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Your Personal
Communications Source
Printed in the United States

Monitoring Times®

- **Stubblefield ...
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- **Adventist World
Radio Celebrates 25th**
- **Anyone for a
Fox Hunt?**

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INNOVATIVE PRODUCTS FOR MODERN PLANET



Vol. 15, No. 10 October 1996



Cover Story

Who's Playing Hell with HAARP?

An Investigative Report By Wayne Mishler

There's always been something a little spooky about radio waves—a phenomena we can't see, which we control just enough to make use of, and upon which so much of modern society depends. Combine these waves with other elements such as aurora and ionosphere—which we can't see, either, but we're fairly sure are essential for life on this planet, add words like heating and bombing, and you have all that's needed for a humdinger of a Halloween story.

In this MT investigative report, Wayne Mishler sets out to counter the witch hunts with an objective look at the High frequency Active Auroral Research Program. (HAARP). Is the project the monster it is supposed? Turn to page 8 for this major story.

Cover photo of the HAARP antenna array is by Al Grillo, Anchorage, Alaska.

The Inventor of Radio Was 20

By Leon Fletcher

... Nathan B. Stubblefield? There has been a lot of debate over Marconi's claim to the title, "father of radio," but among the list of contenders, Stubblefield is not a name that generally comes to mind. Yet, a convincing case for him can be made—or could have been, had his business sense been as keen as his sense for invention.



The AWR Story 24

By Adrian Peterson



On October 1st, twenty-five years ago, the first official broadcast of Adventist World Radio was launched over a short-wave transmitter at Sines, Portugal. Adrian Peterson, himself a player in its development, traces the course the broadcaster took to its current worldwide reach.

Anyone for a Fox Hunt? 28

By Arthur Lee

Call it a "bug," a "fox," or a hidden transmitter—trying to be the first to find it can be as much fun as a scavenger hunt. Although it's an activity generally enjoyed by hams, anyone who can hear the frequency can join in! Here are some tips to help you win.



Bug Hunt, Expo Style 18

By Bob Burdick

How I out-foxed the fox at the '95 Grove Communications Expo!

Reviews:

We're going mobile this month. The BayGen Freeplay wind-up wonder goes anywhere without power cord and without batteries. In fact, your editor took it on a pontoon boat last summer, listening to the local AM station, then shifting to jazz and afro-pop from Canada and South America on SW. But is this a serious radio or a passing toy? Magne tackles that question in his review this month.



Parnass goes mobile in *Scanner Equipment* with the Radio Shack PRO-2046. Are you a serious monitor who's on the road a lot? Then this scanner may be for you. Check out the specs.

Bob Grove, who rarely recommends active antennas, found himself duly impressed with the LF Engineering SkyMatch, for coverage from VLF to VHF! See his review on page 92.

Also see reviews on the Universal SCPC-200 satellite audio receiver on p. 82, Hoka Code-3 Gold on p.102, and WiNRADiO (part 2) p.86.

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Synthesized FM Stereo Transmitter



Microprocessor controlled for easy freq programming using DIP switches, no drit, your signal is rock solid all the time - just like the commercial stations. Audio quality is excellent, connect to the line output of any CD player, tape deck or mike mixer and you're on-the-air. Foreign buyers will appreciate the high power output capability of the FM-25, many Caribbean folks use a single FM-25 to cover the whole island! New, improved, clean and hum-free runs on either 12 VDC or 120 VAC. Kit comes complete with case set, whip antenna, 120 VAC power adapter - easy one evening assembly.

FM-25, Synthesized FM Stereo Transmitter Kit \$129.95

Tunable FM Stereo Transmitter



A lower cost alternative to our high performance transmitters. Offers great value, tunable over the 88-108 MHz FM broadcast band, plenty of power and our manual goes into great detail outlining aspects of antennas, transmitting range and the FCC rules and regulations. Connects to any cassette deck, CD player or mixer and you're on-the-air, you'll be amazed at the exceptional audio quality! Runs on internal 9V battery or external power from 5 to 15 VDC, or optional 120 VAC adapter. Add our matching case and whip antenna set for a nice finished look.

FM-10A, Tunable FM Stereo Transmitter Kit \$34.95
CFM, Matching Case and Antenna Set \$14.95

RF Power Booster Amplifier



Add some serious muscle to your signal, boost power up to 1 watt over a frequency range of 100 KHz to over 1000 MHz! Use as a lab amp for signal generators, plus many foreign users employ the LPA-1 to boost the power of their FM Stereo transmitters, providing radio service through an entire town. Power required: 12 to 15 volts DC at 250mA, gain of 38dB at 10 MHz, 10 dB at 1000 MHz. For a neat, professionally finished look, add the optional matching case set.

LPA-1, Power Booster Amplifier Kit \$39.95
CLPA, Matching Case Set for LPA-1 Kit \$14.95
LPA-1WT, Fully Wired LPA-1 with Case \$99.95

Micro FM Wireless Mike



World's smallest FM transmitter. Size of a sugar cube! Uses SMT (Surface Mount Technology) devices and mini electret condenser microphone, even the battery is included. We give you two complete sets of SMT parts to allow for any errors or mishaps-build it carefully and you've got extra SMT parts to build another! Audio quality and pick-up is unbelievable, transmission range up to 300 feet, tunable to anywhere in standard FM band 88 to 108 MHz. 7/8" w x 3/8" h x 3/4" h.

FM-5 Micro FM Wireless Mike Kit \$19.95

Crystal Controlled Wireless Mike



Super stable, drift free, not affected by temperature, metal or your body! Frequency is set by a crystal in the 2 meter Ham band of 146.535 MHz, easily picked up on any scanner radio or 2 meter rig. Changing the crystal to put frequency anywhere in the 140 to 160 MHz range-crystals cost only five or six dollars. Sensitive electret condenser mike picks up whispers anywhere in a room and transmit up to 1/4 mile. Powered by 3 volt Lithium or pair of watch batteries which are included. Uses the latest in SMT surface mount parts and we even include a few extras in case you sneeze and loose a part!

FM-6, Crystal Controlled FM Wireless Mike Kit \$39.95
FM-6WT Fully Wired FM-6 \$59.95

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we've packed into the FM-100. Set frequency easily with the Up/Down freq buttons and the big LED digital display. Plus there's input low pass filtering that gives great sound no matter what the source (no more squeals or swishing sounds from cheap CD player inputs!) Peak limiters for maximum punch in your audio - without over modulation, LED bargraph meters for easy setting of audio levels and a built-in mixer with mike and line level inputs. Churches, drive-ins, schools and colleges find the FM-100 to be the answer to their transmitting needs, you will too. No one offers all these features at this price! Kit includes sharp looking metal cabinet, whip antenna and 120 volt AC adapter. Also runs on 12 volts DC.

We also offer a high power export version of the FM-100 that's fully assembled with one watt of RF power, for miles of program coverage. The export version can only be shipped outside the USA, or within the US if accompanied by a signed statement that the unit will be exported.

FM-100, Professional FM Stereo Transmitter Kit \$299.95
FM-100WT, Fully Wired High Power FM-100 \$429.95

Speech Descrambler Scrambler



Decode all that gibberish! This is the popular descrambler / scrambler that you've read about in all the Scanner and Electronic magazines. The technology used is known as speech inversion which is compatible with most cordless phones and many police department systems. hook it up to scanner speaker terminals and you're in business. Easily configured for any use: mike, line level and speaker output/inputs are provided. Also communicate in total privacy over telephone or radio, full duplex operation - scramble and unscramble at the same time. Easy to build, all complex circuitry contained in new custom ASIC chip for clear, clean audio. Runs on 9 to 15VDC. RCA phono type jacks. Our matching case set adds a super nice professional look to your kit.

SS-70A, Speech Descrambler/Scrambler Kit \$39.95
CSS, Custom Matching Case and Knob Set \$14.95
SS-70AWT, Fully Wired SS-70A with Case \$79.95
AC12-5, 12 Volt DC Wall Plug Adapter \$9.95

Tone-Grabber Touch Tone Decoder / Reader



Dialed phone numbers, repeater codes, control codes, anywhere touch-tones are used, your TG-1 will decode and store any number it hears. A simple hook-up to any radio speaker or phone line is all that is required, and since the TG-1 uses a central office quality decoder and microprocessor, it will decode digits at virtually any speed! A 256 digit non-volatile memory stores numbers for 100 years - even with the power turned off, and an 8 digit LED display allows you to scroll through anywhere in memory. To make it easy to pick out numbers and codes, a dash is inserted between any group or set of numbers that were decoded more than 2 seconds apart. The TG-1 runs from any 7 to 15 volt DC power source and is both voltage regulated and crystal controlled for the ultimate in stability. For stand-alone use add our matching case set for a clean, professionally finished project. We have a TG-1 connected up here at the Ramsey factory on the FM radio. It's fun to see the phone numbers that are dialed on the morning radio show! Although the TG-1 requires less than an evening to assemble (and is fun to build, too!), we offer the TG-1 fully wired and tested in matching case for a special price.

TG-1, Tone Grabber Kit \$99.95
CTG, Matching Case Set for TG-1 Kit \$14.95
TG-1WT, Fully Wired Tone Grabber with Case \$149.95
AC12-5, 12 Volt DC Wall Plug Adapter \$9.95



Mini-Peeper Micro Video Camera

Super small, high quality fully assembled B & W CCD TV camera the size of an ice cube! Provides excellent pictures in low light (2 lux), or use our IR-1 Infra-Red light source to invisibly illuminate an entire room on a pitch black night! Imagine the possibilities... build it into a smoke detector, wall clock, lamp, book, radio. Exact same camera that's in big buck detective catalogues and stores. Kit includes: fully assembled CCD camera module, connectors, interface PC board kit with proper voltage regulation and filtering, hook-up details, even a mini microphone for sensitive sound! Two models available: Wide Angle Lens 3.6mm/1/2, adjustable focus lens, 92 degree view; Pinhole Lens 5.5mm/1/4, 60 degree view. The Pinhole Lens is physically much flatter and provides even greater depth of focus. The camera itself is 1.2" square. The Wide Angle Lens is about 1" long, Pinhole Lens about 1/2", interface PC board is 1" x 2" and uses RCA jacks for easy hook-up to VCRs, TVs or cable runs. Power required is 9 to 14 VDC @ 150 mA. Resolution: 380 x 350 lines. Instruction manual contains ideas on mounting and disguising the Mini-Peeper along with info on adding one of our TV Transmitter kits (such as the MTV-7 unit below) for wireless transmission!

MP-1, Wide Angle Lens CCD TV Camera Outfit \$169.95
MP-1PH, Pin-Hole Lens CCD TV Camera Outfit \$189.95

MicroStation Synthesized UHF TV Transmitter



Now you can be in the same league as James Bond. This transmitter is so small that it can fit into a pack of cigarettes - even including a CCD TV camera and battery! Model airplane enthusiasts put the MTV-7A into airplanes for a dynamite view from the cockpit, and the MTV-7A is the transmitter of choice for balloon launches. Transmitter features synthesized, crystal controlled operation for drift-free transmission of both audio and video on your choice of frequencies: Standard UHF TV Channel 52 (which should only be used outside of the USA to avoid violating FCC rules), and 439.25 MHz or 911.25 MHz which are in the amateur ham bands. The 439.25 MHz unit has the nifty advantage of being able to be received on a regular 'cable-ready' TV set tuned to Cable channel 68, or use our ATV-74 converter and receive it on regular TV channel 3. The 911.25 MHz unit is suited for applications where reception on a regular TV is not desired, an ATV-79 must be used for operation. The MTV-7A's output power is almost 100 mW, so transmitting range is pretty much 'line-of-sight' which can mean many miles! The MTV-7A accepts standard black and white or color video and has its own, on-board, sensitive electret microphone. The MTV-7A is available in kit form or fully wired and tested. Since the latest in SMT (Surface Mount Technology) is used to provide for the smallest possible size, the kit version is recommended for experienced builders only. Runs on 12 VDC @ 150 mA and includes a regulated power source for a CCD camera.

MTV-7A, UHF TV Channel 52 Transmitter Kit \$159.95
MTV-7AWT, Fully Wired Channel 52 Transmitter \$249.95
MTV-7A4, 439.25 MHz TV Transmitter Kit \$159.95
MTV-7A4WT, Fully Wired 439.25 MHz Transmitter \$249.95
MTV-7A9, 911.25 MHz TV Transmitter Kit \$179.95
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ATV-74, 439.25 MHz Converter Kit \$159.95
ATV-74WT, Fully Wired 439.25 MHz Converter \$249.95
ATV-79, 911.25 MHz Converter Kit \$179.95
ATV-79WT, Fully Wired 911.25 MHz Converter \$269.95

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Blowing in the Wind

I read Bob Grove's *Closing Comments* in this issue with mixed feelings. I know of no other publication or business which has published such a comprehensive summary of where our hobby and our business stand today. It's a little like standing on a hilltop in a hospital gown ... On the other hand, there are those who will be convinced it must be a whitewash of our true situation: it isn't.

The truth regarding the radio hobby is not all good—nor is it all bad. A recent phone conversation with columnist Ken Reitz reminded me that the next ten years or so are likely to be an unprecedented era for radio. There are still plenty of analog transmissions to enjoy. We can still experience the excitement of building a crystal set or renovating an old tube receiver and have our handiwork rewarded by the reception of live signals. On the other hand, we live in an era of tremendous strides in digital technology, making possible a quality and quantity of communication never dreamed of, even in our own youth. For a brief time we have the opportunity to experience the best of both worlds—let's make the best of it!

Bob Grove makes reference to the flexibility and diversity of Grove Enterprises and its staff. Much the same has been true of *Monitoring Times*—as modes of communication change, so does the content of the magazine. I'm proud to say we're "flexing" again, with the addition of a significant new column: *PCS Front Line*. The author of this regular department is Dan Veeneman, whose professional background includes an engineering degree from Northwestern University, management and technical positions in the computer industry, including local and wide-area networks, Internet connectivity, and security and encryption services. Of interest to *MT* readers is the fact that, on the side, Dan also edits a quarterly newsletter on cryptography.

Dan is interested in emerging personal communication systems from both the user and the professional perspective. Once you have read his opening article, I guarantee the concept of "PCS" will begin to take shape, even though the systems themselves are likely to remain fluid as technology, legislation, and customer requirements change. Dan will help us keep on top of what's hot, what's not, who's proposing projects, and who's disposing spectrum space. I'm also happy to announce you can meet our new

columnist at the *MT/ST* table at the Grove Expo this month!

Just the FAX, Ma'am

We have had inquiries about additional ways to acquire the JV-FAX program used by Brian Webb in his August weather fax article. Mike Rausch tells us it's available several places on the Web, including the ARRL site and <ftp://ftp.funet.fi/pub/ham>. If you are a reader without Internet access, *MT* has obtained a copy of the program. Send \$3 plus a 3-1/2" IBM high density disk, and we'll mail one out to you.

John Mayson of Palm Bay, Florida, has another mode of wefax reception he says is even easier: Paul Hitchcock of Berkeley, California, "wrote some software that allows a person to receive faxes through a PC sound card. The only item you may need to buy is the patch cable to run between the radio and the MIC input of the sound card. I use this software and it works great. My only warning to would-be users is they must be completely out of Windows for this software to work. The software is available at <ftp://www.cdrom.com/pub/hamradio/grzii/misc/wxman2.zip>

"Similarly there is software allowing you to receive SSTV through a sound card. It is available at:

<ftp://www.cdrom.com/pub/hamradio/oak/arrl/bbs/programs/sstvbl.zip>"

John invites readers to visit his radio related web page at:

<http://www.spacecoast.net/users/jmayson/radio.htm>

In the same August issue, Ken Reitz wrote about the National Weather Services Emergency Managers Weather Information Network (EMWIN) and how the public can tap into this informative data stream. Referenced in the article was Zephyrus Electronics, which sells a complete package for EMWIN reception. We received the following information from Jack Long of SkyWalker Data Systems which also supplies weather reception systems.

"EMWIN is spreading rapidly across the country. There are five VHF stations broadcasting in Oklahoma now, with more coming on line every month. Our site plan, with frequencies already assigned, calls for a total of at least 15 in Oklahoma alone.

"The rapid growth results from the availability of the signal on the GOES satellites at *no cost* to users, and high quality download

SKY WALKER

equipment at reasonable prices. The National Weather Service Southern Region office has just purchased the SkyWalker/Wilmanco system from us, to be used by the Tulsa Forecast office in a demonstration project on Cavanal Mountain in eastern Oklahoma ... The National Weather Service in Silver Spring, Maryland, after extensive testing of several packages, has purchased two more units from us, one for Hawaii and one for Puerto Rico. Our equipment also feeds the Tulsa and Miami, Oklahoma, stations.

"If you would like to have a complete update on everything that is happening in the EMWIN world, check out our new web site at www.webczar.com/skywalker. You'll find a full description of EMWIN, WeatherNode software, transmitting sites, equipment specs, and links to all the key players. If your questions are not answered there, drop us an e-mail.

"We'd appreciate it if you would let your local Emergency Management people know how to find our site. We believe you will all find it useful." (Jack Long, SkyWalker Data Systems, 7303 W. 35th Street, Tulsa, OK 74107, 918-445-1488)

We've been gratified to see the increase in equipment available to private citizens for access to National Weather Service information, including a system from *ST* advertiser Swagur Enterprises (608-592-7409; www.execpc.com/~swagur/). Our best advice is: shop around.

Thanks for the Break

In response to reader requests, we are now providing a 6-month subscription option. Here's one response we received to the offer: "I commend the powers-that-be for their starting the 6-month subscription offer. Things have been a bit tight for me lately, so it really did make the difference concerning my renewing. All I can say is thanks to you all for providing an excellent magazine, and continued best wishes! Cheers," Frank

Continued best wishes to our readers as well from *Monitoring Times*, your personal source for communications information.

—Rachel Baughn, mteditor@grove.net

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Raucous Rock and Roll in Tidewater

WKOC-FM, a station in the Norfolk/Virginia Beach radio market, recently changed to the identical rock format played by WNOR-FM, also in the same radio market. As with any such competition between stations, you can expect some fireworks. In Norfolk/Virginia Beach, however, things apparently overheated and spilled out onto the streets in the form of fistfights.

Within days of the change, WNOR disc jockey Tommy Griffiths sued ex-partner Henry Del Toro, who now anchors the morning show on WROX-FM, also in Norfolk/Virginia Beach market. Griffiths says that Del Toro repeatedly called Griffiths a drug addict on the air.

Then there was the remote broadcast by WNOR at a K-Mart. Who shows up but several WROX staffers. According to WROX's owner, the WNOR staff "went ballistic." When the smoke cleared, warrants had been issued against two WNOR employees, including program director Harvey Kojan, who allegedly assaulted WNOR's William Russ. WNOR promotions assistant William Fiveash, in turn, allegedly assaulted WROX's Tammy McClanahan. WNOR General Manager Jeff Scarpelli, however, says that "no attack took place."

Future Scanner Action

Next time you're scanning the air bands and think that it's a little dull, be thankful. According to the *Boston Globe*, a major failure in air traffic control in at least one region may be just a matter of time.

Over the past several years, says reporter Matthew Brelis, there have been more than

"Boston Control, I'm not questioning your authority, but isn't this holding pattern you have me in a tad congested?"



600 radar, computer, power, and runway-light glitches at Logan International Airport and at the Boston Regional Air Traffic Control Center in Nashua, New Hampshire. Air traffic controllers there direct planes over some 270,000 square miles from Lake Erie to 100 miles out into the Atlantic. On average once every two days some piece of equipment breaks or shuts down. Outages last anywhere from seconds to more than a day.

According to Robert Charette, a computer-risk analysis consultant, "probability theory says that one of these days everything will go wrong at the same time." In the meantime, to keep the system running, the controllers have purchased parts on their own rather than waiting for replacements to be ordered. "It's easier to go to Radio Shack for a transistor or resistor," said one controller.

Yo, Yonkers! Use Your Head!

According to the *New York Times*, Yonkers, New York police will soon be using a new digital system that will make it impossible to scan. Part of the decision to go digital was to keep information away from criminals. Lieutenant Daniel Daly of the department's planning and management division says that "there are often cases where car thieves or burglars carry scanners tuned to police frequencies. This alerts them to the whereabouts of the police. They won't be able to do that anymore."

Nor will we be able to help you, Lt. Daly.

Not In Yonkers

Two accused robbers are today behind bars, thanks to a local scanner listener in Canton, Ohio. Authorities credit Madison County Supervisor David Richardson with helping to chase down the pair. Armed with a scanner, Richardson followed the two at high speeds down twisting country roads before the two were captured by deputies.

"It think it was above and beyond the call of duty," said Joe Pennington, who owns the business the two men are accused of robbing.

Playing Ball

Early last year, Motorola, the multi-national communications giant unveiled SportsTrax, a wireless pager-like device that delivers baseball scores, base runner positions, innings, and outs on a diamond display. Motorola also reportedly engaged in negotiations with the NBA for basketball, as well, but no deal was reached.

This season, Motorola apparently added

basketball anyhow, to which the NBA responded with a lawsuit. Motorola, said the suit, was neither licensed nor authorized by the NBA to provide play-by-play.

A U.S. Federal Judge agreed, ruling that Motorola's conduct constituted "commercial misappropriation" and ordered them to stop marketing the \$200 "toy." There was no word as to whether any damages were awarded.

Scanner Music

According to reports received at *Monitoring Times*, a British band is making a name for itself by using a radio during its performance. Called "Scanner," the band actually incorporates a scanner tuned to pick up cellular phone calls into its music. Because the transmissions are live, each performance is different. Check their home page at <http://www.obsolete.com/scanner/> for dates and places of their American tour.

"And then she ordered some pizza and beer, yeah, yeah, yeah ..."



Hang 'Em High!

Use a CB over the legal power limit in Beloit, Wisconsin, and you could get hit with a \$10,000 fine. City council there unanimously approved a measure that they say will stop CB interference with people's telephones, televisions, and stereos. Beloit city officials took the action because they said that FCC agents are not conveniently available to arrest CB users."

"CBers who protested the action says that they will now be the victims of a witch-hunt. "Now if people get the slightest bit of interference, they'll be looking for the first antenna they see," said local radio operator Robert Smith.

Shortly after the passage of the local law,

Sen. Russ Feingold, D-Wis., announced that he planned to introduce legislation to help other communities regulate misused CB radios. Feingold wants federal law amended to let municipalities enforce FCC regulations on radio frequency interference.

Run! Hide! Great Radio Listening is Coming!



We're all in big trouble. This could be the big one. Yes, the media is already warming up for another overhype. This time the big story is not the much-anticipated (but never materialized) clouds of killer bees swarming at our borders. It's not the Comet Kehoutec. It's not entitlement programs, either. This time the world is on the brink of disaster from—solar storms.

In an article headlined, "A Solar Storm Warning," reporter Lee Bowman warns in the *Cleveland Plain Dealer* that "a billion-ton wave of super-hot, electrically charged gas from the sun [will] crash into the Earth's magnetic field at 620 miles per hour. By the time people in Florida notice a spectacular display of northern lights, it will probably be too late," says Bowman, "The Storm of the Millennium may be well under way."

Should you begin to make preparations for the end? Head for the hills wrapped in a white sheet? Believe it or not, the object of all of that hype is nothing more than the coming of the next peak of the 11 year solar cycle and it means little more than several years of some really great communications monitoring. Get prepared? Yeah. Get your radio gear ready.

Yo Ho Ho

Allen Weiner is back on board. Weiner, the genius behind Radio New York International (RNI) and another shipboard partnership with religious broadcaster Brother R. Stair, is taking to the high seas again. This time, Weiner has put new shortwave and mediumwave transmitters aboard the *Electra* and may be heading for France. The ship is very seaworthy, he says. Weiner is outfitting the vessel with more digital

equipment than old military surplus.

Weiner is not taking any chances this time, either. RNI and a second operation were both closed down by the FCC. He's been sending press releases to the FCC and has hired an independent laboratory to monitor the ship and report any RF emissions coming off it. While the *Electra* is being outfitted, "we're not even going to allow a microwave oven."

The bottom line for the *Electra* venture, says Weiner, is to bring environmental issues and "peace, love, and understanding about the oceans and the peoples of the world to listeners."

Stealing from the Leprechauns

Fifty-four megahertz of television spectrum allocated to the new digital TV may be withheld and auctioned off instead. If

"The radio spectrum? It's mine, ALL mine!"



all goes as planned, the spectrum could be officially reallocated within a year and auctions scheduled soon after. According to the FCC, Chairman Reed Hundt endorsed the goals saying that "we stand under the rainbow...looking at a pot of gold." He estimates the frequencies would bring in some \$50 billion.

The FCC previously auctioned off the old TV channels 70-84 for cellular use. The new spectrum would reportedly come from TV channels 60-69.

Meanwhile, the FCC just gave 216-217 MHz for unlicensed devices that could be used to track stolen money or to help hard-of-hearing students listen to a classroom teacher. Those devices will operate at low power and share the band with maritime radios.

Communications is written by Larry Miller with help from Rachel Baughn and the following readers who are members of the a group as distinguished as the Washington Press Corp, the *Monitoring Times* Media Monitoring Team: Mr. Anonymous; Bob Grove, Brasstown, NC; Harvey Graves, Akron, OH; Russell Hood, Europa, MS; Clay Irving; T.R., Yonkers, NY; Maryanne Kehoe, Atlanta, GA; Kevin John Klein, Appleton, WI; Wesley Nelson, Seymour, IN; Ira Paul, Royal Oak, MI; Doug Robertson, Oxnard, CA; John Sill, Lynn, MA; Richard Sklar, Seattle, WA; Walter Szczepaniak, Philadelphia, PA and David Zantow, Janesville, WI.

We also consulted the following publications and organizations and list their names in appreciation: *National Scanning*, *Radio World*, and the *W5YI Report*.

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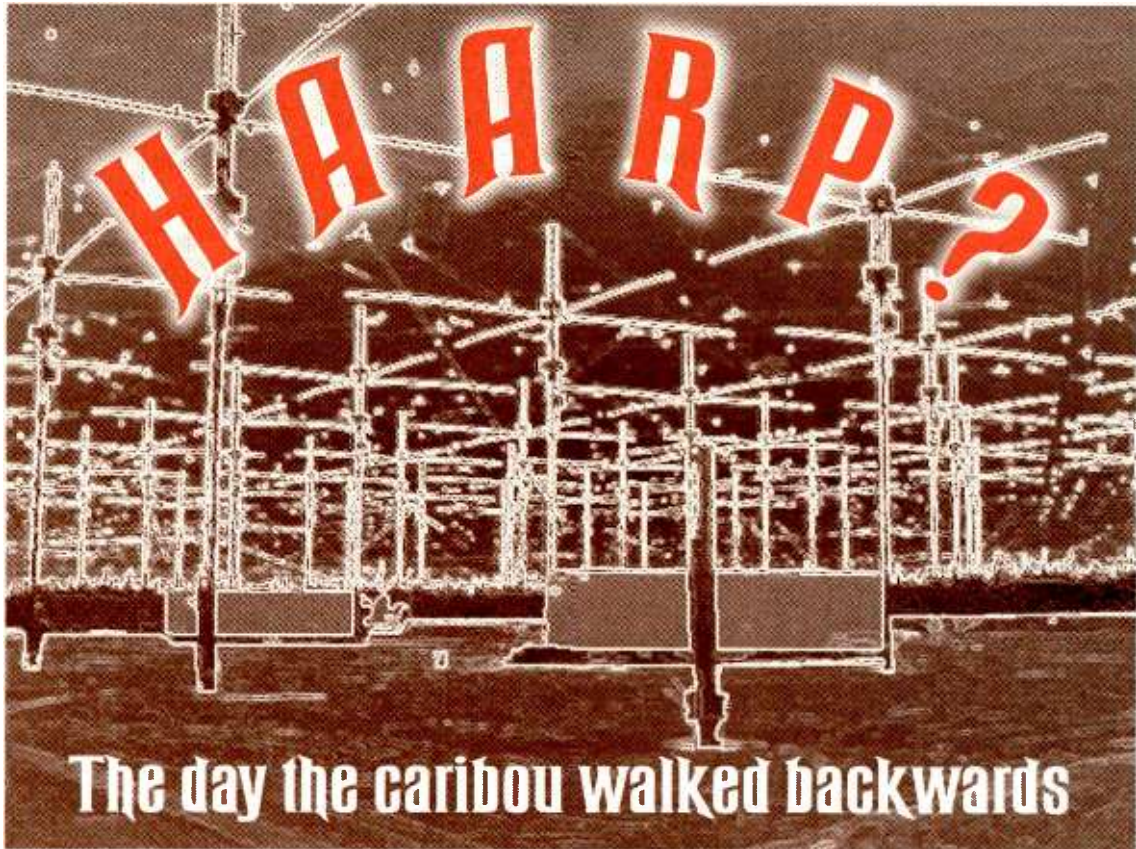
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Who's Playing Hell with



The IRI antenna array in Alaska, electronically solarized to suggest the ultimate power of the planned transmission tests. The structures that resemble umbrella frames are the antennas used to direct HAARP transmissions upward. The shelters at ground level house the transmitters used to generate HAARP's signals.

