dense forests and endless variety of exotic flora and fauna. The topography of the islands is hilly and abounds in evergreen forests. The sandy beaches on the edge of meandering coastline are fringed with coconut plams that sway to the rhythm of the sea. The sea around the islands offers excellent scope for adventure water sports. The rare flora and fauna, underwater marine life and corals, crystal clear water and mangrove-lined creeks, offer a dream-view of the rare gifts of nature. These blessed islands attract any nature-lover, who seeks absolute peace and tranquility in the lap of Mother Nature. Adventure tourism like trekking, [illegible] camping, snorkeling, scuba diving etc., are the major attractions here. A visit to these islands is a memorable lifetime experience and a dream destination for eco friendly tourists.

All India Radtio, Port Blair operates on the MW frequency of 684 KHz on a 100 KW Transmitter and 10 KW Transmitter on the SW frequencies of 4760 KHz and 7115 KHz. A new FM service is likely to be started very shortly. We would like to keep receiving reception reports from you whenever possible. Thanks once again for the interest envisaged in this remote station of All India Radio.

Sincerely yours,

K S VENKATESWARLU
STATION ENGINEER

*Robert Brossell added the difficult Andaman Islands to his countries verified list with this reply from All India Radio, Port Blair on 4760.*

**AUSTRIA**—Radio Austria Int., **6155** in SS to Europe at 2156. Also **9870** in EE at 0117. (DeGennaro, NY) **7325** at 0119 and **17865** via Canada at 1633. (Charlton, ON)

**BELGIUM**—Radio Vlaanderen Int., **11730** in Flemish at 2200. (Paradis, ME) 2235. (Charlton, ON)

**BOLIVIA**—Radio Mallku, Uyuni, **4796.7** with Bolivian music and SS at 1015. (Wilkner, FL) **4799** with music and SS ID at 1100. (DeGennaro, NY) Radio San Miguel, Riberalta, **4903.8** at 0925 with light instl. music, local ballads, SS talk, ID, anmts, jingles. (Alexander, PA) Radio Uncia, Uncia, **4722.9** at 1000 with Bolivian music, man/woman anncrs in SS. (Wilkner, PA) Radio Guanay, Guanay, (t) **4761.6** at 1020 with poor signal in SS. (Wilkner, FL) Radio Eco, Reyes, (t) **4409.8** at 2330 with weak SS signal. (Wilkner, FL) Radio Santa Cruz, Santa Cruz, **6135** with SS talks at 1016, "El Condor Pasa" segments. (DeGennaro, NY)

**BOTSWANA**—VOA Relay, **7340** in unid language at 0337. (Paszkiewicz, WI) **7460** with "News Now" programming at 0420. (D'Angelo, PA) **9885** with sports at 0323. (Brossell, WI)

**BRAZIL**—(all in PP except where noted) Radio Mundial, Sao Paulo, **3325** with songs and talk at 0913. (DeGennaro, NY) Radio Difusora Roraima, Boa Vista, **4875** with ID at 0255. (DeGennaro, NY) Radio Senado, Brasilia, **5990** with accordion music, ID at 0940. (DeGennaro, NY) Radio Difusora Amazonas, Manaus, **4805** with news at 1012. (DeGennaro, NY) Radio Guaiba, Porto Alegre, **6000** with ballads and talk at 0915; **//11785**. (Alexander, PA) Radio Cultura, Sao Paulo, **9613** with music and talk at 2335 (*nominal 9615—gld*). (DeGennaro, NY) Radio Guaruja Paulista, Presidente Prudente, **5045** at 0854 with songs and ID at 0859. (DeGennaro, NY) Radio Pioneira, Teresina, **5015** with talk by woman at 0957. (DeGennaro, NY) Radio Bandeirantes, Sao Paulo, **9645** with ID, commercial at 2343. (DeGennaro, NY) Radio Nacional, Macapa, **4915** with call-in program at 0926. (DeGennaro, NY) Radio Difusora, Taubate, **4924.5** with songs, commercials at 1055. (DeGennaro, NY) Radio Brazil Central, Goiania, **4985** at 0848 and **11815** at 2148. (DeGennaro, NY) Radio Educador, Guaraja Mirim, **3375** with vocals, talk, ID at 0958. (Paszkiewicz, WI) Radio Aparecida, Aparecida, **5035** with music and commercials at 0852. (DeGennaro, NY) **6134.8** at 0915 with local music, talk, //9630. (Alexander, PA) Radio Anhanguera, Goiania, **4915** with futbol coverage at 0059. (DeGennaro, NY) **11830** at 2344. (Charlton, ON) Radio Universo/RadioTupi, **9565** with religious programming at 0050. (DeGennaro, NY) **11765** at 2352 with Brazilian music. (Charlton, ON) Radio Difusora Acreana, Rio Branco, **4885** with ID, talk at 1030. (DeGennaro, NY) Radio Novas de Paz, Curitiba, **9515** with news at 1004. (DeGennaro, NY) Radio Educacao Rural, Campo Grande, **4754** with songs and local anmts at 0834. (DeGennaro, NY) Radio Educacao Rural, Tefe, **4925** with local commercials at 1048. (DeGennaro, NY) Radio Cultura Ondas Tropicais, Manaus, **4845** with talk on marriage and morality at 1017. (DeGennaro, NY) Radio Nacional Amazonia, **6180** with Catholic service at 0926. (DeGennaro, NY) **6183.2** with phone talks at 0834. **//11780**. (Alexander, PA) 11780 with songs and ID at 2059. (Brossell, WI) 2245. (DeGennaro, NY) Radio Nacional Brazil, **9668.2** at 0501 sign on and ID, talk, local ballads. (Alexander, PA) **11780** heard at 0005. (Little, NC)

**BULGARIA**—Radio Bulgaria, **5800** with music and biographical notes on composers at 2251. Also **7400** with news at 0322 and **9440** at 0037. (DeGennaro, NY) 7400 at 0010. (Charlton, ON) 7400/**9400** at 0000 with IS, ID, headlines. (Burrow, WA) **7495** with letters at 2245. (Ziegner, MA) 9400 at 0310 and 15700 at 1335. (Brossell, WI)

**CANADA**—CHU time station, **3330** at 0423. (Little, NC) CKZN, St. John's, Newfoundland, **6160** at 0300 relaying CFGB-FM. (Linonis, PA) 2115 with weather and marine forecasts. (Brossell, WI) Radio Canada Int., **5850** via Sweden at 2244 with interview (EE to FF). (DeGennaro, NY) **6040** with talk on the Klondike gold rush at 0240. (Harnett, FL) **9515** with news at 1313. (Northrup, MO) **17860** via Xi'an, China at 0248. (Foss, Philippines)

**CHILE**—Voz Cristiana, **11745** at 0001 with news and religious message. (DeGennaro, NY) **13365** in FF to Africa at 2024. (Brossell, WI) **17680** at 2203. (Barton, AZ)

**CHINA**—China Radio Int., **5960** via Canada at 1114. **9440** in unid language at 1132, **9665** via Brasilia in SS at 0105, **9790** via Cuba at 0311 and **13700** in SS at 2220. (DeGennaro, NY) **6190** from unknown site at 0400. Also **13680** at 2332 (*via Canada—gld*). (MacKenzie, CA) **9580** via Cuba at 0150, **11975** via Mali in CC at 2351 and **13680** at 2322. (Charlton, ON) 9665 via Brazil in SS at 0315. (Brossell, WI) **11700** in Farsi at 1510. (Ziegner, MA) **13630** to Africa in FF at 2100. (Rosetti, MA) CPBS, **9810** from Xi'an in CC at 1145 and **11925** from Lingshi in CC at 1210. (DeGennaro, NY) **11800** from Beijing in CC at 1249. (Foss, Philippines) Music Jammer, **9355**, **//9455**, **9870**, **9875** and **13670** at 1925. **13670** against Radio Free Asia at 1855; **//11945** and **13745**. **13800** at 2330. (MacKenzie, CA)

**CLANDESTINE**—(To N. Korea) Voice of the People, **3912** in KK at 1128. Heavily jammed. (Foss, Philippines) (Iraq) Radio Sawa, **9645** via Morocco in AA at 0041. (Jeffery, NY) 0100. (DeGennaro, NY) (Cuba) Radio Marti, **6030** in SS at 0237. (Harnett, FL) Radio Free Asia, **11900** via No. Marianas, in CC at 2105. (Brossell, WI) **15550** in CC at 2313. (Jeffery, NY) Voice of Mesopotamia, via Russia, **11530** in AA at 1335. (Northrup, MO)

**COLOMBIA**—La Voz de tu Conciencia, Puerto Ileras **6010.2** at 0353 with ID 0354, religious music by children. (Alexander, PA) **6012** in SS heard at 1051. (DeGennaro, NY) Radio Melodia, Bogota, **6139.8** with romantic ballads, SS talks, ID from 0950. (Alexander, PA) **6140** with sign-on at 1100. (DeGennaro, NY)

**COSTA RICA**—University Network, **11869** with Gene Scott sermonizing at 1348. (Brossell, WI)

**CROATIA**—Voice of Croatia, **6165** with news in Croatian at 2145. (DeGennaro, NY) **7285** via Germany at 2320. (Charlton, ON)

**CUBA**—Radio Havana Cuba, **9550** at 2351. (Charlton, ON) **11760** with DX program at 2100. (Paradis, ME) Radio Rebelde, **5025** in SS at 0033. (DeGennaro, NY)

**CYPRUS**—BBC Relay, **7140** in AA at 0345. (Brossell, WI)

**CZECH REPUBLIC**—Radio Prague, **7345** in FF at 2301. Also **9435** in Czech at 2200. (DeGennaro, NY) News heard at 2330. (Charlton, ON) 0318 in SS. (Brossell, WI) **17485** with news and letters at 1703. (Jeffery, NY)

**DOMINICAN REPUBLIC**—Radio Cima Cien, Santo Domingo, **4959.8** in SS with meringue and salsa music heard at 0039. (DeGennaro, NY)

**ECUADOR**—Radio Buen Pastor, **4816** with religious program sat 1057. (DeGennaro, NY) La Voz del Napo, Tena, **3280** in QQ at 0908. (DeGennaro, NY) Radio Oriental, Tena, **4781** in SS with ID heard at 1008. (DeGennaro, NY) Radio Quito, **4919** in SS at 1047. (DeGennaro, NY) Radio Federacion, Sucua, **4960** in SS/QQ with flute and rap at 1035. (DeGennaro, NY) La Voz del Upano, **4870** monitored at 0240 with music variety, SS talks, ID at 0300, classical piano. (Alexander, PA) HCJB—**3220** in QQ with children's choir, talks. (DeGennaro, NY) **9745** with "Spotlight" and SS ID at 0330. (Paszkiewicz, WI)

**EGYPT**—Egyptian Radio/Radio Cairo, **9990** in FF at 2050. Also **12050** in AA at 1958. (Brossell, WI) 2130 with EE to Europe. (Rossetti, MA) 9990 in SS at 0204, **11725** in EE at 2340, **11780** in SS at 0204 and 12050 in AA at 1641. (Charlton, ON) **9994** at 2215. (Ziegner, MA) **11755** in SS at 0059 and **12050** in AA at 2230. (DeGennaro, NY)

**EL SALVADOR**—Radio Imperial, **17835** in SS with vocals at 2305. (MacKenzie, CA)

**ENGLAND**—BBC, **6195** with World Service at 0705. (Little, NC) **12095** with features at 1010. (Ziegner, MA) Bible Voice Broadcasting, **13845** via Germany at 1805. (Charlton, ON)

**ETHIOPIA**—Radio Ethiopia, **9561.5** at 1607 with interview, music, possible ID and bells at 1630 and into news with mentions of Ethiopia, clear ID at 1636. Transmitter drifts slightly. (Burrow, WA)

**FRANCE**—Radio France Int., **9730** (*via South Africa—gld*) at 1620 with ID at 1627. (Burrow, WA) 1854 in FF. (Charlton, ON) **11955** via Gabon with sporting event in FF heard at 2023. (Brossell, WI) **15300** in FF at 1639. Also **17620** in FF at 1618. (Jeffery, NY) 17710 (*via Japan—gld*) in FF at 2317. (MacKenzie, CA)

**GABON**—Africa No. One, **15475** in FF at 1610. (Barton, AZ)

**GERMANY**—Deutsche Welle, **3995** in GG with ID at 0259 followed by news. Also **7400** to East Asia via Russia in GG at 1112. (DeGennaro, NY) 7400 via Irkutsk in GG at 1054. (Foss, Philippines) **6100** at 0220 and **11890** at 2318, both in GG, both via Canada. (Charlton, ON) **6145** in GG at 0247. (Harnett, FL) **12030** via Russia in GG at 1351. (Brossell, WI) **15335** (*via Sri Lanka—gld*) in Urdu at 1700, Dari at 1730 and Pashto at 1745. (Ziegner, MA) **21560** via Sines in FF at 1603. (Jeffery, NY) Radio Africa Int., via Germany, **11735** with phone-ins at 1828. (Burrow, WA) Religious talks at 1850. (DeGennaro, NY) Bayerischer Rundfunk, **6085** in GG at 2018. (DeGennaro, NY) Deutschland Radio, **6005** in GG with news at 2202. (DeGennaro, NY)

**GREECE**—Voice of Greece, **5865** in Greek at 0215. (Harnett, FL) 0231. Also **9420** in Greek at 2154, **17565** via Greenville in Greek at 2123 and **//17705** via Delano in at 2131. (DeGennaro, NY) **15630** in Greek at 1642. (Ziegner, MA) VOA Relay, **15540** in unid language at 1403. (Brossell, WI) Radio Aap Ki Dunyaa (VOA Urdu Service), **7175** via Greece at 0100 sign on with duo IDs, and news in Urdu. Off at 0159 with VOA ID. (D'Angelo, PA)

**GUAM**—Adventist World Radio **11980** with ID heard at 1629 and into features. (Burrow, WA) **15320** with clear ID at 2300 but then hit by heavy QRM from Radio Netherlands, **15515**. (Barton, AZ) **17880** in EE/CC at 2257. (MacKenzie, CA) AFN/AFRTS, **13362 USB** with NPR programming at 2357. (Foss, Philippines)

**GUATEMALA**—Radio Amistad, (p) San Pedro La Laguna, **4698.7**, struggling with transmitter problems and poor modulation. In SS at 1140. (Wilkner, FL) Radio Verdad, Chiquuimula, **4052.5** with religious music at 0550, EE sign off anmts at 0555 with "Radio Truth" ID and address, then SS anmts. National anthem at 0556. (Alexander, PA) Radio Buenas Nuevas, San Sebastian, **4800** with children singing at 1034. (DeGennaro, NY) SS ID at 1139 and into religious music. (Brossell, WI)

**GUINEA**—RTV Guineenne, **7125** at 2249 with drum music and chants. (DeGennaro, NY) 2320 in local and FF. Very strong at 20 dB over S9 and no QRM. (Ziegner, MA)

**GUYANA**—Voice of Guyana, **3291** at 0822 with Hindi vocals, EE ID heard at 0822 and into choral religious music. TID and TC at 0840 and into Koran. (Alexander, PA)

**HAWAII**—AFN/AFRTS, **6350 USB** with report on NATO heard at 1151. (Brossell, WI)

**HONDURAS**—Radio Luz y Vida, San Luis, **3250** with religious songs and anmts at 0335. (Brossell, WI) 0345. (Paszkiewicz, WI) Radio Litoral, La Ceiba, **4832** with SS songs ant talks at 1105. (DeGennaro, NY)

**HUNGARY**—Radio Budapest, **6025** in EE with "Hungary Today" at 1959. Also **7160** in SS at 2247 and 9825 in HH at 2246. (DeGennaro, NY) **9828** in presumed HH at 2210. Off at 2257. (Ziegner, MA) **9835** at 0158 with multi-lingual IDs, IS, and news. (Burrow, WA) 9835 in HH at 0236 and **11965** in HH at 2233. (Charlton, ON)

**IRAN**—VOIRI, **9610** with political commentary at 1614. (Burrow, WA) **9885** in presumed Farsi at 1305. (Northrup, MO) **11740** in AA at 1930. (Linonis, PA) **11950** in presumed Farsi at 1400. (Brossell, WI)

**ISRAEL**—Kol Israel, **7545** in HH at 0348 and **11585** in RR at 1835. (DeGennaro, NY) **9435**//11585 in EE at 1808 with news, interview, financial report, weather and "Reshet Alef" ID. Into another service at 1815. (Burrow, WA) 11585 in HH heard at 1850. (Chandler, ON)

**ITALY**—RAI Int., **9675** in II at 2330. (Charlton, ON) 0055. (Burrow, WA) 2251 in II and **11800** at 2240. (DeGennaro, NY)

**JAPAN**—Radio Japan/NHK, **6145** via Canada at 0015 sign on. 9660 via French Guiana in SS at 0408 and **15220** via Ascension in JJ at 2205. (DeGennaro, NY) **11855** via Ascension at 2100. (Brossell, WI) **15355** (*via Gabon—gld*) at 1714. (Brossell, WI) **17605** via Bonaire in JJ at 2324. **17810** in II at 2310. (MacKenzie, CA) **17865** at 0100 and //17810, 17835. (Strawman, IA) Radio Tampa, **3925** in JJ at 1126 and **6055** in JJ heard at 1024 (*now Radio Nikkei—gld*). (Foss, Philippines)

**JORDAN**—Radio Jordan, **9830** in AA heard at 2035. (Brossell, WI) **11690** in EE with time pips heard at 1659 and into news. (Burrow, WA)

**KUWAIT**—Radio Kuwait, **11990** in AA at 1644. (Burrow, WA) **15110** in AA at 1412. (Brossell, WI)

**LIBERIA**—ELWA, **4760** with Celeste IS at 0555 sign on, anthem and EE ID at 0059 but very poor modulation. (Alexander, PA) 0644 but poor reception. (Little, NC)

**LIBYA**—Radio Jamahiriya, **11715** via France with AA talk heard at 1844. (DeGennaro, NY)

**LITHUANIA**—Radio Vilnius, **7325** with news at 0030. (Paradis, ME; Burrow, WA) **9875** in EE at 2336. (Charlton, ON)

**MADAGASCAR**—Radio Nationale Malagasy, **5010** at 0253 sign on with open carrier, IS, music and vocal group with national anthem. Then woman with ID and sign on anmts in Malagasy with some FF also noted. Then news by man. Some music but mostly talk. (D'Angelo, PA) Radio Netherlands Relay, **7120** in DD at 2118. (Brossell, WI) **9895** in SS at 0306. (DeGennaro, NY) **11655**


*This Radio Denmark QSL, from Rich D'Angelo, is likely the last version used before they left the air.*


*We're in the right season to hear the higher-frequency Brazilian stations, such as Radio Guiaba in Porto Alegre, which uses 11785. (Thanks Rich D'Angelo)*

at 1830, **//15315** via Bonaire, **17725** via Bonaire and **17875** via Canada. (MacKenzie, CA) Radio Malaysia, **7295** with pops and DJ at 1551. "Radio 4" jingles and ID at 1600, news at 1603. (Burrow, WA)

**MALI**—RTV Malienne, **4835** at 2351 in FF, highlife, and apparent phone calls. Sign off ID and anmts at 2359, orchestral anthem and off at 0001. (D'Angelo, PA) **5995** in FF with ID "Radio Mali, Bamako" heard at 2230, then news. (DeGennaro, NY)

**MAURITANIA**—Radio Mauritanie, **4845** with impassioned talk in AA at 0107. (Brossell, WI)

**MEXICO**—Radio Mil, **6010** at 0840 with SS pops, talk, ID. (Alexander, PA) Radio Educacion, **6185** with jazz and SS talks at 0110. (DeGennaro, NY)

**MOLDOVA**—Voice of Russia via Moldova, **7125** in RR heard at 0305. (Brossell, WI)

**MONGOLIA**—Voice of Mongolia, **12085** at 0959 with chimes, ID and woman anncr with happy-sounding music. (Foss, Philippines) Also 12085 at 1000 with mailbag program, into possible Kazak at 1030. (Ziegner, MA)

**MOROCCO**—VOA Relay (p), **5980** with AA music and woman announcer at 0235. (Harnett, FL) **5995** with news features at 0655. (Little, NC) **15240** heard at 1852. (Charlton, ON) Radio Medi-Un, **9575** in AA at 2330. (DeGennaro, NY) 0030 in FF. (Charlton, ON) RTV Marocaine, **15345** in AA heard at 1809. (Charlton, ON) 1915 with AA talks. (Linonis, PA) 2158 with music and off at 2200. (DeGennaro, NY)

**NETHERLANDS**—Radio Netherlands, **9895** in DD heard at 1150. (DeGennaro, NY) **11655** heard at 1900, **//17810**. (Rossetti, MA)

**NETHERLANDS ANTILLES**—Radio Netherlands Bonaire Relay, **6165** in SS at 0255. Was completely covered by a strong unmodulated carrier at 0259, then off briefly and back on in DD. (Harnett, FL) **17810** with "Report From Beijing" at 1938. (Charlton, ON)

**NEW ZEALAND**—Radio New Zealand Int., **9870** with news and coastal weather at 1400. (Brossell, WI) 1641 with music, preview of headlines. Pacific Islands news at 1700. (Burrow, WA) **9885** with news at 0900. (Barton, AZ) 1015 with music from "West Side Story." **15340** with "Radio Sport" at 0509. (Jeffery, NY) **17675** with listener calls on gardening at 0215. (Charlton, ON) 0100 with news. (Barton, AZ)

**NIGERIA**—Voice of Nigeria, **7255** in unid language at 2256. 17800 with music and interview at 2137. (DeGennaro, NY) **15120** with ID and news at 1900. (Burrow, WA) **15125** with talk about Nigerian environmental problems at 1815 (*legitimate frequency?—gld*). **17800** at 2139. (Charlton, ON) 2255 with ID, anthem and sign off. (MacKenzie, CA)

**PAKISTAN**—Radio Pakistan, **9395** at 1558 with IS, music bridge, time pips, news and sign off at 1614. Also **11570** at 1557 with IS, pips and into presumed news in EE. (Burrow, WA)

**PALAU**—KHBN/Voice of Hope, **9965** with CC talks heard at 1424. (Brossell, WI)

**PAPUA NEW GUINEA**—Radio Western, Daru, **3305** with country and R&B at 1130. (Foss, Philippines) NBC, **4890** with pops at 1340. (Brossell, WI)

**PARAGUAY**—Radio Nacional, **9736.8** at 2218 with futbol match and excited announcer, station jingles and sound effects, short music breaks. Off with national anthem at 0256. This one is irregular—not heard every night. (Alexander, PA)

**PERU**—(*Note: Language is mostly SS with occasional use of Quechua. Indigenous music is abbreviated as OA.*) Radio Cultura Amauta, Huanta, **4955** at 1041. (DeGennaro, NY) La Voz de la Selva, Iquitos, **4825** at 1043. (DeGennaro, NY) Radio Atlantida, Iquitos, **4970** at 1102 with local anmts. (DeGennaro, NY) Radio del Pacifico, Lima, **4975** with talk at 1029. (DeGennaro, NY) Radio Horizonte, Chachapoyas, **5019** with 1000 sign on. (DeGennaro, NY) Radio Tarma, Tarma, **4775** with music and talk, ID at 1045. (DeGennaro, NY) Radio Huanta 2000, Huanta, **4748** with two men in discussion at 1040. (DeGennaro, NY) Radio LTC, Juliaca, **5005.8**, strong at 1030. (Wilkner, FL) Radio Peru, San Ignacio, **5637.2** at 0250 with pops and OA, canned ID from 0302 and off at 0303. (Alexander, PA) Radio La Poderosa, Huancabamba, **6536**, at 0050 with many IDs, pop & OA. (Alexander, PA) Radio Santa Monica, Cusco, **4965** at 0940 with OA and echo anmts, ID at 1021. (Alexander, PA) 1031. (DeGennaro, NY) Radio Union, Lima, **6115.2** at 0850 with OA music and IDs. (Alexander, PA) Radio Altura, Cerro de Pasco, **5014.4** at 1110 and clear ID by man. (Wilkner, FL) Radio La Hora, Cusco, **4856.2** at 1006 "...cinco en la manana, este es Radio La Hora." OA music. (Wilkner, FL) Radio Ilucan, Cutervo, **5678** with commercials at 0022. (DeGennaro, NY) 0234 with romantic vocals. Canned ID and sign off anmt at 0247, off without anthem at 0248. (D'Angelo, PA)

**PHILIPPINES**—Radio Pilipinas, **11730//11890** in Tagalog at 1734. Presumed news, ID and schedule. (Burrow, WA) VOA Relay, **17735** heard at 2315. (MacKenzie, CA) FEBA, **9405** in CC at 1345. (Brossell, WI) **9435** at 2321 with religious talks in unid language. Also **9500** in CC at 1124. (DeGennaro, NY)

**PIRATES**—Ragnar Radio, **6925** at 0030 with Hank Williams songs, Yahoo e-mail address. (KW, OK) (*Please include your full name, city, and state, and use UTC.—gld*) WHYP, **6925** at 1430 with a morning show called "Get Up and Go" or something like that. (KW, OK) Take It Easy Radio, **6925 USB** at 0330 with Eagles numbers. (KW, OK) Captain Morgan Radio, **6925 USB** at 0420 with old rock things and a "Jeopardy" skit. (KW, OK) Grasscutter Radio, **9625** at 0004. (Silvi, OH) Big Thunder Radio, **6925** heard at 0150 with various rock. (Silvi, OH)

**PORTUGAL**—RDP Int., **9715** in PP to Eastern North America at 0028. (DeGennaro, NY) **15140** in PP at 1141. (Foss, Philippines) **21655** in PP at 1900. (Linonis, PA) **21830** with live sports in PP at 1703. (Jeffery, NY)

**PUERTO RICO**—AFN/AFRTS, **7407** with computer question call-in at 1115. (DeGennaro, NY)

**ROMANIA**—Radio Romania Int., **9570** heard at 1730 with IS, ID, news. (Burrow, WA)

**RUSSIA**—Voice of Russia, **5945** in SS so South America at 0215. **6145** in EE at 2028. **9965** in PP to Brazil at 0041 and **11510** via Armenia at 1830. (DeGennaro, NY) **7240** in RR at 0226 and **9765** in EE at 0216. (Charlton, ON) **7300** in FF at 2038. (Brossell, WI) **11500** in what seemed RR at 1320. (Northrup, MO) **21485** in FF at 1830. (Linonis, PA) Kamchatka Rybatskaya, Petropavlovsk-Kamchatka, **5910** in RR with woman anncrs and music. Presumed ID at 0050. (DeGennaro, NY) Radio Rossii, **11655** in RR at 1355. (Brossell, WI) **12020** with RR pops at 0100. (Linonis, PA)

**RWANDA**—Deutsche Welle Relay, **9875** in PP at 2038. (Brossell, WI) **15410** at 2100. (Paradis, ME)

**SAO TOME**—VOA Relay, **11975** at 2110. (Brossell, WI)

**SAUDI ARABIA**—BSKSA, **17560** in AA at 1711. (Jeffery, NY)

**SERBIA-MONTENEGRO**—Int. Radio of Serbia and Montenegro, **6100** with news in EE at 2212. (DeGennaro, NY) **7115** with political commentary in EE at 0120. (Linonis, PA) **9680** at 2358 sign on to 0028 close. (D'Angelo, PA)

**SINGAPORE**—Radio Singapore Intl., **6150** with domestic market and economic news heard at 1205. (Foss, Philippines) 6150 at 1548

with discussion, ads and "News Radio 938" ID at 1558. Also as "Mediacorp Radio, Radio Singapore International" and off at 1600. (Burrow, WA)

**SLOVAKIA**—Radio Slovakia Int., **5930** with EE talk at 0112. (Charlton, ON) 0220 in FF and **7345** in FF at 2041. (DeGennaro, NY)

**SOUTH AFRICA**—Channel Africa (t) **3345** with news at 0303. (DeGennaro, NY) **11710** at 0512 with sports news. (Little, NC) **15265** at 1831 and **17770** at 1552. (Charlton, ON) BBC via Meyerton, **3255** at 0319. (DeGennaro, NY) 0325. (Brossell, WI) Trans World Radio, **7215**, via Meyerton at 0333. (Paszkiewicz, WI) Radio Sondergrense, **3320**, via Meyerton in Afrikaans at 0312. (DeGennaro, NY) 0329. (Brossell, WI) 0349. (Paszkiewicz, WI) Adventist World Radio, via Meyerton, **11985** at 1842. (Charlton, ON) **12105** in FF at 2030. (Paradis, ME) **15295** at 2018. (Brossell, WI)

**SOUTH KOREA**—Radio Korea Intl., **5975//7255** at 1612 with reports on South Korea-Turkey trade relations. (Burrow, WA) **9560** via Canada at 0203. (Charlton, ON) **9760** via Canada in SS at 1010. (DeGennaro, NY)

**SPAIN**—Radio Exterior de Espana, **6055** heard at 0020. Also **9620** in SS at 2338. (DeGennaro, NY) SS talks at 0243. (Harnett, FL) **12035** in AA at 2025. (Brossell, WI) **15110** in SS at 1857. (MacKenzie, CA) **21570** at 1640. (Barton, AZ) **21610** in SS heard at 1017. (Foss, Philippines)

**SRI LANKA**—Deutsche Welle Relay, **11890** in AA at 2105. (Brossell, WI)

**SUDAN**—Republic of Sudan Radio, **7200** in AA heard at 0226. (Charlton, ON)

**SWAZILAND**—Trans World Radio, **3240** in unid language at 0323. (DeGennaro, NY) 0332 in unid language. (Brossell, WI) **4775** at 0401 to 0430 close in GG. (D'Angelo, PA)

**SWEDEN**—Radio Sweden, **6065** with news monitored at 2230. (Paradis, ME) **9400** with "60 Degrees North" at 2034. Also **9495** via Canada in unid language at 0026. (DeGennaro, NY) 9495 in EE at 0244. (Charlton, ON) **18960** in Swedish 1300-1330 and EE 1330-1400. (Michael, OH) IBRA Radio, via Julich, Germany, **7260** in AA at 2050. (DeGennaro, NY)

**SWITZERLAND**—Swiss Radio Intl., **9885** with "Swiss Info" program at 2330. (Paradis, ME) **11660** via French Guiana at 2334 and **17660** via French Guiana at 1937. (Charlton, ON)

**SYRIA**—Radio Damascus, (t) **13610** at 2000 with possible EE talk but only at threshold level. Mid-East pop type music. Off at 2210. Listed //**12085** not heard. (Alexander, PA)

**TAIWAN**—Radio Taiwan Int., **5950** (via WYFR) at 0710. (Little, NC) **7445** opening EE to SE Asia at 1100. (Barton, AZ) **11550** at 1614 going into "Taiwan Today." (Burrow, WA) **11605** in CC at 1330 and **11620** with flute music at 1325. (Northrup, MO) 11605 in unid Asian language at 1350. (Brossell, WI)

**TANZANIA**—Radio Tanzania, **5985** with long talk monitored at 0420 mentioning Tanzania several times. (Paszkiewicz, WI)

**THAILAND**—Radio Thailand, **7305** in Thai at 1115 with EE ID. Also **11805** in Thai at 1200. (DeGennaro, NY) **9535** with news, ID at 1928. Also **9680** with news in progress at 0002. (Burrow, WA) **9560** opening in EE at 1400. (Barton, AZ) **9810** on oil refineries in Thailand at 1240. (Brossell, WI)

**TUNISIA**—RTV Tunisienne, **7190** in AA at 2251 and **9720** in AA at 0419. (DeGennaro, NY) **12005** in AA at 2025. (Brossell, WI) **17735** in AA at 1412. (Ziegner, MA)

**TURKEY**—Voice of Turkey, **6015** at 2332 and **9655** at 2321. (Charlton, ON) **6055** at 2009 and **9460** at 2325. (DeGennaro, NY) 9460 in TT at 2130. (Ziegner, MA) 0312 in TT. (Brossell, WI) 9655 monitored at 2300. (Michael, OH) 2300 with "Review of Turkish Press." (Paradis, ME)

**UKRAINE**—Radio Ukraine Int., **5905** with talk, interview and ID at 0225. (DeGennaro, NY) **5910** with possible news heard at 0405. (Burrow, WA)

**UZBEKISTAN**—Radio Tashkent, **7160** with clear ID at 0119. (Burrow, WA) **9715** in EE at 1345. (Barton, AZ) **11905** at 2030 in presumed Uzbek. (Linonis, PA)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*Pirate broadcaster Radio Free Speech sent this full size QSL sheet to Rich D'Angelo.*

**VATICAN CITY**—Vatican Radio, **5890** with news in II at 2236. (DeGennaro, NY) **7305** in EE heard at 0253. (Charlton, ON) **13765** with "Focus on the Church" at 1545. (Barton, AZ)

**VENEZUELA**—Radio Amazonas, Puerto Ayachuco, **4940** with SS ID at 1044, commercials. (DeGennaro, NY)

**VIETNAM**—Voice of Vietnam, Xuan Mai, **5035** with acapella singing at 1233, domestic folk songs and woman annor in VV. (Foss, Philippines) **6175** via Canada at 0241. (Charlton, ON) **9730** with news in VV at 1907. (Burrow, WA)

**YEMEN**—Republic of Yemen Radio, **9779.7** with EE news in progress at 1830, clear ID at 1839. (Burrow, WA)

**ZANZIBAR** (Tanzania)—Radio Tanzania-Zanzibar, **6015** monitored at 0310 with talk in language, mentions of Tanzania, flutes. (Paszkiewicz, WI)

**ZIMBABWE**—ZBC, **3306** at 0328 with tribal vocals and man in presumed Shona language taking phone calls. Some EE including TCs and miscellaneous chatter. ID heard at 0400 and news. (D'Angelo, PA)

And that, as C.J. Craig says on "The West Wing," "is a full lid." Endless thanks to the following folks who made it happen this time: Sheryl Paszkiewicz, Manitowoc, WI; Ciro DeGennaro, Feura Bush, NY; Robert Wilkner, Pompano Beach, FL; Tricia Ziegner, Westford, MA; Stewart MacKenzie, Huntington Beach, CA; Bruce Burrow, Snoqualmie, WA; Jerry Strawman, Des Moines, IA; Russ Harnett, Naples, FL; Dave Jeffery, Niagara Falls, NY; "KW," Salina, OK; Ray Paradis, Pittsfield, ME; Robert Brossell, Pewaukee, WI; Jack Linonis, Hermitage, PA; Robert Charlton, Windsor, ON; Rich Barton, Phoenix, AZ; Rich D'Angelo, Wyomissing, PA; Brian Alexander, Mechanicsburg, PA; Richard Michael, Akron, KOH; Lou Rossetti, Arlington, MD, Matthew Little, Morganton, NC, Mark Northrup, Gladstone, MO and Marty Foss, Guinayangan, Philippines.