An *MT* Investigative Report
By **Wayne Mishler**

The Pentagon's controversial HAARP project has drawn fire from television broadcasters, writers, publishers, and concerned citizens. Some say it could wipe out worldwide radio communications and disrupt the ionosphere to the point of destroying aircraft and missiles in-flight. It has been called a star wars weapon in the making, a devious military plot to control minds and dominate the world, vandalism in the sky, and the beginning of the end of the Earth. In some cases the tension has approached panic stages.

What is this monster? Is it really capable of doing these sinister things? To learn the truth, *MT* launched into an investigative research project. We talked to people who actually work with HAARP, the High Frequency Active Auroral Research Program. We gathered comments and information from people who live near the project. We searched the Internet for different viewpoints and facts that we could verify. We talked with the United Nations and international science communities. We approached the story with an open mind and asked hard questions. In this article we share with you what we learned. Our findings may surprise you.

For years to come, Alaskans will be telling their grandchildren about the day the caribou walked backwards in Glennallen, a small town 147 miles northeast of Anchorage. A resident telephoned that strange story to the *Anchorage Daily News*, and identified the cause. It was, of course, that newfangled HAARP transmitter the government had built down the road at Gakona. They'd heard it was capable of mind control. Here was proof: moonwalking caribou.

There was, however, a flaw in their theory. "It hadn't fired. It was not operating. To make those [kinds of] conclusions [at that time] was wrong," admitted one of the HAARP project's strongest critics, Alaska resident Nick Begich, son of the former U. S. Rep. Nick Begich, and co-author of a critical book entitled *Angels Don't Play This HAARP*.

Wrong or not, that premature report of dancing caribou typifies the public's reaction to the HAARP project. "Some people are very frightened," the *Anchorage Daily News* reported. And no wonder. Anyone who hasn't been in a coma or cave the past year has undoubtedly heard or seen at least some of the hyped press coverage leveled at the HAARP project. Critics warn that it will irreparably damage the Earth's magnetic field and possibly destroy the ionosphere, leaving Earthlings to wriggle and fry with no protection from the Sun. The stories sell books and boost television ratings, and there's no question that writers and reporters have exploited the obvious opportunity.

The *Anchorage Daily News*, which sets on the doorstep of the HAARP facility and takes phone calls from fearful residents, expresses concern over "the danger of confusing people" about the capabilities of this controversial facility.

■ The Truth about HAARP

HAARP is a government-coined acronym for High frequency Active Auroral Research Program. It is essentially a system of high frequency (HF) transmitters and directional antennas known as the Ionospheric Research Instrument (IRI). It is located on a government-owned 33-acre clearing in a black spruce forest near Gakona, about 160 miles east of Anchorage. The Gakona site was chosen primarily because of its location in the auroral zone where ionospheric fluctuations are prevalent and most conducive to scientific experiments.



The HAARP site is located at 62 degrees 23.5 minutes North, and 145 degrees 8.8 minutes West. This places it about 160 miles northeast of Anchorage, about 13 miles northeast of Glennallen (near Gakona), and about 160 miles southeast of Fairbanks.

The most visible part of the IRI is its huge antenna array which sits on a gravel pad 1000 wide and 1200 feet long. When completed, the array will include 180 antenna towers, each 72 feet high. The towers are mounted at the intersections of gridlines 80 feet apart. At the top of each tower are two dipole antennas. One of the dipoles is adjusted to operate in the 2.8 to 7 MHz range; the other in the 7 to 10 MHz range.

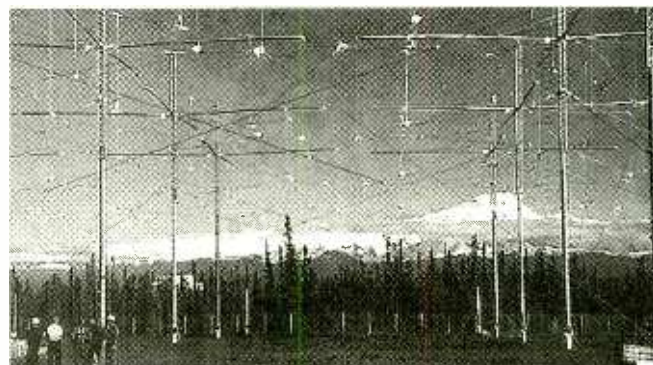
The two dipoles are mounted horizontally like a large "X" at the top of each tower. Only one of the dipoles on each tower can be in operation at any given time, depending on the output frequency. A metal screen stretches between the towers 15 feet off the ground, forming a continuous reflector for the antennas. During transmissions, the screen "catches" downward-directed RF energy and re-directs it upward. This intensifies the beam and helps to protect people and animals on the ground from intense RF fields when the transmitters are in operation.

On the ground beneath the antenna array are 30 transmitter shelters. Each shelter houses 12 diesel-powered transmitters which can be switched to drive either the low-band or high-band dipoles. Each transmitter is capable of generating 10,000 watts of RF power. Collectively as a system they can send 3.6 million watts of raw RF output to the antennas. The transmitters can be adjusted in amplitude and phase to focus the RF signal into a narrow upward beam with about 30 decibels of gain. This produces an effective radiated power of about 3.6 billion watts.

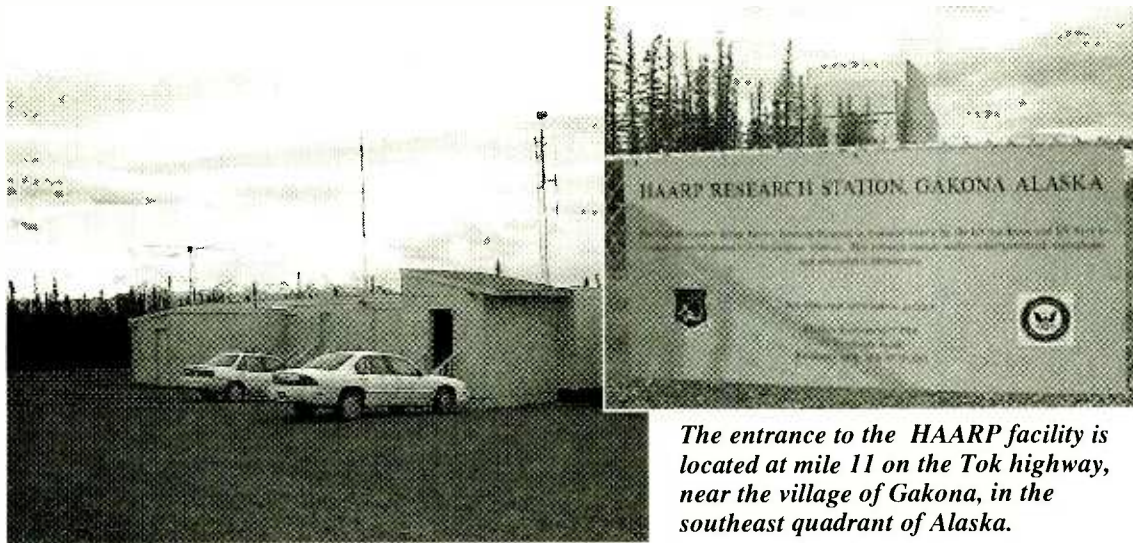
Ionospheric heaters around the world have been probing the ionosphere since the 1950's. But HAARP is different because it has the capability of steering its RF beam, operating on more frequencies, and using a greater array of scientific instruments to measure the results of its experiments.

The beam can be steered or aimed at specific regions of the ionosphere—the layered portion of the atmosphere that stretches from about 35 to 500 miles above the Earth. The ionosphere is created by solar winds striking the Earth's outer atmosphere. The ionosphere is in a constant state of change, dependent on solar activity. When conditions are right, the layers of the ionosphere can reflect (or propagate) radio signals back to Earth, making possible world-wide radio communications. The layers also absorb some of the signals. How deeply a signal can penetrate into the ionosphere depends on a number of factors, including frequency of the signal. In other words, different layers of the ionosphere can be excited by varying the frequency of the radio signal.

An RF beam is essentially electromagnetic energy. When an RF beam strikes the ionosphere, some of the signal is reflected back to Earth, some penetrates the ionosphere and is



HAARP engineers (lower left) examine the main antenna array.



The entrance to the HAARP facility is located at mile 11 on the Tok highway, near the village of Gakona, in the southeast quadrant of Alaska.

Temporary trailers house the control center for the HAARP development prototype as well as all currently installed diagnostic and scientific instruments. The antenna masts in the background are (left to right) the spectrum monitor HF antennas, the spectrum monitor VHF/UHF tower, and the X-band aircraft detection radar tower.

lost in space, and the rest is absorbed. The energy in the beam that is absorbed changes to heat in the gaseous molecules of the ionosphere. In this sense, a strong radio signal can be an ionospheric heater. The more powerful the signal, the greater the heating effect. Scientists theorize that targeted portions of the ionosphere can be raised in altitude by increasing the temperature of its ionic molecules.

HAARP is fundamentally an ionospheric heater with steerable beam. In operation it will attempt to excite targeted portions of the ionosphere so that scientists can measure the results with test instruments. One of the test instruments is a radar device that will measure densities of affected electrons, temperatures of affected electrons and ions, and Doppler velocities in the stimulated region, and compare them with those in the unstimulated portions of the ionosphere. The HAARP facility includes a huge inventory of other sophisticated test instruments, including ELF (extremely low frequency) and VLF (very low frequency) receivers.

Scientists will attempt to use the IRI to generate ELF signals by heating the ionosphere. Research at other facilities indicates that this is possible. These low frequencies are actually byproducts of the ionospheric heating process. The ELF signals are created in the HF-excited regions of the ionosphere at an altitude of about

80 km, and radiate toward Earth. Theoretically they could be modulated to carry intelligence. Potential uses include improved communications with submarines, and geophysical exploration.

To date HAARP's transmitters have operated in tests at power levels far below their capability. Currently the transmitters are silent. No doubt they will be fired up periodically in additional tests. But the facility is not scheduled to go into full operation until sometime in the year 2002.

■ The need for ionospheric research

The ability to understand, predict, and perhaps even enhance ionospheric propagation could have profound effects on world-



The HAARP facility is located in a clearing in black spruce forest, as shown in this aerial view of the prototype. The smaller pad in the lower left corner contains two riometers. The larger pad contains the 48-element developmental prototype of the main antenna array. The aircraft detection radar is located out of view off the lower left corner of the photograph. The mountain in the background is Mt. Sanford of the Wrangle-St. Elias Park.

wide communications. The ionosphere's ability to reflect, distort, and absorb radio signals certainly affects the quality of civilian and military communications, navigation, surveillance, and remote sensing systems.

Long-range HF radio signals usually "hop" many times from ground to ionosphere to ground in their journey around the world. In the process, they are subject to amplitude fading. This is caused by interference between signals that take different paths from transmitter to receiver. The effects of the ionosphere are not limited to HF radio. Satellite links must pass through the ionosphere en route to and from the Earth. Because of their typically higher frequencies, satellite links are especially susceptible to absorption in the ionosphere.

Because space-based civilian and military systems must transmit through the ionospheric shield, their quality of performance depends on monitoring and using to best advantage ionospheric conditions. But, scientists want to go beyond passive monitoring and forecasting. They want to find out whether "controlled modification" of specific portions of the ionosphere can enhance the performance of these systems. Results from tests by other ionospheric heaters around the world have suggested that the ionosphere can be controlled. However, the only way to find out if ionospheric heating can be used to improve communications is to conduct scientific experiments on a small scale and monitor the results.

HAARP experiments are intended to stimulate and control plasma processes in tiny localized regions in the ionosphere, measure the results, and use this data to improve the planning of space-based systems in the future.

■ The military connection

To be sure, the U. S. military has more than a passive interest in the outcome of HAARP, which could have a vital impact on U. S. national security. The HAARP site is owned by the U. S. Department of Defense, and operated under the auspices of the Pentagon jointly by the Air Force

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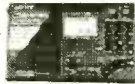
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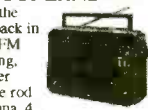
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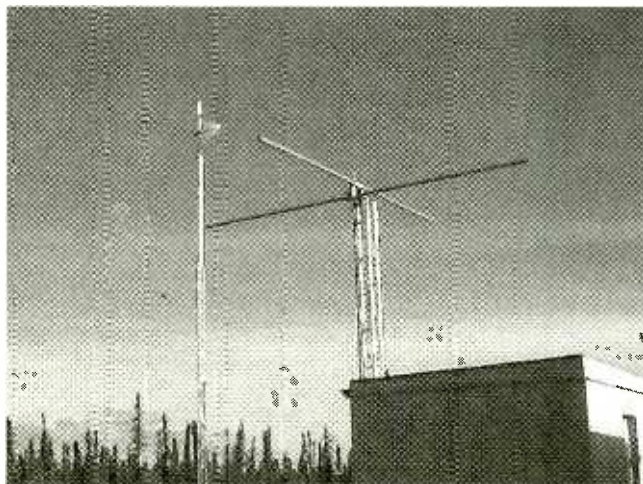
Phillips Laboratory and the Navy's Office of Research.

One area of military interest centers on improving the performance of existing communication, surveillance, and navigation systems. But there are other unexplored possibilities that military officials expect to emerge from HAARP research. These include new technologies to detect underground objects, communicate to great depths in the sea and Earth, and generate infrared and optical emissions. With this power at its fingertips, the world would not have to guess whether or not offending nations were hoarding underground nuclear weapons. Military officials could use ionospheric technology to look deep inside the Earth or its oceans to see for themselves.

Studies of the ionosphere are necessary to unlock the underlying principles necessary for developing and perfecting such complex and far-reaching technologies. There is an old military axiom that says, in essence, that superiority goes to "whoever gets there fastest with the mostest." If the ionosphere does hold secrets to enhance military operations, the nation that unlocks them first could have a global military advantage. The basic mission of the U. S. Navy and Air Force is to ensure

freedom of movement and commerce on the sea and in the air for everyone. The ability to prevent domination of the ionosphere by any individual nation or group of nations is obviously essential to that mission.

The government claims that HAARP is "a major Arctic facility for upper atmospheric



The Spectrum Monitor uses three antennas to monitor the electromagnetic environment in the vicinity of the HAARP installation. One of the antennas consists of two crossed dipoles mounted 25 feet above ground. They receive signals in the 2-30 MHz range. The antenna elements are 15 feet long and fed by low loss heliax coaxial transmission line through a wideband balun and impedance transformer.

and solar-terrestrial research." Officials overseeing the project deny that the facility is designed for military operations. On the surface there is no question that at this point it is a research facility intended to answer scientific questions about the ionosphere's relationships to the Earth and the Sun. Nor is there any question that much of the research could be used for developing important new civilian and military technologies.

■ HAARP's effects on shortwave listening

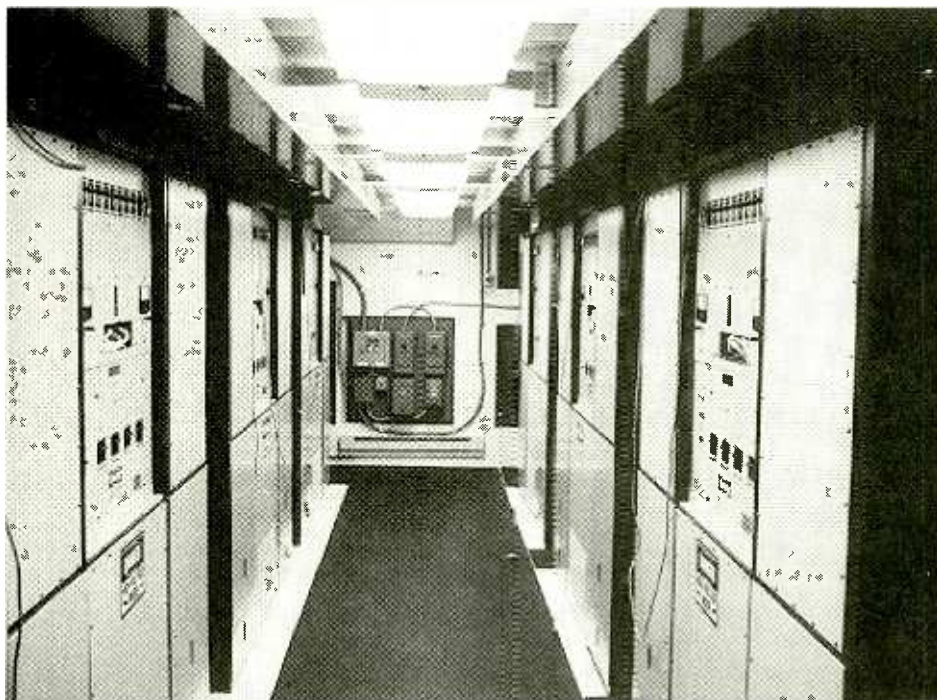
There may be cases where propagation could be affected by the IRI. For example, if an SWL in the U.S. is monitoring a radio broadcast originating overseas with a signal path over Alaska, and the IRI is operating at the time, it is possible that propagation of the broadcast could be interrupted. Certainly the IRI transmissions will be heard on HF transmitters. They will probably be short bursts of pure CW or possibly modulated CW.

"There will be a wide variety of experiments, each one demanding a different duty cycle, modulation type," says HAARP engineer Ed Kennedy. "A lot of ionospheric research is conducted with CW-only type transmissions. This would appear to be only a carrier signal with no modulation to someone tuning through the band."

But there may be times when HAARP produces some interesting listening. "HAARP has been suggested as an element of a disaster communication network in Alaska. Under these conditions, there might be voice modulation. But there are no experiments planned with voice," Kennedy explains.

The HAARP antenna array is essentially a directional high-gain antenna. As with any antenna of this type, there will be a primary lobe accompanied by side lobes of lesser strength. These side lobes could strike the ionosphere at angles that would allow them to be reflected rather than absorbed by the ionosphere. In such a case, the side lobes could be propagated like ordinary HF radio transmissions. If so, they could be detected around the world.

"Since the predominate transmission direction is straight up, the area where we might expect [radio] interference is in Alaska," says Kennedy. "We measured signal strengths [while testing] the program. Using computer-



Inside the transmitter shelters there are six transmitter cabinets with two transmitters in each cabinet: one for each of the two frequency ranges in which HAARP will operate.

controlled spectrum analyzers, we found few occasions when the signal caused interference. The Alaskan ionosphere is very bad [for radio propagation] as most Alaskan hams will testify."

The HAARP program maintains a special telephone line (907) 822-5497 dedicated to receiving calls of suspected radio frequency interference (RFI). When the IRI is in operation, this telephone number rings in the control room and a person will answer it. When the facility is shut down, the phone is connected to an answering machine with an announcement that no testing is being conducted. We called this number in preparing this article and reached the answering machine.

A committee with local and national representatives has been formed to review RFI complaints. The first meeting was held last year in Glennallen. There are representatives from the local community, the Aircraft Owners and Pilots Association, ALASCOM (telephone service), Alyeska Pipeline Service Co., American Radio Relay League, Coast Guard, Federal Aviation Administration, U. S. Fish & Wildlife Service, Alaska Fish & Game Department, HAARP environmental liaison officer and operations staff, the National Park Service, Naval Research Laboratory, and Alaska Military Command,

In addition to reviewing RFI complaints, these representatives and others will oversee the future operations of the HAARP facility within their respective fields of expertise. But critics say this is not enough.

■ The HAARP controversy

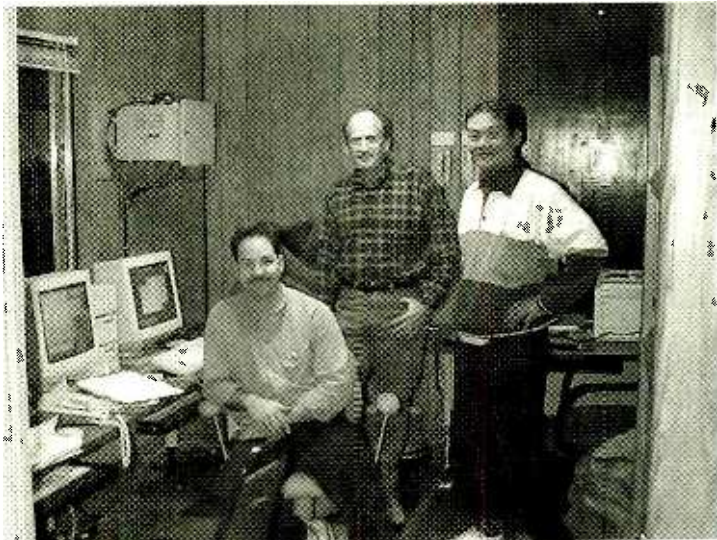
The controversy surrounding HAARP stems primarily from its potential for altering and exploiting the ionosphere for military purposes. The controversy was undoubtedly intensified during the autumn of 1995 by the publishings of Begich's book and a *Popular*

Science magazine article entitled *Mystery in Alaska*. Both portrayed HAARP as a dangerous experiment with a devious military agenda.

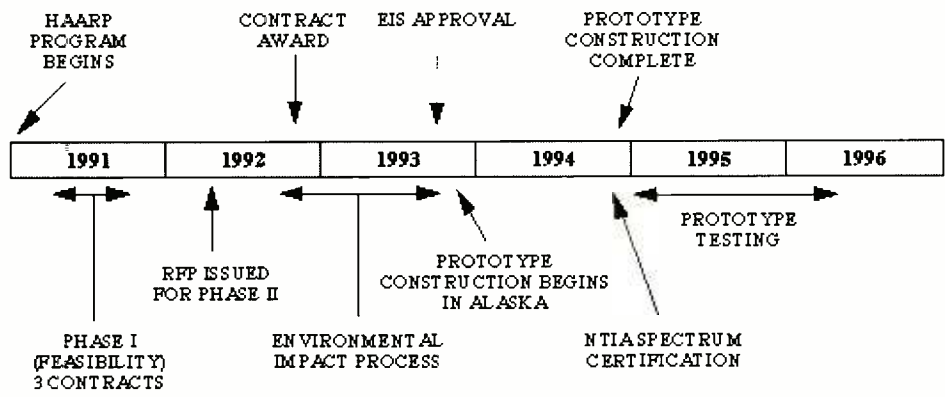
The highly critical article appeared in the September 1995 edition of *Popular Science*. It portrayed HAARP as having a "secret agenda" with exotic military goals. It explains in vivid detail how the facility would achieve these goals, alluding to the Eastlund papers (described below). The article predicts that HAARP will

be able to turn the ionosphere into a system of virtual mirrors and lenses capable of reflecting its powerful beam back toward Earth, and even concentrating its power like a magnifying glass focuses sun rays. But we found nothing secret about HAARP. The project is not classified. Its planning, construction, and operational theory are matters of public record. The facility is open to public inspection.

Angels Don't Play This HAARP was co-authored by Begich and Jeanne Manning of Vancouver, British Columbia. The book warns that HAARP is intended to "massively disturb" parts of the atmosphere. The transmissions, Begich says, could create an electromagnetic pulse similar to that of a nuclear explosion which could destroy unprotected communications equipment around the world. He accuses the military of trying to create a



HAARP technicians work at computers inside the operations center. All of the equipment on the HAARP site is controlled from this room, which also contains displays for the various scientific observation instruments. The aircraft detection radar display is located out of view in the corner of the room.



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new surveillance technology. Both authors say independent scientists have told them that HAARP, by deliberately altering the ionosphere, could affect people's moods and mental functions because the frequencies are the same as human brain waves. Begich and many other critics say that HAARP is currently conducting experiments.

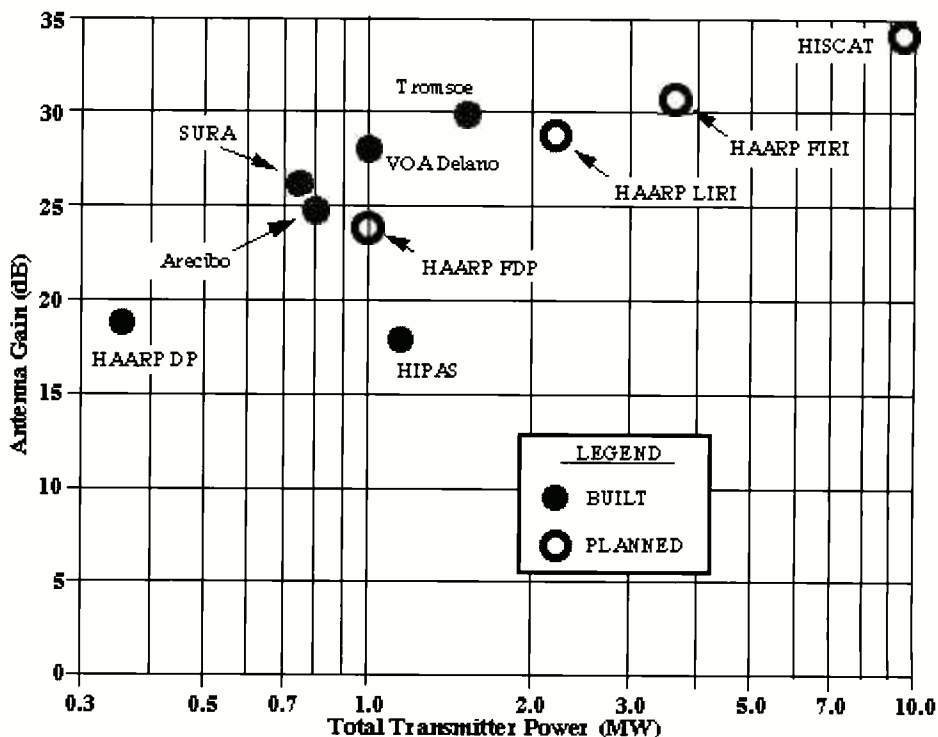
"The military insists that all of this is safe," Begich says, "but we have shown the risks through careful research involving hundreds of source documents. [Our book] contains over 350 footnotes detailing the source of each significant fact. Questions have arisen in the research. Could these manmade disturbances trigger destructive weather? What will it do to our health? To salmon or other species which rely on the naturally-occurring geomagnetic fields for direction?"

The questions stir emotions and sell books. But on close scrutiny the veil of criticism becomes thin and you see that the criticism of HAARP is based more on fantasy than reality. This is because Begich, Manning, and others compare HAARP to a 1980's plan by an ARCO physicist, Bernard Eastlund, to build a transmitter similar to, but many times larger and more powerful than the HAARP facility. This transmitter was never built. It exists only on paper.

■ The Eastlund proposal

Like HAARP, Eastlund's transmitter would have been located in Alaska, and would have functioned as an ionospheric heater. But the Eastlund project would have been more than 30,000 times larger than HAARP with power to distort the upper atmosphere through brute force. His transmitter and antenna site would have covered 1,600 square miles (more than a million acres.) "You can [with my plan] lift part of the upper atmosphere," Eastlund said. "You can make it move, do things with it." Eastlund described how he could "surgically" distort the ionosphere to disrupt global communications. He told how he could generate enough turbulence in the ionosphere to destroy missiles in flight. By lifting and moving regions of the ionosphere, Eastlund theorized that he could redirect the jet stream to alter global weather patterns, incinerate airborne pollution, and repair the ozone layer.

Eastlund patented the processes that he envisioned for his Frankenstein-like creation. The patent for altering the Earth's atmosphere reportedly was sealed in secrecy by the government. The device supposedly could have generated one watt of heat per cubic centimeter in the ionosphere, more than a million



times the power that had ever been beamed skyward before. Critics feared the effects that this could have on the Earth and its inhabitants. Excerpts from the patent underscored their concerns. For example, according to the patent, Eastlund's technology theoretically could:

- Control weather by altering upper atmosphere wind patterns.
- Change molecular compositions of specific regions of the Earth's atmosphere, increasing levels of desired elements, such as ozone.
- Beam electrical power directly from a power plant in the Alaskan gas fields to consumers without using power lines—wireless power transmission.
- Confuse aircraft and missile guidance systems.
- Destroy high-altitude missiles in flight.
- Knock out "enemy" radio communications without affecting "friendly" communications.
- Create electromagnetic pulses capable of destroying sensitive electronic equipment, similar to those produced by nuclear explosions.

Because of similarities between Eastlund's plan and the HAARP facility, critics put them in the same category. They warn that HAARP is the first of many steps the government will take toward building Eastlund's device. Many

accuse the government of lying about the startup date of HAARP and about the power level at which it will be operated. Some say the facility is already in full operation, and that its power levels are much greater than the government will admit.

We checked. At this writing, the only people at the HAARP site was a caretaker and a few technicians working on the antennas. The transmitters were not operating.

■ HAARP is small part of worldwide study

Critics warn that HAARP is the largest device of its kind, operating with inadequate external oversight, and therefore a threat to mankind. But we've learned that in the grand scheme of things HAARP is a relatively small element of a worldwide effort to probe and study the Earth's outer atmosphere. There are a number of facilities similar to HAARP operating unnoticed around the world. According to a U.S. government report, at least one of these facilities, operated by the International Radio Observatory in Sweden, is many times more powerful than HAARP will be when in full operation in the year 2002. The Swedish facility, according to the report, transmits 10 megawatts with an antenna gain of almost 35 decibels. This would produce an ERP of nearly 32 billion watts. This facility reportedly has been operating with little attention in the press.

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Such high RF power levels stagger man's imagination. But in comparison with the Sun, which creates and regulates the ionosphere, they are minuscule. HAARP engineers maintain that any source of energy large enough to destroy or permanently damage the ionosphere would have to be greater than the Sun itself.

■ International Space Law

The United Nations regulates through international space law what any member nation or group of member nations can do in space. This law is based on five treaties and four sets of principles to which members have agreed.

The UN's interest in peaceful use of space was first expressed in 1957, soon after the launching of Russia's Sputnik-1. This interest has grown steadily with the development of space technology. The focal point of UN action is the General Assembly's Committee on the Peaceful Uses of Outer Space, set up in 1959.

In 1966, the Committee and the General Assembly negotiated the Outer Space Treaty, which went into effect in 1968 and has been ratified by 91 countries. The basic principles contained in this Treaty were later elaborated by the Committee in five other legal instruments: the astronaut rescue agreement (1967), the liability convention (1971), the registration (of launched objects) convention (1974), and the Moon agreement (1979). The Committee has also negotiated direct broadcasting principles (1982), remote sensing principles (1986), and principles on the use of nuclear power sources (1993).

The Outer Space Treaty itself provides that space exploration will be carried out for the benefit of all countries. It seeks to maintain space as the province of all mankind, free for exploration and use by all nations and not subject to national appropriation. This would seem to preclude the U.S. or any other member nation from controlling or manipulating the ionosphere to the detriment of the world.

One of the Committee's special interests has been remote sensing of the Earth. This could be extrapolated to include any attempts to "X-ray" the Earth with ELF radio waves, which is one outcry from HAARP critics. ELF waves generated by HAARP in the ionosphere will penetrate the Earth and its inhabitants. Critics fear this will interfere with human brain waves and possibly damage the Earth. But this type of activity is regulated by international law.

The first UN conference on the exploration and use of space, held in Vienna in 1968,

called for increased international cooperation. A new program was created in 1970 to help member nations develop space technology. Additional programs were developed during the 1970s addressing telecommunications, weather forecasting, disaster warning and relief, environmental monitoring, and remote sensing for agriculture, forestry, geology, cartography, oceanography, and other uses.

The UN Office for Outer Space Affairs follows scientific and technical developments relating to space technology. It collects and provides technical information. It also advises member nations on matters of space development.

For anyone interested in space law, there are several books and collections of reports available from two different sources. One of the sources is *Editions Frontieres*, B.P. 33, 91 192 Gif sur Yvette Cedex, telephone (33 1) 69 28 51 35, fax (33 1) 69 28 86 59. The other source is: Kaigai Publications Ltd, Tokyo International, P. O. Box 5020, Tokyo 100-31 Japan, fax 03 3292 4278. The titles available include *Space Debris and the Corpus Juris Spatialis*, *International Space Law in the Making*, *The United Nations Space Treaties Analysed*, and *The Protection of Astronomical and Geophysical Sites*.

■ International studies of Sun and Earth

A common link between HAARP and international studies is that they are concerned with the Sun's impact on the Earth's atmosphere and environment. Ionospheric heaters such as HAARP probe and study the ionosphere from Earth. Others scrutinize solar phenomena from outer space.

One such study is being conducted from a relatively new solar space observatory, called *Soho*, a joint project of the European Space Agency (ESA) and the National Aeronautics and Space Administration (NASA).

Soho is a project of international cooperation between ESA and NASA. The spacecraft was built in Europe and equipped with instruments by scientists on both sides of the Atlantic. NASA launched *Soho* on December 2, 1995, and provides ground support from an operations center near Washington. *Soho* arrived at its vantage point—1.5 million kilometers above Earth—in February of this year. It was formally commissioned on April 16. The international space community expects many years of service from it.

Scientists from several experimental teams

are using *Soho* to explore the Sun's from its innards to its outer atmosphere (corona), where temperatures are measured in millions of degrees. Images obtained via *Soho's* visible-light coronagraph LASCO (a telescope used to observe the Sun's corona) show the Sun releasing billions of tons of gas into the solar system. Such events disturb the whole system and can affect the Earth's own environment.

The Sun's flames are literally lapping at the Earth's doorstep. This generates a space wind of ions, electrons, and protons which reach Earth at speeds of 1.5 to 3 million kilometers per hour. The only protection that stands between us and this onslaught is the Earth's magnetosphere—a distant magnetic, ionized extension of our atmosphere which slows and deflects the stream of particles emitted by the Sun.

"By the end of the [*Soho*] mission we shall know the Sun far better than we do now," says Roger Bonnet, ESA director of science. "And we shall be able to comment with much more confidence on important but puzzling aspects of solar behavior that affect our lives on the Earth, whether in short-lived magnetic storms or long-lasting changes of climate."

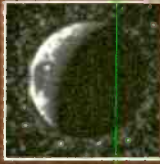
Another project, called the *Cluster*, would have given international scientists specific data about the Sun's interaction with the Earth's outer atmosphere, if the experiment had not perished in the failed launch of Ariane-501 in June 1996. A cluster of four special satellites would have taken readings from different vantage points in space to give scientists a three-dimensional view of the phenomena that occur where the solar wind strikes the near-Earth environment.

Cluster would have gathered information about the magnetic storms, electric currents, and particle accelerations that take place in the space surrounding Earth. These phenomena are believed to play a role in the aurora in the polar regions, power outages (brown-outs), breakdowns in telecommunications systems, satellite malfunctions, and possibly even changes in Earth's climates.

There is little doubt that the world's study of the stormy relationship between the Sun and Earth will continue on a cooperative basis. Ionospheric heaters, including HAARP, will contribute to that information base. In the process, science will be advanced and new technologies developed. That's life. Critics are not likely to slow the process. Like it or not, some of these technologies will probably be put to military use. Whether that is good or bad for the Free World depends on whose military puts them to use first.

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ICOM

Bug Hunt, Expo Style

By Bob Burdick

Metamorphosis by Kafka? Oh, sorry, not that kind of bug! You mean the electronic type ... spies ... intrigue ... that sort of stuff.

Well, no, not quite. An annual highlight of the Grove Communications Expo is the hidden transmitter hunt. John Fulford and company sure know how to frustrate us fox hunters. All to the bemusement of the hotel guests.

In fact, there was a sense of the absurd to be wandering around a hotel looking for a spy transmitter just after listening to last year's keynote speaker Joe Adamov of Radio Moscow speak. The incongruity gives one pause to think. The familiar voice from *Moscow Mailbag* told of the serious conditions both during and after Soviet rule. Congenial and nervous laughter rang out as he used satirical jokes to illustrate the quandary of Russian citizens—people like you and me. At first we did not know what to expect from a man whose former job was to tell us that life in Soviet Russian wasn't so bad. His speech was well worth the entire trip to the Expo!

Actually I had a choice of two bug hunts: one earlier in the day outdoors, the other indoors after Saturday evening's banquet. Opting for the evening hunt, I recalled a hunt two years ago during which this hunter came within inches of finding the bug. My scanner was close enough to the bug to cause feedback when another participant grabbed it. He recognized the "bugged" smoke detector used in the previous year's hunt.

But back to the contest. We were given some ambiguous clues. The assignment: find two transmitters: one VHF Low between 35-40 MHz and the other VHF High in the 138-140 MHz range. It was located somewhere on what can be considered the main level of the Airport Hilton Hotel, we were told.



How it all begins: "Gentlemen, raise your scanners!"

On command, the army of eager hunters, scanners and frequency counters in hand, was let loose on the hotel. A group of us decided to track the "High" bug and quickly zeroed in on the main lobby. Strong signal indications were registered between the main desk and the restaurant. People were climbing fixtures and leafing through potted plants to no avail. Fluorescent light fixtures were also producing false hits.

Another clue to find the elusive device: it is on WFM. That has to be it on 139.985. The signal is strong near the restaurant entrance—walk away and it fades. "Clink" What was that? It sounded like a glass. The restaurant? No, couldn't be. I heard that sound in both ears: the right through the scanner earphone, and the left open to the air. It's nearby and someone's around it. We've already looked everywhere here. Suddenly several hunters run upstairs. Last clue—it's on the next level overhead.

Hurrying upstairs I begin to visualize where my mind tells me the clink came from. Proceeding past a few searchers I enter a door as a hotel employee scurries out of the way.

Harry Baughn (yes, the editor's spouse) comes in and we make eye contact silently saying "it's here!" Outside others say no it's not and we affirm, this time out loud, "it's here!"

Enticed by the sound of our joined voices transmitted by the bug, the others enter. No more time for electronic wizardry. Think: where would you hide it? On the verge of discovery, common sense and decisiveness will decide the contest. Look at that tray of dirty dishes and glasses on the floor in the corner. That's the only hiding place here (no smoke detectors present). Harry and I dive into the pile and a shift of a napkin reveals a styrofoam cup with a black object hidden under ice. Lifting the object wrapped in a protective shell of black electrical tape I know I've found the object of the search. (Sorry, Harry.)

Back downstairs the rest are off searching for the Low Band bug as I investigate the Optoelectronics-donated M-1 counter that is my prize. Joe Adamov walks by and inquires of a companion what we are all doing. When told, he lets out a knowing, ironic chuckle which causes me to reflect. Here we play a game which in another time and place could have meant life and death.

The tension and distrust of the Cold War between our countries was a poignant part of Joe's speech. We worked so hard against each other—can't we now work together for peace? His ending declaration still hangs in the air: "The Eagle and the Bear, together, would make a formidable pair."

Bug Hunt anyone?

If this sounds like fun, but you're a first-timer, why not take advantage of John Fulford's tutorial on bug hunting and direction finding at 8:30 Saturday morning? Also note Arthur Lee's feature on Fox Hunting on page 20. Scanners up!



You never know where John Fulford will plant his bugs next!

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- Computers and the Internet
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- Radio astronomy

As in recent years, the Expo will feature exhibits by top-name vendors, a hands-on listening post, club booths and prizes.

Tours will be conducted to the **Delta Communications Center, Atlanta Fire Communications, Atlanta/Fulton County Communications Center** and more.

Keynote speaker at this year's banquet will be **Ron Parise, NASA astronaut** and astronomer. Parise, WA4SIR, has made two trips into space aboard the shuttle and operated the shuttle's amateur radio experiments (SAREX). Several special workshops, forums and exhibits will be sponsored this year by the Society of Radio Astronomers (SARA), which will be conducting their fall conference in conjunction with the Expo!

This year's scheduled exhibitors include **AMSAT, Bearcat Radio Club, Cellular Security Group, Computer Aided Technology, Dallas Remote Imaging Group, Drake, Electronic Distributors (EDCO), Grove Enterprises, ICOM, Image the Earth, OptoElectronics, Radio Astronomy Supplies, Radio Progressive, Scan Master, ScanStar, Signal Intelligence, Sony, Swagur Enterprises, Transel Technologies and Woodhouse Communications**.

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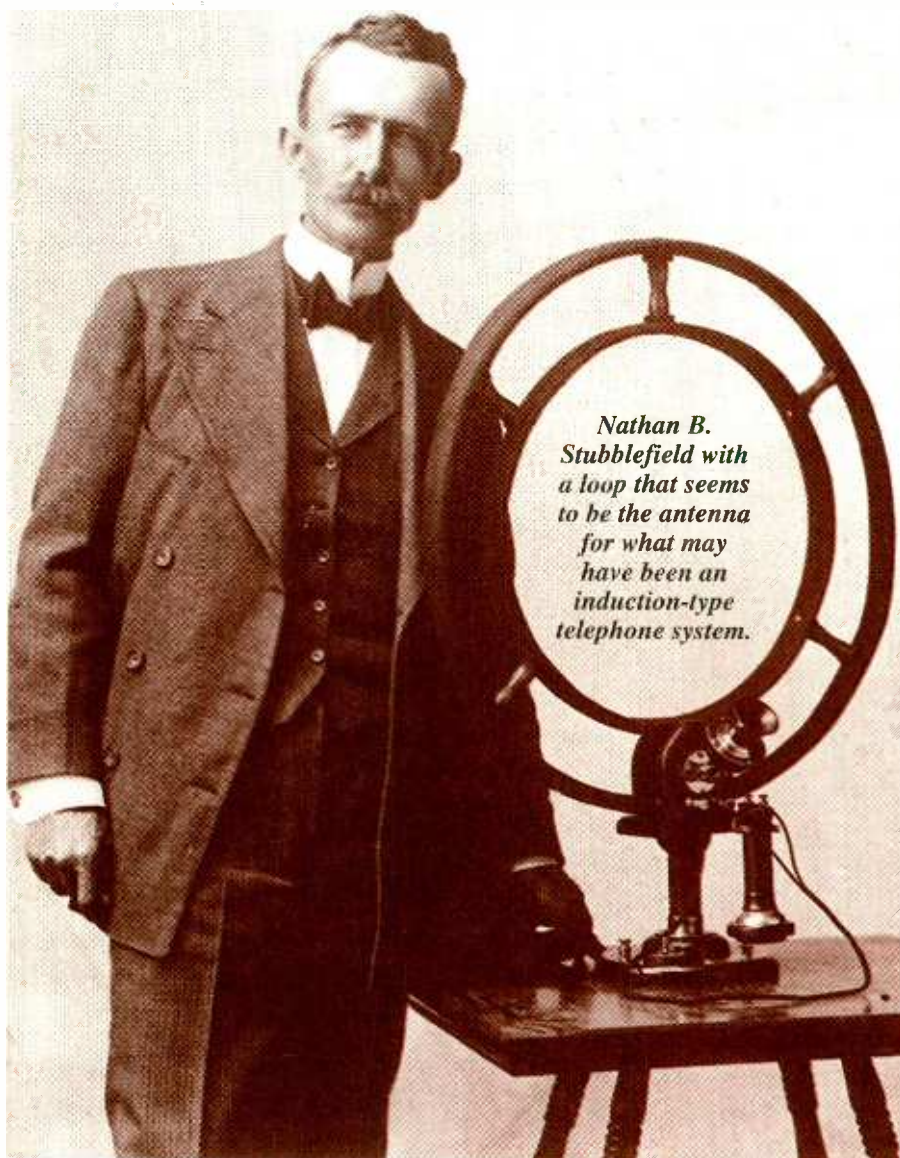
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Okay, Class, The Inventor of Radio Was ...



Marconi?

Poppov?

or would you believe ...

By Leon Fletcher

All Photos Courtesy of Pogue Library Archives,
Murray State University

You may think that Marconi invented radio, but don't try to tell that to folks in Murray, Kentucky.

There, on the campus of Murray State University, is a memorial naming Nathan B. Stubblefield as the actual inventor of radio. In front of Stubblefield's home and on the side of the state highway through town there are additional monuments honoring him for inventing radio. The first broadcast station in Murray is still operating with its original call, WNBS—letters selected to memorialize Stubblefield. On April 29, 1991, Kentucky Governor Wallace G. Wilkinson issued a proclamation stating that "...Stubblefield is the true inventor of radio and should be so recognized internationally as such..."

Murray radio talk show host Joe Pat Jones told me recently, "Most of the people here in Murray think Stubblefield was a genius and that he was the first to broadcast voice without wires."

Nathan B. Stubblefield?

But outside of Murray, Stubblefield is remembered by few radio enthusiasts, hams, historians, or anyone else. "He is completely ignored in most books covering the history of radio," according to the official journal of the Antique Wireless Association.

■ **A True Eccentric**

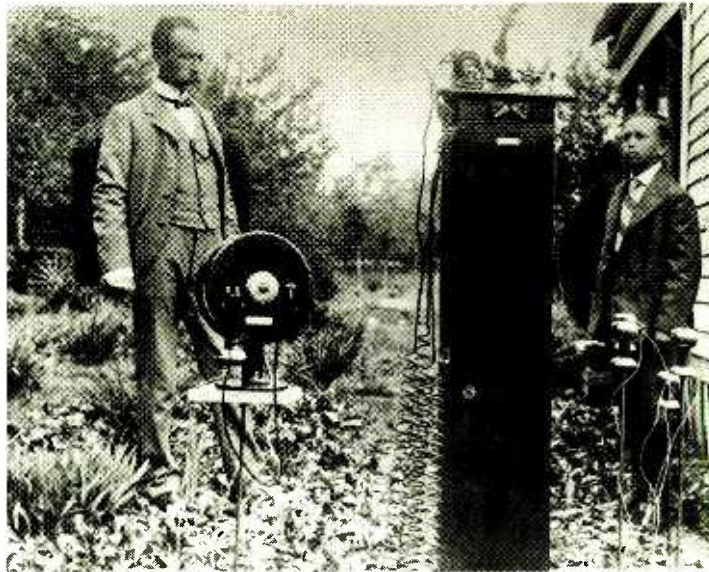
Stubblefield's life was filled with many strange conflicts, confusions, and contradictions—actually, from the day he was born to the day he died.

He was born near Murray in 1860. Or in 1859—depending on which reference you want to believe. His birthdate was either November 22 or December 27; again, researchers disagree.

Folks don't even agree about that "B" in the middle of Nathan B. Stubblefield's name. Some say it stood for Beverly, others say it's for Bedord, and still others claim it was for Bowman, his mother's maiden name.

Whatever his middle name, residents of Murray certainly thought he was eccentric. Nathan's sister, Aline, said he was a "moody genius." His schoolmates considered him an "odd ball." His grammar school teachers rated him a poor student. When he was just 15 years old, he quit school.

But he was studious. As a youngster, he spent much of his time studying all the science books he could find. He was intrigued with electricity, telephone, and telegraph. His



Two pieces of his communications gear displayed by Stubblefield and his son Bernard. Note the rods sticking in the ground in the right foreground.

cousin had a drug store with a magazine rack, and from it Nathan "borrowed" current editions of magazines such as *Scientific American* and *Electrical World*, trying to expand his knowledge. He often hung out at the offices of the local newspaper, *The Calloway Times*, searching for reports about what would become "electronics."

Stubblefield made his living as a farmer. One account claims he was "especially renowned for the quality of his orchard fruit and melons." Another source states he "spent some time farming but mostly (he was) reading"—mainly about developments in exchanging messages without wires. A third account says he spent as little time as he could raising vegetables and selling them to support his family.

He married a nearby resident, Ada May

Buchanan, when he was 21 years old. Another curious report: The *Kentucky Encyclopedia* states, "Though (they had) ten children, Nathan and Ada Kay were not a close couple."

Apparently they argued frequently. They separated several times. Soon after their youngest child left home, Ada May moved out and settled in relatively far-off Arkansas.

■ **His Career Begins**

In 1885, when he was 25 years old, Stubblefield successfully transmitted the human voice over what he called a "Vibrating Telephone." It was patented three years later, in 1888.

Marconi's patent was granted in 1896.

Stubblefield waited until 1892 to present what was apparently his first public demonstration of transmitting voice without wires. One observer was Dr. Rainey Wells, an attorney, politician, educator, and founder of Murray State University—a more reliable witness would be hard to find. Wells wrote:

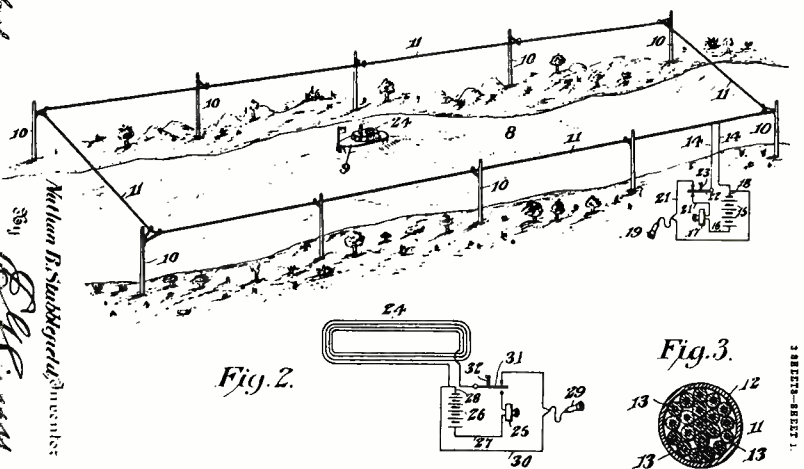
"One day he invited me out to his farm for a demonstration of some kind of wireless outfit... He had a shack about four feet square near his house from which he took an ordinary telephone receiver such as we have today, but entirely without wires. Handing me these (sic), he asked me to walk some distance away and listen."

Dr. Wells walked into an adjacent apple orchard, beyond the range of hearing Stubblefield's voice directly.

"I heard 'Hello, Rainey' come booming out of the device. I jumped a foot and said to myself, 'This fellow is fooling me. He has

FIGURE 1: Stubblefield's application for a patent, submitted April 5, 1907, included this drawing of how a person aboard a river boat would use wireless telephone to communicate with someone ashore.

Attest: *John T. McCallum*
 Notary Public
 Nathan B. Stubblefield, Inventor
N. B. Stubblefield
 Witness



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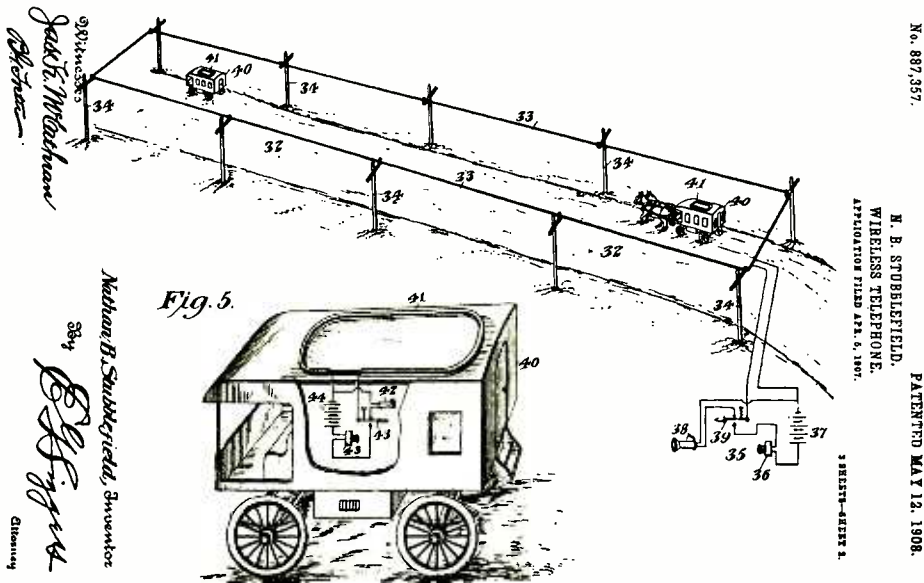


FIGURE 2: Showing how wireless telephone could be used by someone in a railroad car, this drawing was another in Stubblefield's application for a patent; it was granted on May 12, 1908.

wires someplace.' I moved a few feet to the side but all the while Stubblefield kept talking to me...but there were no wires, I tell you."

Stubblefield was a very suspicious fellow. His son Bernard was the only person allowed to see all of his experiments. He wired the area around his home so bells rang whenever anyone came within a half-mile. He waited, sometimes for years, to obtain copyrights on his inventions, apparently afraid they'd still be stolen. He delayed public presentations of his innovations.

Finally, on January 1, 1902, Stubblefield staged a giant demonstration to bring to the attention of the American public his wireless communications. Some 1,000 people attended. A reporter for the *St. Louis Post-Dispatch* wrote:

"I placed the receiver to my ear and listened. Presently there came with extraordinary distinctness several spasmodic buzzings and then a voice which said, 'Hello, can you hear me?'"

That story created national interest. Two months later, on March 20, 1902, Stubblefield was in Washington, D.C. to present another demonstration. From the steamer *Hartholdi* in the Potomac River, Stubblefield sent wireless messages to receivers ashore. There, several congressmen and public officials heard the messages. The *Washington Times* and other newspapers reported the event.

Triumphantly, Stubblefield returned to his home in Murray and presented another demonstration. Written invitations were sent. Still, Stubblefield was a proud farmer: in his adjacent orchard, apples were "tied upon the trees so they would show up in the pictures," one guest reported.

Stubblefield was on a roll—briefly. He was offered \$40,000 for his invention; he turned it down. Later he was offered \$500,000, but he rejected that, too. Instead, he accepted stock in a company incorporated in distant and tiny Prescott, Arizona, the Wireless Telephone Company of America. Its prospectus claimed it had "been organized with a capitalization of \$5,000,000. But the outfit sold only one of Stubblefield's systems, to the Gordon Telephone Company of Charleston, South Carolina, which wanted to communicate with its offshore islands.

Stubblefield had been taken. The company was a hoax, formed to sell stock, not telephones. And Stubblefield had lost the rights to his own invention.

He went back to work in his shop, to refine his apparatus and then prove to the U.S. Patent Office that his new equipment was unique.

In 1907 he began a new project—Telephondelgreen, a home school. It offered the standard "Three R's"—and added "Three E's": Etiquette, Easop's (sic) Fables, and Ethics. Other subjects included fruit growing, and technical courses in magnetism, telegraph, telephony, and such.

■ The Start of His End

Four years later, Stubblefield was broke. Local businessmen, who'd already lost their investments in two of his projects, were reluctant to finance him again. Creditors seized his home and farm. In 1913, his house burned; all of his equipment was destroyed. Still, he wrote to a relative, "... my ambition is not gone."

He moved out of town, into the country. His living conditions were primitive: he built

a house between four trees, used cornstalks and mud for walls, dirt for the floor, tin for the roof. Friends and relatives left food at his door. He was a hermit.

Still he continued to conduct experiments, often scrounging for parts. Neighbors saw strange lights and heard weird sounds coming from his shack.

In mid-March, 1928, he told a friend, Obid Daniel, that he was feeling weak. "If you don't see smoke from my fire for a day or so you'd might come and knock at my door."

A few days later, Daniel noticed there was no smoke coming from Stubblefield's chimney. Daniel went to the shack, looked in, saw Stubblefield spread out on the dirt floor, dead.

Today, one of the few researchers who continues to search for information about Stubblefield is Dr. Robert Henry Lochte, Assistant Professor of Journalism, Murray State University. In gathering material for this article, I talked with him—a staunch believer that Stubblefield was the first to invent radio. Launche has written extensively about the strange inventor and summarizes his findings into four "schools of thought:"

1. Stubblefield's "discoveries are inconsequential and can be ignored."
2. "He did invent a wireless telephone, but used conduction and/or induction rather than the electromagnetic waves now called radio frequencies."
3. "...Stubblefield transmitted voice and music first. Any argument to the contrary is an exercise in semantics."
4. "...(he) was a talented and diligent inventor who lacked the business acumen and entrepreneurial spirit to develop the commercial potential of his discoveries."

That last view, says Dr. Lochte, "seems to be the proper perspective."

After Nathan B. Stubblefield died at age 68, on March 28, 1928, collapsing from starvation, alone except for his cat, there was even then one more odd incident added to his biography. County corner Horace Churchill wrote in his report of the death that Stubblefield's "cat had licked out his entire eyeball sockets."

(Happy Halloween!)

ABOUT THE AUTHOR:

Leon Fletcher, an extra class amateur radio operator (call: AA6ZG), is a fulltime writer and Emeritus Professor of Speech, Monterey Peninsula College. His publications include 12 books and more than 500 articles.

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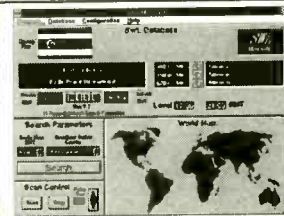
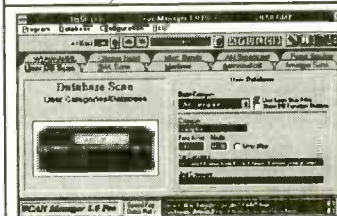
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The AWR Story

Logging 25 Years
with Adventist World Radio

By Dr. Adrian M. Peterson

T

wenty-five years ago, on October 1, 1971, the first official broadcast of Adventist World Radio was launched over a shortwave transmitter located at Sines in Portugal. The occasion of this historic first broadcast of the new Voice of Hope was on a Friday afternoon using a 250 kW transmitter which was owned and operated by a commercial company, Radio Trans Europe. This shortwave station was, at the time, a comparatively new facility that had begun carrying a relay service for Deutsche Welle just a few months earlier.



The 25th Anniversary QSL card for AWR. Shown on opposite page are QSLs from European sites (top to bottom) Portugal, Malta, Andorra, and Italy.

No advance publicity heralded the launching of the new Adventist World Radio, and the first broadcasts from this new international radio voice caught the radio world by surprise. The authoritative DX program, *Sweden Calling DXers*, reported the first broadcasts, noted on 9670 kHz as “unidentified,” and similar monitoring reports were printed in the *Australian DX News* and elsewhere. Subsequent monitoring revealed that these “unidentified” broadcasts originated with the new Adventist World Radio, which had been launched by the new radio personalities, Allen and Andrea Steele.