Welcome to the new names and thanks again to each one of you. Until next month—good listening! ■

# homeland security

by Rich Arland, K7SZ

power, and products

## Emergency Radio, Alternative Power, And Civil Defense

Over the last year we've covered a lot of territory in the "Homeland Security" column—everything from radio services for the concerned citizen to specific equipment needed to pursue our goals within the hobby. This month, I want to touch upon a subject that is often overlooked when it comes to emergency communications: training.

There was a plaque in my office at RAF Mildenhall that read: "We train hard. We, the unwilling accomplish the impossible for the unknowing. We have done so much with so little for so long that we are now qualified to do everything with nothing." Cute, but all too often, true.

The U.S. military spends a lot of time and importance on training. If you know your job and can do it the same way each time, regardless of what is going on around you, your chances of surviving in a combat situation are greatly enhanced. My good friend and former "Green Beanie," Edgar "Sonny" Womelsdorf, MSgt USA (Ret.), reminded me of the training mantra of the U.S. Special Forces: "What you do in training you'll do in combat." Literally, words to live by.

Taking this mantra and extending it to emergency communications (EMCOMM) training is an outstanding idea. Over the years I have participated in countless emergency drills and some actual real-world emergency communications support efforts during times of disaster. When I first started out, there was literally no training available for anyone. You mustered out when the Amateur Radio Emergency Service (ARES)/Radio Amateur Civil Emergency Service (RACES)/Radio Emergency Associated Communications Teams (REACT) were activated, deployed to an assigned position, and did your level best to cope and provide whatever emergency communications support that was needed.

### Times Have Changed

With the despicable terrorist acts of 9/11, emergency communications took on a whole new meaning. Thankfully, the ham radio community was able to rally and respond quickly to fill in the gaps that appeared in the normal comm systems, which were disrupted during the disasters. This didn't happen by accident. This was the result of ongoing training conducted by the local ARES Emergency Coordinators (EC) in the affected areas. Response was swift and deliberate. The ARES members in New York City, near the Pentagon, and out in western Pennsylvania trained hard and knew their jobs. "What you do in training you'll do in combat." Amen.

If your idea of providing emergency communications begins and ends with a 2-meter handheld radio and a couple of spare battery packs, you are going to have to drastically alter your perception. What most neophytes (and some old timers, too) think about when they join an ARES or RACES group is the amount of gear and hardware that they have available to provide communications. It's not about gear, or radios or antennas. It's about training and *communicating*.

Inexperienced emergency communicators are often overwhelmed by the idea that they will be in the limelight, providing disaster support communications and "saving the day." Absolutely nothing could be further from the truth. In reality you, as an ARES/RACES/REACT volunteer, are part of a team. If the team functions well, your comm mission will be accomplished in good order. If, on the other hand, one or two team members are "wild cards" or "know-it-alls," then the entire team suffers and the professional disaster communicators, with whom you'll be working side by side, won't want to see you again—ever! Here is where a solid training background will be beneficial.

### The Incident Command System

To fully understand the concepts needed for modern day emergency communications support by ARES/RACES/REACT volunteers we need to take a close look at how a disaster and/or emergency is handled. Enter the Incident Command System (ICS).

The ICS is the answer to a series of difficulties encountered in managing emergencies over the years. What started as a way to organize a disaster response to wild fires in Southern California in the early 1970s culminated in an "all-risk" system of disaster management applicable for all types of fire and non-fire emergencies. While there are several versions of the ICS currently in use, the one developed by the National Fire Academy (NFA) has been adopted by the majority of emergency response units on the local, county, state, and federal level. Not only is the ICS being used in the United States, it has also been adopted by foreign countries as a model for disaster management.

So what exactly is the ICS? In a large-scale emergency you will have multiple agencies responding to the incident. You might have local police and fire departments along with the county and state Emergency Management Agency (EMA), and possibly federal agencies like FEMA and, in the case of 9/11, the FBI, ATF, etc.

In the "old days" (pre-ICS) each of these various agencies would try to take over command of the emergency incident, resulting in chaos. Duplicated efforts, missed critical needs, and dramatically reduced overall efficiency were the results. After the adoption of the ICS, each responding agency recognizes one lead coordinating agency (or person) that will handle the emergency. Interaction between agencies is controlled by the lead agency. Everyone has a part to play, and by using the ICS, maximum benefit and effectiveness in mitigating the emergency incident is realized.

Today's ICS is based upon proven business management plans where the responsibilities are shared between several agencies, but are under the direction of one lead agency. The Incident Commander (IC) is responsible for and directs the overall operations of the responding agencies. As the incident

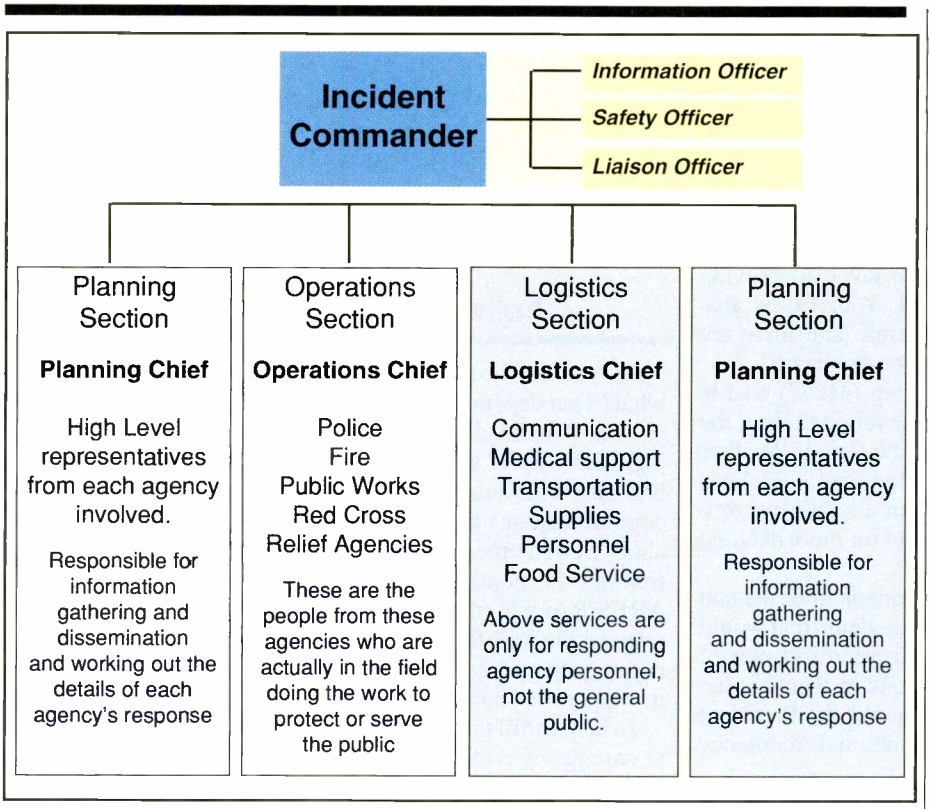


*Figure 1. The organizational structure of the Incident Command System (ICS).*

progresses it is not unusual for the IC to change personnel as various agencies become "top dog" in the mitigation efforts.

In the ICS there are two interrelated parts: "management by objectives" and the "organizational structure," both of which are crucial in any disaster response, regardless of the size of the incident.

There are several steps within management by objectives:

- Understanding the policies, procedures, and statutes that affect the official response.
- Establishing incident objectives or the desired outcome of the mitigating efforts.
- Selecting appropriate strategies for the coordination of resources and their utilization.
- Applying the tactics which will most likely accomplish the objectives of the response.
- Assigning the proper resources to the response and monitoring the outcome.

The organizational structure of the ICS allows it to be a dynamic entity in that it can be changed to meet varying conditions. The person in charge is the IC (usually the most senior on-scene officer from the first responding unit), who, depending upon the size of the incident, may elect to assemble a general staff (or "battle staff") to help in handling the intricacies of the response. This general/battle staff can be comprised of a Planning Chief, Operations Chief, Logistics Chief, and a Financial Chief, each of whom is responsible for managing a particular portion of the overall disaster response. Each of these Chiefs reports directly back to the IC (See **Figure 1**).

As ARES/RACES/REACT volunteer emergency communicators, we are a deployable resource and fit under the Logistics portion of the IC's general/battle staff. While some might think we'd fit under the Operations Chief, in reality we are going to support those agencies, so we actually fall under Logistics. We are normally tasked to support a specific agency within the ICS. Exactly which agency will be determined by the IC when planning the resources needed to best serve the overall response. One thing is for sure—we will be rubbing elbows with professional communicators so we *must always* present ourselves in a professional manner.

## ARES/RACES/REACT

ARES is the oldest and largest emergency communications group and is sponsored by the American Radio Relay League (ARRL). Established in 1935, ARES is part of the ARRL's field organization, comprised of various sections

within the United States. While most sections encompass entire states, here in Pennsylvania, as well as in other large population areas, the sections are divided: Western PA, (WPA section) and Eastern PA (EPA section). The same goes for California, Texas, New York, and other highly populated states. **Figure 2** shows the ARES organizational structure from the national to the local level.

Your local EC is responsible for assembling a core group of volunteers, normally done at the city-town level, to provide emergency communications when needed. Your EC is also responsible for training sessions and to ensure that there are enough volunteers available when "the balloon goes up."

ARES has a Memoranda of Understanding (MOU) on file with a variety of agencies on the national level, including the American Red Cross, Salvation Army, National Weather Service, and FEMA. These MOUs outline general guidelines between ARES and these served agencies for emergency communications, and they serve as a starting point for more detailed MOUs at the county and local level.

RACES was created by the federal government after the end of World War II to provide a group of radio amateurs that would be integrated into the Civil Defense organization in times of national emergency or war. RACES is unique in that it is the *ONLY* amateur radio service authorized should the President suspend regular amateur operations due to a national emergency or war.

In case you hadn't noticed, the Civil Defense organization, along with RACES, has changed dramatically over the years. It has become fashionable for RACES groups to also wear ARES hats. This is looked upon quite favorably by the EM folks, since it allows these communications volunteers to fill two distinct roles in emergency communications requirements.

REACT has been around for well over 30 years. This emergency communications group is comprised of CB radio operators, radio amateurs, General Mobile Radio Service (GMRS), Family Radio Service (FRS), and Multiple Use Radio Service (MURS) personnel. REACT has a similar organizational structure to ARES, having local emergency communications teams that serve many of the same agencies as ARES. REACT also has MOUs with many of these organizations, as well as the ARRL.

As you can plainly see there is a little "something for everyone" when it comes to emergency communications. The REACT option is especially attractive to non-amateur license holders.

## Training: The Key Ingredient

So, you've chosen an EMCOMM organization to join, now what? That depends upon your county EC (for ARES/ RACES) or your RACES officials. One thing is certain: you need training. Show up at a real world emergency incident with a van bristling with antennas and equipment, but lacking the basic communications training needed to be effective and you'll be about as welcome as a screen door in a submarine. Appropriate training is paramount in your EMCOMM career. With ARES/RACES, the county (or possibly the district) EC is responsible for offering training class in everything from basic net operating procedures and message handling to how to deploy in support of your group's served agency.

To help fulfill these training requirements there are two annual emergency communications-oriented activities that test the skills of ARES/RACES volunteers. One is the annual ARRL Field Day, held the last full weekend in June (June 26 and 27 this year). The other is the annual Simulated Emergency Test (SET) held each fall.

## Edsel Murphy University

Each spring, at the end of June, thousands of normally rational ham radio operators "hit the bush" in support of the ARRL Field

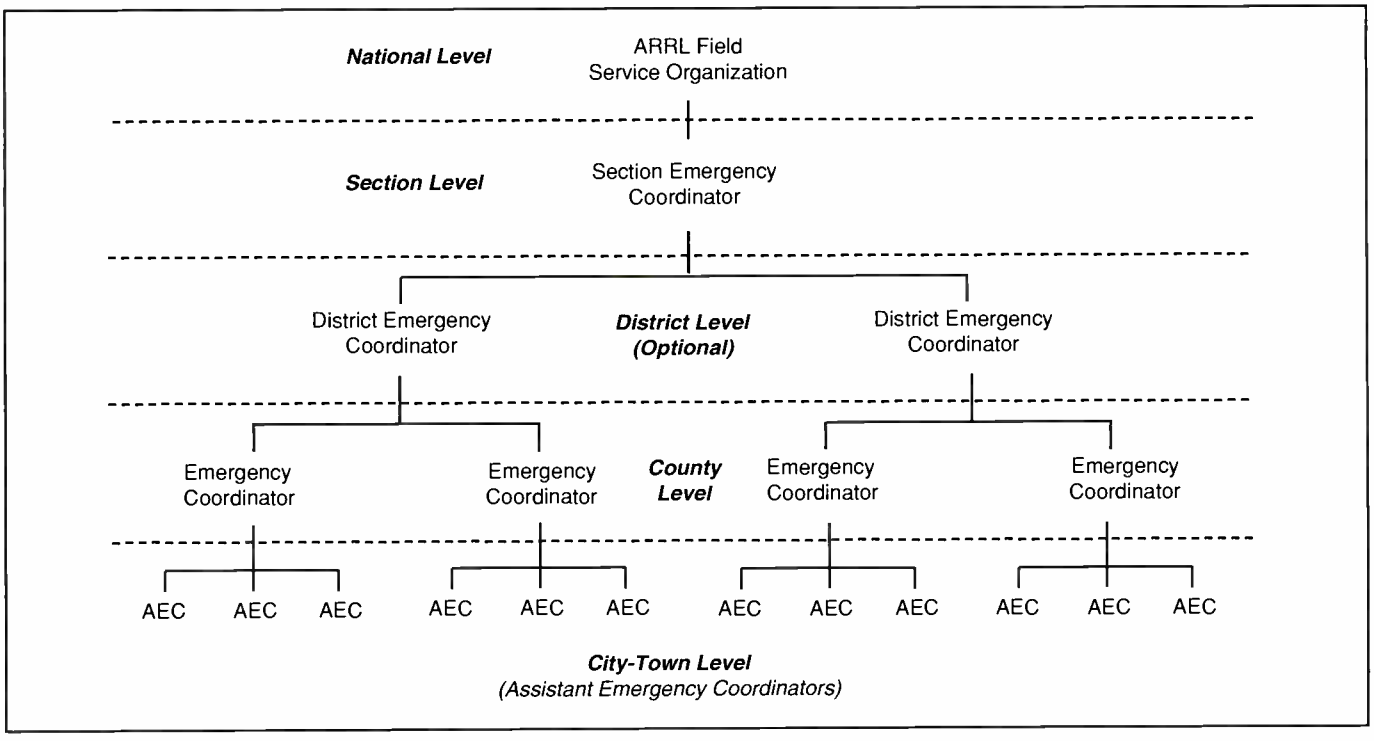


*Figure 2. The ARES organizational structure from local to national level.*

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Day exercise. While some actually think that Field Day is a contest, in reality it is a large-scale communications exercise that tests not only the communications abilities of the participants, but their problem-solving skills as well.

We all know Edsel Murphy, from Murphy's Law ("Anything that can go wrong will go wrong at the least opportune time and at the maximum expense"). Well, I'll tell ya—Edsel lives for Field Day! All things considered, Field Day is one heck of a good way to get out, enjoy the outdoors, have some fun playing radio, and sharpen your emergency communications skills all at the same time. It's training at its best!

SET is a fall emergency drill that focuses on fulfilling the local ARES/RACES group's commitment to their served agencies. Normally conducted on the first full weekend in October, SET offers radio amateurs the chance to gain experience in communicating using standardized procedures under simulated emergency conditions. Experimentation with new communications concepts (like amateur television and the Automatic Position Reporting System (APRS) is also highly encouraged. SET is conducted with the idea of exposing weaknesses and limitations, as well as highlighting the strong points of your local communications plan. Additionally, SET provides a great public relations event (using the local media) to demonstrate the value of amateur radio during emergencies.

SET also provides the test bed for trying out new digital modes for handling high volume point-to-point messages. All in all, SET is a great place to hone your EMCOMM skills prior to a real-world incident.

In addition to Field Day and SET, many ARRL Section ECs have developed training activities that are unique to a given locale. Here in my area of Northeastern Pennsylvania, our local ARES group has at least one or more drills per year in support of the Susquehanna Steam Electric Station (Berwick Nuclear Power Plant). These drills are indispensable in planning for a nuclear incident at the plant. In this case, the Luzerne County EOC is in charge of the drill and our ARES group staffs local (city and township) EOCs within a 12-mile area around the nuke plant. We act as a back-up comm system to the county EMA radio system. All messages are sent twice: once through the EMA's UHF radio system, and then again through our VHF system. We use one or two local repeaters along with one or more simplex frequencies. Upon occasion we implement a packet cluster to handle high volume point-to-point messages.

## Become A Better Operator

There's no better time to get involved in emergency communications than right now, and training—YOUR training—is the key!

That's a wrap for this month. Next month we will continue with our training theme and take a close look at the Amateur Radio Emergency Communications Courses offered by the ARRL.

This column will appear just prior to Field Day. So get off your duff, hit the bush, and participate! If you don't have a local club that mounts a Field Day effort, go out by yourself or find a couple of like-minded hams and enter the event following the ARRL's instructions (you'll find them at www.arrl.org)!

Until next time, remember: Preparedness is *not* an option. ■



# POPULAR COMMUNICATIONS

***July 2004 Survey Questions***

**My mobile radio equipment consists of:**
CB-Citizen's Band .....1
Ham .....2
GMRS (General Mobile Radio Service) .....3
FRS (Family Radio Service) .....4
One scanner .....5
Two scanners .....6
More than two scanners .....7
MURS (Multi-Use Radio Service) ....8
Portable shortwave .....9
None, I only use a radio at home or at work .....10

**I'm interested in learning more about GMRS - (General Mobile Radio Service):**
Yes .....11
No .....12

**I regularly use the following additional types of electronics equipment in my vehicle:**
Radar detector .....13
GPS (Global Positioning System) ...14
Frequency counter .....15
Headset or speaker-microphone for my two-way equipment .....16
Amplified speaker .....17

**My radios are mounted to my vehicle using:**
They're not physically mounted; I put them on the seat .....18
Hook-and-loop (Velcro) fastener .....19
A standard metal bracket .....20
A homemade device .....21
A floor or console-mounted product specially designed for radios .....22
A floor or console-mounted product designed for consumer items .....23
A rubber strap (or bungee cord, belt) .....24
A slot in the vehicle's console area or wedged between the seat and console .....25
Headliner or above the rear-view mirror .....26

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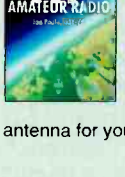

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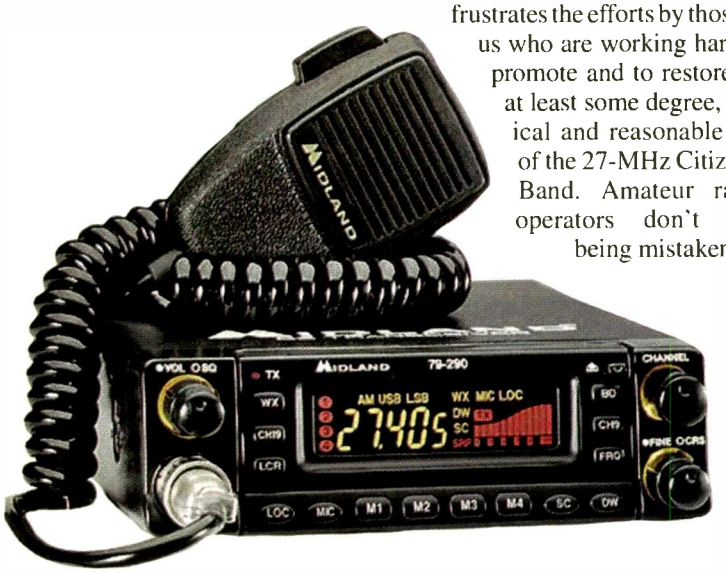
by Alan Dixon, N3HOE / WPUC720 / KST8678

## Freeband Operation Is NOT CB Radio, Plus Good Old Basic Radio Always Comes Through!

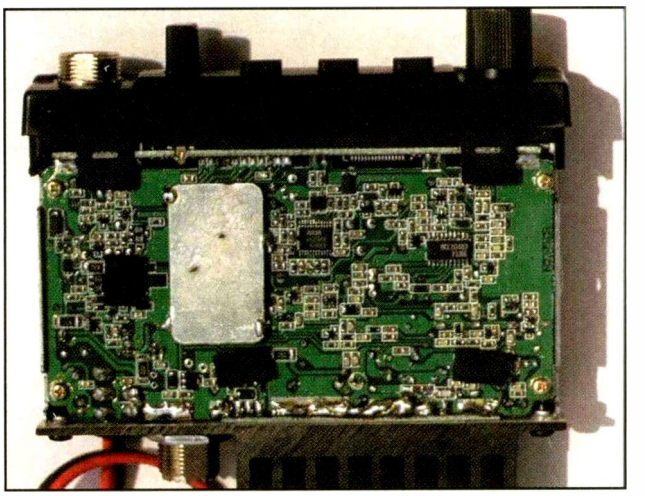
That elusive swath of spectrum between 11-meter CB and the 10-meter amateur band is commonly referred to as the *freeband*. Most folks would describe the freeband radio revolution as a hobby movement due to its apparent popularity, and despite its inherent legal problems. In fact, some freebanders proudly consider themselves to be CB radio operators. Many in this group, therefore, tend to refer to the spectrum in question here as "outband," rather than "freeband." Since this is an area not all radio hobbyists may be aware of, we should take a moment to examine just where the freeband stands in the context of frequency bands and radio services.

We must, however, take exception to the commonly stated definition of CB radio relative to freebanders. You see, I often hear it said that freeband is a form of Citizen's Band radio. Most freeband operation is found just above Channel 40 of the 11-meter Citizen's Band. This frequency range presumes the quite logical exception of the actual 11-meter Citizen's Band from 26.965 to 27.405 MHz. But we need to understand one crucial point: *Freeband is not any type of CB radio whatsoever.* By its very definition, freeband (or outband) is specifically *outside* the Citizen's Band. Nowhere does Part 95 of the FCC Rules define Subpart D (Class D) CB radio as operating above 27.405 MHz (or below 26.965 MHz, for that matter). Freebanders are not CBers. Like it or not, that's really all there is to it.

I make such an assertive point because illegitimately labeling freebanders as CB radio operators seems to unnecessarily incriminate the millions of legitimate CBers, such as families on road trips and long-haul truckers who use CB radio for telematic connectivity, security, and for business. Such misrepresentation also frustrates the efforts by those of us who are working hard to promote and to restore, to at least some degree, ethical and reasonable use of the 27-MHz Citizen's Band. Amateur radio operators don't like being mistaken for CB radio operators, and I don't think freebanders would like their operations to be confused with ordinary CB radio operation, either.




*If you're going on the road at all this summer, make sure you have a CB radio on board to monitor professional drivers on Channel 19. You don't necessarily need a top-of-the-line unit, like this versatile Midland 79-290. Just about any discount store CB mobile radio will serve this purpose. (Photo courtesy of Midland Radio Corp)*



*How many home hobbyists have the tools to work with minuscule Surface Mount Technology (SMT) components? How many of us could fabricate a halfway complex SMT circuit card at home? How many of us have proper soldering tools to even replace a single component at home? Most SMT boards are assembled without the touch of human hands, so it is little wonder that SMT radios are often returned to the factory when repairs are needed. (FCC File Photo of RadioShack prototype 2-meter mobile)*

Freebanding is what it is. It has become its own subculture, with its own challenges, and its own unofficial and unwritten "rules." Love 'em or hate 'em though, you've got to give freebanders their due.

Admittedly, I do have a reputation as being a stickler on correct terminology, including correct technical and regulatory definitions. It's a matter of wanting everyone concerned to fully understand what they read or hear on any subject regarding mobile radio, and frankly I would like to fully understand what others have to say on these subjects, as well. I'm sure that everyone here deserves the same consideration, too. It all comes down to an amazingly simple concept: *Say what you mean, and mean what you say.*

### Just What Exactly Is Software-Defined Radio?

I do need to take exception to one commonly stated definition of software-defined radio (SDR). I occasionally hear it said, essentially, that SDR is radio in which some or all transceiver functions are accomplished by *digital circuitry* under *software control* on a *digital representation of a signal*. I really feel that this definition is entirely too restrictive. First, there is neither an industry standard nor regulatory definition, in any strict sense, of exactly what SDR is. Given this, I suggest that we take the

phrase at face value; it means exactly what it says, nothing more and nothing less. In essence, there is no need to presuppose that (1) the circuitry under software control is necessarily digital, and (2) that the functions performed are necessarily restricted to a digital representation of the signal.

For example, I can conceive of software to control analog filtering of one sort or another, on an "analog" (sinusoidal) waveform. Now, I understand that in actual practice the most efficient methods of accomplishing frequency selection, bandwidth, emission mode, filtering, etc. are likely to be digital methods. But why restrict the imagination of software control to only the digital domains? This brings up another point: Conversely, one must never presume that non-SDR radios are "analog" radios. Considering the many all-digital communications devices on the commercial market that are not programmable-software controlled that would be just a little silly.

Here again I exercise my reputation as a stickler on correct terminology and technical definitions. As it turns out, I have already heard one congressman on the House Telecommunications Subcommittee incorrectly refer to SDR radios as "digitally defined radios." *Not*! Whether any given SDR radio is or isn't specifically digitally controlled is not at all the point. What makes SDR technology software-defined is—well, uh—the *software*! It is not hard-coded IC chips; it is not burned-in firmware. It is software that can be easily changed in the field, whether flash-updated, on-line or disc-downloaded, or even keyboard entry coded. Arguably then, numerous existing radio devices are already software controlled. The mechanism at work, then, is the software.

SDR is further along than many folks in radio technology appear to realize. It has only been in very recent years that the FCC woke up and realized that SDR had arrived. But just because the FCC is only now finalizing early rules for SDR does not mean that the technology has not existed for a while already. Anyway, we can all look forward to advances in SDR in amateur and commercial-grade radio equipment, and likely in certain consumer-grade radio products eventually.

## Amateur Radio Innovation And Professionalism

For perhaps the first time in history, radio amateurs and other radio hobbyists seem to have fallen behind in the lead in technological advancement. Or have we? I totally understand and even empathize with those who see things this way. I feel that it will be helpful though, if we step back to view the greater picture in order to visualize everything in proper perspective.

Some forces are undeniably irresistible. For whatever reasons—regulatory, market-related, or technological—industry has taken a relentless and headlong rush into research and development of wireless technologies in the last 10 to 15 years that has far outpaced any previous efforts. Now, we must face certain realities. Given that the telecommunications industry has for some years now poured virtually unlimited resources into wireless sector R&D, what can we really expect? No group of amateurs and aficionados, no matter how large and how motivated, is going to consistently outdo the collective force of industry in a market that for at least a decade showed double-digit growth, typically on the order of a whopping 40 to 60 percent each year.

There are simply times when industry R&D will outpace amateur experimentation in certain areas. This is frustrating to the amateur radio community, which is accustomed to coming in first. But today's apparent industry edge is not in itself a bad omen for hobbyists, nor is it indicative of any shortcoming or failure on the part of radio amateurs. Even the fittest team in any sport will not have winning seasons perpetually, year after year. Some games will be lost and occasionally there will be a losing season. But as long as a team stays in the running, it will again have winning games and winning seasons.

But then, consider this. Many, possibly most, radio hobbyists who are the most serious innovators in amateur radio are the very individuals who are within industry making all of the progress! I don't know that any party has surveyed and documented any statistics, but my qualified guess is that the vast majority of all radio amateurs, who are serious experimenters, are indeed among those innovators in industry. I know that I was one, and I have known and worked with many others who have been, as well. I should go on to point out that this industry has been driven so hard by economics that most of us in R&D often found ourselves on call or working virtually 24-by-seven, three-sixty-five. What time and energy remained for home life, for so many of us, left no "extra" time for experimenting or for much hamming, for that matter.

This entire scenario may be changing

already, with the recent burst of the high-tech economic "bubble" (as in lagging corporate financial statements, hesitant investors, and unpredictable Wall Street figures) in recent years. Telecommunications industry sectors are not nearly as profitable as they had been only four or five years ago. Both "Third Generation" wireless telephones and Internet, as well as public safety communications "interoperability," are mired in economic and regulatory uncertainty. Wireless R&D has been hit very hard, with massive layoffs.

Regardless of the foregoing, I still have other considerations on the table. It has occurred to me that there is more to the "art" of radio than technology alone, and we radio hobbyists must present all of our finer aspects. While hams may not presently be in the lead technologically, we hobbyists are nonetheless highly skilled radio operators.

Think about it. If even the more educated consumers had to select an appropriate frequency, power level, and mode to dial and initiate a wireless phone call, they would be *lost*. Ask them to change frequencies and repeater facilities while on the move, and nearly every consumer would throw down their wireless phones in disgust. It is all most folks can do to dial a telephone number and remember to press the "SEND" key. In the world of two-way radio, operating mobile CB or FRS handhelds is just about the limit of mass-consumer tolerance.

What's more, most public safety dispatch communications professionals I have met and worked with have no real concept of truly efficient operating procedures, either. In fact, if more of them did, the public safety community would not be screaming about how many new radio channels they say they need! But, that's another story.

Digital voice communications seems to be the single area where amateur radio technology appears to have fallen behind. But in the digital world, not all is as glitzy as may appear. My motto stands: *"New and improved is usually neither, and seldom both."* Entirely too many within government and industry are convinced that digital voice communications technologies are the best simply because this is the latest technology. Proponents cite alleged benefits of increased channel density and immunity to interference. We should all know that this is bunk.

As I have written several times, the single sideband mode as pioneered by hams is the one analog mode that beats all channelized digital voice modes in spectral efficiency. And the suppressed carrier characteristic of amateur and 11-meter CB radio sideband modes results in an energy efficiency (power consumed) completely unmatched by digital modes, most of which have a 100-percent transmit duty cycle, whether traffic is present or not. It amazes me that this is consistently overlooked by industry. Believe me, if I were a cellular carrier CEO with thousands of cell sites, each costing about $5,000 a month to power, I would be beating down the equipment vendor's R&D door in an effort to migrate to the more cost-effective mode!

Additionally, digital radio voice communication modes are *extremely* vulnerable to interference. A lot of folks seem to think that if they can't hear static, that there is no interference. Duh! In analog speech modes, interference manifests itself in the form of a weak signal sinking into the noise floor ("static"), or another, interfering signal is audibly overriding the desired signal. In digital speech modes, we will never hear the noise floor or anything else that sounds like static. Instead, when our digital signal is in the presence of an interfering signal, we will simply hear *nothing*. This is progress? In any event, radio amateurs know how to make things work, and functionally speaking, know how to make radio communications work very well.

And let me add one final thought that always bears repeating, however obvious it may be to radio hobbyists. The level of sheer simplicity to which hobbyists can reduce their communications networking when necessary assures operation when the more complex, and thereby necessarily more fragile systems, *fail*. Industry won't acknowledge this. But government, and in particular public safety agencies, will. And since 9/11, they certainly have. Given then, that simplicity increases reliability, CB radio and amateur radio simplex operations are the *last* radios to fail when airplanes crash and towers fall and a nation responds to help.

We can see then that hams along with other radio hobbyists must remain focused on our collective strengths and attributes rather dwell, perhaps unnecessarily, on our hobbies' perceived momentary technological lagging.

## Movin' On

This is absolutely the best time of year to go *mobile*, so get out and about. Be sure to take CB radio with you whenever you take a road trip. The highway information on Channel 19 is as good as it has ever been. For the most part, you will hear only professional drivers—truckers—these days. It's not like the 1970s and 1980s when the channel was flooded with idiotic "goodbuddy" four-wheelers and bad operators. In fact, truckers have dropped most of the silly lingo, such as, "the rocking chair" and "shaking the trees." State troopers are still "Smokey's," but that's about all that's left from the influences of the two fuel shortages of the 1970s and the 55-mph national speed limit that only truly began to go away in earnest in the waning years of the 1990s.

As it happens, since truckers have gone back to *plain language* on CB, they have been tending to keep their language just a *little* less "salty" than it sometimes has been. All in all, monitoring and operating CB Channel 19 these days turns out to be a significant improvement over doing the same 25 years ago. Try it for yourself, and please let me know how it worked for you! You can reach me at wpuc720@juno.com.

## Wanted: Your Contributions

Here at "On-The-Go Radio" we are anxious to see and publish your shack photographs, and we are especially interested in pictures of your *mobile* shack! A number of loyal and regular readers have been kind enough to send in their stories, anecdotes, and local news clippings. And these have been excellent, of course. But, we are really starving for graphic material from readers for this, *your* column. Digital pix work best for us, but we can definitely use hard-copy photographic prints, too.

Also, we're especially eager to hear of 11-meter CB radio activity in your locality. Tell us what you know, so we can share your news with others! Write to me at my e-mail address or by postal mail to *Pop'Comm* at 25 Newbridge Road, Hicksville, NY 11801.

I want to say, "many thanks!" to the many of you who have already written me in recent months to bring certain news items to our attention, or to say hello and give us your thoughts on this column. I can't quite get back to everybody these days, but be assured that each and every valued piece of correspondence is personally read by me—no exceptions and no excuses!

See you next month, in the hottest part of a sizzling summer!

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### Compact Active Antenna

MFJ-1022 **$49.95**

**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.

**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 preseletor 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**

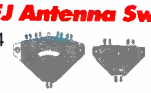
***New!*** **Improves** any receiver! Suppresses strong out-of-band signals that cause intermod, blocking, cross modulation and phantom signals. Unique Hi-Q series tuned circuit adds super sharp front-end selectivity with excellent stopband attenuation and very low passband attenuation and very low passband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

### Easy-Up Antennas

MFJ-38 **$16.95**

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 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

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

**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.

### 21 Band World Receiver

MFJ-8121 **$39.95**

**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!

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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** | 9680 | International Radio of Serbia and Montenegro | |
| 0000 | 5678 | Radio Ilucan, Peru | SS |
| 0000 | 9895 | Radio Netherlands Relay, Madagascar | SS |
| 0000 | 6145 | Radio Japan/NHK, via Canada | |
| **0030** | 9715 | RDP Int., Portugal | PP |
| 0030 | 9575 | Radio Medi-Un, Morocco | FF |
| 0030 | 7325 | Radio Vilnius, Lithuania | |
| 0030 | 9645 | Radio Sawa, US, via Morocco | AA |
| 0030 | 4960 | Radio Cima Cien, Dominican Republic | SS |
| 0030 | 5025 | Radio Rebelde, Cuba | SS |
| 0030 | 9615 | Radio Farda, US, via Germany | AA |
| **0100** | 5930 | Radio Slovakia Int. | |
| 0100 | 7115 | International Radio of Serbia and Montenegro | |
| 0100 | 12020 | Radio Rossii, Russia | RR |
| 0100 | 11735 | Voice of Korea, North Korea | |
| 0100 | 4845 | Radio Mauritanie, Mauritania | AA |
| 0100 | 11800 | RAI Int., Italy | |
| 0100 | 17685 | Radio Japan/NHK | |
| 0100 | 9565 | Radio Universo/Tupi, Brazil | PP |
| 0100 | 9870 | Radio Austria Int. | |
| 0100 | 11755 | Radio Cairo, Egypt | SS |
| 0100 | 11710 | RAE, Argentina | SS |
| **0130** | 11780 | Radio Nacional Amazonia, brazil | PP |
| **0200** | 9635 | Radio Nacional, Colombia | SS |
| 0200 | 9560 | Radio Korea Int., South Korea, via Canada | |
| 0200 | 9765 | Voice of Russia | |
| 0200 | 17675 | Radio New Zealand Int. | |
| 0200 | 11620 | All India Radio | Hindi |
| 0200 | 4052.5 | Radio Verdad, Guatemala | SS |
| **0230** | 7200 | Republic of Sudan Radio | AA |
| 0230 | 6165 | Radio Netherlands Relay, Bonaire, NWI | SS |
| 0230 | 9737 | Radio Nacional Paraguay | SS |
| 0230 | 4870 | La Voz del Upano, Ecuador | SS |
| 0230 | 6030 | Radio Marti, USA | SS |
| 0230 | 6175 | Voice of Vietnam, via Canada | |
| 0230 | 6115 | Radio Tirana, Albania | |
| **0300** | 7240 | Voice of Russia via Ukraine | RR |
| 0300 | 3220 | Radio Sondergrense, South Africa | Afrikaans |
| 0300 | 3240 | Trans World Radio, Swaziland | unid |
| 0300 | 7305 | Vatican Radio | |
| 0300 | 7125 | Voice of Russia, via Moldova | RR |
| 0300 | 9790 | China Radio Int., via Cuba | |
| 0300 | 6160 | CKZN, St. John's Newfoundland | |
| 0300 | 9885 | VOA Relay, Botswana | |
| **0330** | 7215 | Trans World Radio, via South Africa | unid |
| 0330 | 3255 | BBC via South Africa | |
| 0330 | 3250 | Radio Luz y Vida, Honduras | SS |
| 0330 | 7400 | Radio Bulgaria | |
| 0330 | 9745 | HCJB, Ecuador | SS |
| 0330 | 6010 | La Voz de tu Concencia, Colombia | SS |
| 0330 | 3306 | Zimbabwe Broadcasting Corporation | vern |
| 0330 | 7140 | BBC Relay, Cyprus | AA |
| **0345** | 7545 | Kol Israel | HH |
| **0400** | 4775 | Trans World Radio, Swaziland | GG |
| 0400 | 5985 | Radio Tanzania | |
| 0400 | 3330 | CHU time station, Canada | |
| 0400 | 4950 | Radio Nacional, Angola | PP |
| **0500** | 7190 | RT Tunisienne, Tunisia | AA |
| 0500 | 11710 | Channel Africa, South Africa | |
| 0500 | 15340 | Radio New Zealand Int. | |
| 0500 | 5975 | BBC Relay, Antigua | |
| **0600** | 7125 | RTV Guineenne, Guinea Guineenne, Guinea | FF |
| 0600 | 4835 | RTV Malienne, Mali | FF |
| **0645** | 4760 | ELWA, Liberia | |
| **0830** | 3291 | Voice of Guyana | |
| 0830 | 4754 | Radio Educacao Rural, Brazil | PP |
| **0900** | 6115 | Radio Union, Peru | SS |
| 0900 | 6010 | Radio Mil, Mexico | SS |
| 0900 | 6000 | Radio Guiaba, Brazil | PP |
| 0900 | 3280 | La Voz del Napo, Ecuador | SS |
| **0930** | 5990 | Radio Senado, Brazil | PP |
| 0930 | 4903 | Radio San Miguel, Bolivia | SS |
| **1000** | 9760 | Radio Korea Int., South Korea, via Canada | SS |
| 1000 | 4965 | Radio Santa Monica, Peru | SS |
| 1000 | 12085 | Voice of Mongolia | |
| 1000 | 9885 | Radio New Zealand Int. | |
| 1000 | 6055 | Radio Nikkei (Tampa), Japan | JJ |
| 1000 | 6135 | Radio Santa Cruz, Bolivia | SS |
| 1000 | 4723 | Radio Uncia, Bolivia | SS |
| 1000 | 9515 | Radio Novas de Paz, Brazil | PP |
| 1000 | 4781 | Radio Oriental, Ecuador | SS |
| **1030** | 4748 | Radio Huanta 2000, Peru | SS |
| 1030 | 4940 | Radio Amazonas, Venezuela | SS |

| UTC | Freq. | Station/Country | Notes |
|---|---|---|---|
| 1030 | 4975 | Radio del Pacifico, Peru | SS |
| 1030 | 4960 | Radio Federacion, Ecuador | SS |
| 1030 | 4919 | Radio Quito, Ecuador | SS |
| 1030 | 4816 | Radio Buen Pastor, Ecuador | SS |
| **1100** | 7445 | Radio Taiwan Int. | |
| 1100 | 9500 | FEBC, Philippines | CC |
| 1100 | 7407 | AFN/AFRTS, Puerto Rico | USB |
| 1100 | 4775 | Radio Tarma, Peru | SS |
| 1100 | 4832 | Radio Litoral, Honduras | SS |
| 1100 | 7400 | Deutsche Welle, via Russia | GG |
| 1100 | 3220 | HCJB, Ecuador | QQ |
| 1100 | 6140 | Radio Melodia, Colombia | SS |
| 1100 | 3912 | Voice of the People (Cland to N. Korea) | KK |
| **1130** | 3305 | Radio Western, Papua New Guinea | |
| 1130 | 3976 | RRI, Padang, Indonesia | II |
| 1130 | 3925 | Radio Nikkei (Tampa), Japan | JJ |
| 1130 | 4800 | Radio Buenas Nuevas, Guatemala | SS |
| 1130 | 5350 | AFN/AFRTS, Hawaii | USB |
| **1200** | 6150 | Radio Singapore Int. | |
| 1200 | 9680 | Radio Republik Indonesia | II |
| 1200 | 13362 | AFN/AFRTS, Guam | USB |
| **1230** | 7235 | VOA Relay, Northern Marianas | unid |
| 1230 | 4890 | NBC, Papua New guinea | |
| 1230 | 11510 | Radio Free Asia, via Kazakhstan | Khmer |
| 1230 | 11800 | CPBS, China | CC |
| **1300** | 7365 | KNLS, Alaska | CC |
| 1300 | 13640 | Radio Sultanate of Oman | AA |
| **1330** | 18960 | Radio Sweden | |
| 1330 | 12030 | Deutsche Welle via Russia | GG |
| 1330 | 11580 | FEBA, via Northern Marianas | CC |
| 1330 | 11870 | University Network, Costa Rica | |
| **1400** | 17735 | RT Tunisienne, Tunisia | AA |
| 1400 | 9560 | Radio Thailand | |
| 1400 | 12070 | Radio Netherlands, via Uzbekistan | |
| 1400 | 9965 | KHBN/Voice of Hope, Palau | CC |
| 1400 | 11950 | VOIRI, Iran | Farsi |
| 1400 | 15540 | VOA Relay, Greece | unid |
| 1400 | 9590- | Radio Australia | |
| 1400 | 15400 | YLE/Radio Finland | Finnish |
| 1400 | 17495 | Democratic Voice of Burma, via Madagascar | vern |
| **1500** | 15150 | Voice International, Australia | CC |
| 1500 | 15530 | Sudan Radio Service, US, via England | EE/AA |
| **1530** | 17770 | Channel Africa, South Africa | |
| 1530 | 13765 | Vatican Radio | |
| **1600** | 11570 | Radio Pakistan | |
| 1600 | 11550 | Radio Taiwan Int | |
| 1600 | 15475 | Africa Number One, Gabon | FF |
| 1600 | 17620 | Radio France Int. | FF |
| 1600 | 9561 | Radio Ethiopia | |
| 1600 | 11710 | BSKSA, Saudi Arabia | AA |
| **1630** | 21570 | Radio Exterior de Espana, Spain | |
| 1630 | 11990 | Radio Kuwait | AA |
| 1630 | 11980 | Adventist World Radio, via Guam | |
| 1630 | 15630 | Voice of Greece | Greek |
| 1630 | 11690 | Radio Jordan | |
| **1700** | 17560 | BSKSA, Saudi Arabia | AA |
| 1700 | 15355 | Radio Japan/NHK, via Gabon | |
| 1700 | 15335 | Deutsche Welle | Urdu |
| 1700 | 17485 | Radio Prague, Czech Republic | |
| **1730** | 9570 | Radio Romania Int. | |
| 1730 | 11730 | Radio Pilipinas, Philippines | Tagalog |
| **1800** | 15120 | Voice of Nigeria | |
| 1800 | 13845 | Bible Voice Broadcasting, England, via Germany | |
| **1830** | 11985 | Adventist World Radio, via South Africa | |
| 1830 | 21485 | Voice of Russia | FF |
| 1830 | 15240 | VOA Relay, Morocco | |
| 1830 | 11715 | Radio Jamahiriya, Libya, via France | AA |
| 1830 | 11585 | Kol Israel | RR |
| 1830 | 11735 | Radio Africa Int., via Germany | |
| 1830 | 15300 | Radio France Int. | FF |
| 1830 | 9780 | Republic of Yemen Radio | |
| **1900** | 21655 | RDP Int., Portugal | PP |
| 1900 | 11655 | Radio Netherlands | |
| **1930** | 11740 | VOIRI, Iran | AA |
| 1930 | 12050 | Egyptian Radio | AA |
| **2000** | 12035 | Radio Exterior de Espana, Spain | AA |
| 2000 | 13630 | China Radio Int., via Mali | |
| 2000 | 11765 | Radio Free Europe | unid |
| 2000 | 15365 | Voz Cristiana, Chile | SS |
| **2030** | 7260 | IBRA Radio, Sweden, via Germany | AA |
| 2030 | 13610 | Radio Damascus, Syria | |
| 2030 | 9875 | Deutsche Welle Relay, Rwanda | PP |
| 2030 | 9830 | Radio Jordan | AA |
| 2030 | 9960 | Voice of Armenia | |
| **2100** | 11890 | Deutsche Welle Relay, Sri Lanka | AA |
| 2100 | 11975 | VOA Relay, Sao Tome | |
| 2100 | 15345 | RTV Marocaine, Morocco | AA |
| 2100 | 11900 | Radio Free Asia, via Northern Marianas | CC |
| 2100 | 11855 | Radio Japan via Ascension Is. | |
| 2100 | 11760 | Radio Havana Cuba | |
| **2130** | 9460 | Voice of Turkey | TT |
| 2130 | 11905 | Radio Tashkent, Uzbekistan | |
| 2130 | 17800 | Voice of Nigeria | |
| 2130 | 17705 | Voice of Greece, via US | Greek |
| **2200** | 15220 | Radio Japan, via Ascension Is. | JJ |
| 2200 | 9910 | All India Radio | |
| 2200 | 11965 | Radio Budapest, Hungary | HH |
| **2230** | 11335 | Voice of Korea, North Korea | SS |
| 2230 | 9825 | Radio Budapest, Hungary | HH |
| 2230 | 5850 | Radio Canada Int., via Sweden | FF |
| 2230 | 11730 | Radio Vlaanderen Int., Belgium, via Bonaire | FF |
| **2300** | 9655 | Voice of Turkey | |
| 2300 | 17735 | VOA Relay, Philippines | |
| 2300 | 15550 | Radio Free Asia, via Northern Marianas | CC |
| 2300 | 9425 | All India Radio | Hindi |
| 2300 | 15320 | Adventist World Radio/KSDA, Guam | |
| 2300 | 17835 | Radio Imperial, El Salvador | SS |
| 2300 | 7285 | Voice of Croatia, via Germany | |
| 2300 | 17880 | Adventist World Radio, Guam | CC |
| 2300 | 9645 | Radio Bandeirantes, Brazil | PP |
| **2330** | 9675 | RAI Int., Italy | II |
| 2330 | 7345 | Radio Prague, Czech Rep. | |
| 2330 | 13800 | China Music Jammer | |
| 2330 | 21740 | Radio Australia | |
| 2330 | 11830 | Radio Anhanguerra, Brazil | PP |

# power up:
# radios & high-tech gear

by Harold Ort, N2RLL

***new, interesting, and useful communications products***

## ICOM's New IC-R20 Ultra-Wideband Handheld Receiver

The new IC-R20 from ICOM receives 150 kHz to 3.3 GHz (cellular blocked) in five modes (SSB/CW/AM/FM/WFM) and includes 1,250 memory channels. You can enter frequencies by the front panel backlighted keypad or using optional PC software.

Features include dual watch, an easy-to-see dot-matrix LCD, internal bar antenna for improved low-band reception, telescoping multi-angled antenna with BNC connector, and ICOM's Dynamic Memory Scan (DMS), which stores memories in up to 18 banks of 100 and lets you mix and match memories to scan as you like (you can also link banks). You also get a 1650-mAh Li-Ion battery with recharger, CTCSS/DTCS/DTMF decode, preset most popular memories for fast access to all broadcast TV and FM audio frequencies, auto squelch, noise blanker, auto noise limiter, attenuator and RF gain controls, multiple scan functions (including Voice Scan Control), CI-V ready, and an IC recorder that allows you to record what you've tuned in.


*The new ICOM IC-R20 is the company's latest ultra-wideband receiver. It allows you to digitally record and play back up to four hours (depending on compression level) of whatever you want to tune in.*

For more information on the new ICOM IC-R20 Ultra-Wideband Receiver, which carries a suggested retail price of $619.99, visit the company website at www.icomamerica.com. Check with your favorite dealer for availability.

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

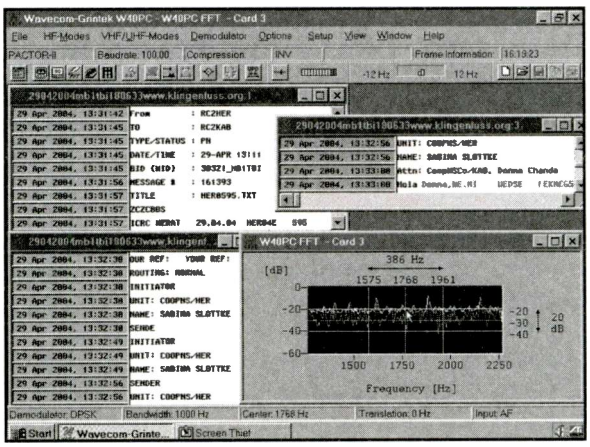
Sangean's handsome new WR-1 tabletop AM/FM wooden cabinet radio features a 3-inch custom speaker with 7 watts of audio output, LED tuning indicator, band indicator, detachable power cord, headphone socket, REC (record) out socket, aux-in socket to connect with other audio sources (a CD player, for example), dynamic bass compensation for rich bass, external AM antenna terminal, external F-type FM antenna switch, and a 9–14 voltage power adapter socket for vehicle power. The radio comes in either a black or walnut wooden case and has three conventional knobs (on/off, rotary tuning, and AM/FM select). It measures 4-1/2 x 9-1/2 x 6 inches (HWD) and weighs 5 pounds.


*Sangean's WR-1 AM/FM tabletop radio is perfect for your living room or shack. It comes with a detachable power cord and wire antenna.*

Look for a review on the new Sangean WR-1 radio, which retails for $99, in an upcoming issue of *Pop'Comm*! In the meantime, for more information, visit the Sangean website at www.sangean.com or contact them at 2651 Troy Avenue, S. El Monte, CA 91733 or phone 626-579-1600. Be sure to tell them you read about it in *Popular Communications*!

## New Digital Data Decoder Screenshots On CD

Klingenfuss Publications tells us about their fascinating new product, *Digital Data Decoder Screenshots on CD*. The result of 2,300 hours of radio monitoring and editorial work, its price




*A screenshot captured from 18063.3 kHz RC2HER International Committee of the Red Cross, Herat, Afghanistan, via MB1TBI International Committee of the Red Cross Tbilisi, Georgia, to RC2KAB International Committee of the Red Cross Kabul, Afghanistan. The new Klingenfuss* Digital Data Decoder Screenshots on CD *has 3,500 such examples.*

is 80 EUR, including registered mail worldwide. This selection of more than 3,500 digital data decoder screenshots was gleaned from the Klingenfuss archives dating back to 1967. Included are more than 550 aeronautical, coast guard, company, diplomatic, fixed, maritime, meteorological, military, police, press, telecom, and terrorist stations, as well as particularly interesting messages from non-governmental organizations, such as the International Committee of the Red Cross (ICRC) and Medecins Sans Frontieres (MSF).

For more information on the new *Digital Data Decoder Screenshots on CD*, and a detailed list of countries and stations that's included on the CD, visit the Klingenfuss website at www.klingenfuss.org. You can also e-mail Jorge Klingenfuss directly at info@klingenfuss.org or mail the company at Klingenfuss Publications, Hagenloher Str. 14, D-72070, Tuebingen, Germany. Please tell Jorge Klingenfuss you read about it in *Popular Communications*.

## B&K Precision's New RF Counter/Detector With Digital Bar Graph

B&K Precision just announced a new line of handheld RF counter/detectors. The Models 103, 104, 105, and 106 share many common features, including a unique digital bargraph that allows the user to simultaneously view the signal strength on a 16-section bargraph and the detected frequency on a large LCD screen just above it. Other features of the new line of B&K Precision RF counter/detectors include 300-MHz direct counter with 0.1-Hz resolution (except Model 106), four selectable gate speeds, 10-digit LCD (seven-digit Model 106), display hold, low battery indicator, and rechargeable NiCd battery pack.


*The B&K Precision Corporation Model 106 handheld RF Counter/Detector is a compact pocket-sized test instrument designed for measuring any digital, on/off keying, or analog signal on frequencies between 30 MHz and 2.8 GHz.*

Prices start at $129 (Model 103). For additional information or the name and location of an authorized distributor near you, contact B&K Precision Corporation, 22820 Savi Ranch Parkway, Yorba Linda, CA 92887; Phone: 714-921-9095; Fax: 714-921-6422; Web: www.bkprecision.com. ■

# Info Central

news, trends, short takes, and other things radio

by Harold Ort, N2RLL, Editor, and D. Prabakaran

## Voice Of Vietnam Commissions Two New Transmitters

The EDXP (Electronic DX Press) reports that,

As part of a technical upgrading program, the Voice of Vietnam recently commissioned two additional 100 kilowatt transmitters for its External Service. These are situated at the Son Tay complex, about 30 kilometers west of the capital of Hanoi. As an outcome of the increased transmitter capacity, there have been extensive rearrangements to the External Service, with several new broadcasts now available. At certain times five transmitters are on the air simultaneously, carrying three different services.

The two new transmitters operate on **7220** and **9550**, in four blocks: 1100 to 1330, 1500 to 1700, 2030 to 2230, and 0000 to 0100, including English 2030 to 2100, and 1600 to 1630.

There is a second site, used for External Services to Asia, at Hanoi, in a western suburb. One 50 kilowatt transmitter is in use on **7285**, from 1030 to 1600, and 2200 to 0100. This transmitter has English from 1100 to 1130 and 1500 to 1530.

## CommercialRadio Australia Wants To Fast-Track Digital Radio

A special news release from CommercialRadio Australia recently reported,

Radio broadcasters have called on the Australian Government to adopt a policy framework, in consultation with incumbent terrestrial radio broadcasters, to fast-track the introduction of digital radio. The policy calls for digital radio implementation to adopt Eureka 147 as the digital technology for Australia, to be based on a full conversion model with incumbent commercial and public broadcasters the first to migrate, and a simulcast period of 20 years with periodic reviews to assess the take up rate of digital radio receivers.

Trials in Sydney are progressing well, with the first phase successfully demonstrating that digital radio broadcasts can be transmitted between two television stations on the VHF spectrum without causing interference to the television broadcasts. The trial has also signed a deal with Unique Interactive, the software division of British broadcaster UBC Media, to supply dynamic scrolling text services.

The Sydney digital radio consortium has also announced that Colmar Brunton, one of Australia's largest research consultancies, will provide strategic research services for the digital radio project. Colmar Brunton will track awareness of, and attitudes to, digital radio using its omnibus study, which covers 30,000 Australians each week. Colmar Brunton will work with the Sydney radio consortium to develop key questions to go out to its NSW panel in two separate waves over the next 12–18 months.

This will help the industry to obtain quantitative data on awareness, general receptivity to the new technology, barriers to usage and the attractiveness of specific features such as scrolling news headlines and song titles.

## Japanese And Vietnamese Broadcasting Agencies Sign Agreement

The Voice of Vietnam (VOV) and the Japan Broadcasting Corporation (NHK) have signed a bilateral cooperation agreement in Tokyo that calls for promoting cooperation in the broadcasting industry, focusing on exchanging news, documents, and staff and on collaborating in producing joint programs. The same day, VOV inaugurated its bureau in Japan.

## Moving Toward Better Coordinated Public Warnings

More consistent and better coordinated public warnings will save lives, protect property, and reduce fear, according to the Partnership for Public Warning (PPW), a not-for-profit consortium of public warning experts from industry and government.

PPW tells *Pop'Comm*,

An important step towards better public warning has just been taken with the adoption of a digital Common Alerting Protocol—a standard message format for public warnings—by the OASIS [Organization for the Advancement of Structured Information Standards] Emergency Management Technical Committee. Our nation's public warning capability relies upon a patchwork of warning systems that use different terminology, inconsistent advisory scales, and a multiplicity of technologies. The result is that we are not reaching enough of the people at risk in a timely and effective manner.

Craig Fugate, chair of the PPW and director of the Florida Division of Emergency Management said, "We need to establish interoperability among the different warning systems. The Common Alerting Protocol is a major step in the right direction."

The Common Alerting Protocol (CAP) is a simple but general format for exchanging all-hazard emergency alerts and public warnings over all kinds of communication and information networks. Using an open, non-proprietary digital message format for all types of alerts and notifications, CAP allows a consistent warning message to be transmitted simultaneously over many different warning systems.

CAP will increase the effectiveness of public warnings by enhancing interoperability among different systems while simplifying the warning process. CAP also reduces costs and operational complexity by eliminating the need for multiple custom software interfaces to the many warning sources and dissemination systems involved in all-hazard warning.

The PPW has provided the leadership behind the development of CAP and sponsored its consideration by the OASIS organization. According to CAP Working Group Chairman Art Botterell,

Adoption of CAP as a standard is the culmination of several years of work by many people. There is more to be done. In the days ahead, the Partnership for Public Warning will be promoting the use of CAP by the emergency management community. In addition, we also plan to begin addressing some of the other standard needs—such as terminology—facing the public warning community.

The PPW (www.ppw.us) is committed to saving lives and property by improving the nation's public warning capability. PPW's mission is to develop consensus on processes, standards, and systems in order to ensure that people at risk from terrorism, accidents, and natural disasters receive the right information at the right time so that they can take timely and appropriate action to save lives, reduce loss, and speed recovery.

## Australian Communications Authority (ACA) To Review Shortwave Bands

A news release from the Australian Communications Authority (ACA) says it is to review the use by Australian licensees of some high HF shortwave radio bands. According to the release,

The review affects certain bands between 4 and 10 MHz and will establish the need for spectrum by current licensees in these bands and whether there is unused spectrum that could be allocated to broadcasters.

ACA Acting Chairman, Dr. Bob Horton said the review followed last year's World Radiocommunication Conference (WRC). The conference called for studies on whether the spectrum allocated to broadcasters in these bands should be increased. Dr. Horton said that studies undertaken for the 2003 WRC revealed that at least 250 kHz of additional spectrum would be required to overcome co-channel interference in the broadcasting bands. An additional 800 kHz would be required by broadcasters to also avoid adjacent channel interference.

The ACA wants to establish whether the increased availability of satellite and telecommunications services nowadays has reduced Australian HF radio usage in these bands. We also need to find out if some spectrum is under-used and could be made available to broadcasters.

## South Africa's Radio Veritas Returns To Shortwave

South African Catholic broadcaster Radio Veritas has resumed its broadcasts on shortwave at 1000 UTC. The schedule is daily at 1000 to 1400 UTC on **7240** kHz with 100 kW from the Meyerton relay. Radio Veritas is partly funded by donations and currently has 3,000 donors. It also sells recordings of some of its programs.

## $1 Billion Emergency Radio Network For New York

An estimated $1 billion emergency radio network for public safety and medical authorities in New York State has been selected. The actual price of the communications improvement hasn't been officially disclosed.

The wireless network would replace an outdated system with a new digital network that will also require radio towers to be erected in both the Adirondack and Catskill Parks. ■

# v.i.p.

# spotlight

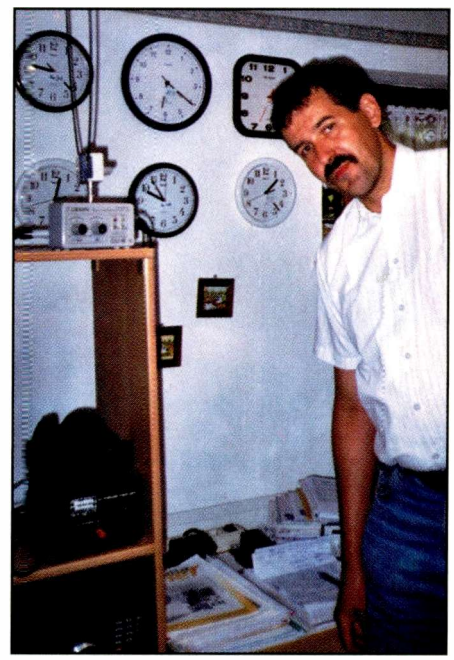
*how you got started in radio*

## Congratulations To Ronald Hagensen Of Germany!

*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.



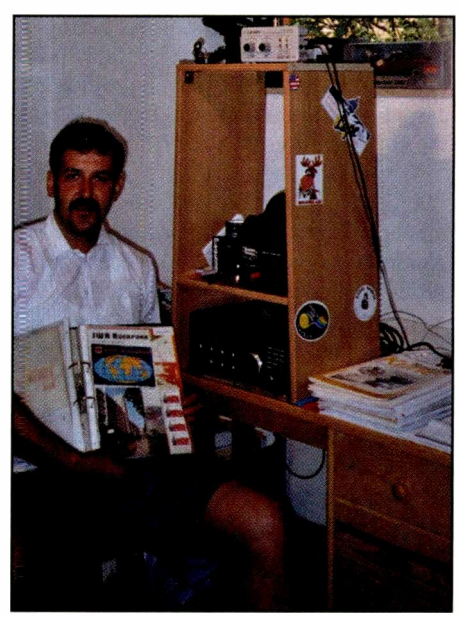
*What time is it in Germany right now? Here is Ronald Hagensen's radio shack in Ottersberg, Germany.*

### Our July Winner: Ronald Hagensen

Doug tells *Pop'Comm,*

I've been an active radio enthusiast for 23 years and work in my free time for two DX clubs; one in Düsseldorf and the other in Bremen. My hobby specialty is DXing the Tropical Bands—60, 90, and 120 meters, the overseas mediumwave band and utility stations. I hear many aero and maritime stations!

My equipment includes a JRC NRD-525 communications receiver, which is nine years old, and an indoor antenna—a GRAHN magnetic loop and two outdoor longwire antennas, one of which is directed 315 to 320 degrees for North America and the Caribbean. It's 8 meters above the ground. Another outdoor antenna is directed 280 to 290 degrees for Central and South America. That one is 6 meters above the ground. Both outdoor antennas are very good DXing antennas. For better reception on one I've installed an MLB-1 balun from RF Systems.



*Ronald Hagensen shows his QSLs and program schedules, which he keeps in a three-ring binder. Note the indoor loop antenna on top of the cabinet.*

# computer-assisted radio monitoring

by Joe Cooper, joe@provcomm.net

## Digital Control—Part V

We've reached the final destination of our journey of the past few months, taking an in-depth look at Ten-Tec's RX320/D "black box" HF receiver. We've explored in detail the new technologies involved in computer-assisted radio monitoring, from the chips in the radio itself to the software used in your PC to control the radio.

While I've been putting a great deal of focus on Ten-Tec's RX320/D, it's not because this column is about product placement or infomercials. There are many excellent computer-assisted radios on the market today that could have been used for this series, such as the Drake R-8 series, JRC's NRD-525 and 535, and Yaesu's FRG-100, to name just a few. (Frankly, I hope that what I have been writing about will motivate those of you who have been using other makes of radios to write in with *your* experiences so I can share them with the readers). The reason for my choice was simple: the information on both the product and its components is readily available, so you can begin learning more about computer-assisted radio technology on your own.

For many people who grew up with radios made out of discrete parts, such as capacitors, coils and vacuum tubes, operating radios made out of integrated circuits and computer chips can be intimidating. The past few "Computer-Assisted Radio Monitoring" columns have hopefully helped you understand what makes this new technology "tick," and maybe even inspired a few of you to try your hand at some new skills, such as computer programming. Most important, I hope the majority of you now have a better understanding of what takes place between your computer and the computer-assisted radio—no matter what make or model you are using. The bottom line is that once you break down each of the component parts and take the time to examine them, you will find that that their operation is not as complicated as you first may have thought.

What we are really looking at today with our state-of-the-art computer-assisted radios is the culmination of several decades of work and planning on the part many people. If you actually looked at when the different parts and components were designed, you'd find that much of this "new" technology is surprisingly old.

### What's Old Is Now New

All the solid-state components of your "modern" radio can be traced back to 1906, when G.W. Pickard of Amesbury, Massachusetts, perfected the crystal detector. Throughout the 1920s many people were experimenting with what were essentially early transistors. Stories about these experiments appeared in Hugo Gernsback's *Radio News* as early as 1923.

Another innovator was Dr. Julius Lilienfeld of Germany, who in 1926 patented the concept of a field effect transistor (FET) in the United States. In 1933, he also patented the method for constructing such a device, considerably ahead of Bell Laboratories point-contact transistor, patented in 1948.

Phase locked loop (PLL) tuning, which is so common in today's monitoring radios, was designed in 1932 by British and French research teams looking for something to replace E.H. Armstrong's superheterodyne receiver. While the new method of tuning was far superior to Armstrong's method, it was simply too complex (and expensive) to be used with vacuum tube technology. However, once solid-state integrated circuitry became established in the 1970s, it was possible to place the entire tuning circuit on one chip at a reasonable price.

Even signal sampling, which is employed in digital signal processing (DSP), can be traced back to its theoretical beginnings in World War II with the work of Professor Norbert Wiener of MIT. This led to the development of digital sampling in 1949 by Henry E. Singleton at the same institution.

Originally DSP required the resources of a mainframe computer and a team of specialists programming it to realize even the most basic forms of DSP. Today such programming and processing takes place on a small and relatively inexpensive chip, which is actually a small programmable computer.

So really, Ten-Tec's RX320/D "black box" radio—not to mention a host of other computer-assisted radios on the market today—is the culmination and convergence of several important ideas and inventions that span close to 100 years of effort on the part of many different people.

You could even argue that all those wonderful radios of the "golden age" of radio monitoring that we all fondly remember

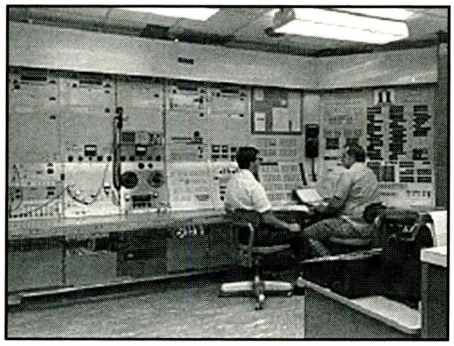


*Photo A. Back in 1975 if you wanted a virtual digital component this is the type of computing power you needed to have. This is the TX-2 computer at Lincoln Laboratory at the Research Laboratory at MIT. Today, you have all that and more built into a single computer chip and installed in the RX320/D's "Black Box." (Photo courtesy Lincoln Laboratory, RLE/MIT)*

were really only stopgap products that were already obsolete when they hit the store shelves, given the theoretical information being developed in the laboratories of the time. Frankly, if the radio engineers of those times had access to the technology we have today, they would have been applying all the textbook theory they had at their hands in more practical ways by making radios that would have looked a lot like the products we are now using. It really makes you wonder what theories the radio engineers have on the books *today* that they would prefer to be using, except that the technology simply does not yet exist to turn those theoretical ideas into practical products.

## A Picture's Worth 1k Words

I was recently contacted by Gary Barbour, AC4DL. Gary is the vice-president of DSP Engineering at Ten-Tec and the "father" of the RX320/320D. He e-mailed me after the first columns in this series started to appear on the newsstand and provided me with some engineering notes and a diagram

Just to make certain that you have the most complete picture possible, I'm going to do one final summary walk-through of the signal path that goes through the RX320/D using the additional information from Gary. This will help pull the key points I've raised together into one clear picture of how the radio works. Keep in mind, if you have followed and understood what I've been writing about the RX320/D, you now have enough fundamental knowledge to start tackling other DSP-based radios available on the market.

The important thing to remember when approaching DSP-based radios is that, in the end, there is no difference between this type and a "conventional" radio. Both take a radio signal from an antenna, tune it, detect it, and turn the result into sound. It's the *way* they perform their tasks that's different. A conventional analog radio uses discrete parts, while DSP-based radios turn equations describing engineering principles into virtual "hardware."

Frankly some of the information I'm going to be providing is a bit complicated. If you don't "get it" the first time you read it, don't worry. This information represents the leading edge of computer-assisted radio design in a civilian application, and even the experts find some of this material a bit tough (myself included, I'm not afraid to admit). Just take your time—the reward for your patience and persistence will be developing a foundation for better understanding later on. Break large amounts of information down into single bite-size chunks and realize that it may take a couple of readings before it becomes clear.