In actual fact, the Adventist denomination had been on the air with shortwave programming for nearly thirty years as individual operations at different locations. These inde-

pendent shortwave broadcasts began during the difficult days of World War II, when the renowned *Voice of Prophecy* with Dr. H. M. S. Richards was aired over the shortwave transmitters of the Voice of America (OWI-VOA) in conjunction with the programming of AFRTS, the American Forces Radio Service. Similarly, Radio Australia, *Australia Calling*, carried an Australian version of the same program. These American and Australian broadcasts were on the air for about 18 months.

Throughout the intervening years, the Adventist denomination was on the air with shortwave programming over a multitude of stations located in Europe, Africa, Asia, and Latin America. In addition, the denomination has also owned and operated a small cluster of

low powered shortwave stations located in Indonesia and several countries of Latin America.

Twenty five years have come and gone since the first fledgling broadcasts in 14 languages were launched over Radio Trans-Europe. To mark the 25th anniversary of the now well-established shortwave outreach of Adventist World Radio, we take a look at each of the many locations that have been on the air with AWR programming.

Europe

■ Portugal

As mentioned, the first broadcast by Adventist World Radio was over a 250 kW transmitter of Radio Trans-Europe in Sines, Portugal. The inaugural schedule showed 14 European languages, generally in half-hour time blocks.

In subsequent years, AWR utilized two of the transmitters at Sines, sometimes in parallel, but often with independent programming. The AWR service from RTE-Sines was on the air for nearly 21 years, discontinued only when AWR transferred its programming to stations located in the Russian republics and Slovakia. The final AWR broadcast from Sines took place on Sunday July 5, 1992.

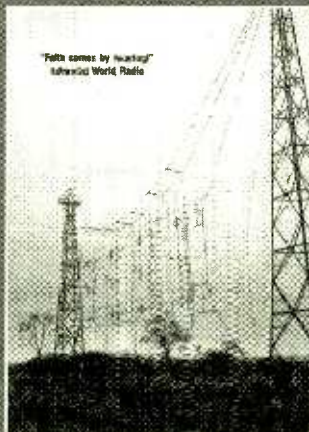
■ Malta

Eight years after the launching of AWR programming over RTE-Sines, a similar service began over the shortwave transmitters of the Deutsche Welle relay station located at Cyclops on the island of Malta in the Mediterranean. This station also contained three shortwave transmitters at 250 kW and a bevy of curtain antepnas, though the whole facility was dismantled earlier this year. The AWR usage of two of these units began in 1975 and concluded about nine years later in 1984.

During the 1975 worldwide convention of the Adventist denomination in Vienna, Austria, daily reports from the convention were broadcast by the AWR services over the DW relay station in Malta. A special limited edition QSL card was issued for these broadcasts.

■ Andorra

Eight years down the road, an experimental service was launched for AWR by manager Ron Myers over the shortwave transmitter of Radio Andorra at the Valley in Andorra. The AWR broadcasts over this low powered



unit (operating at about 3 kW) began on September 8, 1979. AWR obtained a 10 kW Collins transmitter and installed it at Radio Andorra where it was put into service during the following year.

However, at this stage, radio interests in Spain and France entered the picture, and the shortwave service from Radio Andorra was terminated. AWR programming was on the air over Radio Andorra for only about two years. The Collins transmitter was later removed and transferred to a new AWR facility in Italy. A commemorative QSL card was issued by AWR depicting the main building of Radio Andorra.

■ Luxembourg

Over a period of many years, AWR had been on the air over Radio Luxembourg on MW and FM as well as shortwave. At first these broadcasts were under the auspices of the England-based *Voice of Prophecy*, but later they came under the auspices of Adventist World Radio. These short programs were on the air for several years; at one stage, AWR was issuing QSL cards for these broadcasts.

■ Italy

The very first shortwave broadcasts in Italy on behalf of Adventist World Radio were in the form of test broadcasts which took place over Radio Milan International for a period of thirteen weeks. These test broadcasts were for the purpose of ascertaining the viability of a shortwave station in this part of the world. By this time, Greg Hodgson was the manager for AWR-Europe.

The 10 kW Collins transmitter from Andorra was installed at a villa near Forli in northern Italy and reactivated with test broadcasts beginning January 30, 1985. The antenna for AWR-Forli is a rotatable, yagi-style log periodic which allows for quick reorientation towards any of the target areas in Europe, Mediterranean, and North Africa. This station is still on the air today—usually on 7230 kHz—eleven years after its inauguration.

Just recently, the Italian government passed a special law which enables AWR to erect a large shortwave station in Italy. When the license is finally issued, AWR intends to begin construction work for this modern station on a large tract of level ground that was reclaimed from the Adriatic during the Mussolini era. This station is likely to utilize four transmitters, most likely 100 kW, with a bevy of antennas. No dates have yet been established for the projected new facility.

■ Slovakia

The large shortwave station operated by Slovak Telecom at Rimavska Sobota, near the Hungarian border, contains four transmitters at 250 kW and more than a score of antennas for its almost worldwide coverage. The first test broadcast was aired on January 1, 1994, over transmitter number 10. Since then, two additional transmitters have entered AWR service—units 8 and 9. AWR is on the air from Rimavska Sobota for coverage to Europe, Africa, and Asia.

The transmitter in the AWR network that gives the widest and most reliable coverage is designated in AWR circles as AWR-RS10 at Rimavska Sobota. In fact, it is quite probable that this transmitter can be heard in every country of the world at some time each day carrying AWR programming. The name, “Rimavska Sobota,” means “Roman Sabbath.”

Another shortwave transmitter base in Slovakia is located at Velke Kostolany, nearer to their capital city, Bratislava. This station contains two transmitters at 100kW and AWR is on the air over unit VK02 for coverage of several countries in continental Europe. The name “Velke Kostolany” means “Great Church.”

■ Russia

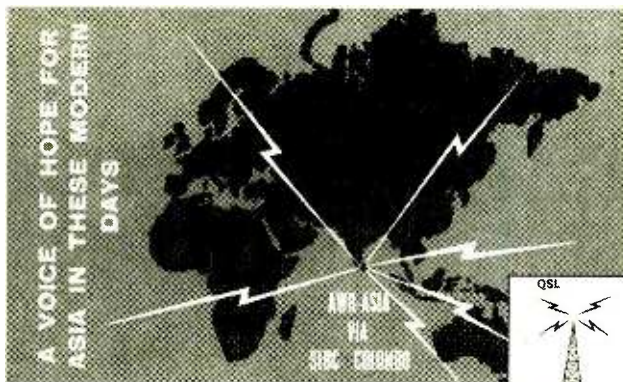
In the European areas of the former Soviet Union, AWR has utilized, as far as can be determined, eight different shortwave transmitters at five different locations. The usage of the Russian stations, located at Samara, Yekaterinburg, and Moscow, began in 1992. Actually, the station designated as “Moscow” is really two separate locations: Taldom and Kurovskaya. These units all radiated with a power output in the range of 100-250 kW. The usage of all of these stations was terminated in 1994, except for three transmitters located at Samara, which are still carrying AWR programming.

The Russian stations have usually been programmed from the Adventist Media Center located in Tula, 200 miles south of Moscow. A large, four-storied building contains radio studios and offices. In addition, these studios are feeding Adventist *Voice of Hope* programs on a daily basis to a network of 1,000 radio stations throughout Russia.

Asia

■ Sri Lanka

The first broadcast on behalf of the Adventist denomination in Southern Asia went



Left: a 1984 DX contest QSL signed by the author. Below: A special QSL signed and stamped by the author in 1977.

on the air over the old Emisorra Goa on April 30, 1950. The broadcasts from this low powered 1 kW shortwave transmitter were on the air until the end of the following year.

However, nearly simultaneously, Adventist programs were also launched on the commercial service of Radio Ceylon, using the transmitter base at Ekala, just north of Colombo. The first broadcast from Ekala went on the air on October 1 of the same year, 1950.

In 1975, when Adrian Peterson was transferred from Colombo to Poona, India, Adventist World Radio in Asia was organized. The studios were in the building which housed the denomination headquarters at Salisbury Park on the edge of Poona. At the time there was a cluster of half a dozen shortwave programs on the air from Ekala in several Indian languages.

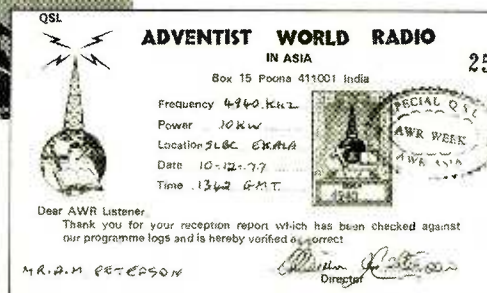
Over a period of time, programming was increased to a total of 25 programs in ten languages, including the DX program, *Radio Monitors International*. These programs were beamed to the Indian sub-continent, Middle East, Africa, and Japan. Listener reports indicated a significant carry-over signal in South America.

In 1985, when the new station on Guam was under construction, the name of the unit in southern Asia was redesignated as AWR-Southern Asia. This service left the air at the end of 1989, when programming was transferred to the new KSDA on the island of Guam. A whole series of QSL cards was issued on behalf of AWR-(Southern) Asia from the offices in Poona, India.

■ Guam

The large and delightfully located AWR station on the island of Guam lies against the edge of the beautiful blue Pacific. This station contains four shortwave transmitters at 100 kW each, together with a bevy of four curtain antennas, all beamed towards various areas of mainland Asia.

The first broadcast from KSDA

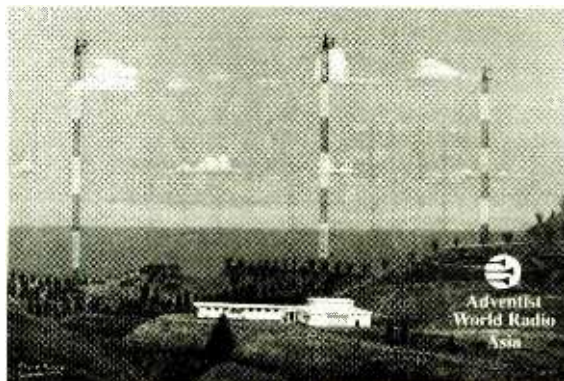


in Agat went on the air in February 1987. The station was constructed under the management expertise of Allen and Andrea Steele, who had transferred to Guam after a stint of management service at an educational FM station in the United States.

KSDA is on the air daily with its four transmitters, usually carrying independent programming in Asian languages. Several special QSL cards have been issued on behalf of AWR-Asia, including one for a special series of test broadcasts to the South Pacific in the earlier part of 1995.

■ Siberia

The huge shortwave radio stations located at Novosibirsk in Siberia were former jamming facilities containing up to 100 transmitters at three different locations. Several international radio stations have utilized various transmitters at this major site; Adventist World Radio went on the air over a pair of 100 kW units in 1982. The AWR broadcasts from Novosibirsk were on the air for a couple of years, but were discontinued because of the logistic difficulties in programming an isolated station from such great distance.



A painting of the transmitter site at KSDA, Guam, by Engineer Elvin Vence.

Africa

■ Gabon

It was back in 1983 that a daily one hour program with a magazine format first went on the air over the huge transmitter of Africa No 1 in Gabon. The powerful 500 kW facility gave AWR-Africa a very wide coverage for its programming in French and English. This service for the African continent was developed by Daniel Grisier. When the large transmitters at Rimavska Sobota became available for AWR programming in 1994, the service over Africa No 1 was terminated. The programming of AWR-Africa may still be heard from the European stations in the AWR shortwave network.

Latin America

■ Guatemala

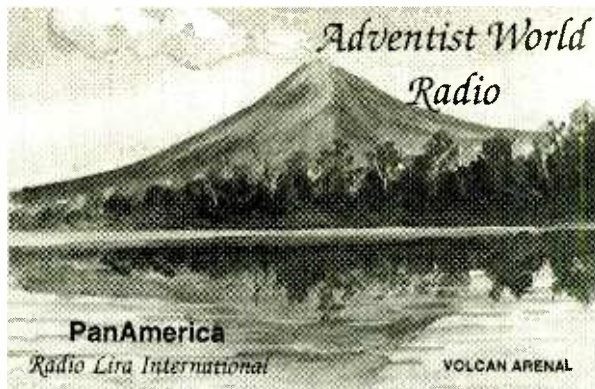


In Guatemala City, Union Radio was procured by the local administration of the Seventh-Day Adventist Church and re-established in the multi-storied headquarters building. Union Radio returned to the air in 1980 as the local unit of Adventist World Radio. Currently, this station is on the air over three transmitters: MW, FM, and shortwave. It operates with 3 kW on 5980 kHz under the Guatemalan callsign, TGMU.

■ Costa Rica

Further down the Central American isthmus, David Gregory procured a radio station, transferred it to the local Adventist university, and gave it the callsign, TISDA, Radio Lira. In some ways, Radio Lira is a direct descendant of Costa Rica's famous pioneer shortwave station, TI4NRH (see *MT*, March 1993), one of the first shortwave stations in the world.

This station was on the air from its own building on the university campus for about six years, from 1986-1992. A special QSL card was issued for the final week of broadcasts from Alajuela.



One of the volcano series of AWR QSLs from Radio Lira.

■ Peru

Another shortwave station operated by the Adventist denomination is located at Celendin, in northern Peru. This

unofficial station broadcasts in Spanish in the 3 MHz band. It identifies as Radio Adventista Mundial, though it is not officially a part of the AWR network.

AWR-Latin America procured the facilities of the infamous Radio Impacto and had the transmitters refurbished and modified at the Elcor factory in San Jose. These were then installed at the old Radio Impacto base located near Cahuita on the Atlantic coast. Currently, there are five shortwave transmitters on the air at the Cahuita facility, 20 kW and 50 kW. Programming for these units comes from the Bella Vista studios over a two-hop microwave relay.

■ Peru

When the 5 kW shortwave transmitter for TIAWR at Alajuela left the air in 1992, it was slated for transfer to Guatemala as a second unit for TGMU. However, because of the exigencies in Guatemala, this transmitter instead went into storage at Cahuita. Current plans call for the unit to be refurbished and transferred to Peru, where it will be co-sited with a new AM station located on the campus of the Adventist college near Lake Titicaca. It will give regional coverage in the Quechua and Aymara languages. If the new shortwave service is successful, other shortwave transmitters may be installed at this location.

In some ways, the Peru facility of Adventist World Radio replaces the station projected for installation in Paraguay. This Paraguayan facility has not yet eventuated because of the difficulty in transferring international funding between countries in South America.

Thus, over the past 25 years, Adventist World Radio has been on the air from a total of 44 different shortwave transmitters located at 18 bases in 11 different countries. All of these units have a combined total output in excess of 5.1 megawatts. Two transmitters have seen service at different locations: a 10 kW Collins in Andorra and now at Forli; and a 5 kW Elcor at Alajuela, now projected for installation at Juliaca in Peru.

For the future, Adventist World Radio looks towards setting up a four-transmitter facility at Argenta on the Adriatic coast of Italy, and establishing a shortwave facility at Lake Titicaca in Peru. Currently, the AWR network is on the air for the proclamation of the Gospel in some 35 languages, but the goal is 100 languages by about the turn of the century.

To mark the 25th anniversary of Adventist World Radio, an enlarged worldwide DX contest will be conducted during the anniversary month of October, for which a special QSL certificate and QSL stamps have been designed. Special anniversary programs have been prepared, as well as a special listener-designed anniversary QSL card.

Other Stations

The Adventist denomination currently operates two additional shortwave stations, though they are not part of the AWR network.

■ Dominican Republic

Radio Amanecer Internacional, HIAJ, in Santo Domingo, the Dominican Republic, operates on mediumwave and on 6025 kHz shortwave. Programming is in Spanish and English, and in many ways it is quite similar to the programming heard from the official units in the AWR network.

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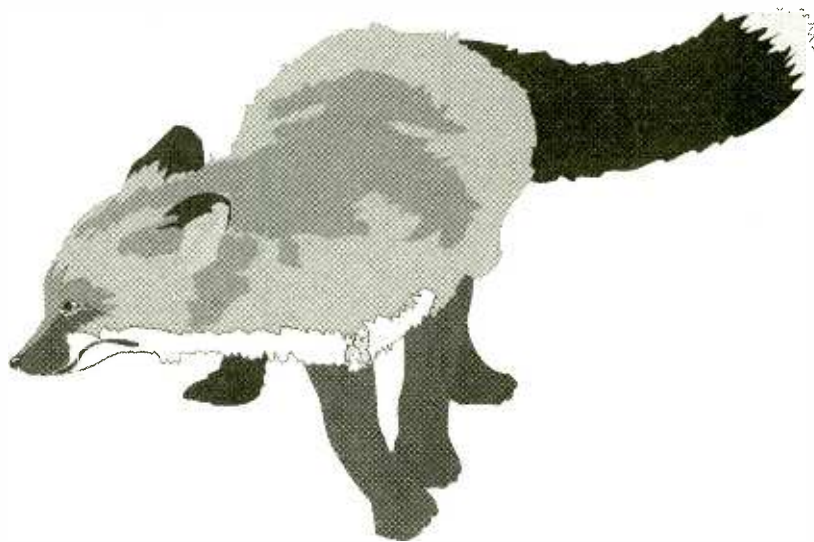
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Anyone for a Fox Hunt?



Whether you call it a bug, a fox, or direction-finding, this game can be practiced (with varying techniques) all across the spectrum. Sure, you can call it preparation for real-life situations, but it's also just plain fun.

By Arthur R. Lee WF6P

What could be more fun than to hunt for a hidden transmitter? The answer—"Finding it!" Known in amateur radio certain circles as a "fox," a transmitter emanating a signal from an undisclosed location can present a significant challenge to the fox hunters. So how does one conduct a fox hunt, either as the fox or the hunter?

Bruce Hawkins (AC6DN), a member of the Santa Cruz county amateur radio club has conducted dozens of these hunts. His fox, contained in a waterproof box, is

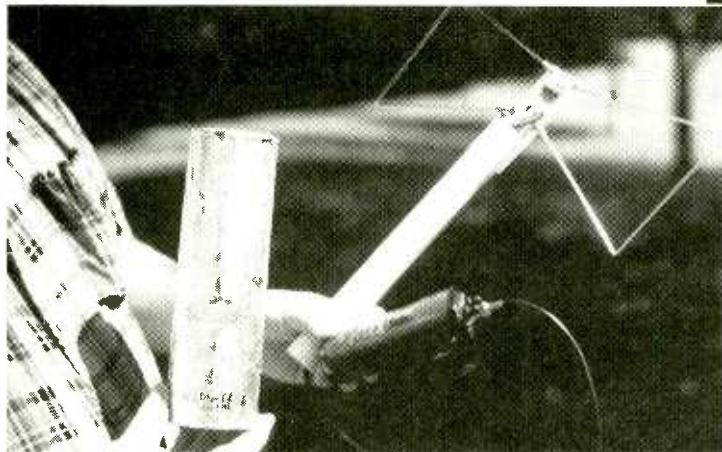


Inserting the handheld in the can makes it more directional (above).

quite advanced in that its transmitter time is controlled by a computer chip. Most foxes are merely a small, hand-held transmitter operating from a well-hidden spot. The object of the "game" is to be the first to locate the transmitter and win the prize—whatever may be offered: recognition in the club newsletter, a wedge of pizza, or a simple pat on the back. Whatever the prize, the search is the fun.

On some of the early searches, Bruce simply sat in his car and operated his 2-meter hand held on low

power, simplex. Hunters would then start at a given point and drive around town, directing their antennas on various compass headings as they went, looking for the strongest signal. While many of the "big time" city-to-city fox hunters use elaborate antenna systems such as roof-mounted beams, Bruce's hunts are conducted on a local basis where the only equipment required is a simple 2-meter hand-held



To shield his hand-held receiver, Bruce Hawkins, AC6DN, sometimes uses a potato chip can wrapped in aluminum foil. Hunter can sometimes use the handy dipole antenna for broad searches.

receiver. Special search techniques have been developed which quickly narrow the hunt down to a manageable area.

■ The Fox

Bruce's equipment consists of a 2-meter transmitter, a six ampere hour 12-volt gel cell battery, and a computer chip timer. All of this is contained inside a surplus ammunition box with a hefty water seal. A small hole is drilled in the top of the can through which a stub, flexible antenna is inserted. The hole is sealed with a silicone sealant to keep foreign material and water out. To prevent unauthorized tampering or theft, a lock is used to chain the unit to a tree or other anchoring post.

The black box is well marked with a prominent label. The large-letter notice glued to the can indicates its contents, purpose, frequency of the transmitting device, and the name and home phone number of the owner. The chip—actually a microprocessor-based controller—causes the transmitter to send out a low-powered signal which acts as a beacon. This controller was assembled from a kit whose source was found in the advertisement pages of the amateur radio magazine *QST*.

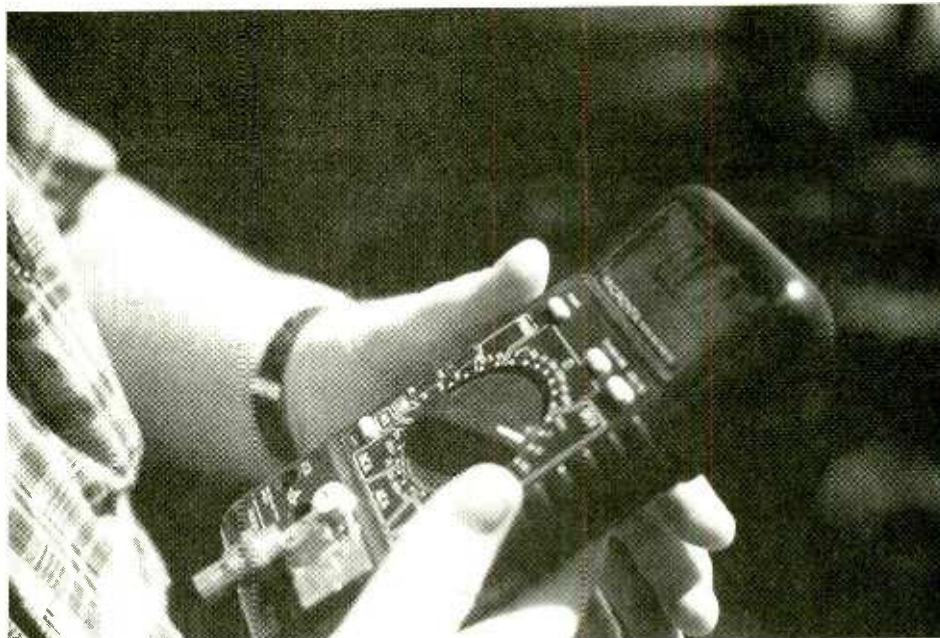
Morse code from a tape recorder can be transmitted, but for most elementary fox hunts, a person talking on frequency will suffice. Bruce adds, "Except that your voice gets tired. One time I read a radio magazine over the air while the hunters homed in on my signal. I sat in my car on a road overlooking the area. I could see my hunters pass me by, then circle around until they found me. I had fun watching them!"

■ Hiding the Fox

This can be fun, too, and the fox "hider" has to be a bit creative. Some of the locations chosen by Bruce have been ingenious:

- (a) In the sand on a beach. Only the antenna stuck up through a clump of seaweed.
- (b) Buried in the sand next to a sea wall. The signals were blocked by the cement wall and could only be detected from the beach or on a parallel course to the beach.
- (c) In a tree. One of the hunters climbed the tree for a better view and bumped her head on the fox!
- (d) Adjacent to a metal water tower. The signals bounced off the tower and "splattered" in several directions.

For beginning fox hunts, it is best to start out simply, and not make the hidden location too difficult for the hunters. Staying within



the bounds of a large city park or other public land can provide lots of fun and excitement for the hunters. At a ham radio operators' club picnic, part of the entertainment was a fox hunt. A 77-year-old ham was the first to find the fox!

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A bent paper clip can be used to short out the antenna lead, allowing the receiver case to become very sensitive to signal strength and direction.

There are two purposes in fox hunting: having fun, and a more serious purpose, learning how to locate an inadvertently left open microphone or key which is transmitting an unwanted signal. In extreme cases, hams have tracked down intentional "jammers" and cautioned them against such conduct or notified the FCC.

■ The Hunters

So, how does one participate in a fox hunt as a hunter? First of all, you must have a receiver capable of receiving the signal frequency. You need not have a license, only the fox operator must be licensed. We operate at a maximum of five watts on a simplex frequency; usually 145.565 MHz. The hunter turns his receiver to the selected frequency.

Then, it is a matter of determining from which direction the strongest signal is emanating. This usually takes about six different initial "cuts" to zero-in on the general location. This can be done by driving, bicycling, or walking in such a manner so as to follow the increase in signal strength. For big time searches, automobiles are used. One ham club in Los Angeles county was very professional about the hunts and hid the transmitter in

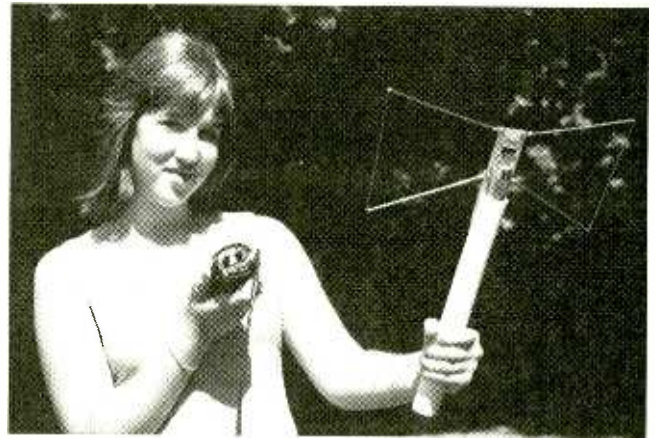
various cities! Hams criss-crossed Los Angeles, Long Beach, and San Pedro, then found the fox, high atop Signal Hill. But that was a "toughie." Our local club keeps the hunt within a five air mile radius.

When in the broad search range, some hams use their small, home-built dipole antennas. These act as a loop, and the null or decreased signal tells you where the transmitter is *not*. Like all loop radio direction finding equipment, it can tell you from which of two directions the signals might be coming.

However, nearly all hunters use a method known as "body blocking," where the receiver and vertical antenna is held close to the body and the hunter's body blocks off the signal from behind. The hunter rotates his body until the signal comes in strongest—then heads in that direction. Some hunters use a compass, rulers and maps, but for simple searches, these implements are not needed.

■ In Close Range

For advanced hunters, a helpful device is a potato chip can sold (with chips!) by the Pringle's company. This aluminum-shielded can makes a fine container to keep out radio waves. A slot is cut in the can through which digital volt meter readings can be seen. Additional aluminum foil is wrapped around the



can to further shield the signals. The volt meter is slipped down inside of the can. When the open end of the can is facing in the direction of the strongest signal, follow the signal. The digital voltmeter is coupled to a radio frequency detector circuit which converts RF voltage to direct current (DC). This special device is used for searching at less than 100 feet.

For beginners, the removal of the standard "rubber duckie" antenna and replacement with a short section of paper clip enables the hunter to turn the gain down and pick up the direction of the strongest signal. Closer in, the paper clip is also removed. This is usually done when almost on top of the fox.

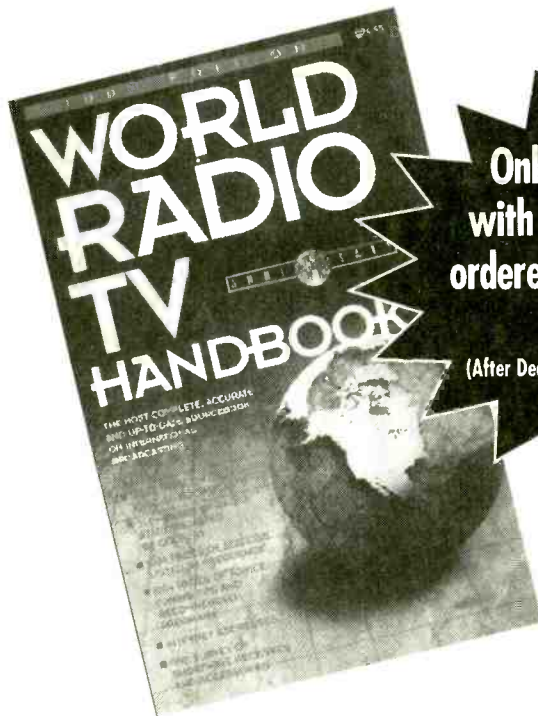
Of course, the object of the game is to locate the fox before anyone else. Like many marathon runs open to the public, most of us would be happy to just finish the race. In a like manner, finding the fox is a reward in itself, whether or not you are the first.



The "exploded" view of the fox. Shown are the black box and placard, cable and lock, two meter Kenwood 02AT transceiver, gel cell and controller. A HP 95 Palm Top computer gives instructions to the controller.