Now let's begin our final look at the RX320/D, from an engineering point of view, by doing a quick walk-through of the signal as it travels from the antenna to your speaker.

## Engineering Summary Of The RX320/D

The RX320/D is what is technically known as a software-defined radio (SDR). This means that rather than using discrete parts, such as coils and capacitors to build a radio, computer software is used to create those parts in virtual form.

To accomplish this, a small computer on a chip (Analog Devices' ADSP-2101) is used to process about 2 kilobytes of computer software written by the radio's engineers. This computer software—called firmware because it is stored in a semi-permanent form using a memory chip called an EPROM (Erasable Programmable Read Only Memory)—defines the functions of an HF radio using a series of mathematical formulas. This software approach allows more components to be built into the radio than is possible in a conventional radio, again because the radio uses virtual components rather than real ones.

Consider that within the small black box of the RX320/D there are 34 discrete audio filters, ranging in bandwidth from 8000 to 300 cycles with a dynamic range of up to 90 dB (see **Figure 1**). With mechanical filters, it would be impossible to fit so much into a box measuring 3 x 6-1/4 x 6-1/2 using even the best-miniaturized components. By using computer software to define the radio, the engineers at Ten-Tec were able to reduce real components to such a minimal number that they could all fit on to two small circuit boards. Then, by incorporating the ADSP-2101 computer on a single chip, the information contained in the built-in software is processed so quickly that it's

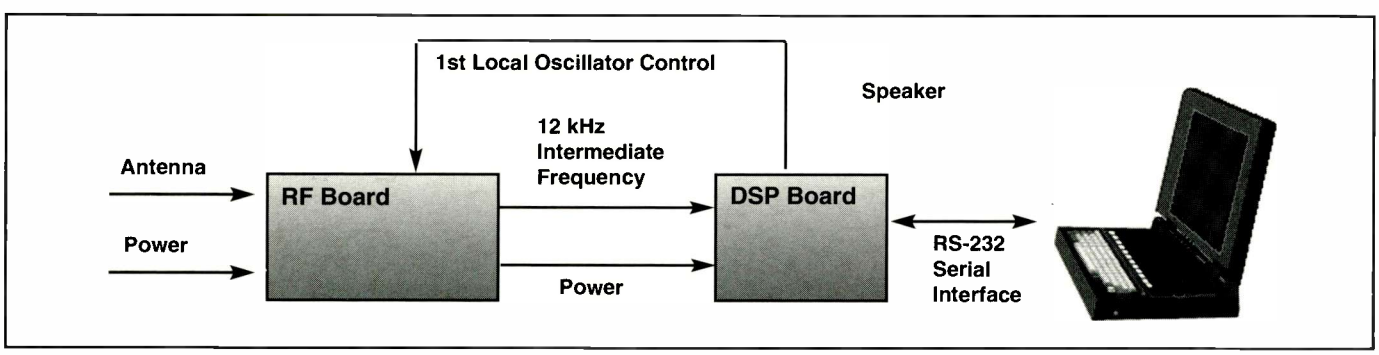



*Figure 1. This is the basic layout of the two circuit boards that make up the RX320/D. Note the 12-kHz IF frequency and the first local oscillator control, which will become important when you read how the PLL tuning works. (Illustration courtesy Ten-Tec)*

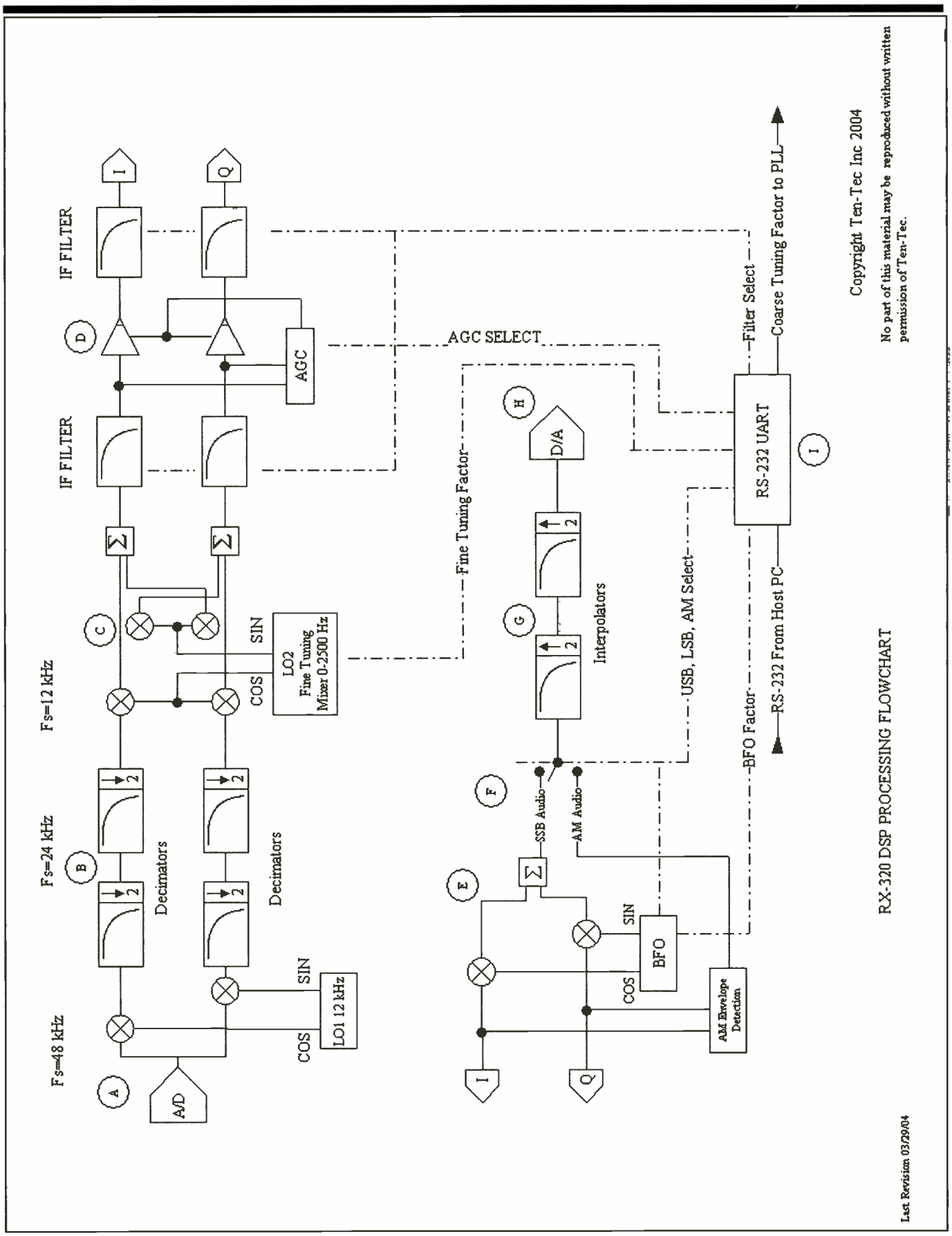



*Figure 2. The schematic diagram prepared for this column by Gary Barbour, AC4DL, Vice President of DSP Engineering at Ten-Tec and the "Father" of the RX320/320D. Many thanks to Gary and the folks at Ten-Tec for taking time to prepare this diagram and share it with us.*

impossible to distinguish between a virtual and discrete component in terms of the radio's performance.

When you turn on the RX320/D, the built-in computer "boots up" just like your personal computer, and then begins to run the built-in software, which then defines its operation as an HF radio.

## The Signal-Processing Path In The RX320/D

Now let's look at how a radio signal is passed through that set of virtual components, where it is amplified, detected, and turned into sound. In many ways it's no different from a conventional radio, except that analog signals must be turned into digital ones first, then converted back again into analog after the computer processing is completed so you can hear them through your loudspeaker or headphones.

Refer to **Figure 2** to trace the signal path. This diagram represents the *second* circuit board, where the ADSP-2101 CPU IC, EPROM, and RS323 UART chips reside and where all the digital processing takes place. Not shown in the diagram is the RF circuit board, where the analog radio signals are pre-processed (that information is available via the downloadable Ten-Tec documentation site at http://www.rfsquared.com/).

To trace the signal, follow the alphabetical letters A through I, shown in circles. Note that where you have points "I" and "Q" shown in the arrow boxes, they are actually connection points (I to I and Q to Q) that allow the diagram to be "shortened" to its present size. The signal path simply follows from A to H as shown in the circles, with I in the circle representing the serial port on the RX320/D where the command codes from your control software on your PC are sent via the serial cable. Note that I will use the convention (A) in this column to signify the circled letter on the diagram as I provide you with the descriptive walk-through of the signal path.

Like all conventional radios, the RX320/D picks up the radio signal via either the outside antenna connection at the back of the radio chassis, or through the built-in whip antenna. If the whip antenna is used, the signal is amplified by a built-in active antenna circuit. The RF circuit board processes analog signals only and provides initial selectivity by passing the signals through intermediate narrow band stages. It does this by using two stages of IF of 45 MHz and 455 kHz. The tuning method is PLL (phase locked loop), which I will talk about separately because it takes place using both the RF and DSP circuit board.

After the RF signals have been processed in the RF circuit board, they are sampled at a sample frequency of 48 kHz and turned into a digital form (A). The signal is then mixed with a 12-kHz oscillator to create a complex representation of the signal and to convert that into a baseband (a method of data transmission where digital signals are placed onto a transmission line with no change in their modulation and use the full-channel bandwidth). This means that the information can be transferred to the DSP circuit board so quickly that the ADSP-2101's CPU can process it virtually instantaneously.

To speed up this process even more, the complex digital signal's sample rate is reduced as it passes through two stages of "decimation" (B) thereby also reducing the amount of processing required. Likewise, the signal is passed through an imageless mixer (C), which means that the outputted signal has no unwanted artifacts, such as "birdies."

The signal then passes through a low-pass filter programmed (remember that we're talking about virtual components written in computer software) to the selected IF bandwidth (D). At this stage the signal level is measured and the automatic gain control (AGC) is applied. The AGC is software-based, using an algorithm that defines the desired decay behavior (slow, medium, or fast). After the AGC is applied, the signal is passed through a second low-pass filter, which results in even better receiver performance.

Jumping from I and Q in the diagram's arrowed boxes, you see the SSB and AM demodulation section (E). For AM signals, the signal envelope is again calculated by processing the signal information through the radio's CPU. For SSB, the signal is mixed with a 1500-Hz BFO, which represents the center of the passband for SSB signals.

Depending upon which mode of signal is chosen (AM or SSB), the next section (F) allows the signal to be passed on to the next stage.

Two sections of interpolation (G) raise the 12-kHz sampled audio to 48 kHz, which is required by the digital-to-analog converter. The 48-kHz sampled audio is then converted back to an analog signal, which can then be heard over a speaker or headphones.

The RS-232 data from the host PC (I) is processed by a software algorithm that converts the serial data into digital information that the radio's computer can use. The digital information is then analyzed for the command codes that have been sent to it via the control software on the PC. The codes are then routed to the prop-

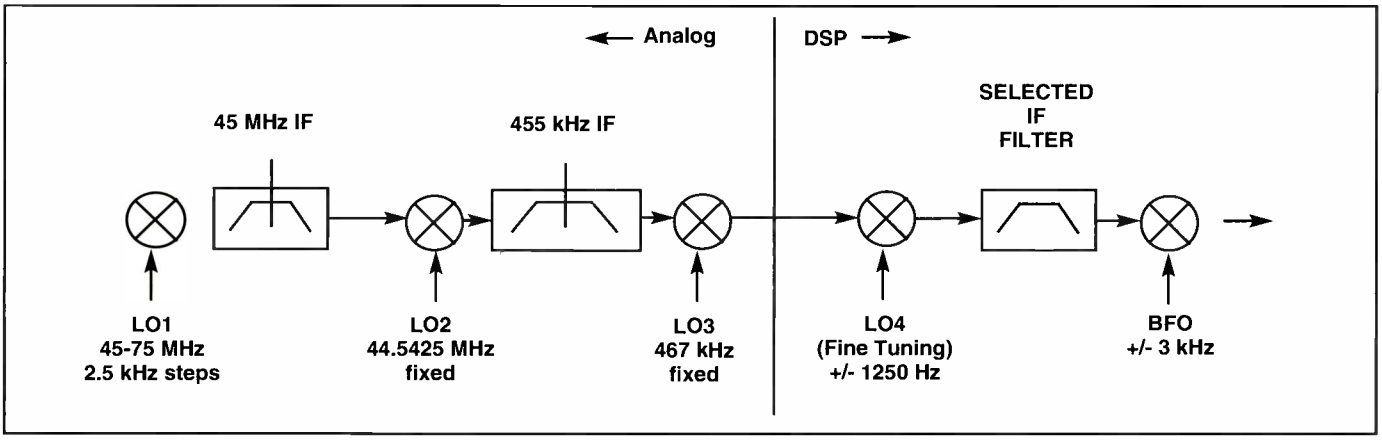



*Figure 3. An illustration of the PLL tuning circuit used in the RX320/D. The "tuning factors" used in this circuit are calculated in your personal computer using the control software you employ (see text). (Illustration courtesy Ten-Tec)*

er control variable (shown as the dotted lines on the diagram).

## Tuning The RX320/D

Having shown you the path that the radio signal takes through the digital section of the RX320/D, we can now look at the point of tuning. Unlike conventional analog radios that change the values of coils and capacitors to change frequencies, this radio uses PLL tuning (see **Figure 3**).

Again, tuning is done through software, with the calculations being performed on your PC through your control program and then passed on to the RX320/D via the serial cable connection. These calculations are called "tuning factors." There are three factors involved: coarse tuning, fine-tuning, and beat frequency oscillation (BFO). These different factors are required because tuning takes place on both the RF and DSP boards.

To give an example of how this tuning is accomplished, let's say that you wish to tune in 12.001 MHz. The first local oscillator (L01) is tunable in 2.5-kHz steps and tunes as close to the desired frequency as possible (for example, 12.000 MHz). The final .001 MHz would be passed to the third oscillator (L03) and the fine tuning oscillator (L04). (The actual formulas used to make these calculations are available through the RX320 programmer's reference guide, downloadable through the aforementioned documentation download site.)

Briefly, the calculation divides the desired frequency by the 2500-Hz tuning step (12.0001 / 0.0025 = 4800.4). In this instance, the 4800 represents the coarse-tuning factor, and the 0.4 represents the fine-tuning factor.

## Wrapping Up The RX320/D

Even though I've given you a fairly thorough look at the innards of the RX320/D, I've really only scratched the surface of this fascinating piece of engineering technology. For obvious copyright reason's I've not even touched on the proprietary software developed by Ten-Tec's engineering staff, but I can tell you that it provides a tremendous amount of computing power for only 2 kilobytes of code.

Again, the most important thing that you should be taking away with you after reading this series of columns is an understanding of the large number of virtual components that have been "built" into that small black box using computer code. Far too many people look at the box and ask, "is that all there is?" I hope you now understand that when you purchase a computer-assisted radio you're really buying a small-dedicated computer that "builds" a virtual radio each time you turn it on. More importantly, I hope you understand that we're looking at the pioneering beginnings of software-defined radios in civilian technology.

The bottom line concerning the RX320/D is that it's indeed a fascinating radio and an excellent introduction into software-defined radio technology and computer-assisted radio software. I hope what I've presented to you gives you the confidence to learn more and begin to experiment with this technology, maybe even learning how to write your own computer programs to operate this radio.

## In Closing

Next month we'll return to the home computer networking and Internet discussion, beginning with controlling a compatible radio over those media. More people are discovering just how simple it is to control a computer-assisted radio in this way. Once you realize it's not that difficult to move from using a serial cable to get control codes into a compatible radio to using a network cable, your radio/computer setup will be operating in no time. Software in your existing MS Windows operating system does the work for you, or you can download programs for free off the Internet.

If you wish, e-mail me with any questions at carm_popcomm@hotmail.com. I cannot answer general computer questions, but will help you with any issues raised in the columns. Your own computer-assisted monitoring station photos and stories are welcome, too. You can also write to me at "Computer-Assisted Radio Monitoring," PMB 121 1623 Military Rd., Niagara Falls, NY 14304-1745.

My personal webpage, located at www.provcomm.net/pages/joe, includes a list of the past two years' "Computer-Assisted Radio Monitoring" columns, along with a summary of the content. You'll also find instructions there on how to purchase back issues of *Popular Communications*. (Remember that I can't release previously published material due to copyright restrictions.)

Please also take the time to write a letter to one of our service people in Iraq offering them your thanks and support. You can send letters to them by simply marking the envelope "Any service person, Iraq." It may take several months to get to someone, but I'm certain it will make the day of whoever receives it. ■

### Is Computer Noise A Problem?

I'd like to take this opportunity to address a question I've received on several occasions: Does the radio pick up noise from a computer or monitor when placed close to those items?

I can only speak from my own experience and say that I've placed the RX320 within inches of both—and have also placed accessories on top of the radio—and have not heard any computer hash noise. This is also with using the built-in whip antenna and placing it within inches of the computer and the monitor. Of course, your results may vary.

If you're using an older-style monitor or CPU that is poorly insulated electrically, you may end up with noise in your radio. Changing the location of the radio, using an outdoor antenna, or keeping the radio at an extended distance from the CPU can fix the problem.

by Steve Douglass
webbfeat@1s.net

# Plip-Plops—Solving A Monitoring Mystery, And World News In Real Time!

Recently, as I was searching through the UHF military aviation bands for any new active frequencies in my area, the scanner stopped on **250.00 MHz**. Suddenly the room was filled with one of the strangest transmissions I have ever encountered. The signal was very strong and can be best described as sounding like raindrops plopping into a steel bucket! Between the "Plip-Plops" could be heard a melodic sing-song flute-like warbling tone. Because it sounded so strange, I sat there and listened to it for quite some time.

My inquisitive (some say snoopy) mind pondered what I was hearing. Was it some new super-secret encryption system? Or maybe it was the scrambled communications of Special Forces fighting in Iraq that was inadvertently being beamed down via military satellite into my QTH? Or could it be secret messages being transmitted by spies operating close to my home? Or wait, maybe it was Air Force One or one of its support aircraft transmitting important Homeland Security data?

But then, reality set in and I thought, maybe it was just interference coming from my neighbor's computer, or even my own. Maybe it was something as mundane as a nearby microwave oven, a harmonic of a wireless computer network, or even the new electric mower my landlord just bought.

Loving a mystery, especially a monitoring one, I decided to try to discover the source of the Plip-Plops. Since the signal was strong and didn't display the Doppler shift that satellite transmissions or spacecraft do, I immediately ruled them out as the source. I then tried to eliminate any terrestrial (earthbound) sources as well. Although I didn't believe it was being generated nearby, I turned off my other receivers, televisions, and computers. Nothing seemed to affect the signal. It remained strong (with occasional fading) and unceasing for almost 30 minutes, and then it abruptly stopped.

## Back Two Hours Later!

Two hours later it was back and just as strong. I decided to take a look at it on my Motorola spectrum analyzer. It displayed a strong wideband FM signal on 250.00 MHz. I checked to see if it was a harmonic (which you can do on the Motorola with a flick of a switch), but the "pip" on the screen remained constant, meaning I was receiving it on its true frequency.

I then "watched" the signal on the scope for the next 20 minutes. There's a lot you can learn by looking at a signal on a spectrum analyzer. Although the signal strength didn't waver that much, it did lessen on occasion, which I attributed to a slightly directional antenna on an aircraft. I figured that as an aircraft would turn, its signal might lessen, either because of its antenna's directional properties or if the signal were being blocked by a structure on the aircraft itself, such as a tail surface or a wing.

Although I had deduced that it was coming from an orbiting aircraft, I still had no idea what *type* of signal was being broadcast. I decided to post my monitoring mystery to the real experts in the MILCOM e-mail group. Chances are if it had to do with military communications, someone in the group would know what it was. (I suggest if you haven't subscribed to MILCOM you do so. Just point your browser to QTH.NET and follow the instructions.)

After much debate in the group about what the signal might be, they were as stumped as I was. One member pointed me to http://people.wiesbaden.netsurf.de/~signals/DIG_intro.htm, which had samples of many strange digital transmissions that can be found on the airwaves. But, alas, none matched what I was hearing.

## The Next Day

When the signal returned the next day I decided to listen to it on one receiver while searching for the source of the communications by trying to find any related voice-channels. If it were flying, chances were that a pilot was talking to ground controllers. For the next three hours I took note of every military callsign in the area, and believe me it was no easy task. On any given day the skies above my humble abode are filled with hundreds of military flights. I had no idea how *many* aerial refuelings, training flights, and military aircraft were transiting the area until I sat there and counted them.

The unknown signal itself came and went several times during the day. The next day it appeared again and, again, I logged every aircraft I could intercept. Comparing the lists I noticed that there were two aircraft in the area that were airborne during the mysterious transmissions: Osprey 4 and Osprey 5. I knew the identity of those two aircraft. They were brand-spanking new MV-22 Ospreys, just two of the hundreds the Amarillo Bell/Boeing Tilt-rotor plant was expected to churn out.

Could the Plip-Plops have anything to do with the Ospreys? Possibly. I decided to test my theory, but that required a trip to the airport.

## The Game's Afoot

Just outside the Rick Husband-Amarillo International Airport was the Osprey plant. Although I had heard the Ospreys on many occasions I had yet to find the plant's tower or test flight frequency. Now determined to find out if the Plip-Plops were indeed related to test flights I decided to park just down the road from the plant and stay there until I had ferreted out the frequencies used by the Ospreys.

It didn't take very long. On that morning two Ospreys were rolled out and soon their stout blades began to turn slowly. With my ICOM R-3 in spectrum mode I easily found the Osprey tower on just the frequency band where I suspected it was. The tall "pip" on the display indicated a strong carrier on 123.100 MHz. I keyed it into my Uniden BC-780 and—voila! "Osprey 4 this is Bell tower, do you copy, over?" was my reward.

Osprey 4 replied "Loud and clear Bell tower. Let's do a comm check on two-three-zero-zero."

Two-three-zero-zero? Was that a UHF frequency, I hoped. Quickly I punched in 230.00 MHz and, sure enough, I heard, "Osprey 4, comm check on two-three-zero-zero."

Then the next communication solved my minor monitoring mystery, "Osprey 4, telemetry check on two-five-zero-zero."

I keyed in 250.00 MHz and was rewarded with the now familiar Plip-Plops coming out of the Uniden. Mystery solved!

Okay, so it wasn't as if I had solved the riddle of the Sphinx, but it just goes to show you that with a little ingenuity and diligence a human brain can solve almost any problem.

Do you have a monitoring mystery that you've solved? Maybe you'd even like to quiz the experts on it. Maybe we can help. E-mail your monitoring mystery to me, and look for your letter right here in the "Utility Communications Digest."

## It's Your Turn

As I stated when I took over "Utility Communications Digest," this is *your* column and I want to hear your stories! Well, some of you took me at my word and responded, so in this issue we'll hear from those readers.

First up is a cool trip report from David Hopcroft. David reports to us about his radio adventures on the high seas:

Way back in the summer of 1964, I was the Radio Officer on the tanker *Partula/GBYH* a 13,000-ton Bitumen tanker in the Shell Tankers (UK) Ltd fleet. Curacao was always the loading port, with discharge being either in Northern Europe or the East Coast of the United States. On that trip, we discharged the liquid Bitumen at three U.S. East Coast ports. First port was Portland, Maine, then down through the Cape Cod Canal to Sewaren, four miles up the Arthur Kill from Perth Amboy, and finally up through Chesapeake Bay to Baltimore.

In those days, a very long time before printed boards and micro everything, fault-finding tended to be a little more "hands on." The comms side of the job was fairly straightforward, but keeping the gear going required a certain amount of ingenuity, some luck, and a little help from friends ashore.

The *Partula* was fitted with an AEG Telefunken 1-kW main transmitter, AEI G2 main receiver, and the standard AEI emergency battery powered back-up transceiver and Auto Alarm, the WT distress-alerting unit.

I joined the *Partula* in Dublin. The Radio Room was situated behind the bridge. Behind that was a small room that housed the main body of the radar, which was a BTH (British Thompson Huston) RMS2 type. I was somewhat surprised when I first looked into the room to find an assortment of large light bulbs wired together trailing out of the radar cabinet. The reason? One day one of the large tubular green enamelled heat dissipating resistors in the PSU had burned out. With no spare available, my predecessor had looked at its rating and wired up light bulbs in a series/parallel arrangement to come up with the same values. Brilliant thinking and it worked perfectly!

On the passage across to Curacao, rolling along in a long Atlantic swell, I began to realize that the radar was a bit unstable. It kept drifting off tune. The receiver crystal and its tuning dial were mounted on the inside of one of the cabinet doors with the tuning indicators on the outside. The fine-tune control was on the display out in the bridge. It proved difficult to keep the tuning locked and stable, and as a result I seemed to be spending most of my time running to and from the bridge.

After a few hours of this I was beginning to give up hope, when once during my dash to the bridge I forgot to dog down (secure) the cabinet door in its open position. At that moment, we took a big roll and the door slammed shut with a loud bang. Somehow this did the trick. "That's it" cried the Mate on watch, "You've fixed it!" Indeed it was an accidental fix and not at all due to anything I intentionally did, but I sure wasn't going to say it wasn't!

*A Bell/Boeing MV-22 tilt rotor aircraft takes off on a night training mission from the Amarillo Osprey plant. Encrypted flight test telemetry from an Osprey generated a minor-monitoring mystery for the author. (Photo by Steve Douglass)*

On the passage to Portland, the radar's CRT display went faulty. An EHT resistor burned out. Having no spare I radioed ahead for assistance. We spent the weekend in Portland and the Tech who came down to help me knew of only one place he might find a replacement. He had an amateur radio enthusiast friend who lived just out of town, so after being tired of being at sea for a few weeks, I went along with him for the ride to see his friend. The ham had exactly what we wanted and all it cost me was a couple of beers! Not a bad trade.

Do any of you old salts remember counting console blips as a navigation fix? I seem to remember the station at Bushmills, Ireland (I know what you are thinking. Yes!—it's the same place the whisky comes from), as one of the stations we relied on. Imagine being out in the middle of the Atlantic Ocean in a deep fog, and not seeing the sun for a few days. It gave me the opportunity to see how counting console blips works.

If I recall correctly, I think you counted the number of "blips" before they faded from the screen, and from this you could calculate a bearing from the station. We also had Loran C, but there didn't seem to be any user guide around—we were not sure what the pulses on the little screen meant, so the Captain was a little wary of depending on it.

One final sea-going memory was one of coincidence. On one trip I got a citation from the FCC for overcalling on HF. Naughty boy! I received a letter from the UK GPO (the Telecomms authority at the time) reminding me that in future I should stick to the rules. It was signed by the Deputy Head of Wireless Telegraphy, Mr. John Handford. You may remember him from my articles on the 1953 flooding at Humber Radio/GKZ when he was a Radio Operator. I later became Manager at GKZ. Small world isn't it?

David signs his letter, "Alongside at Larvik in Southern Norway." Still adventuring, it seems.

## World News In Real Time

Mark Cleary sent in this missive and logs concerning monitoring a disaster at sea and the recent unrest in Haiti.

It is often mentioned how our monitoring hobby gives us a window on the world and allows us to monitor events as they happen, even before they make the news. The weekend of 28 February is a perfect

illustration of this. Two major news events happened that weekend and I had the opportunity to monitor both of them. The first event was the tragic *Bow Mariner* tanker explosion and sinking off the Atlantic coast that made national headlines. I was monitoring on HF as the action unfolded. Here is what I logged.

*[Note: In this instance we've arranged the following loggings in time order.—Ed.]*

2345Z 8983.0 CG 1501 (HC-130, CGAS Elizabeth City) airborne with 7 SOB en route to SAR.

2359Z 8983.0 CG 1501 takes radio guard for CG 6026 (HH-60J, CGAS Elizabeth City) and CG 6588 (HH-65, CGAS Atlantic City).

0111Z 8983.0 CG 1501 reports CG 6588 is departing SAR scene with patient. Requests ALS ambulances meet them at Ocean City airport.

0119Z 5696.0 CAMSLANT passes to CG 1501 lat-long position of Salisbury hospital and states next helo will be departing E-City at 2053 local.

0126Z 5696.0 CG 1501 passes to CAMSLANT that CG 6026's rescue swimmer and mechanic are covered in crude oil. CAMSLANT requests to know condition of fire on vessel and if it is sinking. CG 1501 passes CG 6026's ETA to Sentara Hospital.

0135Z 8983.0 CG 1501 requests permission for CG 6026 to make a one-time flight to E-City or Chambers Field to clear the flight deck at Sentara Hospital. CG 6026 has crude oil and biohazard in cabin.

0143Z 5696.0 CG 1501 reports CG 6588 has hoisted one body onboard. CAMSLANT informs them CG 6026 is cleared to fly at pilot's discretion. CG 1501 states CG 6026 plans to fly to E-City and requests new swimmer and mechanic as well as decontamination. CAMSLANT requests to know if vessel sank before their arrival on scene.

0203Z 8983.0 CG 1501 reports CG 6031 is on scene.

0212Z 8983.0 CAMSLANT states that per LANTAREA emergency procedures all personnel need to be evacuated 1000 feet from the area of the spill.

0227Z 8983.0 CAMSLANT requests to know from CG 1501 how many bodies they can count from the air and passes that District 5 requests they drop DMB. CG 1501 passes posit of DMB dropped by CG 6026 37-52N 074-14W. CG 1501 states they have shut down an engine for endurance purposes.

0335Z 5696.0 CG 1501 requests CAMSLANT contact E-City to get another helo on scene. CAMSLANT states E-City is out of helos. CG 1501 states CG 6026 is still at the hospital and could not fly due to fumes.

0557Z 5696.0 CG 1501 reports that CG 1502 has relieved them on scene and they are RTB.

1557Z 8983.0 CG 1503 position report 37-48N 074-20W on scene of SAR.

1908Z 5690.0 CG 1503 p/p to LANT D5 reporting SAR update and status of Cutter *Shearwater*.

2014Z 5690.0 CG 1503 wkg LANT D5. D5 tells them that when Cutter *Albacore* completes search they are to RTB.

2020Z 5690.0 LANT D5 requests to know if *Albacore* still has body onboard. D5 will contact Group Hampton Roads and have coroner standing by. CG 1503 passes that Cutter *Shearwater* departed scene at 1905Z and Cutter *Albacore*'s ETA to Little Creek is 0600–0800Z.

The other national event I was able to tune into was the insertion of U.S. Marines into Haiti the next day. The press reported that the U.S. had decided to intervene in Haiti, and I was standing by in my shack to see what could be heard. Living near Charleston AFB, where the missions originated, I was able to monitor almost from start to finish. My first indication of activity was when I caught a colonel personally directing C-17 loading and unloading operations on UHF. He made a statement that this was being watched at the "four-star level." I monitored the C-17s departing for MCAS Cherry Point that afternoon. Later that evening I was able to catch one of the first aircraft into Haiti on HF. My logs follow:

0242Z 4721.0 REACH 433 (self-ID C-17A, tail # 2-1100, 437 AW) ALE initiated call to TACC, Scott AFB. States they are en route to Port Au Prince, Haiti, and want to change flight plan for 0445Z arrival and 0500Z departure.

0252Z 4721.0 REACH 433 ALE initiated call to TACC with inbound message for Port Au Prince. A1, 5 rolling stock, 51 PAX.

0253Z 4721.0 REACH 433 ALE call to Meteo for 0500Z WX at MTPP (Port-Au-Prince). Gives PIREP posit 31N 077W.

0316Z 4721.0 REACH 433 call to HILDA OPS. HILDA passes that REACH 423 has departed Haiti and was on the ground for 35 minutes.

Hours later I was monitoring UHF as the aircraft returned to Charleston AFB from Haiti and CNN was flashing clips of C-17s on the ground there. Quite a fulfilling monitoring weekend hearing events transpire before they ever hit the TV screens.

## TVI And UFOs?

The "Night Owl" writes,

Hi Steve, I saw the picture of your Amarillo listening post and was wondering if having all those monitors (TVs, computer monitor) cause interference to your reception? Seems to me TVs put out a lot of RF. I was puzzled over a strange pulsing sound coming in over my radio gear until I found out it was coming from my computer monitor from across the room. And the computer also puts out that "motor-boating" sound all up and down the band, so it's a mixed bag whether it is a good thing to have it in the radio room.

By the way, I don't know if you are interested in this or not, but you mentioned the Chisum VORTAC, formerly "ROW"

Roswell VOR, which reminded me that I saw those famous "lights" over Phoenix on March 13, 1997. They went right over me. One of the "lights" trailed off from the group and came back at one point, which (to me) disproves it was a giant aircraft and/or spaceship, unless it was made of putty. I carefully read the accounts of where they were seen and reconciled it against my aviation chart of the southwest. Sure enough, the lights seemed to fly a course that would link the "Drake" and "Stanfield" VORs.

If alien civilizations could cross billions of light years to get here, why would they have to tune in VOR "omni" stations on a VHF AM radio like terrestrial pilots do? I think it is more likely they were a squadron of one of the "black project" planes you have been writing about being moved from one place to another.

I get annoyed at all the hoopla over it, because most of the stuff I hear on talk radio about it is pure crappola, but like the "numbers" stations on SW, there must be SOMETHING to it. With all the controversy and interest in that flight, still no one directly involved has ever come forward to tell the story. Hmmmm?

My simple answer to Night Owl is that my Macintosh Cube puts out relatively low amounts of RF interference as compared to a PC. Also I had the inside of all my televisions professionally shielded by a company in Amarillo that does just that. They lined the inside of the cabinets with aluminum foil. I also connect all my radios to a noise-filtering spike protector (clean power) power strip made by Monster Cable. Still, I do encounter some RF interference, but it's manageable.

## More On Black Box Thinking

Art Kern writes,

I have been using EQ with scanners and shortwave to record on VHS tape for some time. I also use DBX noise reduction after the EQ to help reduce tape hiss on college radio programs and public radio. I record 20 hours of Jazz and Blues programming a week, then remix it down to cassette. Your tip of using a cable signal to quiet the video track is a big help to index the tracks I want to remix. Please have more articles like this. Big improvements for a low budget shack!

Send in *your* "thinking outside the black box" suggestions and we'll publish them in this column!

## Texas UTE Says Howdy!

And we hear this from a Lone Star State reader,

My name is Bow and I live in Houston, Texas, just down the road a piece! I am writing to let you know that I really enjoy your column in *Pop'Comm*. I have really enjoyed your recent comments on the Black Aircraft Projects that cruise around in the skies above. I was wondering if you could suggest any frequencies for radio monitoring from Houston. If I must say, commercial air traffic is getting a bit boring. I have been working in the aviation field for about 14 years and really enjoy what I do. Radio monitoring is a hobby of mine in the HF and 30 MHz and up ranges. I am also a ham radio Technician license holder and active on the 11-meter sideband.

My current HF monitoring setup consists of an ICOM IC-718 with the optional DSP installed; an ICOM IC-R10; a 65-foot inverted V dipole; and a Shakespeare NBS 2100 (21-foot vertical) antenna. On VHF I use an ICOM IC-R10; a RadioShack PRO-2039; a Bearcat BC-160 (no air band, but cheap); a Scantenna (frequency coverage 25–1300 MHz); and a Homebrew dipole cut for 103 MHz

I know that my shack is a little limited as far as equipment goes, but it does okay. Any suggestions on catching the "cool stuff" from the Northwest Houston area would be great. Regarding the *Columbia* accident, I knew Mr. Husband and Mr. McCool from work. I work at Ellington Field on the Shuttle Training Aircraft and had met them both a couple of times.

Bow, I did find a limited list of military frequencies on the Internet at http://home.flash.net/~upchurch/ScannerFreqs.html, and at http://www.milaircomms.com/artcc_zhu.html.

Any Houston readers out there who can help Bow with some frequencies please send them in to my e-mail address and I'll pass them on!

## Reader's Logs

Before we get on with our HF logs I want to remind you that you can send in your MILCOM loggings above 30 MHz, including UHF aero band catches. Just do so in the format below. Special thanks to Ron Perron, our most dedicated UTE listener! Many thanks also to our ever-faithful UTE monitors who dutifully submit their logs every month. Maybe you'd like to be one of them?

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

**2501.8**: Pirate op., east-Europe, also very active on 2–3.5 MHz every night at 0050 in AM. (LA)

**2670**: CG Group, Ft. Macon, NC: 0110 USB w/MIBs. (RP)

**3146**: IDR, Italian Navy, Rome, wkg P4U: 2146 USB and RTTY. (LA)

**3310**: Osap (hear as) Radio, warning in EE: 2255 USB. (LA)

**4149**: UNID Maritime, warning in east-Europe language, incomprehensible ID in EE: 2245 USB. (LA)

**4585**: Hill CAP 604 (West Virginia CAP-acting as NCS): 2238 USB closing down the West Virginia Civil Air Patrol Directed Net. (RP)

**4721**: IDR, Italian Navy, Rome, wkg 9AH: 2100 USB. (LA)

**5097.5**: CFH (Halifax Military): 0123 RTTY 75bd/850Hz w/NAWS DE CFH ZKR F1 2822 3287 8303 12380 16576 22182 AR. (RP)

**6730**: UNID Italian mil: 1719 USB. (LA)

**7510**: USAIS1012 (Army Intelligence & Security Command, Ft. Belvoir, VA): 1516 USB/ALE TO USADA1010 (unidentified). (RP)

**7805**: MA1NC (Manchester NH EOC): 2246 USB/ALE sounding. (RP)

**7805**: KE1EN (Keene NH EOC): 2231 USB/ALE sounding. (RP)

**8056**: A3Z (unidentified SHARES station): 1719 USB/ALE sounding. (RP)

**8210**: Olympia Radio, Greek Maritime, tx schedule, services list, contact references in EE/Greek: 1615 USB. (LA)

**8297**: O/M (EE): 0119 USB w/O/M (EE). Probable Gulf of Mexico fishermen coordinating fishing spots. (RP)

**8432**: Unid: 0128 SITOR w/Spanish language mariners advisories. Possible PEMEX link. (RP)

**8906**: New York (MWARA NAT-A): 2130 USB w/Reach 290 w/position report. (RP)

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

**9010.7**: UNID, CW, continuous stream of mostly dits with an occasional dah at 1620Z (CG)

**9906**: SCLC514 (Communications Logistics Center, 514th Jungle Inf Bn, Venezuelan Army): 0303 USB/ALE TO CLC51 (Communications Logistics Center, 51st Jungle Inf Bde). (RP)

**11039**: DDH8 (Hamburg Meteo): 2037 RTTY 50bd/425Hz w/wave height/direction report & German language WX. (RP)

**11232**: Trenton Military: 2056 USB w/Sentry 61 (E-3 AWACS, Tinker AFB) in pp w/Eagle 2 (Tinker AFB) concerning radar problems. (RP)

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

**12087**: 311 (unidentified, Defense Logistics Agency): 1323 USB/ALE TO 306 (DLA 306, Defense Logistics Agency, Boston MA). (RP)

**12170**: T1Z147 (1/147th Avn Bn, WING Truax Field Madison WI): 1845 USB/ALE sounding. (RP)

**12191**: SCLC501 (Communications Logistics Center, 501st HQs Bn, Venezuelan Army): 2324 USB/ALE TO CLC51 (Communications Logistics Center, 51st Jungle Inf Bde). (RP)

**12666**: RFFMEA (NAVITER FRANCE SUD): 1940 RTTY 75bd/850Hz W/TO BATIMENTS TT NON PROTEGE test tape. (RP)

**13134**: Olympia Radio, Greek Maritime, tx schedule in EE/Greek: 1533 USB. (LA)

**13170**: Olympia Radio, Greek Maritime, tx schedule in EE/Greek: 1533 USB. (LA)

**13051.5**: WLO: 1958 FEC w/WX forecast for Eastern North Pacific area from Miami Hurricane Center. (RP)

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

**14000**: MOCHUELO (Colombian telephone net): 0016 LSB/ALE TO 1901 (Colombian telephone net)—[AMD] DIAL0942371804. (RP)

**14569**: SCLC501 (Communications Logistics Center, 501st HQs Bn, Venezuelan Army): 2317 USB/ALE TO PCRC5 (Regional Communications Command Post, Military Region 5). (RP)

**14671**: CER11 (FR MFA, Paris): heard at 2008 USB/ALE to Rabat (FR Embassy Morocco). (RP)

**15920.5**: CFH (Halifax Military): 2028 RTTY 75bd/850Hz w/NAWS. (RP)

**16077**: SAMHF1 (Army Corps of Engineers, Mobile, AL): 2328 USB/ALE sounding. (RP)

**16822**: Unid: 2018 FEC w/Spanish language mariners advisories and shipping information for Vera Cruz & Tampico Mexico. Probable PEMEX link. (RP)

**17359**: Olympia Radio, Greek Maritime, tx schedule in EE/Greek: 1455 USB. (LA)

**18880**: Pirate op., two Spanish fishermen in chat: 1500 USB. (LA)

**17477**: Rabat (FR Embassy Morocco): 1752 USB/ALE TO CER11 (FR MFA Paris). Also noted on 14671.0. (RP)

**19131**: Flint Base (DEA Air Ops, Dallas TX): 2112 USB w/Flint 514 (DEA pilot) closing out comms. (RP)

**19320**: OLZ (Czech MFA Prague): 1949 USB/ALE TO OLZ78 (Czech Embassy Beijing). (RP)

**20810.6**: KWB57 (Dept of State/Intell, Wash DC): 1926 USB/ALE sounding. (RP)

**22389.6**: NMN (CAMSLANT Chesapeake): 2006 CW/FEC markers. (RP)

**22332**: Honolulu Meteo: 2010 Fax. Poor quality WX chart. 02/03 (RP)

**25310**: O/M (IT): 2238 USB w/O/M (IT). (RP)

This month's contributors are Chris Gay (CG), Ron Perron (RP), and Lupo Alberto (LA).

## Wrapping It Up

Since we published our special three-part look at black aircraft, rumors have been flying in aviation circles that soon the Pentagon will be announcing the existence of a secret F-117 variant that has been unofficially dubbed the "Super 117." In fact, by the time you read this it may have already been declassified.

Described as an F-117 stealth on steroids, the Super 117 is thought to be an aircraft based on the standard 117 platform but scaled up by 30 percent. Possibly a two-seater with a larger weapons bay and F-22-type engine exhausts and twin tails, this secret bomber may be the real replacement for the retired medium bomber, the F-111 Aardvark.

Back in the 1980s when the geniuses at Lockheed Skunk Works discovered the secret of stealth shaping, they realized that if they followed their computations for shaping (it didn't matter how large the aircraft was), it would have the same small radar cross-section no matter what the size. They realized you could make small cruise missiles or even a large stealth aircraft carrier without increasing the craft's radar signature.

Using the parameters set down in the "ECHO ONE" program, apparently size doesn't matter! This may have been the thinking behind building a super-duper Nighthawk. And here's the cool thing: Since it follows the same general design as the F-117, an observer looking up at a Super 117 wouldn't be able to tell that it was much bigger than its progenitor. Talk about hiding in plane sight!

As soon as more information is available on the Super 117, you'll hear about it first in *Popular Communications*! ■

# Shannon's Broadcast Classics

a look back at radio & TV's golden years

by Shannon Huniwell

## The Island Radio Coincidence

"Now *there's* a super place for a local FM radio station!" said my dad as he enthusiastically pointed to Martha's Vineyard. "There's a captive audience and no mountains to stop the signal coverage!" We were aboard a ferry bouncing over moderate waves off the Massachusetts coast, and bound for Martha's Vineyard. With an affectionate smile and overly dramatic Boston accent, mom reminded him that we were supposed to be on an historical New England excursion weekend in honor of my eighth birthday, not one of his tower hunting wild goose chases.

"Shannon," father directed, "tell your *"prop-a Ha-vud"* mother what you'd just love to do while on *Mah-thas Vin-yud*." That's when I laughed and confessed that my birthday dream was to "visit the island's little radio station, WVOI-FM, a unique 3-kW folk music outlet." Mother shook her head and rolled her eyes, knowing dad had fed me that particular line, and that her planned version of our outing would be the victim of a sea change that included a broadcast-related detour.

At our Cape Cod motel the night before, dad had twisted the radio dial to no avail. "Shannon honey," he directed, like a doctor trying to make a diagnosis, "run out to the car and check the *White's Radio Log* again to see if we've got the right frequency for that Martha's Vineyard FM." My mission verified that WVOI-FM lived at 92.7 MHz, but curiously nothing emanated from the radio. "Well, this *is* a strange RF signal mystery," he announced, and pledged we'd get to the bottom of it for sure when on the island. Admittedly, it must have been the mild conspiracy factor in his voice that caused my anticipation about the impending excursion to be more focused on that local station than upon the quaint shops, beaches, and celebrities that mother promised we'd encounter.

It must have been at least five times during the boat trip that dad got back into our black 1976 Ford Grenada, turned the key to "accessory," and again tried the under-dash-mounted FM converter radio for 92.7 WVOI-FM. "Still no sign of her on these salty airwaves, Princess," he'd whisper to me as he rejoined mom and I on the ferry's observation deck. "It's a good thing we'll be investigating the enigma on Mr. White's behalf." Mother chuckled that he was making this out to be some sort of clandestine military mission, but she understood that such tactics made simple things more fun.

Soon, we were all back in the car and being directed by a college-age boy in a ferry company shirt and sailor hat exactly when to drive down the ramp onto Martha's Vineyard. Rolling down the driver's side window, dad lost little time in finding the first "local-looking" islander and sought directions (or "intell" as he said they call it in the Army) to WVOI.

*With our '76 Ford Grenada sticking into the shot, I focused my little Kodak on the WVOI-FM studio/transmitter house. Part of the defunct station's 200-foot tower can be seen in the backyard. Note that what would normally be the garage section was void of garage doors. It served as storage and square footage where an anticipated successful WVOI-FM could be expanded.*

"I cahn tell ya way-ah it waz, but 'taint they-a anymoah," the old gentleman noted after thinking for a moment. Mother quietly translated the fellow's New England-ish into the reality that the station was gone.

"IS YOUR ISLAND'S RADIO STATION STILL IN EXISTENCE?" my dad loudly re-queried as if the man were either deaf or foreign.

"Got any pay-pa?" the native queried.

With my father's trusty, yellow plastic mini clipboard and stubby pencil (tied with a string to the clip mechanism) in hand, the first islander we encountered sketched out some directions. Ten minutes and several course corrections later, our trail of road dust subsided in the cul-de-sac of a long dirt driveway. "I'll be!" dad exclaimed, "Quite appropriately, WVOI is in a little Cape Cod-type house. And look at that sturdy stick in the backyard! Must be 200 feet."

Mother was relieved we found the place so quickly. She pulled a well-worn paperback from her purse, and hoped dad and I could limit our tour to about an hour. Oddly, even less than 100 feet from the tower, nothing near the 92.7-MHz spot flowed to our car radio. Also strange were the two other vehicles there—a pickup with Massachusetts plates and a car from Connecticut.

Both were parked near the head of the driveway, as if the occupants had wanted to walk the whole length of the property.

## There's Your Trouble!

A couple of paces inside the front door, my father motioned towards the telltale debris on what was likely a receptionist's desk. "Looks ransacked, Princess," he quietly stated as if not to alert the suspects. "Bet ya dollars to donuts this one is what they call d-a-r-k." The broadcast term meaning that a station has left the air, "dark" usually signaled fatal financial woes and lots of disappointed staff. When we stepped into the next corridor, it was evident even to this then-fourth grader that WVOI-FM had trouble with a capital "T."

Through smudged panes of glass, dad and I saw Formica-topped studio furniture with holes for turntables, a master control board, tape recorder and various pieces of equipment—all naked that day. Almost in unison, our gaze crept into the former transmitter room where a fat antenna line hung from the ceiling. Strands of small wiring lay on the floor near where they must have been hooked to monitoring gear. "No wonder we couldn't hear this station," I remarked. Dad nodded with a smile, then seemed momentarily distracted, put his finger to his lips, and pointed upstairs.

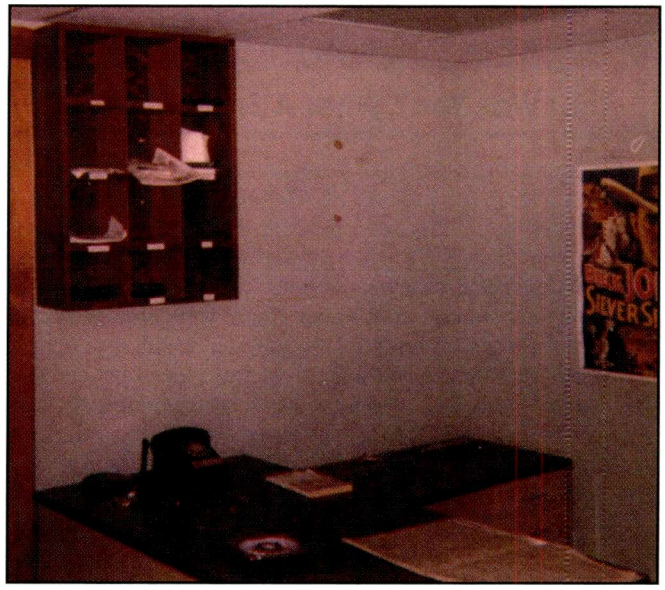
## We Were Not Alone

The sound of footsteps came in several pairs. As they got louder, my gregarious father moved towards the stairway and called out "Hello there. Radio station visitors here." Descending was a young couple and serious looking 60-something man. He quickly indicated that there was really nothing for us to see because WVOI-FM had been off the air for at least two years and its broadcast equipment repossessed. No matter, dad was intrigued and wanted evidence that we'd been there. The older gentleman, in happier days WVOI's chief engineer, said it'd be okay for me to take a few pictures with my Kodak 110 Instamatic. Checking the cubbyholes above the reception desk, father spied a piece of WVOI letterhead and successfully requested it as a souvenir.

Honestly, I'd had enough of the chilly, nearly bare interior, so left to get an exterior snapshot and rejoin mom in our car. About 10 minutes later, dad emerged. He had his collector stationery, as well as an account of how the Martha's Vineyard station lasted only 15 months, went bankrupt, lost its frequency, FCC license, and was in imminent danger of having its tower dismantled and studio/transmitter house sold at auction. The young husband and wife were prospective buyers who hoped to resurrect WVOI-FM. "They're short on money, but long on dreams and energy." Dad sighed as if half wishing to be in on the project, saying, "They've got a heck of a challenge ahead of them."

## Here's The Coincidence...

He might have never mentioned that couple or the island FM again—except for my showing him a list of upcoming *Pop'Comm* column topic ideas. There were a dozen proposals on that notepaper. Handing the roster back to me, dad nodded and indicated WVOI could make for an especially good story because of the firsthand information that was still available. I figured he meant we'd be the primary sources, which didn't seem like a fact-filled treasure trove, because this former eight-year-old couldn't recall much. Father also admitted that the nearly three decades since our Martha's Vineyard trip eroded some details, though—for what it was worth—he still had the official letterhead.



*Not all of the WVOI-FM personnel expected the station to be quickly silenced on a "routine" fall day in 1975. Looks like the receptionist left the newspaper she was reading right on her desk. A few unopened letters and never-consummated advertising contracts waited in the staff mail/correspondence cubbyholes. The multi-line phone on the desk was dead.*

No, my dad was referring to the young would-be broadcaster we saw inspecting the silent studio/transmitter building that October Saturday in 1977. "Seems to me," father recalled, "that the guy told me he was the morning announcer at WNLC in New

October 17, 1977

IN REPLY REFER TO:
8832-JB

Mr. Peter Hunn
18f Anthony Road
New London, Connecticut 06320

Dear Mr. Hunn:

This is in reply to your letter, dated October 11, 1977, in which you asked whether 92.7 megahertz (channel 224) in Tisbury, Massachusetts, is a vacant assignment. As of this date, channel 224 in Tisbury is vacant and there are no applications for that assignment. It has not been deleted and it is not necessary to go through a rulemaking proceeding.

Sincerely yours,

David S. Landis, Chief
Broadcast Facilities Division
Broadcast Bureau

*Hunn says this letter should have prompted him to file for the vacant Tisbury (Martha's Vineyard) Massachusetts FM frequency immediately and to worry about acquiring the former WVOI site later. Today, few FM channels stand empty waiting for someone to apply.*

London, the same fellow you interviewed for your *Power Towers of Connecticut* column (November 2002) a couple years back."

## That Was You? What A Small World!

Sure enough, my e-mail to Peter Hunn netted a reply with the subject line: "*Yes, that was me. How'd you know?*" It was a few evenings later, in a phone interview for this article, that I mentioned having "visited" WVOI with my father, and barging in on a young couple being shown the defunct station. There was a pause. And then Hunn remembered, "Wait, wait, um...a big tall friendly radio buff and the little red-haired girl with a camera?" Hearing that verified, he could hardly believe the coincidence.

Of course, Hunn's memory of the meeting included more about my dad than me. "He tagged along on the rest of the tour and spouted off sundry facts about other stations he'd seen," the former Connecticut broadcaster laughed. "Later, the WVOI engineer apologized for the intrusion, but my wife and I were glad that the 'know-it-all radio nut' felt free to make some very blunt observations about the facility we were desperately trying to acquire for a lot less than the asking price."

## Well, Did You Buy WVOI?

At the time, Hunn was one of a couple dozen young, relatively impecunious New England/New York broadcast ownership hopefuls who, in the mid-1970s to mid-'80s, kicked the tires of poorly performing stations, and applied to fill empty channels, or had the Federal Communications Commission Table Of Allotments modified in order to propose a new FM. He generated a stack of FCC petitions and applications in his search for an interesting radio situation. They ranged from allocations on Block Island, Rhode Island, to a pleading seeking permission to build a 250-watt commercial shortwave outlet for simulcasting his WHRC-FM 92.1 in Port Henry, New York. "Of all of the ones that got away, though," he smiles, "the Martha's Vineyard deal would have been nicest."

During the phone interview, he cut to the chase and sighed that the year-and-a-half or so of pursuing the famed island's silent station produced a bit of heartache, a fat file folder, and some mighty good lessons. Now a public school administrator as well as an adjunct communication studies professor with the State University of New York at Oswego, Hunn shares, in the first person, his slice of the WVOI-FM saga.

## Thumbnail History Of The Voice Of The Islands

In Hunn's words,

Well, let's see, my notes start sometime in the summer of 1973 when a group of islanders got serious about founding a local station. Actually, I believe the instigator and eventual general manager of the outfit talked his way into the project from elsewhere. A vacant FM channel (95.9 MHz.) at Falmouth, Massachusetts, some eight miles

WVOI

"The Voice of the Islands"

96 FM

Edgartown Road
Tisbury, Massachusetts 02568

Telephone 617-693-9596

J. Robert Windsor
General Manager

John F. Schiffin
Sales Manager

Dear Islander:

WVOI, "The Voice of the Islands", will be on the air this summer, and I hope you'll be there with us. All indicators point to "BUSY" and a good season for us all.

As an Island radio station, WVOI will be devoted to events and issues on Martha's Vineyard and Nantucket. We'll feature Country/Folk music during the day, and Classical music in the evenings. We'll bring you weather reports every fifteen minutes (some of them "live"), Island news exclusively three times a day, fishing reports, passenger boat schedules, (and delays), and "live" coverage of events which have broad public interest. We may be small but we're rugged, and we intend to be on the air sixteen hours a day, seven days a week.

I've enclosed our Charter Rate Card for your consideration. It really explains itself, but I want you to know the Charter Rates are special and will not be available after we go on the air unless you have signed a contract.

The process is simple. If you are interested in the Charter Rate Card, call us at: 693-9596, and we'll write an order. After we have talked face-to-face about the message you want on the air, we'll sign a contract. I hope you'll consider a schedule of at least two weeks.

REMEMBER, WE GUARANTEE THE CHARTER RATES FOR THE FULL 13 WEEKS PROVIDED YOU ADVERTISE CONSECUTIVELY.

When you plan your summer advertising schedule, include WVOI. If you have any questions, call us at: 693-9596.

I hope you will join us on "day one" with your message. In any event, have a good summer.

Yours for the Islands,

J. Robert Windsor
General Manager

*Here's a copy of the WVOI introduction letter my dad secured from the reception area cubby. It's a rare slice of New England radio history.*

FCC Form 303-A
February 1974

United States of America
FEDERAL COMMUNICATIONS COMMISSION

File No. BRH-2947
Call Sign: W V O I

FM BROADCAST STATION LICENSE

Subject to the provisions of the Communications Act of 1934, as amended, treaties, and Commission Rules, and further subject to conditions set forth in this license, the LICENSEE

WASQUE CORPORATION

is hereby authorized to use and operate the radio transmitting apparatus hereinafter described for the purpose of broadcasting for the term ending 3 a.m. Local Time APRIL 1, 1978

The licensee shall use and operate said apparatus only in accordance with the following terms.

1. Frequency (MHz) ..... : 95.9MHz
2. Transmitter output power .... : 2.2 kilowatts
3. Effective radiated power .... : 3 kilowatts(H&V)
4. Antenna height above average terrain (feet) .... : 260' (H&V)
5. Hours of operation ..... : Unlimited
6. Station location ..... : Tisbury, Massachusetts
7. Main studio location ..... : Edgartown Road Tisbury, Massachusetts
8. Remote Control point ..... : - -
9. Antenna & supporting structure: North Latitude: 41° 26' 16" West Longitude: 70° 36' 50"
10. Transmitter location ..... : Edgartown Road Tisbury, Massachusetts
GATES, FMC-3A, Three sections (H&V), side-mounted near top of uniform, cross-section, guyed, steel tower. Overall height above ground: 197 feet.
11. Transmitter(s) ..... : GATES, FM-2, 5H3.
12. Obstruction markings specifications in accordance with the following paragraphs of FCC Form 715: 1, 3, 11 & 21
13. Conditions: Subject to Report and Order adopted April 17, 1975 in RM-2158, Docket 20049

The Commission reserves the right during said license period of terminating this license or making effective any changes or modifications of this license which may be necessary to comply with any decision of the Commission rendered as a result of any hearing held under the rules of the Commission prior to the commencement of this license period or any decision rendered as a result of any such hearing which has been designated but not held, prior to the commencement of this license period.

This license is issued on the licensee's representation that the statements contained in licensee's application are true and that the undertakings therein contained so far as they are consistent herewith, will be carried out in good faith. The licensee shall, during the term of this license, render such broadcasting service as will serve public interest, convenience, or necessity to the full extent of the privileges herein conferred.

This license shall not vest in the licensee any right to operate the station nor any right in the use of the frequency designated in the license beyond the term hereof, nor in any other manner than authorized herein. Neither the license nor the right granted hereunder shall be assigned or otherwise transferred in violation of the Communications Act of 1934. This license is subject to the right of use or control by the Government of the United States conferred by section 606 of the Communications Act of 1934.

This license consists of this page and pages - -

Dated: MAY 8, 1975

FEDERAL COMMUNICATIONS COMMISSION

*When Hunn and his wife first visited the dark WVOI, its former chief engineer pulled the FCC license from the transmitter room wall. "Take it for your files," the gentleman suggested. It shows the Tisbury FM authorized to operate on 95.9 MHz, a frequency that later went to a new suburban Boston station.*

FCC Form 301 — FEDERAL COMMUNICATIONS COMMISSION — Section V-B

FM BROADCAST ENGINEERING DATA

Name of applicant: Peter Edward Hunn

1. Purpose of authorization applied for: (Indicate by check mark)

(If application is for a new station or for any of the changes numbered B through E, complete all paragraphs of this form: if change F is of a character which will change coverage or increase the overall height of the antenna structure more than 20 feet, answer all paragraphs; otherwise complete only paragraphs 2 and 9 and the appropriate other paragraphs; for changes G through L, complete only paragraph 2 and the appropriate other paragraphs; for change J, complete only paragraphs 2 and 5.)

A. [X] Construct a new station
B. [ ] Change effective radiated power
C. [ ] Change antenna height above average terrain
D. [ ] Change transmitter location
E. [ ] Change frequency
F. [ ] Change antenna system
G. [ ] Change transmitter
H. [ ] Install auxiliary or alternate main transmitter
I. [ ] Other changes (specify)
J. [ ] Change studio location

If this is not for a new station, summarize briefly the nature of the changes proposed.

2. Facilities requested

Frequency: 92.7 Mc/s. — Channel No.: 224 A

Effective Radiated Power: Horizontal .935 kw; Vertical .935 kw

Antenna height above average terrain: Horizontal 279 feet; Vertical 279 feet

3. Station location: State: Mass. — City or town: Tisbury

4. Transmitter location (principal community): State: Mass. — County: Dukes — City or town: Tisbury — Street Address (or other identification): (off) Edgartown Rd.

5. Main studio location: State: Mass. — County: Dukes — City or town: Tisbury — Street address: (off) Edgartown Rd.

6. Remote control point location: none — State — City or town — Street Address (or other identification)

7. Transmitter: Make: Wilkinson — Type No.: FM 500SS — Rated Power: 500watts

(If the above transmitter has not been accepted for licensing by the F.C.C., attach as Exhibit No. a complete showing of transmitter details. Showing should include schematic diagram and full details of frequency control. If changes are to be made in licensed transmitter include schematic diagram and give full details of change.) does not apply

8. Modulation monitor: Make: Hewlett-Packard — Type No.: 335 B

9.(a) Antenna structure:

Is the proposed construction in the immediate vicinity or does it serve to modify the construction of any standard broadcast station, FM broadcast station, television broadcast station, or other class of radio station? YES [ ] NO [X]

If "Yes", attach as Exhibit No. complete engineering data thereon.

Submit as Exhibit No. a vertical plan sketch for the proposed total structure (including supporting building if any) giving heights above ground in feet for all significant features.

Overall height in feet above ground. (Without obstruction lighting): 197'

Overall height in feet above mean sea level. (Without obstruction lighting): 317'

Overall height in feet above ground. (With obstruction lighting): 200'

Overall height in feet above mean sea level. (With obstruction lighting): 320'

Height of antenna radiation center in feet above mean level. Horizontal / Vertical: 303' Horiz. & Vertical

Geographical coordinates of antenna (to nearest second): North latitude 41° 26' 16" — West longitude 70° 36' 50"

(b) Antenna data: Make: Phelps-Dodge — Type No. or description: CFMLP 4

No. of sections: Horizontal 4; Vertical 4 — Antenna power gain: Horizontal 2.05; Vertical 2.05

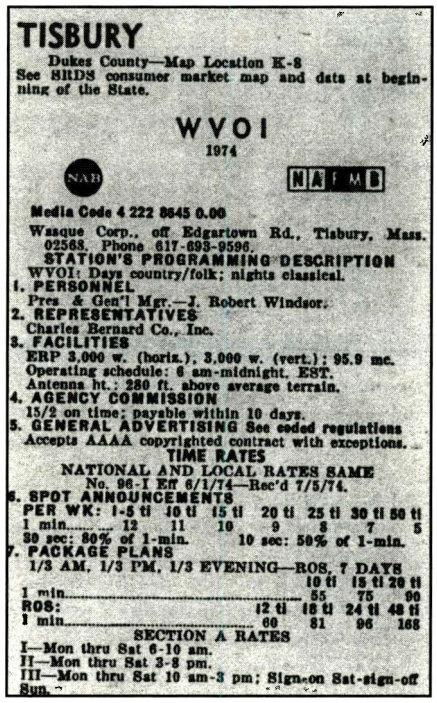
If directional antenna is proposed, give full details including horizontal and vertical plane radiation patterns, as Exhibit No. does not apply

Is electrical or mechanical beam tilting proposed? YES [ ] NO [X]
If so, describe fully in Exhibit No. including horizontal and pertinent vertical radiation patterns

Will antenna be altered to provide null fill-in? YES [ ] NO [X]
If yes, describe fully in Exhibit No. does not apply

*The engineering section of Hunn's untimely Martha's Vineyard FM application. It proposed a 92.7-MHz facility with 935 watts at 279 feet above the island's average terrain.*

*According to this listing in a 1975 advertising directory, WVOI was a member of the National Association of Broadcasters and the National Association of FM Broadcasters. Commercial rates for a one-minute spot were in the $5 to $12 range, depending on time aired and how many were purchased. Package plans, special deals, and shorter commercials could likely be had for considerably less.*



**TISBURY**

Dukes County—Map Location K-8
See SRDS consumer market map and data at beginning of the State.

**WVOI**
1974

NAB — NAFMB

Media Code 4 222 8645 0.00

Wasque Corp., off Edgartown Rd., Tisbury, Mass. 02568. Phone 617-693-9596.

**STATION'S PROGRAMMING DESCRIPTION**

WVOI: Days country/folk; nights classical.

1. PERSONNEL
Pres & Gen'l Mgr.—J. Robert Windsor.
2. REPRESENTATIVES
Charles Bernard Co., Inc.
3. FACILITIES
ERP 3,000 w. (horiz.), 3,000 w. (vert.); 95.9 mc.
Operating schedule: 6 am-midnight, EST.
Antenna ht.: 280 ft. above average terrain.
4. AGENCY COMMISSION
15/2 on time; payable within 10 days.
5. GENERAL ADVERTISING See coded regulations
Accepts AAAA copyrighted contract with exceptions.

**TIME RATES**

NATIONAL AND LOCAL RATES SAME
No. 96-I Eff 6/1/74—Rec'd 7/5/74.

6. SPOT ANNOUNCEMENTS

| PER WK: | 1-5 ti | 10 ti | 15 ti | 20 ti | 25 ti | 30 ti | 50 ti |
|---|---|---|---|---|---|---|---|
| 1 min | 12 | 11 | 10 | 9 | 8 | 7 | 5 |

30 sec: 80% of 1-min. 10 sec: 50% of 1-min.

7. PACKAGE PLANS
1/3 AM, 1/3 PM, 1/3 EVENING—ROS, 7 DAYS

| | 10 ti | 15 ti | 20 ti |
|---|---|---|---|
| 1 min | 55 | 75 | 90 |
| ROS: | 12 ti | 18 ti | 24 ti | 48 ti |
| 1 min | 60 | 81 | 96 | 168 |

**SECTION A RATES**

I—Mon thru Sat 6-10 am.
II—Mon thru Sat 3-8 pm.
III—Mon thru Sat 10 am-3 pm; Sign-on Sat-sign-off Sun.

off the coast of Martha's Vineyard, proved to be a catalyst. Under the FCC's old "10 mile rule," the frequency was requested by the groups—by then officially known as the Wasque Corporation—for its proposed Tisbury locale. There were no competing applicants, allowing the Commission to grant a construction permit in mid-January 1974. The call letters WVOI-FM, meaning *Voice of the Islands*, were selected. The plural denoted anticipated service to Nantucket as well as Martha's Vineyard.

A piece of land was purchased and a 200-foot tower was erected. The local zoning board was pretty nervous about authorizing a painted/illuminated tower that'd change the island's skyline. Reportedly, the okay came only after Wasque Corp. officials promised the stick would come down if WVOI went dark for longer than six months, and deposited a thousand bucks in some special account in case removal became necessary. Neither the agreement nor the money ever subsequently surfaced.

So far, so good, but someone convinced the stockholders to spend their bankroll on curious amenities like spring-isolated studio flooring—as had been used in big city network radio facilities of the 1930s and 1940s—and that Cape-style house, plus a two-car garage. Perhaps start-up capital could have been conserved by putting the transmitter in a small garden shed building and renting modest studio space in town. When the 3-kW station (via 2.2-kW into a three-bay antenna at 280 feet above average terrain) went on the air July 19, 1974, Harris Broadcast Products had advanced it over $30,000 worth of new gear.

Shortly before its debut, the station's general manager and its sales manager collaborated on an introductory letter mailed to residents of Martha's Vineyard and Nantucket. The flyer promised that WVOI would devote its schedule to both islands, and "...feature country/folk music during the day, and classical in the evenings. We'll bring you weather reports every 15 minutes (some of them 'live'), Island news exclusively three times a day, fishing reports, passenger boat schedules (and delays), and 'live' coverage of events which have broad public interest. We may be small, but we're rugged, and we intend to be on the air sixteen hours a day, seven days a week."

By small market station standards, WVOI was heavily staffed. That is to say, there were more bodies in the building than the typical start-up's husband and wife owner/operator who handled on-air, sales, engineering, janitorial duties, and oversaw several minimum wage part-timers. Those experienced in running this brand of radio understand that most any employee who is not out on the street successfully selling advertising is racking up wage costs, as well as payroll tax liabilities. Financial problems developed and grew. In the middle of an October, 1975, day, the announcer on duty was told by the worried investors to tactfully indicate that WVOI would be leaving the air, turn off the transmitter, and the lock the door on his way out.