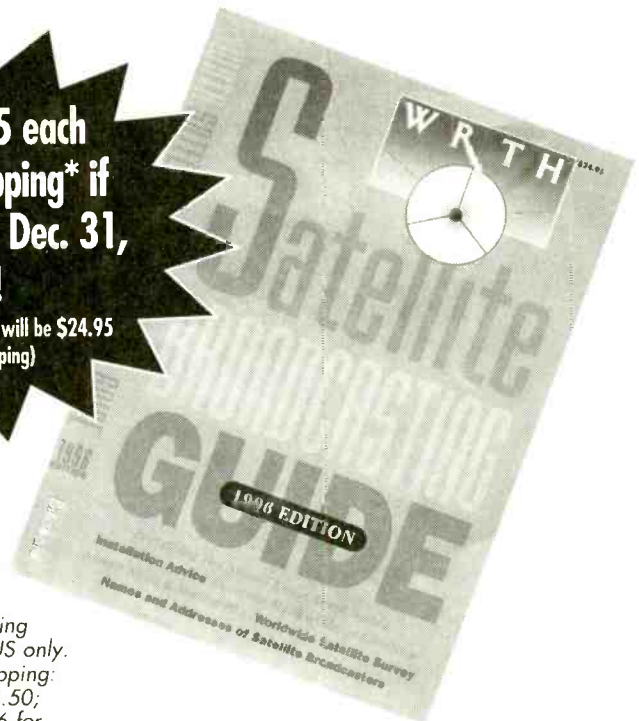
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Emerging PCS Technologies

There is a revolution underway, and your telephone is in the middle of it. Changes in technology and regulation are creating opportunities for companies to introduce what has come to be known as PCS, or personal communication services. Initially PCS will look a lot like existing cellular telephone, but will grow into an interconnected network bringing voice, data, and even video to wireless users. Two-way voice and data messaging over fully digital networks are just the first stages of what will become the PCS revolution.

■ FCC Auctions

But first, some background. In the United States, the authority to allocate commercial radio spectrum lies with the Federal Communications Commission (FCC). In the past, the FCC granted licenses either by lottery or by having a judge determine which potential licensee would "best serve the public interest."

When the FCC granted cellular telephone licenses more than a decade ago, they gave out two licenses in each metropolitan statistical area (MSA). The existing local telephone company received one, and the other was awarded by lottery. Businesses who received those licenses did not pay very much for them, but most made quite a bit of money over the following years, either by actually building a cellular system, or by selling their license to someone who would.

In 1993 Congress changed all that. The Omnibus Budget Reconciliation Act authorized the FCC to sell portions of the spectrum to raise money for the United States Treasury. At the same time the unexpected popularity of cellular telephones and pagers created additional demand for radio spectrum from the wireless industry. The FCC responded by announcing an auction strategy for regional and nationwide personal communications service licenses in three basic categories: broadband PCS, narrowband PCS, and unlicensed PCS.

The area that each license covers is identified as either a major trading area (MTA), basically a large city or metropolitan area; or a basic trading area (BTA), which is essentially a set of highly populated counties or regions. The FCC used Rand McNally's *Commercial Atlas and Marketing Guide* as a starting point to define 51 MTAs and 493 BTAs in the United States and possessions.

■ Narrowband PCS

Narrowband PCS lies in three 1 MHz slots of the 900 MHz band— at 901-902 MHz, 930-931 MHz, and 940-941 MHz—and was the first group to be auctioned off. In the summer of 1994 the FCC awarded eleven nationwide licenses, split between 50/50 kHz paired (for two-way service), 50/12.5 kHz paired (also for two-way), and 50 kHz unpaired (one-way only). This generated more than \$600 million for the U.S. Treasury.

In the fall of 1994 the FCC auctioned 30 regional licenses, six in each of the five regions of the United States. Two licenses in these regions are 50/50 kHz paired and four are 50/12.5 kHz paired. Eleven of the 30 licenses were won by businesses owned by women or minorities, and four bidders managed to win the same frequency block

in each of the five regions, effectively creating four more nationwide service providers.

The narrowband PCS frequencies are already being used for their expected purposes, namely voice messaging, two-way paging, and other low bandwidth one-and two-way services. One interesting application yet to appear is a pinpoint location service which will allow owners to precisely locate objects or vehicles containing a PCS transmitter.

AUCTION TYPE	GEOGRAPHIC AREA	NUMBER OF LICENSES
50/50 kHz paired	Nationwide	11
50/12/5 kHz paired		
50 kHz unpaired		
50/50 kHz paired	Regional	30
50/12.5 kHz paired		
50/50 kHz paired	Narrowband MTA	357
50/12.5 kHz paired		
50 kHz unpaired		
12.5 kHz unpaired	Narrowband BTA	986
50/12.5 kHz paired		
12.5 kHz unpaired	Narrowband Response Channel MTA and BTA	2176
12.5 kHz unpaired		

TABLE 1: Narrowband PCS Licenses

■ Broadband PCS

Broadband PCS is the bulk of the spectrum allocation. Although the FCC does not regulate the specific services offered, most license holders are either offering or planning to offer two-way voice services. This will bring some competition to the existing "duopoly" of cellular providers, as well as creating new services.

The FCC allocation for broadband PCS lies between 1850 and 1990 MHz. Twenty MHz of that block is set aside for unlicensed applications, with the remaining space broken up into six frequency blocks, A through F (see figure 1 and table 2). No single licensee is allowed to hold more than 40 MHz in any particular market, but the blocks are laid out such that a bidder may "aggregate" adjacent blocks to reach 40 MHz.

The auctioning of the A and B blocks, completed in 1995, garnered more than \$7 billion for the U.S. Treasury. The FCC had previously granted three A block licenses under "pioneer preference" in the New York, Los Angeles, and Washington, D.C. areas, leaving 48 A blocks and 51 B blocks to be auctioned. Eighteen bidders won the 99 licenses.

The C and F blocks are referred to as "Entrepreneur's Blocks," and were set aside to be bid on only by smaller firms who fall below certain financial thresholds. The C block auction suffered some controversy and is undergoing a Supreme Court challenge in the way the auction was handled; however, by the time you read this the 493 BTA licenses should have been awarded.

Auctions for the D, E, and F blocks, each of which contain 10 MHz of bandwidth, are scheduled to begin in late summer 1996.

Broadband PCS Frequency Allocation

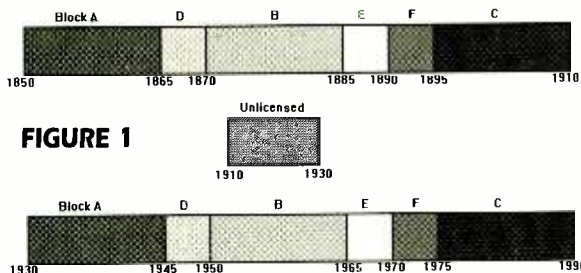


FIGURE 1

BLOCK	LOWER BAND	UPPER BAND	SIZE	MARKET	STATUS
A	1850 – 1865 MHz	1930 – 1945 MHz	30 MHz	MTA	Awarded
B	1870 – 1885 MHz	1950 – 1965 MHz	30 MHz	MTA	Awarded
C	1895 – 1910 MHz	1975 – 1990 MHz	30 MHz	BTA	Awarded
D	1865 – 1870 MHz	1945 – 1950 MHz	10 MHz	BTA	Open
E	1885 – 1890 MHz	1965 – 1970 MHz	10 MHz	BTA	Open
F	1890 – 1895 MHz	1970 – 1975 MHz	10 MHz	BTA	Open

TABLE 2: Broadband PCS Licenses

■ Unlicensed PCS

Unlicensed PCS lies between 1,910 and 1,930 MHz. Low power, short range applications, such as local area networks, cordless private branch exchanges (PBX), and cordless telephones, are expected to make their appearance using this band. Since no coordination is necessary other than limits on transmit power, manufacturers are free to introduce products almost immediately, rather than waiting for signalling and modulation standards to emerge.

■ PCS Pioneer

One early PCS provider is American Personal Communications (APC), based in Bethesda, Maryland. In 1995, partnering with Sprint Spectrum L.P., APC introduced Sprint Spectrum, the first PCS-based communication network in the United States, offering wireless telephone, paging, and voicemail services.

Utilizing more than 300 Ericsson PCS-1900 base stations to communicate with Nokia, Ericsson, and Motorola handsets, Sprint Spectrum is proving to be a popular alternative to existing cellular services, and now serves more than 80,000 customers. Handsets are sold at more than 200 retail outlets in the Baltimore-Washington, D.C., area, and activation is accomplished simply by calling an 800 number, unlike starting a cellular account.

Each handset holds a subscriber identity module (SIM), which is a smartcard containing serial numbers, the user dialing directory, and text messages. Moving the SIM from handset to handset allows customers to quickly and easily change equipment in different service regions. At present, Spectrum customers can take their SIM cards to Europe, rent a general system mobile (GSM) phone, and make and receive calls as if they were back in the Washington, D.C. area (except for the roaming charges, of course).

Sprint Spectrum uses a standard known as PCS-1900, which is essentially GSM operating at 1900 MHz. GSM operators currently offer service in more than 90 countries, typically in the 800-900 MHz range. In the United States this band is allocated to traditional cellular service, so cell sites and handsets have been modified to operate at 1900 MHz. All communication between the handset and cell sites is digital, as opposed to traditional cellular service where the voice channels are broadcast as analog. The data stream is also encrypted, so besides providing a clear, static-free audio connection, it also enhances security by making electronic ID theft (cloning) and eavesdropping much more difficult.

Since a digital connection is standard, data messages can flow as easily as voice, and this is where the existing cellular providers will have to play catch-up. In addition to normal voice calls, the system also supports text messaging. For an additional monthly charge, users can send and receive up to 100 brief text messages using the short messaging service (SMS) feature, similar to alphanumeric pagers.

Caller ID is also built in to the system, so a Sprint Spectrum user may decide not to answer a call based on the caller ID display. That caller ID information is also saved when the answering machine feature is used. If a Sprint Spectrum user's handset is off, or if a call is not answered, the system will automatically switch to an answering machine feature and record the message, the time the call came in, and the caller ID information. Sprint Spectrum users can dial an 800 number or a service number on their handset to retrieve those answering machine messages.

Also, when a Sprint Spectrum handset is powered up, the network will deliver any pending text messages and inform the user of any voice messages waiting in the answering machine service.

Sprint Spectrum has also been aggressive in their pricing. Subscribers have a relatively simple set of choices to make, based on the amount of time they expect to be talking each month and what features they'd like to use. Each "package" is typically less expensive than the competing cellular price, especially since Sprint Spectrum does not charge for calls that last less than one minute. Also, some features are simply not available with cellular: Caller ID and call forwarding are already included with a Sprint Spectrum account; call waiting and text messaging are available for an additional monthly fee.

Usage patterns reflect the difference in pricing. Typical cellular calling patterns peak during morning and evening rush hours and are relatively low at other times. Roughly 80 percent of cellular calls are placed from the cell phone (going mobile to landline), the implication being that most cellular subscribers don't give out their number.

Network traffic for Sprint Spectrum, in contrast, rises during the morning rush hour and stays high for the rest of the day, and about 50 percent of calls are placed from the handset. Because of a better cost structure, customers are using the Sprint Spectrum network more often, and relying on their PCS handset to stay in touch throughout the day.

Additional PCS voice systems are operating in Hawaii and Utah, with more to come. The challenge that all PCS operators face is not just fielding this new technology, but to actually turn a profit doing so.

FEATURE	SPRINT SPECTRUM	TRADITIONAL CELLULAR
Voice	Digital	Analog
Paging	Yes	No
Voicemail	Yes	Add-on
Caller ID	Yes	No
Messaging	Yes	Requires additional equipment
Cell Site Range	2 - 3 miles	5 - 10 miles

TABLE 3: Spectrum vs. Cellular

■ Welcome

If you've made it this far, you already have an idea of what this column will be like. The focus will be on the emerging technology that drives personal communications services. Future topics will include cellular systems, paging services, data transfer networks, and other new communications ventures, looking at both the technology and the business of putting advanced technology in the hands of consumers like you and me.

Speaking of me, I'd like to say thank you to the staff of *Monitoring Times* for welcoming me on board, and I look forward to working with them. I also look forward to hearing from you. Send comments, questions, ideas, and even criticisms to me, via electronic mail, at dan@decode.com. If you come to the Grove Expo, look for me at the *MT/ST* booth. Until next month, happy monitoring!

Richard Barnett

ScanMaster@aol.com, CompuServe at 102354,3643

Wanted: Your Used Scanners

Scanning, for most of us *MT* subscribers, has been a wonderful hobby since we were kids. Growing up, we would go to a friend's house, and there, in a workshop or on a night-table, we would get our first glimpse of a scanner.

Your friend's dad might have been a volunteer firefighter, or just a curious guy, but whatever the case, he was the first in the neighborhood with a police scanner. It might have been a Regency eight-channel crystal unit, with those big old red LEDs—or perhaps a Bearcat Three, black-faced, with eight small LEDs, rhythmically flickering away as the scanner searched for an active channel. You were hypnotized by those lights, and mesmerized by what you heard when those lights stopped. You ran right home, and at the dinner table that evening, you told your mom and dad all about that scanner. You dropped hints left and right about Christmas, Chanukah, or your upcoming birthday. You went to sleep that night watching red LEDs dance across your eyes.

Well, all right, maybe you just went into a Radio Shack store last year, plunked down your American Express card, and bought your first scanner on a whim at age 35. But, I was actually one of those fortunate kids who lived that early magical scanner moment. I'll never forget those first transmissions of my local police department. There was something incredible about hearing an officer on the other side of the city talk about something as mundane as a car accident, or a fire, or even a lost dog. It's hard to explain, but it has always stuck with me.

Now, I would like to give something back to this hobby, and I hope a good number of you will join me. A small group I am overseeing here in Massachusetts is investigating the possibility of providing used scanners to hospitalized and bedridden kids. We feel that scanners will offer an exciting, even fascinating diversion for these children. We're hopeful that scanners can generate that same fervor in those not as fortunate as the rest of us. And, as we all know, what's terrific about scanning is not just the entertainment of radio transmissions, but also the fun of tracking down new frequencies, of figuring out radio jargon, of following a chase from town to town—all of which makes scanning a good exercise of intelligence as well.

We have identified one other group as being worthy of scanner donations: Neighborhood Watch associations. Few things can keep you as well informed of crime in your area as a scanner. While many, if not all, of these associations may already be scanner-equipped, we're interested in doing the research and studying their needs.

We're just in the early stages of our research on this effort. We don't know for sure what the interest level may be on the part of the



kids and their parents. We also don't know if the core hobbyists have old scanners that they're willing to donate. That's where you come in: Are you interested in participating in this cause?

Perhaps we are being premature in announcing this campaign. We may find that there is little interest on the part of either of these two groups. We may find that there are few of us out there with the means to donate older radios. But our commitment to this cause is two-fold: we hope in some small way to help improve the lot of others; and, at the same time, to put our hobby in a better light—to show that scanners are beneficial to society—and to grow the hobby by encouraging new scanner devotees.

There are many other questions that will need to be answered before the program could get underway. Are scanner donations tax deductible? How would we distribute the scanners? Are there volunteers willing to program scanners and then, in turn, show those receiving the radios how to operate their new equipment? Will the manufacturers participate by providing new or used scanners to the program? (I'm confident they will—we already have made some calls.) Will the magazines grant some free starter subscriptions?

If the program becomes very popular, could we encourage police officers, firefighters, and EMTs to participate by talking to these groups about their profession, and what their radio communications are all about?

If you have any comments, pro or con, about this program, I'd be very interested in hearing your thoughts. If you have any ideas on how to make this successful, please contact me via e-mail at ScanMaster@aol.com or call me at 1-800-722-6701 if you don't have

e-mail access. We would love to get this program started this holiday season.

If you have old scanners you're willing to donate, or if you're interested in helping in any other way, please contact me immediately. Please *do not* send any radios until we have answered some of the questions listed above, however.

■ The Electronic RCMA?

Everyone in this hobby of ours was saddened by the demise of the RCMA (the Radio Communications Monitoring Association). As we experience what is, hopefully, the bottom of a cycle that will hopefully soon spin upward—a sine wave of sorts—the RCMA has fallen victim to this current deep trough. A few of the volunteer editors of the RCMA are, however, keeping the spirit alive by posting their monthly column electronically, in such places as the "Scan-L List." Below is an example of one of those columns, reprinted with the permission of its author, Andy Barber. This column, which would have appeared in the August '96 issue of RCMA, is an outstanding example of the kind of detail and care that went into so many of the monthly reports.

"Friday, April 12th, I found a previously unused, undocumented frequency. Normally such an accomplishment is accompanied by bragging, chest pounding, and other infantile displays which are performed in order to show one's feeling of personal omnipotence. Of course, I was not so subtle. My immediate concern was to brag to Bob KS-001, who routinely unearths such information before me. My wife was in mid-blink as I left the room to make the phone call to him, so she completely missed my exit.

"Anyway, the frequency is 867.3375 KNNJ875 licensed to Douglas County (Kansas) Sheriff. Detective work revealed that Douglas County has been testing the equipment, and that it will most likely be their dispatch channel in the future. Douglas County dispatch and mobiles already have the ability to talk with troopers and dispatch on the Kansas Highway Patrol's new 800 system, so it makes sense that they would go 800 for their own communications. It should eliminate the need for a low-band radio and an 800 radio in each car.

"My point of going overboard about this discovery is to illustrate that anyone can stumble across something like it. Patience is the key. In this case I searched from 866 to 868.9875 MHz for weeks until the frequency came to life, and then spent several days listening to it. The NPSPAC (National Public Safety Planning Advisory Committee) manual indicated it was licensed to Douglas County, so I called them and they were able to confirm it.

"Those of you who are fortunate to have several scanners could dedicate one to a search while the other radio scans your normal frequencies. ...

This might be a good time to recap the Kansas 800 system, and what has been discovered so far. Kansas is developing a statewide 800 MHz system for all state agencies...KDOT, KHP, KBI, Fish & Game, etc. It will be a quilt-work of different types of sub-systems, including:

- 1 New trunked systems licensed to the state.
2. Existing trunked systems owned by other agencies on which the state is allowed to "piggyback."
3. Trunked and/or conventional repeaters in the NPSPAC frequency range.

"To complicate things, NPSPAC has dished out the 866 to 868.9875 range for *any* Kansas agency to use...state, county, or local.

If you have read some of the Kansas columns, you probably noted portions of NPSPAC frequencies routinely listed there. Since all the agencies involved may allow other agencies on their systems (primarily on trunked systems), you will never know just who may pop up on a frequency. Here are some of the known frequencies for the state, as well as some NPSPAC frequencies for non-state agencies:

856-860.4875	Kansas state trunked system in Topeka, Shawnee County agencies, KHP, KDOT, KBI, etc.
856-860.7125	Kansas state trunked system in Manhattan (haven't heard from anyone out there who can confirm this one yet)
856-860.9625	Johnson County trunked system: Johnson County agencies, KHP
856-860.7625	Kansas City, Kansas, trunked system: KCK all city services, KHP
856-857.7125	Ellis County trunked system: Ellis County agencies, KHP
856-860.2625	Sedgewick County trunked system
856-860.4625	Sedgewick County trunked system
856-860.7375	Sedgewick County trunked system
856-860.9625	Sedgewick County agencies, Wichita agencies, KHP
866.0125	Mutual Aid
866.5125	Mutual Aid
866.6750	KHP Bonner Springs
868.6750	KHP Eskridge (Topeka area)
868.1750	KDOT Bonner Springs
866.1000	KDOT Olathe
866.7125	KDOT Osawatomie
866.9750	Unassigned in NPSPAC manual: KDOT-type traffic heard (unsure)
867.2000	KDOT in Waverly

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868.8625 KHP in Lawrence
 866.6875 KHP Olathe
 868.9250 KHP Corning
 867.3375 Douglas County

Other NPSPAC frequencies:

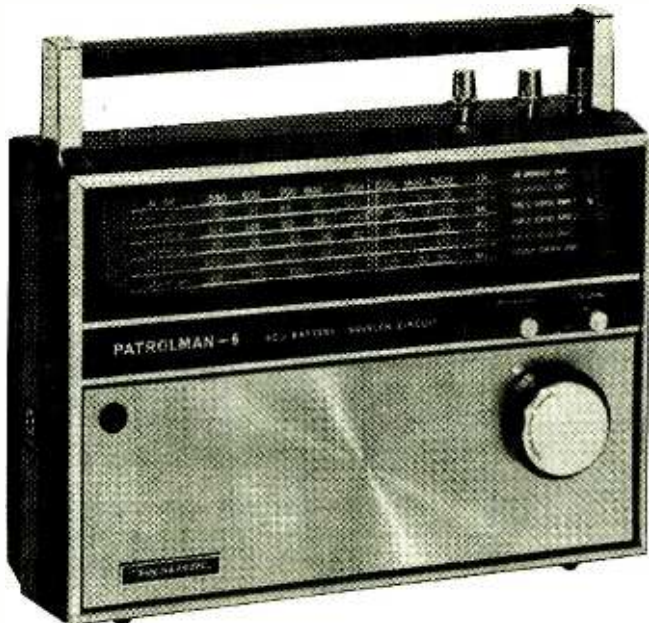
Jackson County	866.2000	Johnson County	866.6125
Jackson County	868.5000	Johnson County	866.6375
Jackson County	866.5375	Johnson County	866.6625
Jackson County	868.7500	Johnson County	866.7875
Jefferson County	866.2375	Johnson County	866.8875
Jefferson County	868.4750	Johnson County	867.8250
Jefferson County	866.4875	Johnson County	868.1000
Jefferson County	868.7250	Johnson County	868.1250
Johnson County	866.2625	Johnson County	868.2000
Johnson County	866.3375	Johnson County	868.3500
Johnson County	866.3625	Johnson County	868.3750
Johnson County	866.3875	Johnson County	868.4500
Johnson County	866.5375	Johnson County	868.5250
		Johnson County	868.7000
		Johnson County	868.7750

"Keep those scanners searching the 866 to 868.9875 range and report what you find. It looks like the Kansas system is coming together quickly..." Andy (andyb@qni.com)

■ Your All-time Favorite Scanner

Ray Matthews responded to our question in the July issue:

"Hi Richard! An interesting question ... What is/was my all time favorite scanner? I have been a scannist ever since I was about 12 years old, which is almost 30 years ago now. I first got hooked on public safety monitoring when I was given a Radio Shack 'Patrolman Mini' VHF receiver and located my local police department. Then I learned about scanners, and owned my first 4-channel handheld soon afterwards. Since then, I have probably owned over 50 different scanners, including names like Teaberry, Kris, Robyn, SBE, and Johnson, as well as the more common units. So what are/were some of my favorites?"



The Patrolman 6, shown here, is probably similar to the 'Patrolman Mini' that Ray Matthews recalls.

"PRO-2006: Right now I regularly use a 2006 that I have modified highly. In addition to the diode cuts, I have added Bill Cheek's HB-232 computer interface, an 'S' meter, and a total of 25,600 channels. I also love the excellent receiving qualities of this unit. This is my favorite unit that I have today, but ranks second for my all-time favorite.

"PRO-2001: About 15 years ago, someone gave me a PRO-2001 because it had been dropped and stopped working. While the case was nearly undamaged, I found that one of the circuit boards inside had been cleanly snapped into two pieces due to the fall. I spent many painstaking hours soldering little wire jumpers across all of the broken traces, and this scanner has been running flawlessly 24-hours a day ever since.

"Uniden MR-8100: I still own this unit, and dearly love the alphanumeric display and the computer interface. I also like the unique vertical case style. If it wasn't that the receiver is so prone to interference, this may have been my all time favorite.

"BCT-7: A scanner in a class of its own, to say the least. In addition for using it while traveling, it is also used heavily in my shack for searching out those 'unknown' frequencies that are being used in my area.

"Patrolman #?: I don't remember the exact model number, but at one time I owned a Radio Shack unit that had seven crystal-controlled channels and the eighth channel had an analog tuner. The best of both worlds!

"But my all time favorite scanner?? It was a Sears unit! Again, I don't remember the exact model number. But it was a LARGE 16-channel programmable unit that used optical cards to do the programming. This was very similar to the old SBE Optiscan units, except that I never really had an SBE that worked worth a damn, plus it was only 10 channels and the cards used stickers for the programming. The Sears unit was 16 channels, and the cards had perforated circles that you would punch out. No more sticky fingers!


"At the time I owned this unit, I traveled frequently around about a seven-county area. So I had the unit mounted in my car (it took up the whole dash!) and would simply swap cards as I went from county to county. I also had separate cards I would use at home, depending on my listening requirements at the moment.

"Unfortunately, this scanner was stolen from my car one day while I was out on my travels, and I have never seen it (or another one like it) since. But I would love to get my hands on another one of these units, and am always looking for them at the swap meets."

Ray sounds like the perfect candidate to help us with our donation program! Thanks for the great letter, Ray. I hope it will inspire other MT readers to respond with their favorite scanner thoughts as well.

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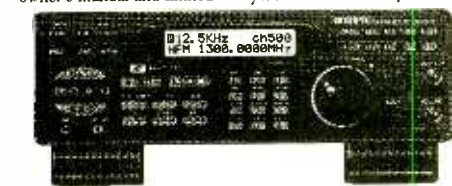
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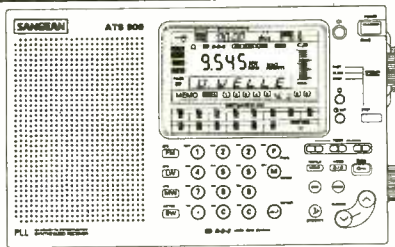
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The Bearcat 9000XLT is superb for intercepting communications transmissions with features like TurboSearch™ to search VHF channels at 300 steps per second. This base and mobile scanner is also ideal for intelligence professionals because it has a selectable attenuator to help eliminate annoying intermodulation from adjacent frequencies in highly populated areas and selectable AM, Wide FM and Narrow FM modes that allow you to change the default receiving mode of the BC9000XLT. Other features include Auto Store - Automatically stores all active frequencies within the specified bank(s). Auto Recording - This feature lets you record channel activity from the scanner onto a tape recorder. HI-Cut filter to help eliminate unwanted static noise. You can even get an optional CTCSS Tone Board (Continuous Tone Control Squelch System) which allows the squelch to be broken during scanning only when a correct CTCSS tone is received. For maximum scanning enjoyment, order the following optional accessories: PS001 Cigarette lighter power cord for temporary operation from your vehicle's cigarette lighter \$14.95; PS002 DC power cord - enables permanent operation from your vehicle's fuse box \$14.95; MB001 Mobile mounting bracket \$14.95; BC005 CTCSS Tone Board \$54.95; EX711 External speaker with mounting bracket & 10 feet of cable with plug attached \$19.95. The BC9000XLT comes with AC adapter, telescopic antenna, owner's manual and limited one year Uniden warranty.



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Who is Herb?

One of the more frequently asked questions that I have received over the last few years is, "Who is Herb and what is the *Southbound II*?"

While this column has mentioned Herb and the *Southbound II* on several occasions, we have never had the complete story until now.

Several years ago, Herb Eric Hilgenberg, on board the vessel *Southbound II*, was monitored by some marine band utility buffs using the Canadian maritime call sign VA-4219. He would show up nightly on marine simplex frequencies in the 6, 8, and 12 MHz bands to pass out weather information to ships and vessels in the Atlantic, Caribbean, Gulf of Mexico, and Pacific.

Herb had HF fax and other radio equipment capability that allowed him to accumulate weather information and pass it to the ships monitoring his net from his location in Bermuda. In return, vessels from all points of the globe would pass to Herb their local weather information and location.

Last year, Herb's employer downsized and his position was cut. He has since returned to Canada. Even though he is now landlocked, Herb still runs his nightly nets on 12359 kHz starting around 2000 UTC. His weather nets have also been heard on other marine simplex frequencies and he's been heard as late as 0300 UTC.

Most frequently, the request is for an address through which ute monitors can contact Herb. Herb holds Canadian amateur radio license VE3LML. Based on that call, here is the most current address I have available: VE3LML, Herb Eric Hilgenberg, 5468 Hixon Avenue, Burlington, ON, Canada L7L3S2.

Even though he now signs VAX-498/coastal on the air these days, maritime vessels worldwide can still be heard most evenings in North America calling for their old friend of the sea—Herb on the *Southbound II*.

memories. Table 1 gives a complete list of marine simplex frequencies on HF.

■ CAP Changes Callsigns

On June 10, 1996, the USAF Civil Air Patrol changed nearly all of their long-standing tactical callsigns. According to Malcolm Kyser, CAP Communications Chief, "Since we have become more involved in interagency operations, we started seeing more conflicts with our tactical callsigns. Since we now come under the NTIA instead of the FCC for radio management, it was time to also update and register our tactical callsigns."

These new tactical callsigns are now registered with U.S. Air Force communications authorities instead of the FCC, which assigned the old KPB callsigns to the CAP many years ago. The old KPB callsigns are no longer valid.

"The list you have for publication in *MT* is about 95 percent accurate. We still have a few changes that need to be made down the road," Kyser said. *Utility World* will keep *MT* readers informed of the latest changes as they become available.

There have also been some interesting changes in CAP frequencies in recent months (both HF and VHF). To expedite getting the information to you, we have included the VHF frequencies in this column.