A businessperson interviewed in the local paper regarding the station closure, said his feeling was that "WVOI and its people tried very hard, but they didn't have a lot of radio experience and they were certainly undercapitalized." Making matters worse, in April, 1975, the FCC approved an allocation shift that moved WVOI's 95.9-MHz spot to Marshfield, Massachusetts (a Boston suburb), and required WVOI to re-tool to 92.7 megs. To no avail, the Wasque Corp. paid its Washington attorney to fight the mandate. WVOI then had to decide whether it would make the change immediately or wait the year or so until the Marshfield outlet (WATD, which denoted its locale near a landfill: We're At The Dump) went on the air. Either way the island station was faced with re-educating listeners and advertisers about where to tune. When the plug was pulled, WVOI hadn't dealt with the imminent relocation.

While I later met a good number of local people who had favorable recollections of WVOI, program logs pulled from a station trash basket were painfully shy of advertisers. One exception was a nicely crowded sponsor roster for a January 28, 1975, high school basketball game broadcast. Had WVOI been a more modest owner/operator situation built with used equipment and housed in a rented room, however, even the revenue from the skimpier ad sheets might have kept it afloat through the crucial "probationary" period.

HARRIS-INTERTYPE CORPORATION

GATES DIVISION 123 HAMPSHIRE STREET QUINCY ILLINOIS 62301 217 222-8200

INVOICE NO 49871
INVOICE DATE JUNE 4 197

RH-21874 | 04174 | MTR FRT -[illegible] MCLEAN | XX | XX | CONTRACT

SOLD TO
WASQUE CORP
EDGARTOWN RD
TISBURY MA 02568

1 14 22031 16053 4 22

SHIP TO
WASQUE CORP.
% BAXTER TRANSPORT
345 WEST 1ST STREET
BOSTON, MASS.
UPON ARRIVAL CALL 617-268-5400
FOR INSTRUCTIONS.

This copy of your invoice should be returned with any remittance. This expedite handling and assure us that we have credited the proper accou Thank

| PRODUCT NUMBER | ITEM NO | QUAN | PRODUCT DESCRIPTION | U/M | COST | UNIT PRICE | AMOUNT |
|---|---|---|---|---|---|---|---|
| F 994-6871-001 | 1 | 1 | XMTR FM2 5H3 60HZ 95.9 MHZ TRANSMITTER TO OPERATE AT 2.20 K WATTS. CONTRACT SERIAL NO. 160531 | EA | 32 | 11500.00 | 11500.00 |
| 990-0587-001 | 2 | 1 | TUBE KIT 100PC FM2H | EA | 57 | 218.00 | 218.00 |
| 990-0649-001 | 3 | 1 | TK 649 100 SPARE XI | EA | 59 | 127.00 | 127.00 |
| 990-0750-001 | 4 | 1 | 100 PCT SPARE IC | EA | 59 | 86.00 | 86.00 |
| 990-0562-001 | 8 | 1 | TK562 100PCT XISTOR | EA | 59 | 11.00 | 11.00 |
| 990-0580-001 | 9 | 1 | 100 DIODE KIT | EA | 59 | 2.46 | 2.46 |
| 731-0004-000 | 13 | 1 | RECEIVER NO 1 AIR AL | EA | 54 | 199.95 | 199.95 |
| 732-0223-000 | 14 | 1 | ERASER BULK TD1A | EA | 54 | 51.00 | 51.00 |
| 994-6435-001 | 18 | 1 | POWER SUPPLY | EA | 45 | 75.00 | 75.00 |

SALES TAX
TRANSPORTATION
INVOICE AMOUNT 12,270.41

SIGNED TITLE

*How much is that transmitter in the studio window? Here's the original invoice for the WVOI "box" and related spare equipment. Grand total: $12,270.41.*

WVOI (FM)
Tisbury, Massachusetts

DAILY PROGRAM LOG

PROGRAM TYPE
- Agricultural
- Entertainment
- Instructional
- News
- Public Affairs
- Religious
- Sports
- Other

EDIT - Editorials
POL - Political
ED - Educational

PROGRAM SOURCE
L - Local (Live or Tape)
NET - Network (ABC, CBS, MBS, NBC)
REC - Recorded (Non-Local)

ANNOUNCE TYPE
CM - Commercial Matter
PSA - Public Service
MRA - Mechanical Reproduction

PAGE 1
DAY Wednesday
DATE 12/4/74
TIME

| Station ID Time | PROGRAM TIME Begin | End | PROGRAM TITLE-SPONSOR | Announcement Time | Type | PROGRAM Source | Type |
|---|---|---|---|---|---|---|---|
| | 5:58:30 | 6:00:00 | SIGN ON | | | | |
| | 6:00:00 | 6:05:15 | WEATHER AND NEWS | | | L | N |
| 6:05:15 | 6:05:20 | 6:29:20 | ISLAND COUNTRY | | | L | E |
| :20:20 | | | | | | | |
| 6:29:20 | 6:29:20 | 6:33:00 | WEATHER AND NEWS | | | L | N |
| | 6:33:00 | 6:34:30 | ISLAND CALENDAR | | | L | PA |
| | 6:34:30 | 7:01:55 | ISLAND COUNTRY | | | L | E |
| | | | M.V. NATIONAL BANK (NDW) | 6:45:20 | CM | | |
| 6:47:20 | | | COLOMBO YOGURT/AVERILL MILK | 6:46:15 | CM | | |
| 7:01:55 | 7:09:00 | 7:08:20 | WEATHER AND NEWS | | | L | N |
| | 7:08:20 | 7:31:50 | ISLAND COUNTRY | | | L | E |
| 7:14:55 | | | ALBERT G. BROCK-INSURANCE | 7:15:25 | CM | | |
| | | | WOODS HOLE, MARTHA'S VINEYARD & NANTUCKET STEAMSHIP AUTHORITY | 7:15:55 | CM | | |

Operator or Announcer [illegible] Off | On | Operator or Announcer | Off

*On most local radio stations in the 1970s, Wednesday mornings in December were usually pretty filled with lucrative commercial advertising. This log for 12/4/74 from 6 to 8 a.m. "drivetime" though, shows only four "paying" spots.*

My brush with WVOI occurred in the summer of 1977 when I took my wife to Nantucket for what was supposed to be a romantic getaway. During the 30-mile boat ride out there, she got me to admit that the island's vacant FM channel allotment was a primary reason for the excursion. We spent much of the time deciphering ways a newly married couple with little money could establish a radio station in a strictly zoned and venerable venue like historic Nantucket. For one reason or another, though, the two of us just didn't feel comfortable about being so far from the mainland.

Anyway, at breakfast, we happened to get chatting with the B & B owner about our thoughts of starting a station. It was she who suggested it might be easier to buy the out-of-business FM on Martha's Vineyard, which was much closer to Cape Cod. Like Shannon's father, I'd been curious about the absence of WVOI's signal, but I didn't put two and two together until the Bed & Breakfast proprietor filled me in on the station's problems. "Read in the paper," she recalled, "that they recently declared bankruptcy and that the FCC cancelled their license. Tower's got to come down, too."

## A Letter To Washington

As soon as we got back to New London, I fired off a letter to the FCC in order to find out the status of the Martha's Vineyard allocation. The Commission replied that 92.7 MHz was indeed open for anyone to apply. In retrospect, that's what I should have done immediately, proposing a couple hundred watts from the roof of some downtown building. That might have netted me the CP [Construction Permit] which could be upgraded to the then full 3 kW of Class "A" power. It would have also made moot the quagmire of attempting to acquire the WVOI house and tower. Instead, though, my wife and I followed a more traditional path. We took a few personal days, withdrew some money from our modest savings account for ferry tickets, as well as lodging on the Vineyard. By the following Friday, we made the first of many trips there to convince mortgagor, Edgartown National Bank, that they should sell the WVOI facility to us, mainly because we loved radio and were real nice folks.

## Readying The Application And Thinking About A Format

Meanwhile, using the original WVOI coordinates, I prepared our FCC (Form 301) construction permit application. Another, specifying 100 watts on the vacant Nantucket channel was also readied, but never submitted. A minimum-specs FM facility out there seemed like a neat way to simulcast the Vineyard "mother" outlet. Programming could be separate for local sports coverage or a Nantucket-only DJ show. With each island station proposing low power, the "city grade" signals didn't overlap, so it would pass muster under the old "duopoly" regulations.

The nice, new Gates/Harris gear that had wafted the short-lived island FM to its audience had since been hauled back to the Harris plant in Quincy, Illinois, and sold off item by item. Calls to equipment dealers resulted in the second-string brand (but certainly worthy) Wilkinson Electronics offering a 500-watt transmitter just within my budget. Combined with an economy four-bay FM antenna, my "on paper" Vineyard station was to generate a little more than 900 watts of effec-

## WVOI's Owners File Bankruptcy

Wasque Corporation of Tisbury, the group of 13 stockholders which began, ran and then closed the Island's only FM radio station after 15 months of broadcasting has filed for bankruptcy in Boston. The first meeting of creditors of the corporation will be held in Taunton superior court April 28.

The corporation of businessmen and broadcasters from the Vineyard, Nantucket and the mainland lost rights to sell the station last year. The Federal Communications Commission (FCC) withdrew the station's call letters — WVOI — and the corporation's control over the 96.9 FM frequency which remains licensed in Tisbury.

David Dunham, a stockholder who acted as the station's chief engineer during its short life, said this week he is bitterly disappointed with the radio's financial collapse.

"I feel very bad that it didn't work out. I am more than upset about this, and I felt things could have gone better," he said.

Mr. Dunham and his wife Marty were unable to secure a buyer for the station while Wasque Corporation retained selling rights. He said a stockholder's motion to file bankruptcy was defeated before the station left the air in October, 1975. "Then there was still hope of resurrection," he said. "A number of buyers came along and one firm buyer, David Facey." Mr. Facey of Wayland, did not consummate negotiations with the corporation in late 1976.

The stockholder says he remains hopeful that the Vineyard will someday have a viable radio station. According to

*To Page Two*

tive radiated power. Estimated coverage probably wouldn't match WVOI's in terms of blanketing Cape Cod and Nantucket, but it would satisfy even the cheapest FM radios on Martha's Vineyard. A local, single-island station is all we were aiming for initially.

Neither my wife nor I were huge country music fans, so we doubted a strong C&W format on our hoped-for version of WVOI would prove very believable with listeners. Additionally, both of us readily admitted not being too savvy in the classical music (WVOI's night fare) avenue either. As a compromise, we readied a record library of pop and country crossover hits from the 1940s through the then-current late 1970s. The watchwords were "humable melodies." Selections would range from Pee Wee King's "Slowpoke" to "The Year of the Cat" by Al Stewart.

Personality was to be interjected during the broadcast day. I'd recently won *Billboard* magazine's Air-Personality of the Year (1976) award, so felt competent in the disc jockey arena. Conversation would be limited to station IDs and weather forecasts, though, when classical music (a holdover from the original WVOI schedule) was slated until sign-off at 10 p.m. We pictured ourselves unwinding each evening on a couch in the station lobby, adding up the advertisers checks, reading listener mail, and enjoying the sounds of Beethoven emanating through the monitor speaker. Note that the studio speaker was described as a singular unit. We figured to keep things simple for a while by running our FM signal in the basic monophonic mode. So much for our big ideas for resurrecting that small station.

## Best Laid Plans

Hunn also told me that a Vineyard resident, who read in the local paper of their dream to restart a station there, befriended him and his wife and kept them posted on what was circulating in the rumor mill. This helpful woman also had connections with the bank that held the WVOI property mortgage. Even some well-placed "good words," however, couldn't convince the institution to accept Hunn's offer over that of four well-to-do summer people whose attorney showed up in front of the studio/transmitter house to make the high bid.

Hunn recalls that, after lots of legwork, ferry trips back and forth, meetings with community leaders, bankers, and the ordinary gentry, the dream evaporated at the close of the brief foreclosure auction. He and his wife were on the verge of tears, watching the bank representative and the buyers' lawyer drive out of the WVOI dirt parking lot. "There we were," he reflected, "with our unsuccessful bid—a cashier's check for $53,000—which we'd put together from about five soon-to-be-disappointed relatives. We took one last look at the WVOI building and tower, bravely smiled at each other and declared, 'oh well,' and then silently headed back to the boat for Cape Cod."

## Epilogue

The successful bidding group (including John Daly, host of the old TV show *What's My Line*) had their agents re-stock the WVOI studio/transmitter facility. The original station's calls had since been taken by an AM in Toledo, Ohio, so the new version adopted WMVY for Martha's Vineyard. Another change over the first incarnation was the FCC-mandated switch (from 95.9 MHz.) to the 92.7 meg mark. WMVY-FM hit the air on June 1, 1981.

By then, Hunn and his wife were getting ready for a move to Port Henry, New York, a tiny Adirondack village overlooking Lake Champlain. There, using many of the lessons learned from the WVOI experience, they built their WHRC-FM. At 92.1 MHz, and even with a modest 818 watts, it put a decent signal into Burlington, Vermont. As they planned to do on the Vineyard, the couple economized so as to be able to afford the station by saving on rent elsewhere and living in its 20-by-24 foot studio/transmitter building. My dad regrets never having visited that unique broadcast house arrangement, but will no doubt convince me to cover it in a future edition.

## Punch-Drunk Employee?

Next time, one of our featured station histories will focus on a long-gone New Jersey daytimer, where an over-stressed engineer almost knocked out the young minister reverently broadcasting the sign-off prayer!

And so ends another day of broadcast history at *Pop'Comm...* ■

# the propagation corner

by Tomas Hood, NW7US,
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*up-to-the-minute forecasts helping you get the most from the radio spectrum*

## Great DX Thanks To Sporadic-E Propagation

In the May 2004 "Propagation Corner," I promised to look closer at working sporadic-*E* (*Es*) on VHF, UHF, and the upper HF spectrum in the June issue. Instead, I delved into tropospheric propagation. Tropospheric propagation is a reasonably well-known mode of VHF propagation, as is the "skip" that can occur during solar cycle maximum years. *Es* propagation is not as commonly known. It can affect higher frequencies than typical *F*-layer skip, up to and including TV Channel 13, and occurs most frequently during late spring and early summer. *Es* propagation does not typically last very long, but the openings can be quite strong.

Earth's atmosphere is a mixture of gases held to the surface of the Earth by gravity. These gases vary in density and composition as the altitude increases above the surface. As the atmosphere extends outward from Earth, it becomes thinner and blends with particles of interplanetary space. The first sixty miles of Earth's atmosphere consists of a homogeneous mixture of various gases. This region is called the homosphere. Above the homosphere lies the heterosphere, where the gases are no longer uniformly mixed. Relatively more of the heavy gas molecules, such as molecular nitrogen ($N_2$) and molecular oxygen ($O_2$), are found near the bottom of this region, and relatively more of the lighter gases, such as hydrogen and helium, are found hear the top.

### The Earth's Atmosphere

The atmosphere is also divided into four regions according to temperature trends: the troposphere, stratosphere, mesosphere, and thermosphere (see **Figure 1**). The lowest region is the troposphere, which extends from the Earth's surface up to about six miles. The gases in this region are heavier than those in higher altitudes and include $O_2$ and $N_2$. The highest mountains are within this region, as is the high altitude jet stream.

### 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) mean stormy conditions with an active geomagnetic field. The more active, the more unstable propagation is, with possible periods of total propagation fade-out. Especially around the higher latitudes and especially at the Polar Regions, where the geomagnetic field is weak, propagation may disappear completely. Extreme high indices may result in aurora propagation, with strongly degraded long distance propagation at all latitudes. Low indices result in relatively good propagation, especially noticeable around the higher latitudes, when transpolar paths may open up. Maximum K-index is 9, and the A-index can exceed well over 100 during very severe storm conditions, with no maximum.

Classification of A-indices is as follows:

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

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

**Ionosphere:** A collection of ionized particles and electrons in the uppermost portion of the Earth's atmosphere, which is formed by the interaction of the solar wind with the very thin air particles that have escaped Earth's gravity. These ions are responsible for the reflection or bending of radio waves occurring between certain critical frequencies, with these critical frequencies varying with the degree of ionization. As a result, radio waves having frequencies higher than the Lowest Usable Frequency (LUF) but lower than the Maximum Usable Frequency (MUF) are propagated over large distances.

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

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

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

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

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

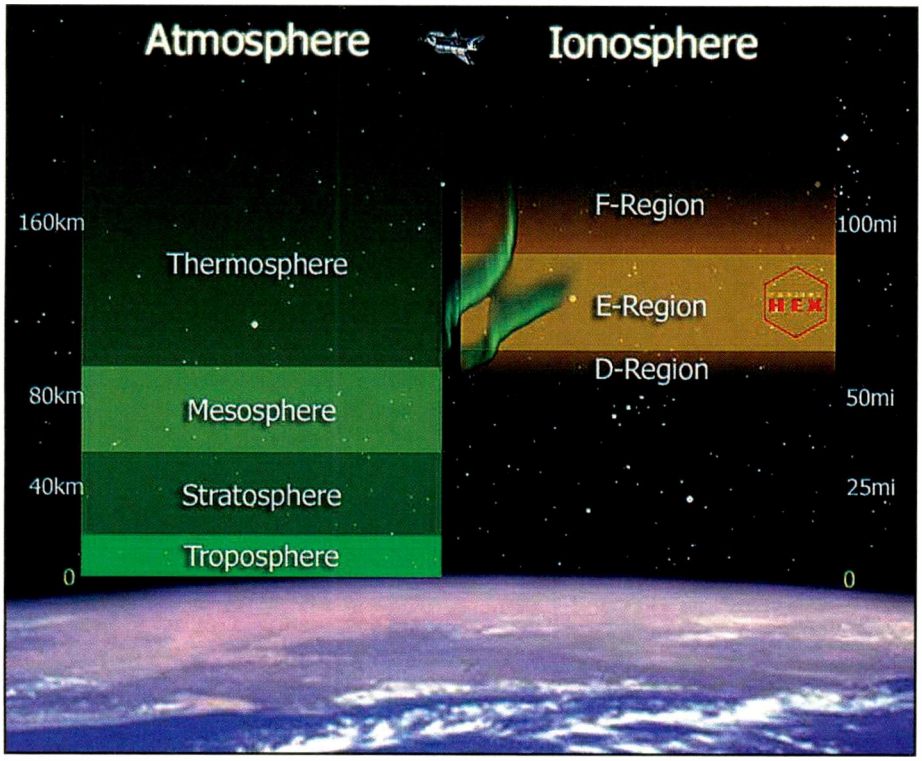


*Figure 1. The layers of our atmosphere and ionosphere. (Courtesy of Project HEX, Horizontal E-region eXperiment, http://www.uaf.edu/asgp/hex/)*

Weather is confined to this lower region, which also contains 90 percent of the Earth's atmosphere and 99 percent of the water vapor.

The atmosphere above the troposphere is called the stratosphere, which starts at about six miles out. Gas composition changes slightly as the altitude increases and the air thins. Incoming solar radiation at wavelengths below 240 nanometers creates ozone, a molecule of oxygen consisting of three oxygen atoms ($O_3$), in this layer. This gas reaches a peak density of a few parts per million at an altitude of about 16 miles.

## Inside The Ionosphere

At altitudes above 50 miles, the gas is so thin that free electrons can exist for short periods of time before being "captured" by a nearby positive ion. The existence of charged particles at this altitude and above marks the beginning of the ionosphere, a region having the properties of a gas and of plasma.

Atoms in the ionosphere absorb the incoming solar radiation, causing them to become highly excited. When an atom becomes energized, an electron may break away from its orbit, producing free electrons and positively charged ions. At the highest levels of the Earth's outer atmosphere, solar radiation is very strong but there are few atoms to interact with, so ionization is small. As the altitude decreases, more gas atoms are present so the ionization process increases. At the same time, however, an opposing process called recombination begins to take place in which a free electron is captured by a positive ion if it moves close enough to it. As the gas density increases at lower altitudes, the recombination process accelerates since the gas molecules and ions are closer together.

Because the composition of the atmosphere changes with height, the ion production rate also changes, which leads to the formation of several distinct ionization regions, known as the *D*, *E*, and *F* regions. The breakdown between regions is based on which wavelengths of solar radiation are absorbed in that region most frequently.

The *D* region is the lowest in altitude, though it absorbs the most energetic radiation, known as hard x-rays. The *D* region doesn't have a definite starting and stopping point, but includes the ionization that occurs below about 56 miles. This region absorbs high frequency (HF) waves between 3 and 30 megahertz or wavelengths between 100 meters and 10 meters. It refracts very low frequencies (VLF), in the range of 3 to 30 kilohertz. The *D* region is a daytime layer due to the density of the gases. Absorption of ultra-violet and visible light radiation creates more negative ions than electrons during the day. At night these ions quickly recombine with other ionic particles, allowing distant AM radio reception to occur.

The *F* region is the largest part of the ionosphere, as well as the highest, and is the primary refractor of HF, or shortwave, frequencies. It extends from about 65 miles up through the end of our atmosphere. Since particle densities decrease as you travel away from Earth, it is difficult to say exactly where our atmosphere ends. Since it is such a large region, the *F* layer is divided into two main sections: the daytime layer, $F_1$, and the denser $F_2$ layer, which exists both during the day and night. Recently, a third layer, $F_3$, has been identified, but more research needs to be done to understand its characteristics.

The *F* region "reflectivity" is directly influenced by solar activity. During years of peak solar activity, the *F* region will have a much higher ionization density, allowing for higher frequencies and sharper angles of waves to be reflected. TV DXers and 6-meter amateur radio operators look forward to solar cycle peaks, as those years are when the *F* region can bring distant DX on frequencies of up to 50 or 60 MHz.

In between the *D* and *F* regions lies the *E* region of the ionosphere, which extends from about 56 miles to about 65 miles. The region's height varies and, along with electron (ionization) density, depends on solar zenith angle and solar activity. During daylight hours, electron density (a measure of the ionization level) increases, while at night, when the supply of x-rays from the sun is cut off, ionization levels drop.

Occasionally very thin regions of extremely dense ionization can form within the *E* layer. These regions can apparently be caused by several mechanisms and have a wide variety of characteristics. At times, these thin regions form into dense clouds, or patches, which are capable of reflecting radio waves of frequencies much higher than those reflected by the regular *E* or *F* layers. At times these clouds make it possible to communicate over relatively long distances on frequencies as high as 220 MHz. These clouds usually cover a rather small geographical region, approximately 50 to 100 miles in diameter. They occur more or less at random and are relatively short lived, usually disappearing with-

## Optimum Working Frequencies (MHz) - For July 2004 - Flux = 90, SSN = 33 - Created by NW7US

| UTC<br>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 |
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| CARIBBEAN | 23 | 23 | 22 | 22 | 20 | 19 | 17 | 16 | 14 | 13 | 13 | 12 | 12 | 14 | 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 | 17 | 20 | 22 | 24 | 25 | 27 | 28 | 29 | 29 | 30 | 30 |
| CENTRAL SOUTH AMERICA | 28 | 26 | 24 | 22 | 20 | 19 | 17 | 16 | 15 | 15 | 14 | 17 | 17 | 19 | 21 | 23 | 25 | 27 | 28 | 29 | 30 | 30 | 31 | 30 |
| SOUTHERN SOUTH AMERICA | 24 | 18 | 16 | 15 | 15 | 14 | 14 | 13 | 13 | 13 | 12 | 12 | 12 | 16 | 19 | 21 | 23 | 25 | 26 | 27 | 28 | 29 | 29 | 27 |
| WESTERN EUROPE | 13 | 12 | 11 | 11 | 10 | 10 | 14 | 13 | 12 | 11 | 11 | 13 | 16 | 18 | 19 | 20 | 20 | 21 | 21 | 20 | 20 | 19 | 18 | 16 |
| EASTERN EUROPE | 10 | 9 | 9 | 9 | 13 | 16 | 14 | 13 | 12 | 11 | 11 | 10 | 14 | 17 | 18 | 19 | 20 | 20 | 19 | 18 | 17 | 15 | 11 | 10 |
| EASTERN NORTH AMERICA | 27 | 26 | 26 | 26 | 25 | 24 | 22 | 20 | 18 | 17 | 16 | 15 | 16 | 19 | 20 | 22 | 23 | 24 | 25 | 26 | 26 | 26 | 27 | 27 |
| CENTRAL NORTH AMERICA | 15 | 15 | 15 | 14 | 14 | 14 | 13 | 12 | 11 | 10 | 9 | 9 | 9 | 10 | 11 | 12 | 12 | 13 | 14 | 14 | 14 | 15 | 15 | 15 |
| WESTERN NORTH AMERICA | 8 | 8 | 8 | 8 | 8 | 7 | 7 | 7 | 6 | 6 | 5 | 5 | 4 | 4 | 5 | 6 | 6 | 7 | 7 | 7 | 7 | 8 | 8 | 8 |
| SOUTHERN NORTH AMERICA | 24 | 24 | 24 | 24 | 23 | 23 | 21 | 19 | 17 | 16 | 15 | 14 | 13 | 14 | 16 | 18 | 19 | 20 | 21 | 22 | 23 | 23 | 24 | 24 |
| NORTHERN AFRICA | 17 | 16 | 15 | 14 | 13 | 13 | 14 | 14 | 13 | 12 | 11 | 14 | 16 | 18 | 19 | 20 | 21 | 21 | 21 | 22 | 21 | 21 | 20 | 19 |
| CENTRAL AFRICA | 18 | 17 | 16 | 15 | 14 | 15 | 14 | 13 | 12 | 12 | 11 | 13 | 16 | 18 | 19 | 20 | 21 | 21 | 21 | 22 | 22 | 22 | 22 | 20 |
| SOUTH AFRICA | 16 | 15 | 14 | 14 | 13 | 13 | 14 | 19 | 17 | 16 | 16 | 17 | 19 | 20 | 22 | 23 | 24 | 24 | 25 | 23 | 21 | 19 | 18 | 17 |
| MIDDLE EAST | 15 | 13 | 13 | 14 | 16 | 17 | 14 | 13 | 12 | 11 | 11 | 10 | 15 | 17 | 18 | 19 | 20 | 21 | 21 | 21 | 20 | 19 | 17 | 16 |
| JAPAN | 20 | 21 | 21 | 21 | 21 | 21 | 20 | 20 | 19 | 18 | 17 | 15 | 14 | 14 | 14 | 15 | 14 | 13 | 13 | 15 | 16 | 18 | 19 | 20 |
| CENTRAL ASIA | 21 | 22 | 22 | 21 | 21 | 21 | 20 | 20 | 19 | 18 | 16 | 15 | 14 | 13 | 14 | 16 | 18 | 17 | 16 | 15 | 14 | 15 | 18 | 19 |
| INDIA | 18 | 19 | 19 | 19 | 19 | 18 | 16 | 14 | 12 | 11 | 11 | 10 | 10 | 10 | 10 | 9 | 9 | 9 | 9 | 11 | 14 | 16 | 17 | 18 |
| THAILAND | 18 | 19 | 21 | 21 | 21 | 20 | 20 | 19 | 18 | 16 | 15 | 14 | 13 | 12 | 14 | 16 | 18 | 18 | 17 | 16 | 15 | 14 | 14 | 15 |
| AUSTRALIA | 30 | 31 | 31 | 31 | 31 | 31 | 30 | 30 | 27 | 24 | 22 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 14 | 13 | 16 | 22 | 26 | 28 |
| CHINA | 19 | 20 | 21 | 21 | 21 | 20 | 19 | 18 | 17 | 15 | 14 | 13 | 12 | 11 | 14 | 16 | 16 | 15 | 14 | 14 | 15 | 16 | 18 | 19 |
| SOUTH PACIFIC | 30 | 31 | 31 | 30 | 29 | 27 | 24 | 19 | 16 | 15 | 14 | 14 | 13 | 13 | 13 | 13 | 12 | 12 | 12 | 21 | 25 | 28 | 29 | 30 |

| UTC<br>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 |
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| CARIBBEAN | 26 | 26 | 25 | 25 | 23 | 21 | 19 | 17 | 16 | 15 | 14 | 14 | 15 | 17 | 19 | 20 | 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 | 22 | 24 | 25 | 26 | 26 | 27 | 27 | 27 |
| CENTRAL SOUTH AMERICA | 29 | 26 | 24 | 22 | 20 | 19 | 17 | 16 | 15 | 15 | 14 | 16 | 18 | 20 | 22 | 24 | 26 | 27 | 28 | 29 | 30 | 30 | 30 | 30 |
| SOUTHERN SOUTH AMERICA | 24 | 18 | 17 | 16 | 15 | 14 | 14 | 13 | 13 | 13 | 13 | 12 | 13 | 18 | 21 | 23 | 24 | 26 | 27 | 28 | 29 | 29 | 29 | 27 |
| WESTERN EUROPE | 16 | 14 | 13 | 12 | 11 | 11 | 14 | 13 | 12 | 13 | 15 | 17 | 18 | 19 | 20 | 20 | 21 | 21 | 21 | 21 | 20 | 20 | 19 | 18 |
| EASTERN EUROPE | 10 | 10 | 9 | 9 | 9 | 14 | 14 | 13 | 12 | 11 | 14 | 16 | 18 | 19 | 20 | 20 | 21 | 20 | 20 | 19 | 18 | 17 | 15 | 11 |
| EASTERN NORTH AMERICA | 19 | 19 | 19 | 18 | 18 | 16 | 15 | 14 | 12 | 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 | 13 | 12 | 11 | 10 | 9 | 9 | 9 | 9 | 11 | 12 | 12 | 13 | 14 | 14 | 14 | 15 | 15 | 15 |
| SOUTHERN NORTH AMERICA | 17 | 17 | 17 | 16 | 16 | 15 | 14 | 13 | 11 | 11 | 10 | 9 | 9 | 10 | 12 | 13 | 14 | 15 | 15 | 16 | 16 | 16 | 17 | 17 |
| NORTHERN AFRICA | 21 | 20 | 18 | 17 | 16 | 15 | 16 | 14 | 14 | 14 | 16 | 17 | 18 | 19 | 20 | 20 | 21 | 21 | 21 | 22 | 22 | 22 | 22 | 21 |
| CENTRAL AFRICA | 19 | 17 | 16 | 15 | 14 | 14 | 16 | 15 | 15 | 15 | 16 | 17 | 18 | 19 | 20 | 20 | 21 | 21 | 21 | 21 | 21 | 21 | 21 | 20 |
| SOUTH AFRICA | 15 | 15 | 14 | 14 | 13 | 13 | 13 | 21 | 19 | 18 | 17 | 19 | 22 | 24 | 25 | 27 | 28 | 29 | 27 | 23 | 20 | 19 | 17 | 16 |
| MIDDLE EAST | 15 | 14 | 13 | 13 | 14 | 16 | 14 | 13 | 12 | 12 | 15 | 17 | 18 | 19 | 20 | 21 | 21 | 21 | 21 | 21 | 20 | 20 | 18 | 16 |
| JAPAN | 20 | 21 | 21 | 21 | 20 | 20 | 19 | 18 | 16 | 15 | 14 | 13 | 14 | 16 | 17 | 15 | 14 | 14 | 14 | 15 | 17 | 18 | 19 | 20 |
| CENTRAL ASIA | 21 | 21 | 21 | 21 | 20 | 19 | 18 | 17 | 15 | 14 | 13 | 12 | 13 | 16 | 17 | 19 | 19 | 18 | 16 | 15 | 15 | 15 | 18 | 19 |
| INDIA | 13 | 15 | 16 | 17 | 18 | 16 | 14 | 13 | 12 | 11 | 11 | 14 | 16 | 18 | 17 | 16 | 15 | 13 | 10 | 10 | 9 | 9 | 9 | 9 |
| THAILAND | 17 | 19 | 21 | 20 | 19 | 18 | 17 | 15 | 14 | 13 | 12 | 11 | 14 | 16 | 18 | 19 | 20 | 19 | 17 | 16 | 15 | 14 | 14 | 15 |
| AUSTRALIA | 30 | 31 | 31 | 31 | 31 | 30 | 29 | 27 | 25 | 22 | 21 | 19 | 18 | 17 | 16 | 15 | 14 | 14 | 13 | 13 | 17 | 23 | 27 | 29 |
| CHINA | 19 | 20 | 20 | 20 | 19 | 18 | 17 | 15 | 14 | 13 | 12 | 11 | 14 | 16 | 18 | 18 | 17 | 15 | 14 | 14 | 15 | 16 | 18 | 19 |
| SOUTH PACIFIC | 30 | 31 | 30 | 29 | 28 | 26 | 23 | 16 | 15 | 15 | 14 | 14 | 13 | 13 | 13 | 12 | 12 | 12 | 12 | 22 | 26 | 28 | 29 | 30 |

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| CARIBBEAN | 21 | 21 | 20 | 19 | 17 | 16 | 14 | 13 | 12 | 12 | 11 | 11 | 13 | 14 | 16 | 17 | 18 | 19 | 19 | 20 | 20 | 21 | 21 | 21 |
| NORTHERN SOUTH AMERICA | 24 | 24 | 23 | 21 | 19 | 17 | 16 | 15 | 14 | 13 | 12 | 12 | 14 | 16 | 18 | 19 | 20 | 21 | 22 | 23 | 23 | 24 | 24 | 24 |
| CENTRAL SOUTH AMERICA | 28 | 26 | 23 | 21 | 20 | 18 | 17 | 16 | 15 | 14 | 14 | 16 | 19 | 21 | 23 | 25 | 26 | 27 | 28 | 29 | 29 | 30 | 30 | 30 |
| SOUTHERN SOUTH AMERICA | 22 | 18 | 17 | 16 | 15 | 14 | 14 | 13 | 13 | 13 | 12 | 12 | 18 | 20 | 22 | 24 | 26 | 27 | 28 | 29 | 29 | 30 | 28 | 26 |
| WESTERN EUROPE | 17 | 16 | 15 | 13 | 12 | 12 | 13 | 13 | 13 | 14 | 16 | 17 | 18 | 18 | 19 | 20 | 20 | 20 | 20 | 20 | 20 | 19 | 19 | 18 |
| EASTERN EUROPE | 12 | 11 | 11 | 10 | 10 | 14 | 15 | 15 | 15 | 16 | 17 | 18 | 19 | 19 | 20 | 20 | 20 | 21 | 20 | 20 | 19 | 18 | 16 | 13 |
| EASTERN NORTH AMERICA | 9 | 9 | 9 | 9 | 8 | 7 | 6 | 6 | 5 | 5 | 5 | 5 | 6 | 7 | 7 | 8 | 8 | 8 | 9 | 9 | 9 | 9 | 9 | 9 |
| CENTRAL NORTH AMERICA | 20 | 20 | 20 | 19 | 19 | 17 | 15 | 14 | 13 | 12 | 11 | 11 | 13 | 15 | 16 | 17 | 18 | 18 | 19 | 19 | 20 | 20 | 20 | 20 |
| WESTERN NORTH AMERICA | 27 | 27 | 26 | 26 | 25 | 24 | 22 | 20 | 18 | 17 | 16 | 15 | 16 | 18 | 20 | 22 | 23 | 24 | 25 | 26 | 26 | 27 | 27 | 27 |
| SOUTHERN NORTH AMERICA | 21 | 21 | 20 | 20 | 19 | 17 | 16 | 14 | 13 | 12 | 12 | 11 | 12 | 14 | 15 | 17 | 18 | 18 | 19 | 20 | 20 | 20 | 21 | 21 |
| NORTHERN AFRICA | 22 | 20 | 18 | 17 | 15 | 15 | 15 | 16 | 15 | 16 | 18 | 20 | 22 | 23 | 24 | 25 | 25 | 26 | 26 | 26 | 26 | 26 | 25 | 24 |
| CENTRAL AFRICA | 19 | 17 | 16 | 15 | 14 | 14 | 15 | 16 | 15 | 16 | 18 | 20 | 22 | 23 | 24 | 25 | 25 | 26 | 26 | 26 | 25 | 24 | 22 | 20 |
| SOUTH AFRICA | 15 | 15 | 14 | 14 | 13 | 13 | 13 | 18 | 17 | 16 | 17 | 20 | 22 | 24 | 25 | 27 | 28 | 29 | 26 | 23 | 20 | 18 | 17 | 16 |
| MIDDLE EAST | 19 | 17 | 16 | 15 | 15 | 15 | 14 | 13 | 13 | 14 | 16 | 17 | 19 | 20 | 20 | 21 | 21 | 22 | 22 | 22 | 22 | 22 | 22 | 20 |
| JAPAN | 20 | 21 | 20 | 20 | 19 | 18 | 17 | 15 | 14 | 14 | 15 | 16 | 17 | 18 | 17 | 16 | 14 | 14 | 14 | 16 | 17 | 18 | 19 | 20 |
| CENTRAL ASIA | 21 | 21 | 20 | 19 | 18 | 17 | 15 | 14 | 13 | 13 | 15 | 16 | 18 | 19 | 20 | 20 | 20 | 18 | 17 | 16 | 15 | 15 | 17 | 19 |
| INDIA | 9 | 9 | 9 | 9 | 14 | 15 | 14 | 13 | 13 | 14 | 16 | 18 | 19 | 20 | 20 | 20 | 19 | 19 | 18 | 17 | 15 | 12 | 10 | 10 |
| THAILAND | 16 | 18 | 19 | 18 | 17 | 15 | 14 | 13 | 12 | 14 | 16 | 17 | 19 | 19 | 20 | 21 | 21 | 20 | 18 | 17 | 16 | 15 | 14 | 14 |
| AUSTRALIA | 31 | 31 | 31 | 30 | 30 | 28 | 25 | 23 | 21 | 19 | 18 | 17 | 17 | 16 | 15 | 15 | 14 | 14 | 13 | 13 | 18 | 24 | 27 | 29 |
| CHINA | 19 | 20 | 20 | 19 | 18 | 16 | 15 | 13 | 13 | 13 | 15 | 17 | 18 | 19 | 19 | 18 | 16 | 15 | 14 | 13 | 13 | 15 | 17 | 18 |
| SOUTH PACIFIC | 30 | 30 | 29 | 28 | 27 | 25 | 21 | 16 | 15 | 14 | 14 | 13 | 13 | 13 | 13 | 12 | 12 | 12 | 12 | 23 | 26 | 28 | 29 | 30 |

in a few hours. *Es* is classically defined as transient, localized patches of relatively high electron density in the *E* region of the ionosphere, which significantly affect radio wave propagation. *Es* can occur during daytime or nighttime and varies markedly with latitude.

The shapes of the clouds are likely to be ragged, rather than true circles or ellipses. Clouds have been shown to have concave undersides in many instances, with tilts up to 10 degrees. The vertical thickness of these clouds has been measured by rocket flights through the *E* region and found to be usually quite small, no more than a few kilometers thick.

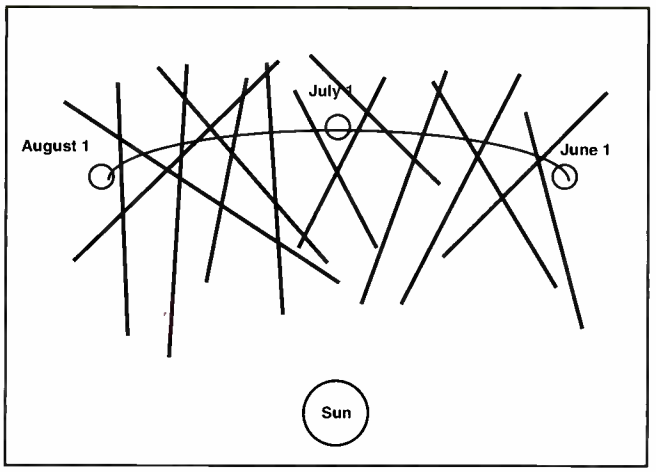



*Figure 2. Pictorial representation of cometary orbits intersecting the Earth's orbit during the June through August time-frame. (Image by G. Neil Spokes, Ph.D, from his paper, "Cometary Origin Of Sporadic-E," delivered at Annual Meeting Of The Society Of Amateur Radio Astronomers, Green Bank, West Virginia, July 15, 1996.)*

## What Happens At This Altitude

Very strong winds exist at the *E* region altitude. After the formation of an ionized cloud, these wind currents move the cloud. Over North America, these winds tend to move large *Es* cloud groups to the west or northwest. Of course, *Es* clouds may also move in any direction on occasion, especially north and south (and less likely to the east). The velocity of the clouds has been measured to be in the neighborhood of about 110 miles per hour, and higher velocities are thought to occur.

Reflection from *Es* clouds takes place with very little signal loss, resulting in exceptionally strong signal levels during most openings. Quite often it is possible to maintain communications considerably off the great circle path between two stations by means of back and side scatter from an *Es* cloud.

Using simple geometry we can approximate the single-hop propagation via an *Es* cloud. The theoretical maximum distance for a transmitted signal propagated after only one encounter with a cloud in the *Es* region is 2,100 kilometers. For the HF bands (below 30 MHz), this appears to be very accurate. However, many transmissions exceeding 2,350 kilometers have been observed in the very high frequency (VHF) bands. This may be due to a combination of other propagation modes (tropospheric and ground wave enhancements, and so forth) which adds distance to the theoretical maximum on both sides of the typical propagation model.

If two *Es* clouds exist within the signal path, the theoretical distance propagated by *Es* can be almost doubled, as long as the clouds are in line with both the transmitter and receiver. This "double-hop" propagation is fairly common during widespread occurrences of *Es*, especially below 70 MHz. Three or more clouds could potentially line up, providing low-loss propagation over even further distances. Of course, the likelihood that each of the clouds is of sufficient density and ionization, and are geometrically lined up, is pretty slim, especially if your interest is in higher frequencies.

*Es* propagation tends to occur in two peaks during the daylight hours centered on either side of noon. Its occurrence during the year seems to follow a similar trend, with the main peak in the late summer, and a second, but weaker, peak occurring in the winter. During the winter peak, *Es* is most common just after sunset. The summer daytime peak is in the morning between 7 a.m. and 12 p.m., local time. A secondary peak occurs between 8 and 10 p.m. However, observations over many decades show a slightly greater likelihood of *Es* in the morning than in the afternoon or evening. Despite the apparent greater chance of *Es* in the morning hours, however, this diurnal characteristic is much less noticeable in the day-to-day casual observation of DXers. In addition, check for *Es* after dark! I remember many summertime *Es* openings around midnight between Washington State and California on 10 meters. Many still remember an opening that occurred after midnight on June 19, 1992, that resulted in signal propagation of 144 MHz and higher.

A pattern of the occurrence of *Es* by some observers suggests that *Es* is correlated to the presence of an excess of meteor dust in the *E* layer, which is pushed into dense patches on the outside of jet stream wind eddies. This possibility is loosely supported by the repeated presence of *Es* above certain locations, such as is seen from the United Kingdom over Nantes in France, and to a lesser extent, over Denmark.

Several studies over the past 30 years have confirmed the presence in *Es* clouds of dense patches of meteoric comet dust. It is suggested that this dust is collected in jet stream eddies. This idea is further supported by looking at the seasonal nature of *Es* and how it coincides directly with those times of year when the Earth passes through the dense tracks of comet dust (see **Figure 2**).

## Sporadic-*E* Propagation And You

DX enthusiasts know that during the summer months, television channels between 45 and 108 MHz, and also FM radio stations between 88 and 108 MHz, are regularly propagated over long distances via *Es*. The first sign that an *Es* event is starting is the observation of "rolling" black bars across TV Channel 2 (or the appearance of signals on that channel if you have no local station on the channel). As the ionization level increases, Channels 3 through 6 and the FM band become filled with signals. During *Es* propagation, signals can abruptly appear or disappear and are usually very strong. Ordinary "rabbit ears" are adequate for *Es* reception, and are even preferred by some TV and FM DXers because they can be sharply directional.

Is it possible for *Es* to support the DXing of signals in the higher VHF frequency band, say, 175 to 226 MHz? Doubling the frequency reduces the probability to one tenth. This means that if you are receiving via *Es* a signal of 50 MHz, then a 100-MHz signal will be propagated one tenth of the time period of the 50-MHz signal. A 200-MHz signal will be propagated one hundredth of the time. Since many high maximum useable frequency (MUF) propagation paths are multi-cloud, the probability could be higher than these figures.

The MUF of a single cloud can be lower than the frequency propagated by a two-cloud path. In practice, it is difficult to predict a propagation path for the highest frequency. Unless the DXer and the transmitter are in precise relative positions, the DX station will not be heard.

Since *Es* reception above 138 MHz often involves high path losses, it is important that you use the highest gain and lowest noise receiving equipment possible. A directional Yagi antenna, with at least 8 dB of gain, mounted 1 to 20 feet above ground level, with low-loss matched coax cable, low-noise receiver, and a low-noise pre-amplifier are ideal for receiving weak signals.

## Typical Distances For Sporadic-*E* Communications On VHF?

What are the minimum, maximum, and typical ranges of distances propagated via *Es* for various VHF modes? How far can one realistically expect for single- and multi-hop *Es* modes?

With over a half-century of *Es* DX logs and observations, we now have a very large database of information that gives us a very good idea of the distances that are possible on the VHF band. This data is mainly obtained from VHF ham radio and TV DX enthusiasts.

One factor regarding the maximum distance propagated by *Es* is the height of the *Es* cloud. According to ionosonde (devices used to measure reflectivity of the ionosphere) data, *Es* usually occurs at around 56 miles of altitude. At this altitude the maximum possible single-hop distance is about 1,500 miles. The highest frequency reflected back to the surface of the Earth, the *Es* MUF, varies from 20 MHz to at least 220 MHz.

The main factors that set the minimum and maximum distance limits for *Es* DX reception are geometry of the Earth, *Es* cloud electron density, the number of *Es* clouds, and *Es* ionization height.

One method to identify your single-hop *Es* target area would be to obtain a great-circle map and draw two sets of boundary lines with a compass. For 45- to 108-MHz TV and FM, draw one at approximately 500 miles and one at 1,500 miles from your location. This would be your prime target area for single-hop *Es*. The same method can be applied to double-hop *Es*, with one boundary line drawn at 1,750 miles and another one at about 2,800 miles. A great-circle distance calculator is also useful for submitting longitude and latitude coordinates (see http://www.vwlowen.demon.co.uk/java/circle.htm for more information).

## Current Solar Cycle 23 Progress

The Royal Observatory of Belgium reports that the monthly mean observed sunspot number for March 2004 is 49, up from February 2004's 46. The 12-month running smoothed sunspot number centered on September 2003 is 60, the same as for August. The lowest daily sunspot value during March 2004 was recorded on March 4, with a count of 23. The highest daily sunspot count for March was 88 on March 27. A smoothed sunspot count of 32 is expected for July 2004.

The Dominion Radio Astrophysical Observatory at Penticton, BC, Canada, reports a 10.7-centimeter observed monthly mean solar flux of 112 for March 2004, up from 107 for February 2004. The 12-month smoothed 10.7-centimeter flux centered on September 2003 is 126, just down from August 2003, continuing the downward trend. The predicted smoothed 10.7-centimeter solar flux for July 2004 is about 90, give or take about 18 points.

The observed monthly mean planetary A-Index (Ap) for March 2004 is 12, down a point from February. The 12-month smoothed Ap index centered on September 2003 is 22, the same as for August. Expect the overall geomagnetic activity to be quiet to unsettled during most days in July.

## July HF Propagation

Solar activity is half of what it was last year. This results in lower MUFs for the same period than last year. Even so, expect fair openings into most areas of the world throughout the day on 22, 19, and 16 meters. Through the summer, you can expect propagation between north and south regions during the daylight hours. Nineteen and 16 meters will be the strong daytime bands, with 19 remaining a popular band throughout the year. Reception of stations located in tropical or equatorial areas may be possible well into the hours of darkness. For distances between 800 to several thousand miles, expect exceptionally strong signals. Multi-hop signals will be observed.

Twenty-five and 22 meters will remain open from just before sunrise to a few hours past sunset. From late afternoon to well into darkness, expect these bands to offer worldwide coverage.

Thirty-one meters is a year-round power band with outstanding domestic and international paths around the clock. During periods of low geomagnetic activity this summer, this band may offer long distance DX all through the night.

Forty-one and 49 meters offer domestic propagation during daylight hours and somewhat during the night. The tropical bands (60, 75, 90, and 120 meters) are not noticeably affected by the solar flux, but are degraded during geomagnetic storminess. Through the summer, expect these bands to be more challenging, though less this year than last year.

Overall, daytime bands will open just before daylight and last a few hours after dark. Look higher in frequency during the day, as these frequencies will be less affected by any solar storms occurring, and because more broadcasters have transmissions in these upper bands.

## VHF Conditions

The summertime *Es* season for the Northern Hemisphere will be quite active through July. Usually these *Es* openings are single-hop events with paths up to 1,500 miles, but July's *Es* events, like June's, are often double-hop. Look for HF openings on the higher frequencies, as well as on low VHF, throughout the day. Don't forget to check during the night hours, too.

## I'd Like To Hear From You!

Propagation is a fascinating aspect of our radio hobby, and I'm sure you've got questions and ideas for your column. Send a letter or e-mail me at pc-prop-man@hfradio.org. You can also 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, that I have put together for you at http://prop.hfradio.org/. I also provide a special resource for wireless devices at http://wap.hfradio.org/, the wireless version of my propagation site.

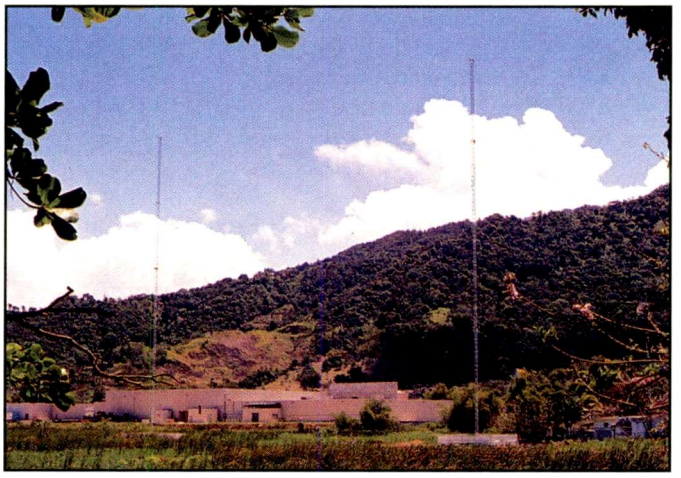
Till next month, 73 and good listening! ■

by Bruce Conti, baconti@aol.com

# Get Better DX With Phased Antennas

Do you ever wish you could just reach out into the ether and cancel out a broadcast signal that's overriding the one you want to hear? You can, and it's easier than you might think.

A typical single wire, dipole, or loop antenna is bidirectional, receiving from two directions at 180 degrees or opposite of each other, such as north-south or east-west. Phasing is an effective tool for unidirectional reception. The goal of phasing is to eliminate or greatly reduce signal strength from one of the two directions of normally bidirectional antennas. AM radio stations often use phased antenna arrays to produce a directional antenna pattern, the simplest using two antennas, resulting in a wide cardioid (heart-shaped) antenna pattern that favors one direction while canceling out the signal in the opposite direction. A similar concept is used by DXers for reception favoring a single direction.



*Radio station 840 WXEW Yabucoa, Puerto Rico, phases two antennas to create a cardioid antenna pattern beamed east.*

## Antenna Phase Relationship

Phasing in its simplest form only requires two antennas connected to a single receiver. Directional reception can be achieved by combining two antennas with different reception characteristics to take advantage of the natural phase relationship between each antenna.

Two loop antennas aimed in different directions, a loop and a long wire, vertical whips spaced at least one-quarter wavelength, or even two random wires can be combined to produce noticeably different reception. Experiment with two antennas. Tune in a frequency where more than one radio station or interference is received. Listen with only one antenna connected, then listen with only the other antenna, and finally try it with *both* antennas connected. If a difference is noted in each case, a level control (10-k to 100-k potentiometer) can be added to balance or vary the input from each antenna for better results. If little or no difference is found, then try adding a 180-degree phase reversal 1:1 RF transformer (MiniCircuits T1-6 or equivalent) in line with one of the antennas. The phase reversal transformer on one antenna will cause signals to be opposite that of the second antenna, and when combined will result in the cancellation of some signals to reveal others. You now have the makings of a basic antenna phasing unit.

## Two Antenna Phasing Units

There are two popular homebrew methods for antenna phasing: the passive tuned L-C tank, and the active broadband delay line designs.

The L-C tank method uses resonant tuning of each antenna to tweak the phase and amplitude of each signal and optimize 180-degree phase cancellation of an undesired signal through a phase reversal RF transformer. (An L-C tank is a band-pass filter circuit of capacitors and inductors.) Once the signals of each antenna are peaked for maximum efficiency, some detuning may be required to better line up the angular components of the signals. Thus the L-C tank phasing unit can be difficult to tune, requiring patience and practice. However, due to its resonant tuning, the passive tuned design tends to be less susceptible to overload where strong local signals are present.

The broadband delay line method is much easier to construct and use because it requires little fine tuning. Adjustable time delay circuits and a 180-degree phase reversal RF transformer allow for signals to be easily lined up and cancelled out.

Phase cancellation is much easier to control over the full angular range such that the limitations of tuned circuitry and antenna configuration are less critical. The disadvantage to this concept is that the delay lines tend to be lossy or less efficient than a tuned circuit, like the L-C tank, thus requiring amplification. It's also more susceptible to overload from nearby transmitters.

Plans for construction of tuned and broadband phasing unit designs can be found on the Internet through the National Radio Club at www.nrcdxas.org or by visiting WA1ION DX Labs at http://hometown.aol.com/MarkWA1ION/weblink.htm where principle designer Mark Connelly has made detailed assembly instructions available free of charge.

## Commercially Available Phasing Units

Because antenna phasing units were considered to be highly specialized, difficult to operate, and in demand by only a small percentage of hard-core DXers, they have not been readily available from mass-production manufacturers. More recently, however, antenna phasing for DX reception has been gaining in popularity, due to improved technology for ease of use and a need to combat rising interference from various sources.

Two units on the market today are primarily designed for noise cancellation on the shortwave band. The MFJ-1026 and Timewave ANC-4 match a local noise pick-up antenna against a DX antenna to cancel out noise and interference from nearby

## AM And FM Station Changes And Updates

### PENDING

| New Call | Location | Freq. | Old Call |
|---|---|---|---|
| KJPR | Shasta Lake City, CA | 1330 | KSNA |
| WLOL | Minneapolis, MN | 1330 | WMNN |
| KKGM | Albuquerque, NM | 1190 | KXKS |
| WCDL | Carbondale, PA | 1440 | WKJN |
| WVKF | Shadyside, OH | 95.7 | WEEL |
| WNAK-FM | Carbondale, PA | 94.3 | WCWI |

### CHANGES

| New Call | Location | Freq. | Old Call |
|---|---|---|---|
| WCKS | Jacksonville, AL | 810 | WNSI |
| KMXO | Santa Paula, CA | 1400 | KKZZ |
| KNWU | Thousand Palms, CA | 1270 | KCMJ |
| KKZZ | Ventura, CA | 1590 | KKOM |
| WAMS | Newark, DE | 1260 | WNWK |
| WNRR | Augusta, GA | 1230 | WKIM |
| WSHE | Columbus, GA | 1270 | WMLF |
| WFGM | Sandy Springs, GA | 830 | New |
| WXNH | Jaffrey, NH | 540 | New |
| KYVA | Gallup, NM | 1230 | KTHR |
| WDCD | Albany, NY | 1540 | WPTR |
| WVTL | Amsterdam, NY | 1570 | WBUG |
| WLTP | Marietta, OH | 910 | WBRJ |
| KFNY | Enid, OK | 1640 | KMMZ |
| WNTJ | Johnstown, PA | 850 | WLYE |
| WNTW | Somerset, PA | 990 | WVSC |
| WEKO | Morovis, PR | 1580 | WMTI |
| KQXX | Brownsville, TX | 1600 | KBOR |
| KVNS | Brownsville, TX | 1700 | KQXX |
| KMSR | Farmersville, TX | 990 | KCAF |
| KFLC | Fort Worth, TX | 1270 | KESS |
| KWFA | Tye, TX | 1030 | New |
| KVNN | Victoria, TX | 1340 | KRNX |
| KCAF | Wylie, TX | 700 | KXXT |
| KDYL | South Salt Lake, UT | 1060 | KKDS |
| KXLX | Newport, WA | 700 | KMJY |
| WEMM | Huntington, WV | 1470 | WHRD |
| WHNK | Parkersburg, WV | 1450 | WLTP |
| XEKTT | Tecate, Mexico | 560 | New |
| XESS | Ensenada, Mexico | 780 | New |
| XESDD | Ensenada, Mexico | 920 | New |
| KHPO | Merced, CA | 106.3 | KIBG |
| KQZQ | Shafter, CA | 89.5 | New |
| KSVY | Sonoma, CA | 91.3 | New |
| WAKT-FM | Callaway, FL | 103.5 | WMXP |
| WEBG | Orlando, FL | 100.3 | WSHE |
| WPFM-FM | Panama City, FL | 107.9 | WLHR |
| WDVH-FM | Trenton, FL | 101.7 | WDJY |
| WSGC-FM | Elberton, GA | 92.1 | WWRK-FM |
| KTHK | Idaho Falls, ID | 105.5 | KPLV |
| WPIA | Eureka, IL | 98.5 | WRVP |
| WVEL-FM | Glasford, IL | 101.1 | WPPY |
| WRDA | Jerseyville, IL | 104.1 | WMLL |
| WSSR | Joliet, IL | 96.7 | WLLI-FM |
| WIKL | Greencastle, IN | 90.5 | WSPV |
| KNWI | Osceola, IN | 107.1 | KJJC |
| KJMH | Lake Arthur, LA | 107.5 | KVEE |
| WXQL | Carrollton, MI | 100.5 | WTCF |
| KPVR | Bowling Green, MO | 94.1 | KPCR-FM |
| KLSK | Great Falls, MT | 100.3 | KEHT |
| KGCX | Sidney, MT | 93.1 | New |
| KCVN | Cozad, NE | 104.5 | KAMI-FM |
| KZTQ | Carson City, NV | 97.3 | KWNZ |
| KWNZ | Sun Valley, NV | 93.7 | KYWD |
| KYVA-FM | Grants, NM | 103.7 | KYVA |
| WPTR | Clifton Park, NY | 96.7 | WDCD-FM |
| WHUG | Jamestown, NY | 101.9 | WMHU |
| WEGQ | Scotia, NY | 93.7 | WEGB |
| WCDG | Moyock, NC | 92.1 | WBHH |
| WDSJ | Greenville, OH | 106.5 | WDJO |
| KJAC | Astoria, OR | 88.7 | New |
| KMKR | Oakridge, OR | 88.5 | New |
| WCAT-FM | Carlisle, PA | 102.3 | WRKZ-FM |
| WCPP | Hershey, PA | 106.7 | WCAT-FM |
| WRDW-FM | Philadelphia, PA | 96.5 | WLDW |
| WSJW | Starview, PA | 92.7 | WHBO |
| WBZR | Tunkhannock, PA | 107.7 | WCWY |
| KLGH | Rapid City, SD | 88.3 | New |
| KRPX | Ingleside, TX | 107.3 | KCCG |
| KHKZ | Mercedes, TX | 106.3 | KMAZ |
| KDUT | Randolph, UT | 102.3 | KMDG |
| WPYA | Exmore, VA | 106.1 | WKOC |
| WHLF | South Boston, VA | 95.3 | WHLF-FM |
| WEMM-FM | Huntington, WV | 107.9 | WEMM |
| WFON | Fond Du Lac, WI | 107.1 | KFIZ-FM |

sources, such as unintentional signals radiating from computers, televisions, and electrical wiring. Because they are both designed for shortwave listening, filtering reduces signal levels from AM broadcast and aerobeacons to prevent harmonics and overload. However, MFJ will provide instructions to modify their 1026 for mediumwave reception and improved performance using two DX antennas, making it a very capable phasing unit for DX applications. Visit our friends at Universal Radio at www.universal-radio.com, or call 1-800-431-3939 for a catalog, to learn more. Details about the MFJ-1026 can also be found at www.mfjenterprises.com.

Thanks to the efforts of one dedicated DXer, phasing units specifically designed for mediumwave are readily available from Radio Plus, manufacturer of the venerable Quantum Loop. Gerry Thomas, KB4JFM, has been designing loop antennas for mediumwave DXers since the 1970s out of his Radio Plus shop in Florida. The increased popularity of phasing and subsequent introduction of shortwave units by MFJ and Timewave inspired Gerry to experiment with several designs, leading to the development of the Quantum Phaser.

Gerry reports,

The Quantum Phaser is a device that combines the signals from two separate antennas and allows the manipulation of level and phase of the signals so that a single, steerable


*WXEW Yabucoa, Puerto Rico.*

null results. It is optimized for use on the crowded MW band, can be used with antennas of virtually any type and is capable of snagging DX not usually obtainable with conventional antennas alone. Adding a phasing unit to your DX toolbox is one of the surest ways of adding new stations to your log.

Check out the Radio Plus website at www.dxtools.com for a complete line-up of mediumwave DX antenna equipment.

So now you know something about phasing. When contacting MFJ, the National Radio Club, Radio Plus, Universal Radio, or WA1ION DX Labs, be sure to let them know that you read about them in *Popular Communications*. Good luck with your antenna phasing experiments, and please let me know your results!

## In Phase With Presidential Politics

Clear Channel Communications dropped Howard Stern from all of its radio stations after the FCC proposed fines totaling close to a half million dollars for broadcast indecency violations. This follows a fine levied against an Infinity radio station in Detroit also involving Stern. Lawmakers are seeking to increase the maximum fine for any single violation from $27,500 to $500,000 in response to mounting political pressure on the FCC for not doing enough to control indecent content over the airwaves. Stern is responding by turning the controversy into a political campaign against the re-election of President Bush.

Meanwhile, a new talk radio network has been launched to balance the scales against what some claim is a radio dial dominated by conservative political talk shows. Air America Radio headlines Al Franken with a liberal perspective and "drug-free" talk, an apparent jab at top rival Rush Limbaugh who gained media attention over a reported addiction to pain killers after it was revealed that he was doctor-shopping for prescriptions.

Air America can be heard on 620 KPOJ Portland, Oregon, 950 WNTD Chicago, 1050 KCAA Loma Linda, California, 1190 WLIB New York, 1330 WMNN Minneapolis, 1580 KBLA Los Angeles, and on XM Satellite Radio, or at www.airamericaradio.com on the Internet.

## QSL Information

**740 CHWO Toronto, Ontario**, received a nice package in 20 days for an e-mail report, with oversized QSL card, bookmarks, CHWO historical data, program schedule, Camp X brochure, Hammond Museum of Radio brochure, and invitation to join the Ontario DX Association, signed Brian Smith, QSL Manager. Address: www.odxa.on.ca (Griffith, CO)

**1170 WWVA Wheeling, West Virginia**, has filed an application with the FCC to move to Stow, Ohio. If approved, West Virginia would become a much more difficult state to receive without this powerful 50-kW signal. Address: 1015 Main St. #1, Wheeling, WV 26003. (Griffith, CO)

**1220 WHK Cleveland, Ohio**, QSL letter in 8 days for taped report, signed David S. Johnson-Dir. of Eng. Address: 4 Summitt Park Dr., Independence, OH 44131. Also enclosed were pictures of the tower site and transmitter. (Martin, OR)

**1470 KKTY Douglas, Wyoming**, a very friendly full-data letter and business card in 16 days, signed Dennis Switzer, Owner/GM, who wrote, "It's always fun to hear from DXers," and invited me on a tour of the studios. Address: 247 Russell Ave., Douglas, WY 82633. (Griffith, CO)

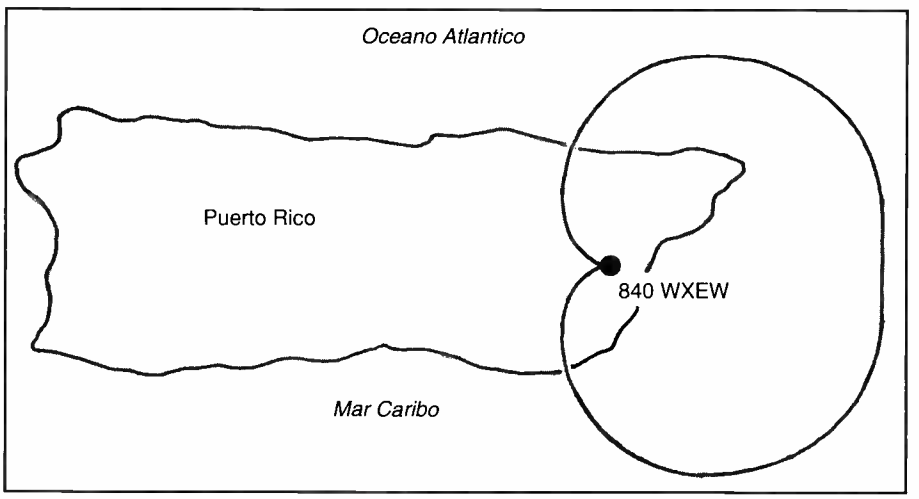
**1520 WQMA Marks, Mississippi**, will be running several minutes of Morse code a couple of times a week for a few minutes before regular sign-on and a few minutes leading up to sign-off when operator schedule permits. The station reports, "We will happily verify any reports. Just keep an ear out for us! WQMA operates from a single 150-foot guyed (12 wires) Rohn 25 tower. We operate sunrise to sunset with 250 watts ERP, with co-located studios, transmitter and broadcast tower one-quarter mile west outside the Marks city limits, on Highway 6." Address: Paul Walker, Jr., Assistant Program & Music Director, WQMA, 1820 West Marks Rd., Marks, MS 38646. (Walker, MS) Received QSL in 10 days for a taped report, my best Mississippi catch ever, not an easy state to receive from Oregon even with a Beverage antenna! (Martin, OR) Received QSL with photo of transmitter site in 43 days for DX test report and $1. (Griffith, CO)

**1620 WTAW College Station, Texas**, received a full data QSL card in 9 days for a reception report and Arizona scenic postcard, signed by Ben Downs. In grand Texas style, the card reads, "YEP! That's us." Address: WTAW Radio, Box 3248, Bryan, TX 77805. (Barton, AZ)

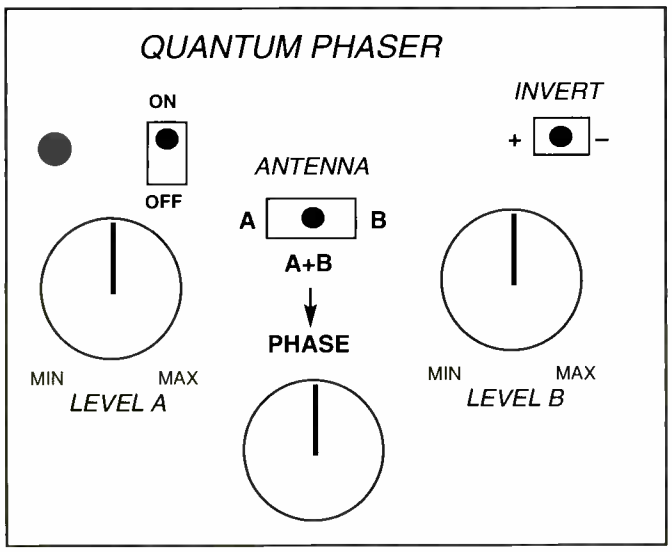
**1690 WRLL Berwyn, Illinois**, "Real Oldies 1690" detailed QSL card in 13 days for written reception report. Address: 233 N. Michigan Ave., Suite 2800, Chicago, IL 60601. (Brown, ON)

## Broadcast Loggings

"It pays to listen!" as they say in radio promos, and for Patrick Griffith of Colorado, one night in particular paid off with a wealth of DX. "Great conditions in the upper end!" reported Patrick, "Had Radio Disney with an echo on 1640 kHz




*The cardioid directional antenna pattern of 840 WXEW.*




*The Quantum Phaser front panel controls include antenna input levels, phase adjustment, and 180-degree phase reversal (invert).*

under 'All Comedy Radio' from Oklahoma. Presume I was hearing Disney from both Wisconsin and Oregon. Not enough to ID either one. Oklahoma has actually become a pest on the frequency for me. I got a great top-of-the-hour ID from KTFH on tape—a distance of 1,016 miles."

David Hochfelder of New Jersey also reported exceptional transcontinental DX conditions. He wrote, "Conditions to the west were great with KOA and WYLL both pounding in here. I'll try for other western stations I need: KSL, KKWY, KXTR, KNX, maybe even KTNN if I can phase WFAN New York City sufficiently."

Welcome to reader Rick Barton of Arizona who wrote in, "I am usually DXing the SW bands, but kinda got re-interested in working with MW more recently. I was driving home and picked up some great DX on my car radio of all things. This resulted in my first MW band QSL in several years, since 1996, when I caught WGN Chicago (normally covered by a dominant Las Vegas station on the frequency)."