If you would like to learn more about the Civil Air Patrol and their communications, a visit to their web site on the internet is a must. This is by far the finest government web site for communications buffs we have visited to date. Our hats are off to the CAP and their fine communications folks for a job well done on a useful and very informative web site. The URL for the CAP is: <http://www.cap.af.mil/> If you like what you see, be sure to drop the webmaster some e-mail and tell them *MT* send you.

TABLE 1: Maritime Simplex Channels

4125	4146	4149	4417	6215	6224
6227	6230	6516	8219	8294	8297
12290	12353	12356	12359	16420	16528
16531	16534	22159	22162	22165	22168
22171					

■ Maritime Simplex Channels

Monitoring the maritime simplex channels like the ones mentioned above can provide the ute hobbyist with some of the most interesting intercepts in the spectrum. These "CB channels of the marine bands" are busy with activity twenty-four hours a day. These frequencies are a great place to start monitoring marine voice communications.

Just bear in mind one of my general listening rules when tuning in these marine simplex channels: go low at night and higher in the daytime (unless you live along a coastline). These frequencies are a lot of fun to monitor and well worth your time to put in your receiver

TABLE 2: New CAP Ground Tactical Callsigns

Note: The "CAP flight" callsign is still required for aircraft use. A three or four digit number will follow the callsign "CAP flight." The first one or two digits will be the charter number of the unit to which the aircraft is assigned (1-52). The last digit or two will be assigned at random or could be the last tail numbers of the aircraft, depending on local usage (e.g., CAP Flight 5201).

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Pennsylvania PENN CAP
Rhode Island NARRAGANSETT
Vermont VERMONT CAP

Middle East Region	MIDDLE EAST	Florida	FLORIDA CAP	New Mexico	SHIP ROCK
Delaware	DIAMOND FLIGHT	Georgia	GEORGIA CAP	Oklahoma	OIL WELL
National Capital	NAT CAP	Mississippi	MISSISSIPPI CAP	Texas	TEXAS CAP
South Carolina	SAND LAPPER	Puerto Rico	PUERTO RICO CAP	Rocky Mountain Region ..	ASPEN GOLD
Maryland	FREE STATE	Tennessee	TENNESSEE CAP	Colorado	BLUE MESA
North Carolina	CAP KITTY HAWK	North Central Region	NORTH CENTRAL	Idaho	STAR GARNET
Virginia	JEFFERSON	Kansas	YELLOW BRICK	Montana	BLACK GRANITE
West Virginia	HILL CAP	Minnesota	STAR FISH	Utah	UNCLE MIKE
Great Lakes Region	CAP GREAT LAKES	Missouri	MISSOURI CAP	Wyoming	HIGH PLAINS
Illinois	RED FOX	Nebraska	RED CLOUD	Pacific Region	WESTERN
Indiana	RED FIRE	North Dakota	PEACE GARDEN	Alaska	SOURDOUGH
Kentucky	JET PILOT	South Dakota	GRASSLANDS	California	YOSEMITE
Michigan	RED ROBIN	Iowa	IOWA CAP	Hawaii	FIREBRAND
Ohio	RED THUNDER	Southwest Region	CAP WEST	Nevada	SILVER STATE
Wisconsin	BLUE MOUND	Arizona	RED ROCK	Oregon	BEAVER FOX
Southeast Region	SOUTHEAST CAP	Arkansas	WILD WOOD	Washington	SPOTTED OWL
Alabama	ALABAMA CAP	Louisiana	CAJUN CAP		

TABLE 3: Civil Air Patrol Frequencies

(Frequency assignments are in flux. This list is not to be taken as definitive.)

The carrier frequencies of 4582.0 kHz and 7635.0 kHz are designated as the national emergency frequencies. Additional assignments in the HF and VHF are indicated below with authorized usage, modes and power restrictions.

2371.0 kHz	All regions. Modulation/Band: USB HF; Maximum Power: squadrons and groups: 400 Watts; national, regions, wings: 1600 Watts	7635.0 kHz	All regions; Defacto HF "guard"; National Emergency and Calling Frequency; National Net. Modulation/Band: USB HF; Maximum Power: squadrons and groups: 400 Watts; national, regions, wings: 1600 Watts
2374.0 kHz	All regions. Modulation/Band: USB HF; Maximum Power: squadrons and groups: 400 Watts; national, regions, wings: 1600 Watts	7920.0 kHz	All regions; to be used by nationally approved Clover stations only. Modulation/Band: USB HF; Maximum Power: squadrons and groups: 400 Watts; national, regions, wings: 1600 Watts
4273.0 kHz	All regions. Modulation/Band: USB HF; Maximum Power: squadrons and groups: 400 Watts; national, regions, wings: 1600 Watts	14902.0 kHz	All regions; Nation-wide general usage; National Command Net. Modulation/Band: USB HF; Maximum Power: squadrons and groups: 400 Watts; national, regions, wings: 1600 Watts
4466.0 kHz	Northeast and Southeast Regions. Modulation/Band: USB HF; Maximum Power: squadrons and groups: 400 Watts; national, region, wings: 1600 Watts	18205.0 kHz	Alaska only. Modulation/Band: USB HF; Maximum Power: squadrons and groups: 400 Watts; national, region, wings: 1600 Watts
4469.0 kHz	Northeast and Southeast Regions. Modulation/Band: USB HF; Maximum Power: squadrons and groups: 400 Watts; national, region, wings: 1600 Watts	20873.0 kHz	All regions. Modulation/Band: USB HF; Maximum Power: squadrons and groups: 400 Watts; national, regions, wings: 1600 Watts
4506.0 kHz	North Central Region. Modulation/Band: USB HF; Maximum Power: squadrons and groups: 400 Watts; national, region, wings: 1600 Watts	26.617 MHz	Authorized for packet. Modulation/Band: USB HF; Maximum Power: 150 Watts; 250 Watts in Hawaii.
4509.0 kHz	North Central Region; Modulation/Band: USB HF; Maximum Power: squadrons and groups: 400 Watts; national, region, wings: 1600 Watts	26.620 MHz	Authorized for packet. Modulation/Band: AM/DSB HF; Maximum Power: 5 Watts. Modulation/Band: USB HF; Maximum Power: 150 Watts; 250 Watts in Hawaii.
4582.0 kHz	Pacific and Middle East regions; All regions-National Emergency and Calling Frequency. Modulation/Band: USB HF; Maximum Power: squadrons and groups: 400 Watts; national, region, wings: 1600 Watts	143.75 MHz	Repeater input frequency; aircraft use discouraged. Modulation/Band: FM VHF; Maximum Power: 50 Watts.
4585.0 kHz	Pacific and Middle East regions. Modulation/Band: USB HF; Maximum Power: squadrons and groups: 400 Watts; national, region, wings: 1600 Watts	143.90 MHz	Repeater input frequency; aircraft use discouraged. Modulation/Band: FM VHF; Maximum Power: 50 Watts.
4601.0 kHz	Rocky Mountain and Great Lakes Regions. Modulation/Band: USB HF; Maximum Power: squadrons and groups: 400 Watts; national, region, wings: 1600 Watts	148.125 MHz	Often used as repeater output; may be used for simplex operation on a non-interfering basis. Modulation/Band: FM VHF; Maximum Power: Land or Mobile station: 50 Watts; Air station: 10 Watts.
4604.0 kHz	Rocky Mountain and Great Lakes Regions. Modulation/Band: USB HF; Maximum Power: squadrons and groups: 400 Watts; national, region, wings: 1600 Watts	148.1375 MHz	Primary ground-to-ground simplex. Modulation/Band: FM VHF; Maximum Power: 50 Watts.
4627.0 kHz	Southwest Region. Modulation/Band: USB HF; Maximum Power: squadrons and groups: 400 Watts; national, region, wings: 1600 Watts	148.15 MHz	Often used as repeater output; May be used for simplex operation on a non-interfering basis; old primary simplex frequency. Modulation/Band: FM VHF; Maximum Power: Land or Mobile station: 50 Watts; Air station: 10 Watts.
4630.0 kHz	Southwest Region. Modulation/Band: USB HF; Maximum Power: squadrons and groups: 400 Watts; national, region, wings: 1600 Watts	149.5375 MHz	Primary air-to-ground simplex. Modulation/Band: FM VHF; Maximum Power: Land or Mobile station: 50 Watts; Air station: 10 Watts.
7341.0 kHz	All regions; National HF packet frequency. Modulation/Band: USB HF;	149.895 MHz	National packet frequency. Modulation/Band: FM VHF; Maximum Power: 50 Watts
		149.925 MHz	Old repeater output; old packet; used near Canada. Modulation/Band: FM VHF; Maximum Power: 50 Watts.

Abbreviations used in this column

AFB	Air Force Base	KCNA	Korean Central News Agency
AM	Amplitude Modulation	MARS	Military Affiliate Radio Station
ANDVT	Advanced Narrowband Digital Voice Terminal	MFA	Ministry of Foreign Affairs
ARC	American Red Cross	MHz	Megahertz
ARQ	Synchronous transmission and automatic repetition teleprinter system	m/v	Motor Vessel
ARQ-E	Single-channel ARQ teleprinter system	MWARA	Major World Air Route Area
ASCI	American Standard Code for Information Interchange	NAS	Naval Air Station
CAMSLANT	Communications Area Master Station, Atlantic	NAVSECGRPACT	Naval Security Group Activity
CAP	Civil Air Patrol	NCS	Net Control Station
CFARS	Canadian Forces Amateur Radio Services	RAF	Royal Air Force
COMSTA	Communications Stations	RTTY	Radioteletype
COMSUBGRU	Commander, Submarine Group	SAM	Special Air Mission (89 Air Wing)
CW	Continuous Wave (Morse code)	Selcal	Selective Calling
CWO	Communications Watch Officer	SITOR-A	Simplex teleprinting over radio system, mode A
DEA	Drug Enforcement Administration	SITOR-B	Simplex teleprinting over radio system, mode B
DSN	Defense Switching Network (old Autovon system)	SWED-ARQ	Adaptive Swedish diplomatic simplex ARQ teleprinter system
EAM	Emergency Action Message	Synop	(Synoptic) Report of surface observation from a land station
FEC-A	One-way traffic FEC teleprinter system	TACC	Tanker Airlift Control Center
FEMA	Federal Emergency Management Agency	Unclass	Unclassified
FF	French Forces	Unid	Unidentified
GHFS	Global HF System	USAF	U.S. Air Force
ID	Identification	USAV	U.S. Army Vessel
ITU	International Telecommunications Union	USB	Upper Sideband
JTF	Joint Task Force	USCG	U.S. Coast Guard
		USCGC	U.S. Coast Guard Cutter
		USN	U.S. Navy
		UTC	Universal Time Coordinated
		VIP	Very Important Person

All times are in UTC, all frequencies in kHz, and all transmissions are in USB unless otherwise indicated

- 122.3 OUA-Danish Navy Stevns, Denmark, with DE CW marker beacon at 1248. (Ary Boender-Netherlands)
- 129.1 DCF49-BMPT Bonn, Germany, with 200 baud encrypted ASCII traffic and test at 1141. (Boender-Netherlands)
- 438.0 OXZ-Lyngby Radio, Denmark, working various vessels in CW at 1113. (Boender-Neth)
- 4009.5 NNN0BVM-Navy MARS NCS for 1N5B traffic net at 2324 using SITOR-B sending Ship's Active List, also sent using 75 baud RTTY. (Richard Baker-Austintown, OH)
- 4020.0 Army MARS Net with AAT3JG as net control at 2131 in LSB. (Keith Stein-Woodbridge, VA)
- 4145.7 Hotel One Tango calling various trigraphs call signs such as Kilo Six India at 0535. (Jeff Haverlah-Houston, TX) Noted same over 24 hour period. (Jeff Jones-CA)
- 4417.0 Quebec Kilo, unid USN? At 0122 working 3Q in reference to getting a number "off the deck" and passing it on. (Baker-OH) *My noted on this one indicate it is a Coast Guard channel-Larry.*
- 4466.0 2239Z Empire 4, Empire 14, Empire 74, Empire 517 conducting some kind of net with Empire 521 as net control at 2239. (Stein-VA) *This is a CAP net with units from New York. Their new call sign is White Peak now-Larry.*
- 4472.0 Motorist working Nightwatch 01 on (self-IDed) Z-130 ay 0648. (Jones-CA)
- 4486.0 ARIA Control and NASA 12 working ARIA 1 and ARIA 2 during the Pegasus/FAST launch countdown at 0745. Launch was scrubbed due to spacecraft problem. Also heard on 6889.0 (Stein-VA)
- 4495.0 Harmonic calling Nightwatch 01 on Zulu 125 at 0124. (Haverlah-TX) Baked Pie working Nightwatch 01 on self IDed Zulu 125 at 0441. (Matthew Cawby-Mount Lake Terrace, WA)
- 4593.5 AFA1FQ running a "directed, but informal net" at 2305. Other stations checking in AFA1HP, AFA1AZ, AFA1IM. (Stein-VA) *This is a U.S. Air Force MARS net from their region one-Larry.*
- 4604.0 Red Fox 4 (Indiana CAP) at 2344 working Red Fox 130 with radio checks. (Baker-OH)

- 5110.0 Unid station at 0656 with ANDVT traffic. (Baker-OH) *The Bookshelf units have been reported here flying over Bosnia, but propagation looks a little late for that-Larry*
- 5211.0 KPS 396-Unid in Orlando, Florida, standing by on FEMA's F-11 at 2105. Found some old FEMA VHF listings with KPS series, but I'm not sure about this one. (Jack Metcalfe-KY) *Jack, I show KPS 396 as a U.S. Customs Service station in Memphis, Tennessee-Larry*
- 5320.0 NOY8-USCG Group Corpus Christi at 0252 working Shark 1339 (aka USCGC Key Biscayne WPB-1339 on DEA mission)
- 5711.0 Cape Radio working station 21 at 2243. They made a schedule to meet the next morning on 10780.0 to set up working frequencies. (Metcalfe-KY)
- 5796.5 Deffley working Footrope for radio check at 2150. Identified this frequency as primary and alternate as P204. (Fernand Vaillancourt-St. Pamphile, PQ)
- 6411.0 At 0346, unid station in SITOR-B with a tirade against Carnival Cruise Lines and other U.S. shippers who flag their vessel in Panama and Liberia to avoid OSHA rules and to avoid paying workman's compensation. Off abruptly at 0401 and into CW. (Sue Wilden-IN) *I show KLB-Seattle Radio on 6409.7 and WLO-Mobile Radio on 6416.0. Take your pick-Larry.*
- 6501.0 NOJ-USCG COMSTA Kodiak, AK, at 0532 working USCGC Sedge (WLB-402), not heard on 6200. (Baker-OH)
- 6586.0 New York Aeradio working Navy WV 071, destination Washington, D.C. This is my first military aircraft I have heard working New York Air. (Merritt Ashmore-St. Petersburg, FL)
- 6712.0 Dover with a "comms test" at 0247. Dover AFB, I guess. (Metcalfe-KY) *Good catch Jack. My records show that this is the first time on that frequency for them-Larry.*
- 6715.0 Kiwi Bird calling Nightwatch 01 at 0224. (Haverlah-TX) *Probable Z-160-Larry.*
- 6717.0 SAM 375 working Andrews with signal check on F-875 at 0038. (Fowler-MA) *SAM 375 is a USAF C-20H, tail no 20375 (92-0375), from the 89 Air Wing at Andrews (c/n 1256, ex-N438GA)-Larry.*
- 6719.4 R5S advising Habitat "Ops Normal" at 1847. At 1716 heard R5S working Habitat on 337.3 MHz, then calling Bigfoot on 364.2 MHz as Navy VJ 105 with position near Hoquiam, WA. Believe that 337.3 is Habitat base frequency, possibly NAS Whidbey Island. (Cawby-WA)
- 6730.0 SAM 375 working Andrews with signal check on F-267 at 0035. (Fowler-MA)
- 6739.0 Offutt GHFS, NE, with a 20/20/20 character EAM set over a nine minute period at 0419; very unusual for the set to conclude with a 20-character string rather than a 26-character string. (Haverlah-TX)
- 6761.0 Mash 83 calling Mainsail at 2356, no response. SAM 375 working Andrews for phone patch at 0053. (Fowler-MA)
- 6826.0 Spanish female 5-digit numbers station in AM at 0314. (Edward Schwartz-Chicago, IL)
- 6910.0 Alpha 81 Sierra calling Alpha 81 at 1901. A81S with a good signal, A81 was weak. They never heard each other. Possibly National Guard or U.S. Army. (Metcalfe-KY)
- 6993.0 Andrews working SAM 28000 in the clear and with ANDVT at 0108. (Haverlah-TX) *SAM 28000 is USAF Boeing VC-25A, Selcal AE-FP from the 89 AW at Andrews-Larry.*
- 6959.0 English female 5-digit number station (Lincolnshire Poacher) using AM at 2132, parallel to 12603 kHz. Off at 2145 (Sunday UTC). (Mark Fine-Remington, VA)
- 7914.9 USAF MARS stations AFA2QG and AFA2DB using SITOR-B at 0043. (Metcalfe-KY)
- 8020.1 HMF 85-KCNA Pyongyang, North Korea, with English news (awful tripe!) using 50 baud RTTY at 1806. (Robert Hall-Capetown, South Africa)
- 8025.5 Foxrot Tango, USN Link 11 coordination net working others with track info. FT nets widely held to be associated with Joint Inter-Agency Task Force-East (JIATF-E or ex-JTF4) Caribbean operations. (Baker-OH)
- 8026.0 SAM 974 working Andrews at 0456. (Haverlah-TX) *SAM 974 is a USAF C-137C, tail no 86974 (58-6974), Selcal AE-KP from the 89 AW at Andrews-Larry.*
- 8156.0 Bahamas Self Defense Force at 2258 with SS2 working MT (C6MT?). At 0210, SS2 calling "Coral Harbor" (SDF headquarters). (Baker-OH)
- 8225.0 ELK16-m/s Fantasy at 0420 working WOO-AT&T coastal station with radiotelephone traffic. (Baker-OH)
- 8369.5 LYAF-m/v Marijampole calling OXZ-Lyngby Radio with move to 8350.0 working frequency in CW at 0713. (Robin Hood-UK)

- 8371.0 ULFU-*T/KH Fedor Varaksin* with crew messages in SITOR-B at 0731. Vessel call changed to UCKU in ITU but still using old call ULFU. (Hood-UK)
- 8394.0 HSIP-*m/v Heritage* using SITOR-A with telex traffic. (Baker-OH)
- 8775.0 SVN48-Athens Radio, Greece, at 0347 with voice marker, female in Greek with announcement of dialup services offered by Hellenic Telecommunications Organization (OTC) separated by a door bell like "ding dong." (Baker-OH)
- 8788.0 HEB28-Berne Radio, Switzerland, at 0514 with female giving English ID. (Baker-OH)
- 8825.0 Santa Maria Aeradio (NAT-E MWARA), Azores, at 0032 working Liberte 852 (selcal AL-HJ, DC-10 registration: F-GPVB). (Baker-OH)
- 8968.0 *Oriole* (probably the *USS Oriole-Larry*) working a GHFS station with a phone patch to a commercial number (904 area code) then a 960 DSN number that involved Mayport, Florida. (Haverlah-TX) *960 is the DSN prefix for the Naval Station in Mayport-Larry.*
- 9014.0 Reach 0275 working Raymond 7 with a phone patch to Hilda (TACC) West, looking for the status of a tanker from the 927th Aerial Refueling Wing at 0144. Also Darkstar November and Gemini 93 calling Raymond 7 without response at 1851. (Haverlah-TX)
- 9016.0 Mongoose working Nightwatch 01 at 0318 he entered the net through the challenge process. It has become obvious that the challenge process changed back on July 1, 1996, as these units used and the Nightwatch nets are still using three alpha character challenge groups instead of the old 2 alpha character group system. (Haverlah-TX) SAM 375 working Andrews at 0050. (Fowler-MA)
- 9017.0 SAM 375 working Andrews at 0058. (Fowler-MA)
- 9057.0 Nightwatch 01 working Overwrite and then moved to Zulu 240 (unknown) at 1620. (Haverlah-TX)
- 9270.0 Andrews VIP checking SAM 26000 out of Offutt AFB location on primary F-517 at 2216. (Jones-CA)
- 10033.0 Connie Ops LDOC Miami, FL, on 0238 working unid flight 943 with selcal check HK-DL. (Baker-OH)
- 10057.0 San Francisco Aeradio (CEP-5 MWARA) at 2205 working Northwest 72 after moving from a lower frequency. (Baker-OH)
- 10201.0 MKK-RAF London, UK, sending test tapes at 2310 using 50 baud RTTY. (Baker-OH)
- 10204.0 Vagabound working Narcotic at 1608. Narcotic seemed to be high up in the net chain of command, and he was a heavy user of Navy communications lingo. (Haverlah-TX)
- 10493.0 KCI 615-ARC Fallas Church, VA, on FEMA's F-26 at 2103. This call was previously listed as a FEMA VHF call. (Metcalfe-KY)
- 10535.0 RDL-Russian Navy Moscow, Russia, with 50 baud encrypted RTTY at 1102, "RDL RDL RDL then encrypted messages." (Boender-Neth)
- 10551.3 GFL23-Bracknell Meteor, United Kingdom, with 75 baud RTTY synop messages at 1059. (Boender-Neth)
- 11053.0 SAM 201 working Andrews at 0447. (Haverlah-TX) *SAM 201 is a USAF C-20B, tail no 60201 (86-0201), Selcal AF-GP from the 89 Air Wing at Andrews-Larry. Trout 99 working Andrews VIP with phone patch to Air Force ops. Secondary frequency 6730.0 at 0412. (Jones-CA)*
- 11055.0 Awareness with test count on this frequency parallel with all the main GHFS channels at 0047. This was followed at 0050 with Offutt transmitting an EAM parallel with all the main GHFS channels. (Fowler-MA)
- 11175.0 At 1743, Offutt GHFS was up with an "Eyestrain, Eyestrain, request you echo...", but disregarded the broadcast, and followed it with "Eyestrain, Eyestrain. Do not answer" and into the trigraph timestamp authentication of a Foxtrot broadcast. Also had Bravo Six Foxtrot working MacDill with a phone patch to 573 DSN number (King Bay) at 2038. Party at King's Bay IDed as COMSUBGRU 10 CWO, for an exercise "Esteem Highly Alpha" message. (Haverlah-TX) AAEH working Andrews GHFS at 0415. (Gordon Levine-Anaheim, CA) AAEH is the *USAV Macon* (LCU-2003) from the U.S. Army 97th Transportation Detachment-Larry.
- 11214.0 SAM 375 working Andrews at 1649. (Haverlah-TX)
- 11220.0 Blade 01 working Andrews VIP for phone patch to Hawaii at 0140. Is Blade 01 still a Travis callsign? (Jones-CA)
- 11466.0 SAM 375 working Andrews with signal check on F-965 at 0043. (Fowler-MA)
- 11494.0 Nightwatch 01 working Chinaware at C546. (Haverlah-TX) *This is Zulu 205-Larry.*
- 11535.8 HMF 49-KCNA Pyongyang, North Korea with 50 baud RTTY English news bulletins at 0815. (Hall-RSA)
- 11660.0 Spanish female 3/2-digit number station in AM at 0117. (J. Nicklaw-Asheville, NC) Same noted at 1535. (Sue Wilden-IN)
- 12070.0 Nightwatch working Gilcrest on self IDed Zulu 211 at 0321. (Cawby-WA) *Thanks a bunch Matthew, we have been looking for that one for a while-*
- 12359.0 *Larry.* Almost daily from 2230-0030, *Southbound II* sends weather to various "sailing ships" in the Atlantic, Caribbean and Eastern Pacific. Do you know who this guy Herb is? (Ashmore-FL) *See this month's content section for more information-Larry.*
- 12485.5 TCKO-*m/v Omer Kaptanoglu* at 1631 in SITOR-A with messages. (Baker-OH)
- 12495.5 SQEB-*m/v Huta Zgoda* at 2216 with a SITOR-A message. (Baker-OH)
- 12508.0 YLBR-*TK Klements Gotvalds* at 2150 with a SITOR-A message. (Baker-OH)
- 12535.0 USSL-*T/KH Sergey Buryachuk* working US05-Izmail Radio with 50 baud RTTY traffic at 0720. (Hood-UK)
- 12573.5 UYTB-*RTMKS Rybak-1* at 2303 in 50 baud RTTY with administrative traffic to Kaliningrad. (Baker-OH)
- 12574.9 EMJW-Russian ship *Novodrutsk* with 50 baud RTTY to Vladivostok. (Hall-RSA)
- 12578.9 UFZ-Vladivostok Radio, Russia, with 50 baud RTTY traffic for various ships. (Hall-RSA)
- 12625.5 UCE-Archangel Radio with SITOR-B traffic for UTQZ-*Yevgeniy Onufriev* at 0711. Vessel call changed to UCNG in ITU, but still using old call. (Hood-UK)
- 12858.6 KPH-San Francisco Radio, CA, with SITOR-B broadcast of charges and traffic list at 1500. (Hall-RSA)
- 13242.0 Overwrite working Nightwatch 01 at 0546. (Haverlah-TX) *This is Zulu 215-Larry.*
- 13248.0 SAM 201 (USAF C-20B tail no 86-0201) at 0018 working Andrews VIP with phone patch to Andrews Metro for Pax River weather. (Baker-OH)
- 13450.0 Spanish female 3/2-digit number station in AM at 0125. (Nicklaw-NC)
- 13903.0 BND-Germany, with 96 baud ARQ-E encrypted traffic at 1038. (Boender-Neth)
- 14441.5 NNN0CUB-US Navy MARS station aboard the *USS Arthur W. Radford* (DD-968) at 2239 calling for any stateside station. At 2042, NNN0CZR-*USNS Powhatan* (T-ATF-166) working NNN0NWV-NAVSECGRPACT, Sugar Grove, WV. (Baker-OH)
- 14479.5 CSY-Santa Maria Air, Azores, with 50 baud RTTY aeronautical messages at 1210. (Hall-RSA)
- 14780.0 Victor Echo Xray working Charlie India Xray 204 with data and maybe ANDVT comms at 0015. (Jones-CA) VEX-CFB Penhold, AB, at 0205 working unid CIX204. Request he try channel and passes 12185. They move to channel 5 and pass another frequency 11605. They also tried channel 4-10920.0, channel 3-10284.0, and channel 2-9292.0 kHz. (Baker-OH) *Based on all this Rick, I am now convinced that these are not CFARS stations. The bandplan and use of ANDVT isn't right. Also the CIX prefix doesn't fit. They are probably regular Canadian Forces communications units-Larry.*
- 14912.0 DFZG-MFA Belgrade, Serbia, with 75 baud RTTY news at 1413. (Boender-Neth)
- 15046.0 Nightwatch 01 working WAR 46 on self-IDed Zulu 230 at 2028. Nightwatch 01 was making a phone patch to a 227 DSN that IDed as "Command Center." (Haverlah-TX)
- 15733.0 SAM 375 calling for Andrews, but receiving no response at 2353. (Jones-CA)
- 15821.9 SAM-MFA Stockholm, Sweden, message traffic at 1405 using 100 baud SWED-ARQ. (Boender-Neth)
- 15942.0 MFA Bratislava, Slovakia, news bulletins at 0950 using 100 baud RTTY. (Boender-Neth)
- 16118.0 HBD46-Swiss Embassy Havana, Cuba, at 18320 with SITOR-A 5-letter group message traffic. (Baker-OH)
- 16143.7 RFLI-FF Fort de France, Martinique, at 2155 using 192 baud ARQ-E3. (Baker-OH)
- 16685.5 KJLV-*m/v Sea Lion* at 1618 using SITOR-A with telex traffic. (Baker-OH)
- 16696.5 DZAB-*m/v General Cabal* at 1448 with SITOR-A AMVER traffic. (Baker-OH)
- 16701.5 YLCZ-*TKH Akademikis Botszhars* at 2032 in SITOR-A with messages. (Baker-OH)
- 16908.0 MFA Ankara with plain language message to Kishasa using 144 baud FEC-A at 1416. (Hood-UK)
- 17001.5 MNM-USCG CAMSLANT Chesapeake, VA, at 2025 in SITOR-A, CW ID, most likely set up here for *USCGC Eagle* as this is not regular SITOR channel for them. *Eagle* seems to get all her unclass traffic via this method. (Baker-OH)
- 22412.0 WLO-Mobile Radio, AL, at 1859 in SITOR-A working C6RT-*m/v Celtic Sea* with telex traffic. (Baker-OH)



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Keep Up With the Time....

"The Month of Confusion" is almost a thing of the past. For many years, Europe has ended Daylight Saving Time one month earlier than North America, on the last Sunday in September. Shortly after the equinox, this was a convenient date for shortwave stations broadcasting to and/or from Europe to change not only times, but frequencies. Britain, however, stayed on DST until the fourth Sunday in October. This has meant that some, but not all broadcasts from Europe suddenly would come in an hour later (by real time) at the end of September, and then jump back to the same clock time as previously when the US made its time change.

Now in a show of Euro-unity, they are all keeping DST a month longer, which in most years will coincide with North America where it lasts until the last Sunday in October.