Dashboard DXing can make even the dullest commute more interesting, especially during sunrise and sunset when conditions are more volatile. Changing terrain adds to the volatility as passing wetlands and mountains may enhance reception in specific directions on AM and FM. So next time you're stuck in traffic, instead of bouncing between presets or scanning for the strongest signals, try manually tuning in frequencies between the local stations. You might be surprised at how much can be received on the car radio.

This month's selected logs are topped off with the return of transoceanic DX as received by Connelly and Martin on the east and west coasts. Patrick Martin uses Beverage antennas aimed across the Pacific, while Mark Connelly works with phased antennas to cancel out signals from the west and receive across the Atlantic. All times are UTC.

**531 2PM Kempsey, Australia**, at 1415 good with old pop and rock and ID, "More music, more variety, more fun, 531 2PM." (Martin, OR)

**558 4AM Atherton, Australia**, at 1410 good on top with pops and "Great songs on 4AM" ID. (Martin, OR)

**639 8RN Katherine, Australia**, at 1430 expecting to hear 2CS, but heard an ABC program instead. Quick to go over to 2325 kHz, there it was parallel to 639! Program ending at 1429 into jazzy music, then a female announcer said, "This is rural ABC, 105.7 Darwin," into ABC News at 1430. Soon lost in the jumble though. This is my second Northern Territory ABC station. 657 Darwin was logged back in the '80s. I am very pleased with this! (Martin, OR)

**660 WXIC Waverly, Ohio**, fair at 1230 during auroral conditions. Gave its slogan, "Ohio's Gospel Giant," along with an announcement mentioning sponsorships and the station's phone number: (740) 947-2166. I thought it was an easy log until I realized it's a 1000-watter located near Huntington, West Virginia, on the other side of the state from my Indiana listening post—and that I've never heard it since. (Smith, IN)

**740 KRMG Tulsa, Oklahoma**, at 2300 a good signal with the "Dr. Laura Show" into top of the hour ID and news, "Remember, today you listened to Newstalk 740 KRMG Tulsa." (New, GA)

**850 KOA Denver, Colorado**, at 2305 with a local newscast and weather buried by interference, but I heard it! "Colorado's official weather station, Newsradio 850 KOA." (New, GA) (*Congrats!—bc*)

**950 WAKM Franklin, Tennessee**, faint but totally readable beneath local station WXLW Indianapolis at 2325. Heard part of a commercial and the all-important ID during the short-lived burst of signal. (Smith, IN)

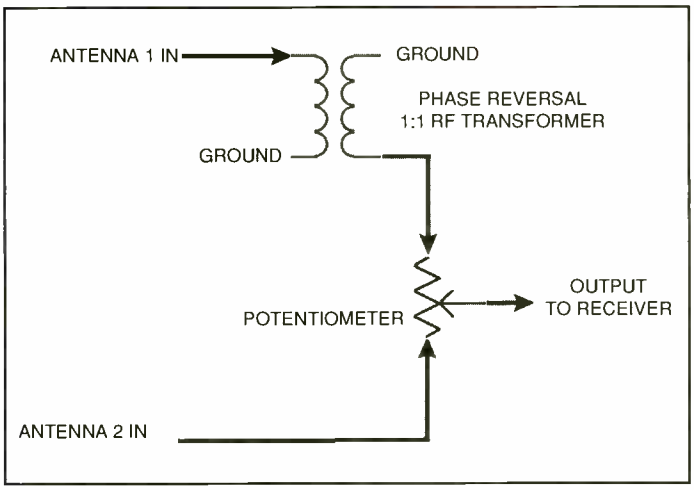
**1062 Danmarks Radio, Kalundborg, Denmark**, at 0400 heard the end of Manfred Mann's "Mighty Quinn," then news by man in Danish, and at 0527 a Beatles-influenced vocal, Danish talk by a man, then a Dido song; good. (Connelly, MA)

**1140 CHRB High River, Alberta**, at 0600 good to excellent at peaks with WRVA phased as much as possible. Slow Country & Western music; IDed at the top of hour as "Southern Alberta's Family Radio Station." (Hochfelder, NJ)

**1160 KSL Salt Lake City, Utah**, at 0133 "Sports Final" and ID, "You're listening to KSL News/Talk 1160." 1,633 miles away. I called KSL and got a mention by the talk show host on the air! (Walker, MS)

**1160 VSB3 Hamilton, Bermuda**, at 2252 the BBC World Service with talk about romantic fantasies, delayed about 15 seconds from parallel 5975 kHz; over WSKW hockey coverage and 1161 Spain het. (Connelly, MA)

**1215 Virgin Radio synchros, United Kingdom**, at 0121




*Schematic of the most basic antenna phasing unit consisting of a 180-degree phase reversal RF transformer and balance potentiometer.*

"Brown Eyed Girl" by Van Morrison from 1967, and at 0407 New Radicals' "You Get What You Give," on a fair to good signal. (Connelly, MA)

**1467 TransWorld Radio, Roumoules, France**, at 2227 a group vocal to the melody of "Salve Regina," then English talk about Adam and Eve, and at 0445 the musical-box TWR interval signal, 10 seconds of jazz, then a woman in German; to good peak with WAZN phased. (Connelly, MA)

**1500 WLQV Detroit, Michigan**, at 0400 a good signal except for some bleed from WLAC on 1510 in Nashville. However it must've been sign-off time for them because I heard nothing but "We Are Victory 1500, WLQV Detroit." (New, GA) *(Probably lost to a reduction in power at this time from 50 kW day to 10 kW night.—bc)*

**1521 BSKSA Dubai, Saudi Arabia**, at 2252 parallel 9555 kHz with reverberated soft-spoken Arabic talk by a man, and at 0255 call to prayer, shrill vocal; local-like, mashing 1520 WWKB Buffalo to a pulp. (Connelly, MA)

**1530 WSAI Cincinnati, Ohio**, at 0055 I found this oldies station with a strong signal and very few fade-outs. IDs were "Real oldies, 1530 WSAI," and "50,000 watts of oldies power." After five minutes of news, programming was 50s and 60s rock tunes by artists such as Dusty Springfield, Jerry Lee Lewis, the Orlons, and Bobby Darin. (Kachmarsky, NJ)

**1570 WBGX Harvey, Illinois**, at 1159 heard the best ever with the DJ saying, "Another full hour of Gospel Music on 1570 WBGX, The Gospel Giant," topping CKMW. (Martin, OR)

**1570 KVTK Vermillion, South Dakota**, at 0427 ESPN into ID, "The Missouri Valley's original sports station, ESPN Radio 1570, The Ticket." Great signal for 71 watts at 463 miles! (Griffith, CO)

**1600 KCRG Cedar Rapids, Iowa**, at 0559 heard a promo for KCRG News Line 9 at 365-9999, frequent mention of TV 9 and News Copter 9, then ID at 0604 as "KCRG, The Zone" into ESPN, with local KCKK off the air. (Griffith, CO)

**1600 KATZ St. Louis, Missouri**, at 0511 "Your 24-hour inspiration station, Gospel 1600, all gospel music, all the time," and at 0052, "Gospel 1600, KATZ St. Louis," with local KCKK temporarily off the air. (Griffith, CO)

**1620 KSMH Sacramento, California**, at 0130 with a Catholic mass, mixing with WTAW Texas. (Barton, AZ)

**1680 KTFH Seattle, Washington**, at 0600 blasting in with Hindi music, top of the hour ID in English as "The Bridge, AM 1680, KTFH Seattle, a service of Salem Communications." (Griffith, CO)

**1690 WSWK Avondale Estates, Georgia**, at 2110 country music, "1690 on your dial, WSWK Avondale Estates, on-air with equipment testing." Steady signal of low strength. (New, GA)

Patrick Griffith mentioned hearing "All Comedy Radio" on 1640 kHz. The station of course is former Radio Disney outlet KMMZ Enid, Oklahoma, and it's broadcasting programming from a new comedy radio network under the new callsign KFNY. There are already some 50 affiliated radio stations, although not all broadcasting comedy 24/7 like KFNY. While programming originates from Hollywood, the network flagship station is 1480 KPHX Phoenix, Arizona. For more info visit www.allcomedy radio.com.

Thanks to all our broadcast DXers; Rick Barton, Doug Brown, Mark Connelly, WA1ION, Patrick Griffith, NØNNK, David Hochfelder, Steve Kachmarsky, Patrick Martin, Ira Elbert New, Brian Smith, W9IND, and Paul Walker. 73 and Good DX! ■

# ham discoveries

*connecting as a radio amateur*

*by Kirk Kleinschmidt, NTØZ*

## It's Not What You Say—It's The Way That You Say It!

With the apparent imminent demise of *required* Morse code proficiency in amateur radio (a few exotic modes aside), what remains are keyboard-to-keyboard modes and SSB (digital voice is still sorting itself out). Good, bad, or otherwise, new opportunities abound for beginners to make DX and stateside QSOs on phone (sideband). The shift in operating emphasis has also created a need for beginning operators to know standard voice operating procedures—and adhere to them!

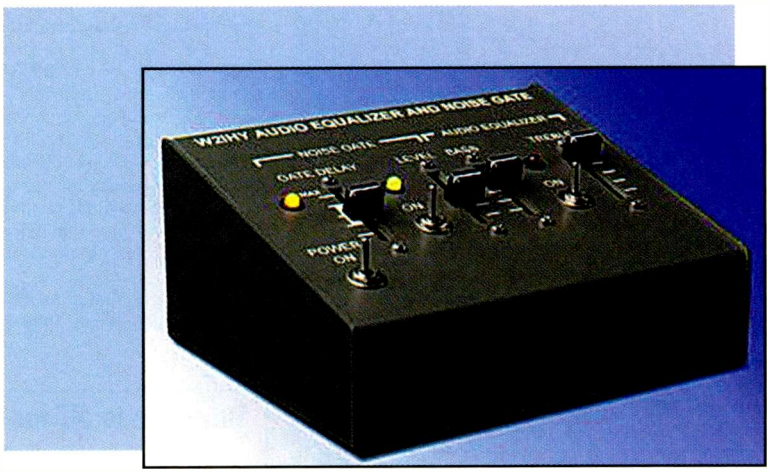
On phone, in addition to using standard QSO procedures, such as the customary practice of telling the other operator how you're receiving him (RS or RST), where you're located (QTH), and what your name is, we use the international phonetic alphabet. This convention is to make sure voice communications are as understandable and as universal as possible—hams are from all around the world after all.

Standardization is the key here! Properly used, phonetics can go a long way toward smoother voice operation and can definitely improve your success rate when trying to break pileups and work overseas ops. This month's column focuses on the dos and don'ts of ham radio phonetics.

### Using Proper Phonetics

The phonetic alphabet (see "ITU Phonetics") is an extremely useful convention, and over the years, several alphabets have come and gone. Many radio services use their own variants. Remember the TV show "Adam-12"? Remember officers Reed and Malloy calling in the license plate numbers of suspected felons and scofflaws? "Lincoln, X-ray, Ida...?" Phonetics at your service!

Today, most countries of the world are members of the International Telecommunication Union, or ITU. The ITU has its own phonetic alphabet, which all amateurs should know and are encouraged to use. Nobody says you have to use it, however, and you'll hear a lot of vari-




*As long as we're talking about proper phonetics and good voice operating techniques, I'd like to get in a plug for proper microphone equalization. Mic and transmitter frequency response topics have been an on-the-air rage for the past several years, with no signs of tapering off (equalization pun intended!). If you want to learn about what microphone equalization can do for your signal and listen to some real-time audio demos, point your browser to www.w2ihy.com. The two-band EQ shown here is W2IHY's most affordable high-quality EQ. Use it mobile or in the shack. It's available assembled or as a kit.*

ation. Many hams devise "cute" personal phonetics specifically for their callsigns. SSB operators often vary from approved ITU phonetics on occasion, especially in pileups, when many stations are calling a rare DXCC country.

"Germany" and "Kilowatt" are popular substitutes for Golf and Kilo, respectively. Being longer and stronger words, they're more likely to be heard under tough conditions. And, for example, in the push and shove of a pileup, just the "watt" might get through, and the DX station might come back, "Ending in Kilowatt, go ahead." Some hams think other phonetics sound better in the wacky world of sideband. They may be right, too!

So why use ITU phonetics? Language, for one thing. Although English is the world's universal language, your "cutsie" phonetics—the ones you use when you talk to your radio buddies on the local repeater—may not be so catchy to a foreign ear. But even spoken with a foreign accent, "Uniform," "Whiskey," "Victor," and so on are easily recognizable.

Standardization is another reason, and so is speed. Much like learning code, when you hear someone spell his name as "Juliett Oscar Hotel November," you won't simply hear the words; your brain will instantly register them as J-0-H-N, with no middle step. Without standard phonetics, you couldn't do that. Stick with ITU phonetics—most everybody does!

Nobody wants to be welded to the rules just for trivial reasons, but useful conventions are something else. We need them for smooth operation and to better our chances of being understood. And there may well be a time in your amateur radio career when you'll need to be understood without delay. Remember, someone else might be counting on you!

The practical use of phonetics aside, don't get carried away and *overuse* them. Use them for callsigns and use them for names, if required. But don't say *everything* with phonetics, especially when conditions are good, and you're using commonly known words.

Hopefully, when it's your turn to save a life, you won't be stuck trying to pass emergency traffic by using goofy, nonstandard phonetics!

## ITU Phonetics

| | |
|---|---|
| A | Alfa (**AL** FAH) |
| B | Bravo (**BRAH** VOH) |
| C | Charlie (**CHAR** LEE) |
| D | Delta (**DELL** TAH) |
| E | Echo (**ECK** OH) |
| F | Foxtrot (**FOKS** TROT) |
| G | Golf (GOLF) |
| H | Hotel (HOH **TELL**) |
| I | India (**IN** DEE AH) |
| J | Juliett (**JEW** LEE ETT) |
| K | Kilo (**KEY** LOH) |
| L | Lima (**LEE** MAH) |
| M | Mike (MIKE) |
| N | November (NO **VEM** BER) |
| O | Oscar (**OSS** CAH) |
| P | Papa (PAH **PAH**) |
| Q | Quebec (KEH **BECK**) |
| R | Romeo (**ROW** ME OH) |
| S | Sierra (SEE **AIR** RAH) |
| T | Tango (**TANG** GO) |
| U | Uniform (**YOU** NEE FORM) |
| V | Victor (**VIK** TAH) |
| W | Whiskey (**WISS** KEY) |
| X | X-RAY (**ECKS** RAY) |
| Y | Yankee (**YANG** KEY) |
| Z | Zulu (**ZOO** LOO) |

Note: The syllables highlighted in bold are emphasized.

## Voice Tips

In addition to using standard the ITU phonetics, there are a few additional steps you can take to further improve your ability to be understood on the other end of a radio connection.

- Speak slowly and distinctly (using phonetics or otherwise) when conditions are less than perfect.
- Make sure your rig's mic gain isn't set too high. Few things can ruin an otherwise decent voice signal faster than overdriving the transmitter!
- One thing that can overdrive your transmitter is an overly aggressive speech processor. Check those settings!
- Make sure you're "working your mic correctly." That is, some mics sound a lot better if you're "talking across" the element instead of speaking directly into the mic. Similarly, some mics are quite sensitive to "plosives" and "breathing." You want good, clear annunciation, not popping sounds and heavy breathing!

Remember, standardization is the key to on-air success. Your on-air observations, along with your suggestions, letters, and QSL cards are always welcome. Write to me at "Ham Discoveries," *Popular Communications*, 25 Newbridge Rd., Hicksville, NY 11801. ■



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# the wireless connection

a look behind the dials

by Peter J. Bertini, radioconnection@juno.com

## A Salute To The Zenith Stars And Bars: The Mechanical And Electrical Restoration Begins

Some Zenith 1939 model year radios deviated from their traditional large black dial format. The Zenith 6S321 table radio is one example. Instead, the 6S321 features a large gold dial, reminiscent of the gold dials used in the Sears Anniversary models.

Another 1939 Zenith theme was its "Stars and Bars" escutcheon. This was a decorative metal bezel emblazoned with embossed stars and a banner stripe (which served as the knob apron) for a somewhat patriotic theme. According to Cones, Bryant, and Blankinship*, these escutcheons were done in a two-tone bronze finish. The raised stars and bars were highly polished, while the recessed areas sported a darker bronze matte patina. This sort of historic information is noteworthy, and it answers the question "how much polishing" is proper for a true restoration. My Zenith 6S321, shown as found in **Photo A**, is undergoing extensive restoration, so please pardon its hopefully temporary appearance!

*Photo A. The author's 6S321 cabinet and radio, awaiting restoration.*

*Photo B. This 1939 Zenith 6S330 tombstone sports the "Stars and Bars" escutcheon with Zenith's "Tip-Touch Tuning" pushbutton preset station selectors.*

This hapless radio was rescued from eBay. The price was right because of its very poor condition and the lack of good clear photos in the auction. The seller gave an honest appraisal of the radio's poor condition, which undoubtedly helped to keep the price within reach of my wallet. These sets are valued at between $170 and $250, but I've seen them go for much more when offered in near original condition.

The radios featured Zenith's "Tip-Touch Tuning" (note the five white push-buttons centered on the top of the dial arch for selecting preset AM stations). **Photo B** shows my Zenith 6S330 black dial Stars and Bars tombstone radio (also note the five preset station pushbuttons at the top of the arch in the escutcheon). Unfortunately, Zenith finished these sets with a faux burl photo-etch finish. I say *unfortunately* because unless these sets have been stored in a clean, climate-controlled environment (granny's living room), chances are you'll find that most examples have flaking or damaged lacquer. If the lacquer is damaged and flaking, those areas will also be missing the faux burl finish. Small areas can be repaired and touched up (a topic for future columns) or stripped and refinished to reveal the original underlying wood veneer.

The previous owner of my 6S330 elected to strip and refinish the radio, thus the set in the photo is not original and, therefore, suffers some loss of value. Yet, the original veneer looks quite nice and, in my opinion, is more fitting for today's decors than the gloomy and dark factory faux burl finishes!

In this month's *hands on* project we'll begin the electrical and mechanical restoration and, when the cabinet is finished, I'll

**Zenith, The Glory Years, Illustrated Catalog and Database*, by Harold Cones, John Bryant, Martin Blankinship, Schiffer Publishing, ISBN 0-7643-1883-7.

show how I saved—or messed up—the cabinet refinishing and restoration. I'll be doing my best to preserve and repair what's left of the original burl finish.

## Rust And Dust

As purchased, the radio's speaker was missing. This greatly reduced its value because most folks don't want to spend an eternity tracking down donors (parts sets) from which they can "steal" missing components! Fortunately, I had acquired an extra speaker from a Zenith 7S432, and I had ascertained it would be both a good, albeit not exact, electrical and mechanical match for the missing speaker. Even the plug was correct! Moral: save everything.

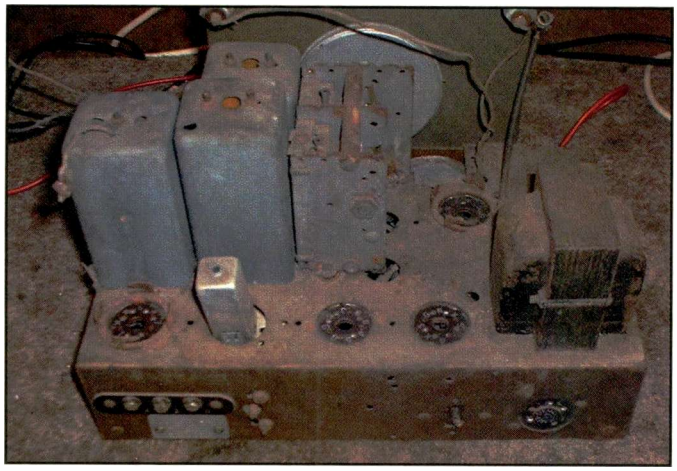

*Photo C. You'd expect to find a dusty radio chassis after 60 or 70 years of existence, but rust, especially on a painted chassis, is also a problem.*

**Photo C** reveals the chassis condition. I suspect that odd miniature IF transformer stuck in the hole left by the missing larger, original part didn't do much for the final auction bid. Fortunately, I found a proper-sized replacement from a 10-tube Zenith console chassis from a fellow collector's parts stash. (Thanks, Dennis D.) Getting back to the photo, the rusted areas on the chassis meant that the hammered-gold finish would also need to be redone.

## Asbestos Woes

I've mentioned the early practice of using asbestos sheets in old radio cabinets as heat shields. The Zenith 6S321 cabinet is a good example. Note the large asbestos sheet shown in **Photo D**. I've covered the proper methods for either sealing the asbestos or leaving it in place unmolested, and I also gave suggestions for the safe removal and disposal of this material in a past column. In any event, remember that this material is now considered to be hazardous to your health if inhaled, and it's also now technically a hazardous waste material. Please treat it as such and handle it accordingly.

## ACE Is The Place

A not-so-shameless-plug for your local family-owned hardware store: I vaguely remembered an Internet newsgroup tip that Hammerite produced a hammered-gold paint in a 12-ounce spray can. The product is Hammerite 41170 Hammered Gold.

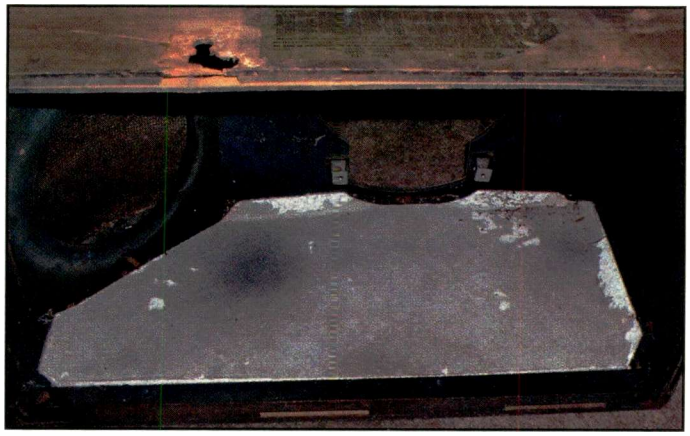

*Photo D. Many manufacturers used sheets of asbestos stapled or glued to the cabinet tops and bottoms to protect the wood and finishes from heat exposure. Asbestos is a hazardous waste material. Be careful!*

It wasn't in stock, but they ordered a few cans that arrived within a few days of my visit. While there, I also picked up an 8-ounce bottle of Naval Jelly (part 802276) rust remover.

Getting down to the nitty gritty, repainting the chassis requires all of the above-chassis components to be removed or protected. **Photo E** shows what was done to prepare the chassis for cleanup and repainting. The rusted areas were treated with applications of Naval Jelly; these applications were refreshed as the older solution weakened. This is a messy process, and in retrospect I would not use a phosphoric acid-based rust remover again.

Besides the mess (you need lots of old newspapers and paper towels on hand to protect surroundings), the solution tends to get into places where it shouldn't. For example, **Photo F** shows how the speaker jack failed in a spectacular manner. This unexpectedly happened several hours after the chassis was restored and playing on the bench. Naval Jelly apparently seeped between the phenolic wafers, and eventually the high B+ voltage leaking across this path burned a carbon arc (a *highly conductive* carbon trail, I might add), causing the radio B+ to short out and pop the protective fuse. The socket had to be taken apart, and the carbon trails completely scraped away with a dental pick to affect a repair. Moral: always fuse your radios! Seriously. If I hadn't fused the transformer primary, I could have ended up

*Photo E. Can you say mess? There has to be a better way.*

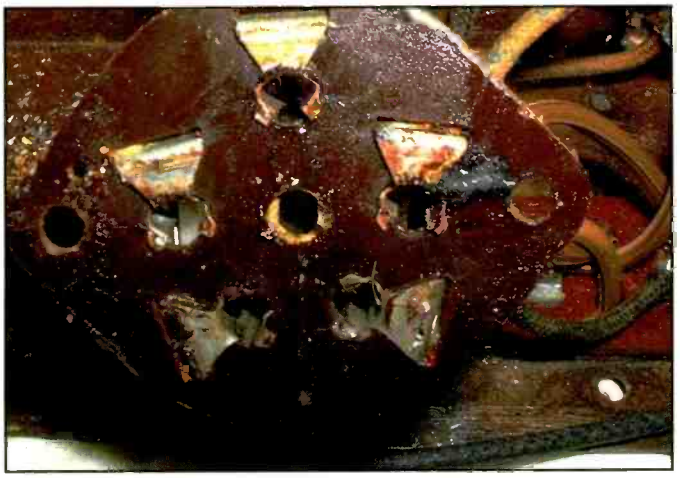

*Photo F. Another problem, besides the messiness, is that acid solutions are very conductive and can cause problems if the solution seeps into the wrong spot. Here's where the speaker socket arced internally to ground, shorting the B+.*

*Photo H. Here's how the chassis looks after repainting. Wow, it's better than I had hoped!*

with a burned out power transformer. These Zenith transformers are undersized, easy to burn out, and are hard and expensive to find or replace. The carbon arc trail measured a scant 40 ohms, a dead short to the rectifier output.

Instead of the Naval Jelly, I'd suggest a Dremel tool with a rotary wire brush to remove surface rust. I was trying to achieve a bare metal chassis, but I later noted that the Hammerite paint is intended to encapsulate rust. All you need to do is remove the loose rust scale before painting. Gently feathering edges between good paint and damaged areas might help avoid telltale ridges beneath the fresh coat of paint. The Hammered finish does hide many ills, though.

## Repainting Preparation

Parts that aren't removed (such as the exposed RF and oscillator coils, tube sockets, metal chassis tags, etc., as shown in **Photo G**) need to be covered with painter's masking tape. Before taping and painting, the chassis should be as clean as possible to ensure that the fresh coat of paint will properly bond to the chassis. Do this by brushing and vacuuming up loose dust and dirt, and follow that with a good cleaning using paint thinner; this works as a solvent to remove the remaining dust and accumulated gunk. Paint thinner is very flammable—and the fumes aren't healthy either—so this cleanup work should be done outdoors in a well-ventilated area! As always, read and follow the directions on the label.

## The Final Product

The hammered gold paint worked extremely well. The repainted 6S321 chassis is shown in **Photo H**. I am extremely pleased with the finished results! Next, I cleaned and repainted the transformer shell with a gloss black lacquer. I then cleaned and repainted the IF and RF transformer shells with a matte gray spray enamel finish. I also repainted the tube shields with the gold hammertone paint.

The tuning capacitor was another problem. It had rust and looked grungy when placed on the now like-new radio chassis. The *badly* rusted areas were treated with Naval Jelly, see **Photo I**. I wanted to clean the aluminum rotor and stator plates, so I tried something new. I've used my large ultrasonic cleaner for this task in the past with varying results. The manufacturer advises against using Naval Jelly on aluminum or chrome.

*Photo G. Areas not to be painted must either be removed or taped over.*

*Photo I. The tuning capacitor was also given a good cleaning with Naval Jelly to remove most of the rust and to clean the aluminum plates.*

*Photo J. Here it is: the chassis components are back in place and painted as needed. The chassis looks factory new—quite a change from the original condition shown in Photo C. It's awaiting the cabinet to be finished so it can be reinstalled and displayed.*

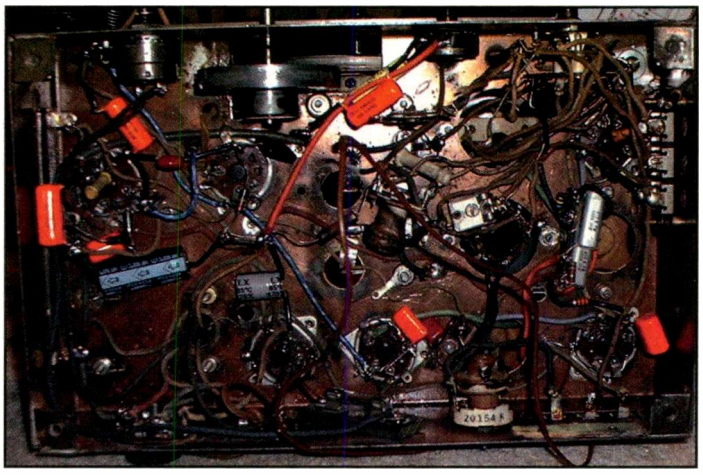

*Photo K. For the curious, this is a view of the under-chassis restoration. I didn't bother to restuff the old wax capacitors this time.*

Regardless, I mixed a small amount of the Naval Jelly with hot water in a small plastic tub, and soaked the capacitor for several minutes to see what would happen. The capacitor came out looking like new! While this worked for me, remember it goes against the manufacturer's directions.

**Photo J** shows the chassis put back together. I am quite proud of this one and have received quite a few favorable comments on how it turned out. Some collectors would object to bringing an old set back to a factory-new appearance, but for a basket-case set that wouldn't otherwise be restored, I feel it's a far better fate than being junked or parted out.

This gold hammertone paint would also be ideal for many of the tube-model Zenith Transoceanic radios. Indeed, I have two 600 TOs with rusted chassis for future column restoration fodder. The under-chassis electrical restoration work is shown in **Photo K**. And, no, I didn't bother to *restuff* the old wax paper caps in this radio. Can you spot the added fuse holder?

## Caveat Restorer

A final note: I mentioned that the original second IF transformer (detector) was missing, and that a similar-sized component was substituted from a 1940's vintage console chassis. Be careful here. While electrically similar, the detector secondary winding is usually connected to a simple RC roll-off filter to remove residual IF radio frequency energy from the recovered audio. These parts were *internal* in the replacement transformer, and external in the original 6S321 chassis. I opted to use the replacement transformer as is, and I removed the associated capacitor and resistor under chassis instead. This is something to watch for and to be aware of when making these kinds of substitutions.

That's it for now. We'll be back next month with more vintage radio. What classic radios have you been restoring? Don't forget that I can always use your photos and ideas—it's *your* column! ■

# loose connection

radio communications humor

by Bill Price, N3AVY, chrodoc@earthlink.net

## Radio, Radio—Wherefore Art Thou, Radio?

Ah, radio. How do I love thee? Let me count the ways. Better yet, let me count the radios. Hmmm. Two GE SuperRadios, two Sangean/RadioShack DX440s (or whatever the latest models are called), and dozens of AM/FM portables with headsets. Oh, and there's the AM-FMs built into all the boom boxes and component sets. It's safe to say there isn't a room without a radio in the Price Manse; however, I have scrupulously avoided *ever* buying a shower radio, or more lately a shower-CD player, even at the yard-sale price of only 50 cents.

And for those who wonder how a person can ever get along without a shower radio, ponder this: Most people who are showering can hear a radio which is in the bathroom BUT NOT IN THE SHOWER! I sometimes wonder if I'm the only person who's ever thought of that. There were several occasions, though, that my wife thought I might like music while bathing, and tossed in one of my older *tube-type* radios, but she *had* plugged them in to the ground-fault interrupter circuits which I'd installed for just such an occasion.

But yes, I *do* love my radio. Not the receiver (though some are pretty nice) but the *listening*. It must be over two years now since I have watched a television program at home—really—but only moments since I last enjoyed a scheduled radio program. The latest was Ed Walker's *The Big Broadcast* on WAMU-FM, which airs every Sunday night here in the greater Washington, D.C. area. On Saturdays, of course, there's Garrison Keillor and *A Prairie Home Companion* on D.C.'s *other* PBS station (yes, we have two!), which is the one that rekindled my love of scheduled radio broadcasts in the '70s or '80s. Right after Keillor, I tune in to Rob Bamberger's *Hot Jazz Saturday Night* back on WAMU, and stay there for *American Routes* (which featured Willie Nelson last night).

I'm not much different from most of you when it comes to riding in the car, except that my commute is perhaps longer than any of yours (feel free to challenge me). When I lived within the Boston AM market and found I was moving to the D.C. area, I was torn between getting a HPJIE* and remaining in WRKO-land (Boston's AM-680) and starving. I reluctantly left Gene Burns and Jerry Williams behind, but it was a tough call. I *need* my car-radio friends, especially during morning drive-time.

On my first morning in D.C. I began at the low end of the AM dial and quickly hit on AM-630, D.C.'s WMAL. I had arrived too late to find *Hardin and Weaver*, as Weaver had passed on before I got here, but I was happy enough with the newer version of *Hardin, Brant & Parks*. Frank Hardin had been at the station for over 40 years, and was a master of subtle humor, Tim Brant was an ABC Sports guy, and Andy Parks was a former airborne traffic reporter whose sense of humor most closely resembled my own.

***"I can go without an Internet connection, without a cell phone, and certainly without a television, but without my radios, I'd likely only last a few hours."***

Eleven years have passed and Andy is still there. Frank has retired, Tim has moved on to a "strictly TV" job, and Andy has changed partners a time or two. He's now teamed up with Fred Grandy, who you might remember as "Gopher" from *The Love Boat*. Between then and now, Fred has been a U.S. Congressman and done a few other gigs, but I think he's found a home with Andy on WMAL. They keep me laughing (and prevent numerous incidents of road rage each morning) and give me a reason to get up and go to work each day. I find that with them along for the ride, I'm almost civil when I arrive at my HPJIE.

I can go without an Internet connection, without a cell phone, and certainly without a television, but without my radios, I'd likely only last a few hours. Books and magazines are fun—I *do* read—in fact, a person can read while listening to a radio (imagine that!) but not while driving.

That reminds me of the time when my ancient (old enough to smoke) BMW lost its radio. That very day, I bought a cheap AM-FM boom box with a CD player and a fistful of D-cells to keep it running. During the time I used that radio, I replaced the antenna about seven times, each time the result of closing a power window on it. I spent as much on replacement antennas as I did on batteries, and because I had to play that thing pretty loud to overcome the wind noise (no AC in the Beemer), I ate up my share of D-cells. After that car turned over a quarter-million miles, I went through a series of beaters (something just good enough to get to work) and the boom box came along in each one of them. All had power windows, so I kept replacing antennas at a rate of about one every two weeks.

Now that I'm driving a fairly normal vehicle with a functional built-in radio (be still my heart) the boom box with its crumpled stub is sitting in my pile of reserve radios with a "wire & alligator clip" antenna attached—a person can't just throw away a perfectly good (almost) radio, now.

*Editor's Note: If you can get his ear, so to speak, tell Bill about your most ridiculous radio experiences, favorite personalities, interesting shows, and any other things that might help him feel more, well, more normal. Write to Bill at chrodoc@earthlink.net.*

*High-Paying Job In Electronics

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