The coordination in Europe, of course, had nothing to do with shortwave broadcasting, and the confusion is far from over: What about propagational changes? We expect some stations will find it inconvenient to wait an extra month as the nighttime maximum usable frequency drops, so look out for frequency, if not time changes, to be implemented when necessary.

Additionally, some stations stay at the same Universal time year-round—others do that with some programming, but don't do it with programming destined to DST-observing areas. Of course, all this could be avoided if everyone just abolished DST!

Especially for Beginners...



Everyone should be able to find something of use in this column, but if you are just starting shortwave listening, you may need to do some additional reading and listening. I suggest you try Bill Matthews' "Technical Corner" on Radio Korea International's *Shortwave Feedback* alternate Sundays. It's really not technical at all, as he explains basic aspects of shortwave listening. He's found

on the Canadian relay at 1036 UT on 11715, (switching to 1135 on 9650 after DST is over).

BBC's revived *Waveguide* also deals with basics, especially regarding BBC reception.

Several webpages include info for beginners, such as: <http://itre.ncsu.edu/radio/> and <http://www.clark.net/pub/cwilkins/rfpi> and <http://www.mcrest.edu/moore/patepluma.html>.

ALGERIA RTA in English 1850-1855 on 15160.35, distorted (Don Phillips, UK, DSWCI *DX Window*) Presumably 1800-1900-gh. //15240.9 (Alex Koutamanis, Holland, *Cumbre DX* via DSWCI *SW News*)

ANGOLA VORGAN heard on new 9765 at 1120-1210 (Vashek Ko zinek, RSA, DSWCI *DX Window*) So that answers last month's question - gh.

AUSTRALIA Budget cuts to ABC next financial year will require RA to lose 10 staff and almost certainly lose some services (Neil Deer, RA comptroller for resources, VOA *Communications World*) RA heard on split freqs several times: 17763 at 0300-0558*, next day back on 17795; 15272 at 0500 sports, next day 15240 (Ernie Behr, Ont., *DXLD, W.O.R.*) Notice these are both 32 kHz off-gh. Brandon site now relays BBC 2200-2300 on 9660, 12080 (Bob Padula, *Electronic DX Press*) No longer via Shepparton 11695 (Arthur Cushen, RNZI *Mailbox*) see also TASMANIA

BOLIVIA Rdf. La Voz de los Lipez, Uyuni, Potosí, heard again from 1000 or 1030 to 1135* in Quechua on 4777.0, varying in evening to 4777.4, closing between 2230 and 2300; announced as an experimental broadcast by this field workers' union station (Emilio Pedro Povrzeni, Argentina, *Latinoamérica DX* via *Radio Nuevo Mundo*) Seems to be La Voz de Nor-Lipez, morns until 1050 drowned by Indo (Henrik Klemetz, *Dateline Bogotá*) Some other DXers thought this was R. Los Andes, Tarija -gh. R. San Miguel, 4925.1, had program for foreign listeners, *Bolivia al mundo*, UT Thu 0200-0225, offered QSL (Klemetz, *op. cit.*)

BRAZIL RadioBrás back on 15445 after more than a month's silence, at first in Portuguese, next day Aug. 12 in English at 1200 with no mention of absence (Dave Jeffery, NY) Also back the same day in English to Europe at 1800 on 15265 (Kjell-Ingvar Karlsson, Sweden, rec.radio.shortwave via

All times UTC; All frequencies kHz; * before hr = sign on, * after hr = sign off; // = parallel programming; + = continuing but not monitored; 2 x freq = 2nd harmonic; Z-96 = Summer season; W-96 = Winter season; [non] = Broadcast to or for the listed country, but not necessarily originating there.

George Thurman) Before this, Amazon service on 6180, 11780 also missing (Matthias Gatzke, Germany, *WWDXC Top News*) <http://www.cdsid.com.br/radiobras/> (Thorsten Koch)

Last month's "R. Marumby" item on 11724.9 is not the station in Florianópolis on 9665, but a slogan or MW ID used by R. Novas de Paz, Curitiba, I heard last year on 6080 and 9515 with both IDs (Ernie Behr, Ont., *World of Radio*)

CANADA Look for the independent film *Johnny*

Shortwave set in near future post-breakup Canada about a clandestine radio broadcaster. In July it was playing at the Film Forum, South Village, NY (NY *Times* via Malcolm Kaufman)

RCI's *Canada and the World*, monthly live show mentioned last month, was on Sun broadcasts in July, but third Sat in August at 2006, not Sun (gh, OK) CBC's *Cross-Country Checkup* has good topics, higher grade of callers than US talk shows: check 9625 at 1259 Sun for preview of the 2009-2200 show (Chet Copeland, DC, *W.O.R.*)

COLOMBIA R. Macarena expected to be back on 5974.3 with the purchase of a new \$3000 tube (Henrik Klemetz, *Dateline Bogotá*) We'll know it with the renewed het on BBC -gh.

COSTA RICA RFPI has been building a cubical quad for 41mb, measuring 36 x 140', 3 elements atop 170' tower (RFPI *Mailbag*) RFPI carries gh's monthly 15-minute DX report in Spanish, *Mundo Radial*, sometime in these weekly half-hours: Mon 1530, Wed 1330, Sat 1330, on 6200, 7385, 15050-



USB. During early evening, RFPI may use 7380 instead of 7385 to avoid interference (gh)

ECUADOR R. El Buen Pastor has been authorized to move to 4815 as hoped, ASAP when new crystal received; has been on 4830.2 clashing with R. Táchira, Venezuela (HCJB *Latest Catch*)

EGYPT R. Cairo on 9175 in Arabic around 1600-1700, heard for 4+ years, unlisted, not //12050 or MW sites (Zacharias Liangas, Greece, DSWCI *DX Window*) *Probably another mixing product -gh.*

[non] R. Egypt of Arabism (Arabic: *Idhaat Misr al-Urubah*), hostile to Egyptian government, and previously part of Iraqi domestic service, now erratic 2030-2100 on 11895, unconfirmed at 1000-1030, 1300-1330; previously used 11815, 13780 (BBCM)

ETHIOPIA [non] V. of the Tigre Revolution reactivated on new 5500 ex-7515 from *0330 with same echoed ID (Ed Rausch, *Cumbre DX* via *The Four Winds*) Also here, non-stop music to 0359 (gh, OK) Still on both freqs (Finn Krone, Denmark, *DXW*) Also both heard at 1500-1600* but from what site? (N. Pashkevich, Russia, *ibid.*)

FINLAND YLE to NAM at 1200-1400 planned to replace 11900 with 11735 // 15400, but date unclear—perhaps Oct. 27 if not already. *Weekly Survey of Finnish Media Scene* observed Thu 1242-1246, ex-Fri (gh, *DX Listening Digest*)

GUAM KSDA plans to use 7540 at 1600-1800 for W-96 season (Internet via Michael Bethge, WWDXC via *BC-DX*) *Ever further out of band -gh.* KTWR will build a fifth SW transmitter here and additional antenna, pending FCC approval; and plans to maintain studio in Hong Kong after reversion to China, in keeping with promises of religious freedom (TWR via BBCM)

HONDURAS La Voz de la Mosquitia, 4910v, has been off since June and may not be back until January, according to Larry Hooker of Global Outreach. Two Viking ham transmitters were sent back to US for repair, and an ex-US military transmitter in Honduras is also broken. Maybe SWLs should donate a ham transmitter (Hans Johnson, *Cumbre DX* via *DXW*)

HUNGARY R. Budapest new home page is: <http://www.eunet.hu/radio> Internet address is: angol1@kaf.radio.hu (note: sixth character is a one) (*EDXP*)

INDIA All AIR 22mb operations are 500 kW from Bangalore—13700, 13732, 13750 (Alok das Gupta, *Electronic DX Press*)

INDONESIA Despite announcement that *Kangguru 2* was over last month, it kept appearing Tue 1230 on RRI, freqs kept changing, such as 15150 (Sheldon Harvey, PQ) Suspect RRI reruns, 9565 but mixed with CRI, jamming, and Marti (gh, Gigi Lytle) Several new high-powered transmitters online for RRI, monitored at 0900 on all these in para/el: 9565, 9640, 9680, 11750, 11785, 11885, 15125, 15150, some clashing with Asia/Pacific stations. Analysis of modulation signatures reveals this deployment: 100 kW Harris-Gates on 9680, 15125, 15150; 250 kW Marconis on 9565, 9630, 11750, 11775, 11885; 250 kW Thomson-CSF on 11785, 9525 (Robert Jones & Bob Padula, *EDXP* via Thurman)

INTERNATIONAL WATERS [non] Lightwave Mission Broadcasting, aboard the ship *Electra*, plans to start broadcasting in late fall well before Christmas, from territorial waters 6.5 miles offshore a host country and with its approval. Also plans to use nearby piece of land for satellite programming downlink, including *Yesterday USA* from Dallas, and perhaps Gold Coast Broadcasting from London, both 24h. Two 50 kW SW, and two 25 kW SW, plus AM MW; the host country gets use of FM. One SW will be kept open for block time sales.

The ship is larger than the *Fury* or *Sarah*, almost 200' long, 35-40' wide, 14' draft; 14-15 cabins or staterooms, crew capacity 65. More on <http://www.tv36.com> (Scott Becker, LMB, *W.O.R.*) *Unclear how they are financing such an expensive project, vaporware? See last month: now three conflicting reports from LMB on size of vessel -gh.*

IRAN [non] V. of Southern Azerbaijan is new clard at 1530-1630 on 12090, weak but clear, no jamming yet; Azeri: *Bura Janubi Azerbaijan Sasi*. Aimed at Azeri population in NW Iran; had phone number in Netherlands, 31-703-192189, but likely transmitted from ME. On cassette tape claims the Farsis are oppressing the Azeri minority, demands autonomy, equal rights, participation in government, etc. (Chris Greenway, BBCM, *DXW*)

V. of Mojahed around 1815 on 4450, 4650, 5150, 5450, 5750, 6175, 7075—Some freqs lagged behind others by a fraction of a second, and were constantly changing to avoid jamming. V. of the Worker on 3940 at 1505 in Persian, gone after 1525. V. of the Movement of the Mojahedin of Iranian Baluchestan (Persian: *Jonbesh-e Mojahedin-e Baluchestan Iran-e Tabari*) is believed to be from Iraq, with a Baghdad PO box, intermittently at 1300-1430 on 11875, unconfirmed at 0600-0745; previously used 15340, 11970, 9545,

7250, 7180 (BBCM)

IRAQ [non] V. of the Iraqi Communist Workers' Party, in Kurdish 1530-1630, Arabic 1630-1730 on 4000. This party, founded three years ago, differs from the old Iraqi CP. V. of Rebellious Iraq, with addresses in Iran and Syria, 1200-1430 on 6030-6090v but announced as 6350-6650v, in Arabic, Kurdish; one hour later in winter (BBCM)

IRELAND United Christian Broadcasters QSL admits 6200 is from Ireland, 100 watts, plans increase to 2 kW. Also has big plans to broadcast via Luxembourg, Russia, Ireland, or Isle of Man (Harald Kuhl, Germany, DSWCI *DXW* and WWDXC *Top News*)

KALININGRAD Correcting last month's item under DENMARK, this Russian oblast between Poland and Lithuania has not changed name. An unrelated city of Kaliningrad near Moscow did change to Korolyov (R. ABC/Denmark, *DXW*)

KYRGYZSTAN Bishkek's English news at 2310-2315, followed by Russian and German, on both 4010 and 4050; then programming splits (*DXW* via HCJB *The Latest Catch*) *One hour later in winter -gh*

LESOTHO BBC relay QSL says will close Sept. 30; reply came from Martin J. Rigby, G4FUL, c/o British High Commission, P.O. Box 521, Maseru 100 (Ed Rausch, NJ, *NU* via *DXW*) Best try at *0300 on 3255, 6190; previously reported that R. Lesotho, from same site would also go off SW, *0300 on 4800 (gh)

LIBERIA ELWA's parent organization SIM has received several unconfirmed reports that Charles Taylor's forces stole their 10 kW transmitter, now used as ELCN on 5100 (Hans Johnson, *Cumbre DX* via *DXW*) Isaac P. Davis at LCN says reports can be faxed to him at 231-226-003 (Rolf Lövström, Norway, *DXW*)

MALTA [non] VOM via Russia 9765, 12060 continues beyond test period, Mon-Sat 1900-2000 English, 2000-2100 Arabic; Sun 1900-2000 English, 2000-2030 French, 2030-2100 German (Eugene Gebreurs, RVI *Radio World* via Steven Cline) And UT Sun 0100-0400 on 15480 in English, French, German, Arabic, to Australia (*also tried 17590 a while -gh*), giving address of High Commissioner of Malta, Canberra ACT (Paul Bailey, Hobart, *ibid.*)

MÉXICO XERMX decided to use 9705, not 5985 after 2300 in summer, but may have reversed by now; is using two old but reliable 10 kW transmitters and two vertical "umbrella" non-directional antennas with 4 dB gain; two rotatable log-periodic antennas with 14 dB gain are out of service because of an arcing problem, but hope to have them repaired by yearend (*Encuentro DX*, Sat 1800, Sun 1530, Mon 0000, Fri 0100)

NETHERLANDS RN has started carrying two minutes of ads per hour, helps pay the bills, but only in Dutch (RN/MN)

NIGERIA [non] R. Democrat International dedicated a day in mid-July to the memory of one of non-Pres. Abiola's wives, who had been murdered, renaming the station R. Kudirat (Eric Lund, Sweden, *DXW*) It was this indomitable woman who urged us to establish a radio voice (Wole Soyinka, NALICON via Swarthmore webpage) Defence Info Dir Brig-Gen Fred Chijuka said he hopes the people behind R. Democrat International know it's a treasonable offence (Nigerian *The Guardian* via BBCM) Have a look at these sites: <http://www.sccc.swarthmore.edu/org/nigeria/radio.html> ending with [..rkudirat.html](http://www.rkudirat.html) (Francis Mougenez, WWDXC *Top News*)

PAKISTAN R. Pakistan reactivated 4949.9 at *0052-0110; was Peshawar 10 kW until 1992, but now as strong as 100 kW 4790, so what is site now? (Harald Kuhl & Anker Petersen, Germany, WWDXC *Top News*)



Radio México
Internacional
XERMX-OC

DX Listening Digest

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PAPUA NEW GUINEA June-July bandscan from DX site in the Washington islands showed these stations inactive: 3305, 3365, 3395. Irregular: 2410, 3275, 3325, 3345, 3385, 3905. Heard every day: 3205, 3220, 3235, 3245, 3260, 3290, 3315, 3335, 3355, 3375, 4890 (John Bryant, *Fine Tuning*)

PERÚ R. Naylán, Lambayeque, at 0050-0125 with tropical chicha music, on 5342.4 (Pedro F. Arrunátegui, Lima, *The Four Winds*) Could be R. Naylamp, ex-4154 (Hans Johnson, *ibid.*) R. Mi Frontera, 6420.3 at 0035-0120 new somewhere in the northeast (Arrunátegui, *DXW*) unID at 1430 on 9505 in UT-5 zone, mentioned AM-1470 (Tim Hendel, AL) Must be R. Tacna, Peru, only 200 watts and occasionally active here, AM frequency checks (gh, *W.O.R.*) Estación Wari, Ayacucho 3280.6 heard in long-awaited reactivation, 1000-1040 when Ecuadorian was off (Henrik Klemetz, Colombia, *NU* via *DXW*) R. Interocéánica, new stn testing on 6096.3 at 2230-2350 from Puno dept. (Levi Iversen, Paraguay, *DXW*) AWR's new 5-kW SW station in Juliaca should be on by yearend, authorized one 25mb frequency, in Quechua, also Spanish, Aymara (*AWR Current*)

PHILIPPINES FEBC Manila retimed its morning English to Asia on 15450 to 0100-0300 ex-0000-0200 (Alok das Gupta, India, *EDXP*) Radyo Pilipinas external service in Tagalog to Australia 1730-1930 on 15190, 11890, 11815; English & Tagalog to Asia & America at 0330-0400 on 17730, 15330, 13770 (BBCM) *0230-0330 no longer listed, so this must replace it -gh.*

POLAND HFCC registrations show the only frequency and the only hour of all Polish Radio broadcasts beamed 316° toward us is 11815 at 1200-1300, indeed the best chance for us to hear Warsaw. All the others are at much lower azimuths (gh)

RUSSIA V. of Russia has had to lay off 30% of its staff, down to 1000 employees, reduced to 32 languages, 77 hours a day (VOR webpage via Bruce Atchison) News for Polar Regions, from Moscow, sked in July was 1400-1430 Tue & Thu on 7135 (one hour later in winter). V. of Assyria (*Kale Alturaia*) from Moscow Sat 1500-1600 on 9880, 9730, and from 1530 also on 7325 in Russian, Arabic, Persian, English to ME; Tue-Fri at same time on 9880, 7325 is Islamskaya Volna—Islamic Wave—in Russian, irregularly also in Arabic, Tatar (BBCM) R. Samorodenko, Moscow pirate may soon be official; has two transmitters in ranges 3919-3924, 4873-4877, and 9419, 9770, 15345, usually on weekends 2000-0230 (VOR *DX Klub* via *Paniview*) University Network, Dr. Gene Scott: Novosibirsk 0300-1000 12065, 1000-1600 12050; Krasnodar 0300-0700 13645; Samara 0700-1300 15550, 1300-1600 13645 (DGS HQ via Jim Moats, *W.O.R.*)

SLOVAKIA AWR will cease using the Velke Kostolans site Oct. 27 and replace it with Jülich, Germany. Hurry to QSL VK on this non-English sked: 5905 at 0400-0500, 1300-1700. AWR will continue via the other site here, Rimavska Sobota (AWR via Diane Mauer)

SOUTH AFRICA Channel Africa clash with Nederland on 9590 resolved by moving to 9675 at 0500-0555 in English (J. Marks, RN, rec.radio.shortwave via Thurman) SENTECH is probing for business in Malawi, Botswana, Zambia, Angola, Mozambique, like the temporary relay of R. Tanzania last year (*Sentalk* via Andy Sennitt, *DXW*)

Afrikaans Stereo will reduce work force by 20% because of budget cut by a third over next three years, to make it comparable to black language stations (*Beeld* via BBCM) Will relaunch in Oct with new name R. Sonder Grense (Without Borders), or just RSG (SABC *Intercom* via Andy Sennitt, *DSWCI DXW*) *Still SW?-gh*

TAHITI RFO's last SW xmtr, 15167.3v was still there in mid-July, 0300-0500+ but barely audible, probably <500 watts instead of 20 kW (Ernie Behr, Ont., *DX Listening Digest*)

TASMANIA Techno Shortwave, Tassie pirate on 4795, mainly music around *0930-1330*, uses 40 watts from 50 km off east coast, making it legal (Paul Bailey, Hobart, *Australian DX News*)

THAILAND R. Thailand 1400-1430 on 9830 contained *Travel Thailand*, bike tour and tourist info (Alok das Gupta, India, *EDXP*) *Any particular day of week?-gh*

TINIAN The Maxoqueira, Portugal, transmitters possibly moving here are 500 kW, not 50 (gh) No indication yet that construction has commenced (Robert Jones, *EDXP*)

UK OGBANI "What is going on is the greatest act of cultural vandalism that I have ever seen," said John Tusa, former managing director of the BBC World Service, in reference to its proposed reorganization. In a mounting campaign of criticism, some 1500 or 2000 WS staff signed petitions of protest, and almost 250 MPs backed a House of Commons motion opposing the changes.

(William Miller, *Boston Globe* via Louis Rossetti, Malcolm Kaufman) SW transmitters in UK to be privatised; owners will be able to lease time to third parties, not just BBC; however, this does not apply to BBC relays overseas (VOA *CW Waveguide* was expected back on BBCWS from mid-Sept for 8 weeks, back to basics for new SWLs, probably repeated 6 months later (BBC *Write On*)

UKRAINE RUI's new *DX Klub* program, UT Fri 0040 on 7150, aired the same show at least three weeks in a row (gh)

USA WEWN became first major station in the 43mb, 6890 from 0300; before that hour on new 7395, super-splattering neighbors VOA 7405, RFPI 7385, from 2200; also still on 7425 part of that period. Started early Aug. but must have been last-minute choices, as no sign of the freqs in Sept. *Gabriel's Horn*. Those wishing to express views to Mother Angela herself about WEWN's un-neighborliness can try her live call-ins UT Thurs 0000-0100 at 1-800-221-9460, (one UT hour later after DST) (gh, OK)



WHRI started new Softronics interactive webpage: needs work, and numerous frequency misprints give 9945 instead of 9495 (gh, *W.O.R.*) *DXing with Cumbres* as of Sept: Fri 2230 UT 5745 kHz, Sat 0500 5760 & 7315, 1300 6040, 1730 9495, 2230 9495, Sun 0330 5745, 1630 13760; KWHR Sat 0200 17510, 0500 17780, Sun 1830 13625, Mon 0330 17510 (*DWC* as corrected by gh's monitoring) Tom Valentine's *Radio Free America* moved to WHRI for weekly UT Mon 0100-0400 on 5745 (*DWC*) Probably simulcast on WWCR-4 2390 (Adam Lock, WWCR)

WWCR news: Tom Valentine, one of the original far-right talkhosts, decided to quit WWCR 5065 at 0200-0400 weeknights due to declining income (John T. Wagner, Gigi Lytle) William Cooper attacked WWCR on his broadcast for not letting him have earlier hours vacated by Tom Valentine, and said he was leaving WWCR for some "network" (Gigi Lytle, TX) *The Big Backyard*, Oz music is on 3215 UT Sun 0315-0345 (Adam Lock, WWCR) *America's Greatest Heroes*, Sat 2000-2100 on 9475 (WWCR webpage)

WORLD OF RADIO on WWCR as of early Sept: Thu 2030 UT 15685 kHz, Fri 2215 9475, Sat 1130 9475, Sun 0100 7435/2390, 0800 3210, 1900 12160, 2130 9475, Mon 0330 5065, 2030 15685, Tue 1230 15685, Wed 1130 15685. From Oct. 27 one UT hour later, and some freqs may change (gh)

WRNO started using 7395 in the mornings for additional far-right or far-Catholic programming, from 1500 or earlier; and sometimes running past 1600 when Limbaugh was supposed to be on 15420 (gh)

WGTG has new show *North of 49* UT Suns 0300-0400 on 9400, non-religious about Old Time Radio (K. Scott, rec.radio.shortwave via Thurman) *Promotes FM micro-broadcasting -gh*. Look for WGTG to show up on 6950 soon (Kirk Trummel, *hard-core dx* via *DXW*) Those wondering about "CIA mind control" and other far-right programs on WGTG should read "Conspiracy Theories and Paranoia" in the Sept-Oct *Skeptical Inquirer* (via Gigi Lytle, TX)

Series of radio plays is being performed before live audiences at the VOA Auditorium through Nov. 20-21 at 7:30 pm, to be broadcast on public radio and later on VOA. Sold out, but try at the door or info from 202-357-3030 (Melissa Dease, Washington *Times* via Chet Copeland) USIA attorneys have ruled against sending *VOA Guide* to Americans, due to §501 of the Smith-Mundt Act. USIA is being sued over this issue prohibiting domestic dissemination (VOA *Communications World*)

Broadcast auxiliaries heard during August sporadic E opening: 26150 WJRT-TV Flint, MI; 26250 WSOC-FM Charlotte, NC; 26350 WMAR-TV Baltimore, MD (Alan Roberts, PQ, *W.O.R.*)

[non?] Stocks & Funds TV Network, home-shopping, plans to add hourly SW broadcasts to expats in Africa, Latin America by mid-Oct, leasing time from some station (VOA *CW*)

VENEZUELA R. Amazonas Int'l, 4939.5 at 0113 put spurs on 5189.7 and stronger 4689.4 (Henrik Klemetz, *Dateline Bogotá*)

VIETNAM [non] VOV via megawatt Tbilisskaya, Russia at 0100-0300 with four English segments was expected on 5940 ex-7250 from Sept. 1 thru winter (Kevin Hecht, rec.radio.shortwave via *DXW*) 7250 had no audio for 17 minutes, just loud hum, then tone and Vietnam finally came on at 0122 (Randy Stewart, MO)

Until the Next, Best of DX and 73 de Glenn!

Gayle Van Horn

- 0002 UTC on 9410**
CYPRUS: BBC WS relay. World news and features to 0100. (Silvi, OH/ via e-mail) BBC's Oman relay on 15310 at 0321. (Edward H. Hamill, Burlingame, CA)
- 0006 UTC on 6020**
NETHERLANDS: Radio Netherlands. Commentary on the rise of drug use among Netherlands teens, on // 6165 from Netherlands Antilles relay site. (Sue Wilden, Columbus, IN; David Swenson, Chehalis, WA)
- 0014 UTC on 7345**
CZECH REP: Radio Prague. Report on the national army's substitution service. *All You Need is Love* tune to station address quote, interval signal, and multilingual IDs. (Brandon Artman, West Chester, PA) Monitored 2234 on 11600. (Swenson, WA)
- 0019 UTC on 5953.76**
BOLIVIA: Radio Pio XII. Quecha. Regional programming and music monitored to 0032. Bolivia's **Radio Illimani** 4945 heard 2332-0325; **Radio Santa Cruz** 6135.03 at 2302. (M. Molano, Spain/Play DX)
- 0045 UTC on 6747.14**
PERU: Radio San Ignacio. Spanish. Clear channel of regional programming and IDs. Peru's **Radio Satellite** 6725.5 at 0110-0415, with strong signal. (D. Monferini, Italy/Play DX)
- 0120 UTC on 15115**
NEW ZEALAND: Radio NZ Int'l. Health program to ID at 0125. (Hamill, CA) Musical program from the Christchurch Band. (Bob Fraser, Cohasset, MA; Frank Hillton, Charleston, SC)
- 0121 UTC on 15130**
USA: Voice of Free China relay. Spanish service with conversation and features. (Hamill, CA) Heard in Spanish on 17845 at 2343. (Wilden, IN; Tom Banks, Dallas, TX)
- 0130 UTC on 6090**
SWEDEN: Radio Sweden. Feature on Swedish food and feature on leading chefs. (Elmer W. Wallesen, La Grange Park, IL) *Sixty Degrees North* heard on 15240 at 1143. (Fraser, MA)
- 0130 UTC on 9655**
AUSTRIA: ORF/Radio Austria Int'l. English service sign-on with IDs and interval signal. National news topics covering unemployment, a new law for the social security system, and weather forecast. *Report From Austria* program. Excellent signal for this North American service. (Gayle VH, Brasstown, NC)
- 0201 UTC on 4824.4**
PERU: (Tent) La Voz de la Selva. Spanish. Fine lite music to possible ID. Male chat monitored in LSB to avoid interference. Peru's **Radio Ilucan** with Andean music on 5620.91 at 0117. (Giovanni Serra, Anzio, Italy/The Four Winds)
- 0209 UTC on 3290**
NAMIBIA: NBC. Continuous various pop and afro pop songs, //3270 with static and utility QRM. (Serra, Italy/TFW)
- 0303 UTC on 15370**
THAILAND: Radio Thailand. Newscast to report on a gas separator plant in Thailand. RTTY interference on frequency. (Swenson, WA)
- 0305 UTC on 15180**
RUSSIA: Voice of Russia. Station ID and news for this Komsomol'sk Amure transmitter site. (Wilden, IN) VOR noted on 15455//12010 at 0331. (Hamill, CA)
- 0311 UTC on 11725**
TURKEY: Voice of Turkey. Commentary on terrorism to report on health benefits of yogurt. (Swenson, WA) *Turkey's Relations With the Balkan Countries* program on 9655 at 2240//11810. (Fraser, MA)
- 0334 UTC on 7520**
MOLDOVA: Radio Moldova Int'l. English news with poor modulation to station IDs. (Silvi, OH)
- 0340 UTC on 11920**
MOROCCO: RTV Marocaine. Arabic. Conversations to regional music and station ID. (Hamill, CA)
- 0342 UTC on 9935**
GREECE: Voice of Greece. National news topics to station ID 0347. Spanish service commencing at 0349. (Swenson, WA)
- 0416 UTC on 9935**
BULGARIA: Radio Bulgaria. Fair signal for program on European unity to ID at 0422. (Swenson, WA) *Events & Developments* heard on 9700 at 2120. (Fraser, MA) Station audible on 11720 at 2100. (Aspinall, VA)
- 0431 UTC on 11870**
YUGOSLAVIA: Radio Yugoslavia. Fine signal quality for report on the Tesla museum. (Swenson, WA)
- 0850 UTC on 9525**
INDONESIA: (Java) RRI-Voice of Indonesia. Talk from Ministry of Foreign Affairs and Ministry of Finance, to discussion about a housing project near Jakarta. Frequency/time quotes to ID. Presumed Indonesian at 0900. (Brian Boulde, Fairfield, CA/TFW)
- 0924 UTC on 6160**
GERMANY: Deutsche Welle. *Newsline-Koln* story about maids in Sri Lanka. News headlines from German newspapers on Algeria and Zimbabwe. (Boulde, CA/TFW)
- 0945 UTC on 9580**
AUSTRALIA: Radio Australia. *Australia Today* with report on ATMs in Aussie supermarkets. (Fraser, MA; Hamill, CA)
- 1100 UTC on 11335**
NORTH KOREA: Radio Pyongyang. News to Korean music and feature on the DPRK leader. (Silvi, OH) Audible frequency 13785 at 1515 with book excerpts and national anthem at 1530. (Swenson, WA)
- 1240 UTC on 11890**
OMAN: Radio Oman. Arabic. Programming announcements alternating with pop music. Arabic songs// 15375 at 1249. (Serra, Italy/TFW)
- 1245 UTC 15530**
FRANCE: Radio France Int'l. *Planet Earth* on the dangers of sunken Russian nuclear subs in the North Atlantic. (Fraser, MA)
- 1310 UTC on 13610**
BELGIUM: Radio Vlaanderen Int'l. *Current Affairs* show on improvements to the barge canals. (Fraser, MA)
- 1415 UTC on 7405**
CHINA: China Radio Int'l. Story on fisherman protection to item about Colombia's president. (Boulde, CA/TFW)
- 1500 UTC on 9515**
CANADA: BBC WS Sackville relay. World news and sports update to program *Greenfield Collection* of classical music. (Wallesen, IL)
- 1524 UTC on 12085**
MONGOLIA: Radio Ulan Bator. Sports report on equestrian and archery competition in Mongolia to 1530*. (Swenson, WA)
- 1603 UTC on 15010**
VIETNAM: Voice of Vietnam. Weak signal for news and Vietnamese music program. (Swenson, WA) Heard on 7250 at 0156-0227. (Silvi, OH) VOV heard on 9840 at 1605. (Serra, Italy/TFW)
- 1724 UTC on 6280**
LEBANON: Voice of Hope. Religious sermon in English to ID, "this is the Voice of Hope for all the Middle East." Pop song to brief religious passage, ID/station address: (Serra, Italy/TFW)
- 1753 UTC on 8000**
ERITREA: Voice of Sudan (Clandestine). Music to ID and brief comments at 1802. (Zacharias Liangas, Thessaloniki, Greece/TFW)
- 2003 UTC on 3380**
MALAWI: MBC. Chichewa. Possible news reporting format to 2005. Afro pops alternated with announcers talk. (Serra, Italy/TFW)
- 2004 UTC on 15420**
USA: WRNO. Ragtime and New Orleans jazz music show. (Wilden, IN)
- 2010 UTC on 11690**
CANADA: Radio Canada Int'l. Sports report with heavy RTTY interference. (Wilden, IN)
- 2015 UTC on 11750**
ASCENSION ISLANDS: BBC WS relay. *Seeing Stars* featuring the Galileo probe of Jupiter, and inter-stellar clouds. (Fraser, MA)
- 2030 UTC on 4777**
GABON: RTV Gabonaise. French. Sports roundup to African highlife music. (Don Aspinall, VA via e-mail)
- 2100 UTC on 15675**
HONDURAS: Radio Copan International. Monitored to 0015, including musical variety program and multilingual IDs. (Frank Reisch, Dallas, TX; Swenson, WA)
- 2107 UTC on 15095**
SYRIA: Radio Damascus. *News and Views* program condemning Israel's premier. (Swenson, WA)
- 2116 UTC on 3366**
GHANA: GBC. Radio 2 in English 2116-2212, continuous pop songs, afropop and lite music. ID and announcements. (Serra, Italy/TFW; Hilton, SC)
- 2130 UTC on 4870**
BENIN: Radio Dif du Benin. French. Announcer's news text to indigenous African music. (Aspinall, VA)
- 2300 UTC on 6025.1**
BOLIVIA: Radio Illimani. Spanish. Station ID and lengthy promotional to regional music. (Pedro Arrunategui, Lima, Peru/TFW)
- 2305 UTC on 4449.26**
BOLIVIA: Radio Frontera. Spanish. Station jingles to local ads. Additional Bolivian's noted as; **Radio Movima** 4472.86 at 2338; **Radio Santa Ana** 4649.08 at 2345; **Radio Eco** 4702.45 at 2355; **Radio Abaroa** 4719.32 at 2328-0037. (R. Puppo, Italy/Play DX)
- 2334 UTC on 5100**
LIBERIA: Liberian Communication Network. Monitored to 0111 with news and music. Frequency drift 5102-5104. (Silvi, OH) Signal fading noted with IDs at 0143 over pop music. Frequency quote and music program noted on subsequent rechecks. (James DeYoung, Arlington, VA/via e-mail)

Thanks to our contributors — Have you sent in YOUR logs?
Send to **Gayle Van Horn**, c/o *Monitoring Times* (or e-mail gayle@grove.net)
English broadcast unless otherwise noted.

FREQUENCIES

Table with columns for call signs, country, frequency, and time. Includes entries for Australia, Canada, China, Costa Rica, Czech Rep, Egypt, Ghana, India, Lebanon, Malaysia, Netherlands, New Zealand, North Korea, Palau, Papua New Guinea, Russia, Serbia, Spain, Thailand, Ukraine, United Kingdom, Ecuador, Iran, Kazakhstan, Lithuania, Sri Lanka, Sweden, Thailand, Denmark, and Italy.

SELECTED PROGRAMS

Sundays

- 0000 Australia, Radio: World News. World and Asia/Pacific region news.
0000 USA, WYFR Okeechobee FL: Family Bible Reading Fellowship. A Bible read-along program.
0010 Australia, Radio: Charting Australia. A program intended to strengthen Australia's links with India and to present the issues of the subcontinent.
0030 Australia, Radio: Correspondents' Report. A round-up of global stories with Hamish Robertson.

Mondays

- 0000 Australia, Radio: World News. See S 0000.
0000 USA, Monitor Radio Intl: Sunday from the Mother Church. From the First Church of Christ, Scientist, in Boston, MA, USA.
0000 USA, WYFR Okeechobee FL: The Open Forum. See S 0605.
0011 Australia, Radio: Network Asia. See S 2320.

Tuesdays

- 0000 Australia, Radio: World News. See S 0000.
0000 USA, Monitor Radio Intl: Monitor Radio News. Five minutes of the latest world news at the beginning of the hour.
0000 USA, WYFR Okeechobee FL: Family Bible Reading Fellowship. See S 0000.
0006 USA, Monitor Radio Intl: Monitor Radio International. News, analysis, commentary, interviews and features in a magazine format.
0011 Australia, Radio: Network Asia. See S 2320.
0030 USA, WYFR Okeechobee FL: The Family Bible Study. See M 0520.
0049 USA, Monitor Radio Intl: Letterbox. Listeners make their views known by telephone or letter to host Lisa Dale.
0052 USA, Monitor Radio Intl: Religious Article from the CSM. As published in the Christian Science Monitor.

Wednesdays

- 0000 Australia, Radio: World News. See S 0000.
0000 USA, Monitor Radio Intl: Monitor Radio News. See T 0000.
0000 USA, WYFR Okeechobee FL: Family Bible Reading Fellowship. See S 0000.
0006 USA, Monitor Radio Intl: Monitor Radio International. See T 0006.
0011 Australia, Radio: Network Asia. See S 2320.

- 0030 UK, BBC London (as pac/south as): Waveguide. NEW! The program for international radio listening returned for an eight-part series beginning September 15th. Simon Spanwick offers advice on buying the best radio and other topics.
0030 USA, WYFR Okeechobee FL: The Family Bible Study. See M 0520.
0049 USA, Monitor Radio Intl: Letterbox. See T 0049.
0052 USA, Monitor Radio Intl: Religious Article from the CSM. See T 0052.

Thursdays

- 0000 Australia, Radio: World News. See S 0000.
0000 USA, Monitor Radio Intl: Monitor Radio News. See T 0000.
0000 USA, WYFR Okeechobee FL: Family Bible Reading Fellowship. See S 0000.
0006 USA, Monitor Radio Intl: Monitor Radio International. See T 0006.
0010 UK, BBC London (south as): Soundbyte (3rd, 10th, 17th). See M 0615.
0011 Australia, Radio: Network Asia. See S 2320.
0030 USA, WYFR Okeechobee FL: The Family Bible Study. See M 0520.
0049 USA, Monitor Radio Intl: Letterbox. See T 0049.
0052 USA, Monitor Radio Intl: Religious Article from the CSM. See T 0052.
0054 Radio Netherlands: Documentary. Millenium. Part I (17th), Part II (24th). See A 2354.
0054 Radio Netherlands: Documentary. Peter the Great. Part II (3rd), Part III (10th). See W 1154.

Fridays

- 0000 Australia, Radio: World News. See S 0000.
0000 USA, Monitor Radio Intl: Monitor Radio News. See T 0000.
0000 USA, WYFR Okeechobee FL: Family Bible Reading Fellowship. See S 0000.
0006 USA, Monitor Radio Intl: Monitor Radio International. See T 0006.
0011 Australia, Radio: Network Asia. See S 2320.
0030 USA, WYFR Okeechobee FL: The Family Bible Study. See M 0520.
0049 USA, Monitor Radio Intl: Letterbox. See T 0049.
0052 USA, Monitor Radio Intl: Religious Article from the CSM. See T 0052.

Saturdays

- 0000 Australia, Radio: World News. See S 0000.
0000 USA, Monitor Radio Intl: Monitor Radio News. See T 0000.
0000 USA, WYFR Okeechobee FL: Family Bible Reading Fellowship. See S 0000.
0006 USA, Monitor Radio Intl: Monitor Radio International. See T 0006.
0010 Australia, Radio: Feedback. See S 0410.
0030 Australia, Radio: Indian Pacific. Christopher Kremmer with news and analysis from across the Pacific and Asia.
0030 USA, WYFR Okeechobee FL: The Family Bible Study. See M 0520.
0049 USA, Monitor Radio Intl: Letterbox. See T 0049.
0052 USA, Monitor Radio Intl: Religious Article from the CSM. See T 0052.

HAUSER'S HIGHLIGHTS
R. AUSTRALIA:

Table with columns for frequency ranges and recommended frequencies in N. America. Includes rows for 0030-0400, 0030-0600, 0030-0800, 0400-0730, 0600-1230, 0730-1200, 0800-0900, 1200-1700, and 2200-2400.

[apparently selected due to beam angles, not taking into account propagation or interference]

(R. Australia webpage, Aug. 5 update)

FREQUENCIES

0100-0200	Australia, Radio	13605pa 15510as	13755pa 17795pa	15365pa	15415as	0100-0130 0100-0200	Slovakia, R Slovakia Intl Spain, R Exterior Espana	5930na 9540na	7300na	9440na
0100-0200 vl	Australia, VL8A Alice Spg	2310dc				0100-0200	Sri Lanka, Sri Lanka BC	15425as		
0100-0200 vl	Australia, VL8K Katherine	5025dc				0100-0130	Switzerland, Swiss R Intl	6135na	9885na	9905ca
0100-0200 vl	Australia, VL8T Tent Crk	4910dc				0100-0200	United Kingdom, BBC WS	5970sa 7265as 9590va	5975va 7325va 9915va	6175va 9410as 11750sa
0100-0200 vl	Canada, CBC N Quebec Svc	9625dc						15360as		11955as
0100-0200	Canada, CFCX Montreal	6005dc				0100-0200	USA, KAIJ Dallas TX	5810am		
0100-0200	Canada, CFRX Toronto	6070dc				0100-0200	USA, KTBN Salt Lk City UT	7510am		
0100-0200	Canada, CFPV Calgary	6030dc				0100-0200 twhfas	USA, KVOH Los Angeles CA	9975am		
0100-0200	Canada, CHNX Halifax	6130dc				0100-0200	USA, KWHR Naalehu HI	17510au		
0100-0200	Canada, CKZN St John's	6160dc				0100-0200	USA, Monitor Radio Intl	7535na	9430am	
0100-0200	Canada, CKZU Vancouver	6160dc				0100-0200	USA, Voice of America	5995am 7405am 11705as 15205as	6130am 9455am 11725as 15250as	7115as 9635as 13740am 17740as
0100-0159	Canada, R Canada Intl	6120am 13670am	9535am	9755am	11715am					7205as 9775am 15170as 17820as
0100-0200	Costa Rica, RF Peace Intl	7380am	15050am			0100-0200	USA, WEWN Birmingham AL	5825eu		
0100-0200	Cuba, Radio Havana	6000nc	9820na	9830na		0100-0200	USA, WGTG McCaysville GA	6950am		
0100-0127	Czech Rep, Radio Prague	6200na	7345na			0100-0200	USA, WHRI Noblesville IN	5745am		
0100-0200	Ecuador, H,CJB	9745am	21455va			0100-0200	USA, WJCR Upton KY	7490na	13595na	
0100-0150	Germany, Deutsche Welle	6040na 11740na	6085na	6145na	9640na	0100-0200	USA, WRM/R Miami Intl	9955am		
0100-0115	Ghana, Ghana Broadc Corp	3366dw	4915do			0100-0200	USA, WRNO New Orleans LA	7355am		
0100-0130	Hungary, Radio Budapest	9840na	11870na			0100-0200 mtwhf	USA, WVHA Greenbush ME	5850eu		
0100-0200	Indonesia, Voice of	9525na				0100-0200	USA, WWCR Nashville TN	3215am	5065am	5935am
0100-0128	Iran, VOIRI	6050na	9022na			0100-0200	USA, WYFR Okeechobee FL	6065na	9505na	7435am
0100-0110	Italy, RAI Intl	6005na	9675na	11800na		0100-0130	Uzbekistan, R Tashkent	7190as		
0100-0200	Japan, NHK/Radio	5960na 11885as	11790as 11890as	11840as 11910as	11860as 17810as	0100-0126	Vietnam, Voice of	5940na		
0100-0200	Lebanon, Voice of Hope	9960eu				0103-0110	Croatia, Croatian Radio	5895eu	7165eu	
0100-0200 smtwh	Malaysia, Radio	7295do				0115-0130 f	Greece, Voice of	7448na	9420na	9935na
0100-0200 s/vl	Malta, VO Mediterranean	15480eu				0130-0155	Austria, R Austria Intl	9655na		
0100-0125	Netherlands, Radio	6020na	6165na	9845na		0130-0150	Greece, Voice of	7448na	9420na	9935na
0100-0200	New Zealand, R NZ Intl	15115va				0130-0200	Netherlands, Radio	5905as	7305as	9860as
0100-0130 m	Norway, Radio Norway Intl	9560na				0130-0200	Sweden, Radio	7290am	9435am	
0100-0200 vl	Papua New Guinea, NBC	9675db				0130-0156	Vietnam, Voice of	5940na		
0100-0200	Philippines, FEBC/R Intl	15450as				0138-0155 1&3rd m	Denmark, R Denmark Intl	7465am	9560am	
0100-0200	Russia, Voice of Russia WS	7240na 15580na	12010na	12050na	13665na	0140-0200	Vatican State, Vatican R	5980as	7335as	
						0145-0200	Albania, R Tirana Intl	6140na	7160na	

SELECTED PROGRAMS

Sundays

- 0100 Australia, Radio: World News. See S 0000.
- 0100 Slovakia, R Slovakia Intl: Frequency Announcements. A summary of all Radio Slovakia English broadcasts.
- 0100 USA, WYFR Okeechobee FL (Satellite Net): School of the Bible Hour. Bible teaching and quiz.
- 0102 Slovakia, R Slovakia Intl: Slovakia Today. A current affairs program.
- 0103 Slovakia, R Slovakia Intl: News. World and regional news.
- 0110 Australia, Radio: Book Reading. Serialized readings of the best Australian novels.
- 0110 Slovakia, R Slovakia Intl: Interview. Discussion of a current topic with a visitor to Slovakia.
- 0130 Australia, Radio: The Europeans. Maria Zijlstra presents reports and features on aspects of European politics, culture and society.

Mondays

- 0100 Australia, Radio: World News. See S 0000.
- 0100 Slovakia, R Slovakia Intl: Frequency Announcements. See S 0100.
- 0100 USA, WYFR Okeechobee FL: Music. See S 1230.
- 0102 Slovakia, R Slovakia Intl: Slovak Music. See S 1630.
- 0107 Slovakia, R Slovakia Intl: Listeners' Tribune (biweekly*). See S 1635.
- 0108 USA, WYFR Okeechobee FL: School of the Bible Hour. See S 0100.
- 0110 Australia, Radio: Australian News. See S 1110.
- 0110 Australia, Radio: Sports Headlines. A one-minute sports update.
- 0118 Australia, Radio: Sports Summary. A two-minute wrap-up of Australian sport.
- 0120 Australia, Radio: Network Asia. See S 2320.
- 0145 USA, WYFR Okeechobee FL: Guidelines. See S 1250.

Tuesdays

- 0100 Australia, Radio: World News. See S 0000.
- 0100 Slovakia, R Slovakia Intl: Frequency Announcements. See S 0100.
- 0100 USA, WYFR Okeechobee FL (Satellite Net): Echoes. Repeats of sermons from the Family Radio archives.
- 0102 Slovakia, R Slovakia Intl: Slovakia Today. See S 0102.

- 0103 Slovakia, R Slovakia Intl: News. See S 0103.
- 0109 Slovakia, R Slovakia Intl: Press Review. See M 1639.
- 0110 Australia, Radio: Australian News. See S 1110.
- 0110 Australia, Radio: Sports Headlines. See M 0110.
- 0115 Slovakia, R Slovakia Intl: Interview. See S 0110.
- 0118 Australia, Radio: Sports Summary. See M 0118.
- 0120 Australia, Radio: Network Asia. See S 2320.
- 0126 Slovakia, R Slovakia Intl: Sports. See M 1656.

Wednesdays

- 0100 Australia, Radio: World News. See S 0000.
- 0100 Slovakia, R Slovakia Intl: Frequency Announcements. See S 0100.
- 0100 USA, WYFR Okeechobee FL (Satellite Net): Echoes. See T 0100.
- 0102 Slovakia, R Slovakia Intl: Slovakia Today. See S 0102.
- 0103 Slovakia, R Slovakia Intl: News. See S 0103.
- 0107 Slovakia, R Slovakia Intl: Front Page Daily Review. Major news items in today's major Slovak newspaper.
- 0110 Australia, Radio: Australian News. See S 1110.
- 0110 Australia, Radio: Sports Headlines. See M 0110.
- 0118 Australia, Radio: Sports Summary. See M 0118.
- 0120 Australia, Radio: Network Asia. See S 2320.

Thursdays

- 0100 Australia, Radio: World News. See S 0000.
- 0100 Slovakia, R Slovakia Intl: Frequency Announcements. See S 0100.
- 0100 USA, WYFR Okeechobee FL (Satellite Net): Echoes. See T 0100.
- 0102 Slovakia, R Slovakia Intl: Slovakia Today. See S 0102.
- 0103 Slovakia, R Slovakia Intl: News. See S 0103.
- 0107 Slovakia, R Slovakia Intl: Front Page Daily Review. See W 0107.
- 0110 Australia, Radio: Australian News. See S 1110.
- 0110 Australia, Radio: Sports Headlines. See M 0110.
- 0114 Slovakia, R Slovakia Intl: Business News. See W 1644.
- 0118 Australia, Radio: Sports Summary. See M 0118.
- 0120 Australia, Radio: Network Asia. See S 2320.
- 0122 Slovakia, R Slovakia Intl: Feature Report. See W 1651.

Fridays

- 0100 Australia, Radio: World News. See S 0000.
- 0100 Slovakia, R Slovakia Intl: Frequency Announcements. See S 0100.
- 0100 USA, WYFR Okeechobee FL (Satellite Net): Echoes. See T 0100.
- 0102 Slovakia, R Slovakia Intl: Slovakia Today. See S 0102.
- 0103 Slovakia, R Slovakia Intl: News. See S 0103.
- 0109 Slovakia, R Slovakia Intl: Regional News (2/4). Important stories from Slovakia's provincial press.
- 0110 Australia, Radio: Australian News. See S 1110.
- 0110 Australia, Radio: Sports Headlines. See M 0110.
- 0115 Slovakia, R Slovakia Intl: Science Feature. News about medicine, the environment and similar scientific developments in Slovakia.
- 0118 Australia, Radio: Sports Summary. See M 0118.
- 0120 Australia, Radio: Network Asia. See S 2320.
- 0121 Slovakia, R Slovakia Intl: Education Feature. An update on educational developments in Slovakia.

Saturdays

- 0100 Australia, Radio: World News. See S 0000.
- 0100 Slovakia, R Slovakia Intl: Frequency Announcements. See S 0100.
- 0100 USA, WYFR Okeechobee FL (Satellite Net): Echoes. See T 0100.
- 0102 Slovakia, R Slovakia Intl: Slovakia Today. See S 0102.
- 0103 Slovakia, R Slovakia Intl: News. See S 0103.
- 0110 Australia, Radio: Oz Sounds. See S 1310.
- 0110 Slovakia, R Slovakia Intl: Cultural News. The arts in Slovakia.
- 0120 Slovakia, R Slovakia Intl: Slovak Kitchen (biweekly). Learn how to cook Slovak style.
- 0120 Slovakia, R Slovakia Intl: Slovak Lesson (biweekly). Everyday Slovak for travelers.
- 0130 Australia, Radio: Australia Today. See S 1130.
- 0154 Radio Netherlands: Documentary. Millennium. Part I (19th), Part II (26th). Helene Michaud reports on how different countries will mark the turn of the century.
- 0154 Radio Netherlands: Documentary. Peter the Great. Part II (5th), Part III (12th). See W 1154.

FREQUENCIES

Table of radio frequencies with columns for time (0200-0300), country (Argentina, Australia, Canada, etc.), and frequency (11710am, 11695as, etc.).

SELECTED PROGRAMS

Sundays

- 0200 Australia, Radio: World News. See S 0000.
0200 South Korea, R Korea Intl: News. Ten minutes of world and regional news.
0200 USA, WYFR Okeechobee FL (Satellite Net): The Quiet Hours. Easy listening music on the spiritual side.

Mondays

- 0200 Australia, Radio: World News. See S 0000.
0200 South Korea, R Korea Intl: News. See S 0200.
0200 USA, WYFR Okeechobee FL: Family Bible Reading Fellowship. See S 0000.

Tuesdays

- 0200 Australia, Radio: World News. See S 0000.
0200 South Korea, R Korea Intl: News. See S 0200.
0200 USA, WYFR Okeechobee FL (Satellite Net): The Open Forum. See S 0605.

- 0245 South Korea, R Korea Intl: Notes of Nostalgia. Traditional music of South Korea.

Wednesdays

- 0200 Australia, Radio: World News. See S 0000.
0200 South Korea, R Korea Intl: News. See S 0200.
0200 USA, WYFR Okeechobee FL (Satellite Net): The Open Forum. See S 0605.

Thursdays

- 0200 Australia, Radio: World News. See S 0000.
0200 South Korea, R Korea Intl: News. See S 0200.
0200 USA, WYFR Okeechobee FL (Satellite Net): The Open Forum. See S 0605.

Fridays

- 0200 Australia, Radio: World News. See S 0000.
0200 South Korea, R Korea Intl: News. See S 0200.
0200 USA, WYFR Okeechobee FL (Satellite Net): The Open Forum. See S 0605.

- 0240 South Korea, R Korea Intl: Economic News Briefs. Five minutes of financial news.
0245 South Korea, R Korea Intl: Tales from Korea's Past. The history of Korea.

Saturdays

- 0200 Australia, Radio: World News. See S 0000.
0200 South Korea, R Korea Intl: News. See S 0200.
0200 USA, WYFR Okeechobee FL (Satellite Net): The Open Forum. See S 0605.

HAUSER'S HIGHLIGHTS

RADIO SWEDEN PROGRAMS

- M-F Sixty Degrees North and... Sports Scan
Mon Media Scan [weeks 1, 3]
Tue Money Matters
Wed Green Scan [environment] or Horizon [science & tech]
Thu Review of the News Week Spectrum [arts] or Sweden Today [monthly]
Fri In Touch with Stockholm [mailbox] or Sounds Nordic [music & chat]
Sat
Sun
[next UT day for evening broadcasts] (R. Sweden via British DX Club)

FREQUENCIES

0300-0400	Australia, Radio	13605pa 15365pa 17795pa	*3755pa 15415as	15240pa 15510as	15240pa 17750pa	0300-0400	United Kingdom, BBC WS	3255af 6175va 9600af 15310as 5810am 7510am 9975am 17510au	3955eu 6190af 9605as	5975va 6195eu 9895va	6005af 9410na 12095af
0300-0400 vl	Australia, VL8A Alice Spg	2310do				0300-0400	USA, KAIJ Dallas TX	5825eu			
0300-0400 vl	Australia, VL8K Katherine	5025do				0300-0400	USA, KTBN Salt Lk City UT	6950am			
0300-0400 vl	Australia, VL8T Tent Crk	4910do				0300-0400	USA, KVOH Los Angeles CA	7490na			
0300-0400 vl	Canada, CBC N Quebec Svc	9625do				0300-0400	USA, KWHR Naalehu HI	9465eu	7535af		
0300-0400	Canada, CFCX Montreal	6005do				0300-0400	USA, Monitor Radio Intl	9955am	6035af	6115af	7105af
0300-0400	Canada, CFRX Toronto	6070do				0300-0400	USA, Voice of America	7280af	7290af	7340af	7405af
0300-0400	Canada, CFVP Calgary	6030do				0300-0400	USA, WEWN Birmingham AL	7415af	9575af	9775af	9885af
0300-0400	Canada, CHNX Halifax	6130do				0300-0400	USA, WGTG McCaysville GA	6890na	6080af	6115af	7105af
0300-0400	Canada, CKZN St John's	6160do				0300-0400	USA, WHRI Noblesville IN	9400am	7280af	7340af	7405af
0300-0400	Canada, CKZU Vancouver	6160do				0300-0400	USA, WJCR Upton KY	7490na	7415af	9575af	9885af
0300-0400	China, China Radio Intl	9690na	9710na	11695na		0300-0400	USA, WMLK Bethel PA	9465eu	6890na	7425na	
0300-0400 vl	Costa Rica, Faro del Carib	5055do				0300-0400	USA, WRNO New Orleans LA	9955am	6950am	9400am	
0300-0400	Costa Rica, RF Peace Intl	7380am				0300-0400	USA, WYFR Okeechobee FL	6065na	5745am	7315am	
0300-0400	Cuba, Radio Havana	6000na	9820na	9830na		0300-0310	Vatican State, Vatican R	6095na	7490na	13595na	
0300-0327	Czech Rep, Radio Prague	5930na	7345na			0300-0400 mtwhf	USA, WRMI/R Miami Intl	9955am	9465eu		
0300-0400	Ecuador, HCJB	9745am	21455va			0300-0400	USA, WRNO Nashville TN	2390am	9955am		
0300-0330	Egypt, Radio Cairo	9475na				0300-0400	USA, WYFR Okeechobee FL	6065na	9465eu	7165eu	
0300-0350	Germany, Deutsche Welle	6085na 9640na	5185na	9535na	9615na	0300-0310	Vatican State, Vatican R	6095na	9955am	9420na	9935na
0300-0400	Guatemala, Radio Cultural	3300do				0300-0400 mtwhfa	Zambia, ZNBC Radio 2	6165do	9955am	9660af	
0300-0400	Japan, NHK/Radio	11790na	11840as	15230na	17810as	0300-0400 vl	Zimbabwe, Zimbabwe BC	3396do	9955am		
0300-0400 vl	Kenya, Kenya Broadc Corp	4885do	4935do	6150do		0303-0310	Croatia, Croatian Radio	5895eu	9955am		
0300-0400 s/vl	Malta, VO Mediterranean	15480eu				0315-0330 s	Greece, Voice of	7448na	9955am		
0300-0330	Mexico, Radio Mexico Intl	9705na				0320-0350	Vatican State, Vatican R	7360af	9955am		
0300-0325	Netherlands, Radio	5905as	7305as	9860as	11655as	0330-0357	Czech Rep, Radio Prague	9480as	9955am		
0300-0430	New Zealand, R NZ Intl	15115pa				0330-0355 mtwhf	Moldova, R Moldova Intl	7520na	9955am		
0300-0400 vl	Papua New Guinea, NBC	9675do				0330-0400 vl	Philippines, R Filipinas	13770as	9955am	15330na	17730as
0300-0400	Russia, Voice of Russia WS	12050na	13645na	15580na		0330-0400 twhf	Portugal, R Portugal Intl	6095am	9955am		
0300-0400	S Africa, Channel Africa	3220af	5955af			0330-0400	Russia, Voice of Russia WS	7270na	9955am		
0300-0400	Sri Lanka, Sri Lanka BC	15425as	9680na	11745as	11825as	0330-0400	Slovakia, Adv World Radio	9465af	9955am		
0300-0400	Taiwan, VO Free China	15345as				0330-0400	Sweden, Radio	7115na	9955am		
0300-0330	Thailand, Radio	9655na	11905na	15370na		0330-0353	UAE, Radio Dubai	13675na	9955am	15395eu	21605na
0300-0350	Turkey, Voice of	9655na	9685eu			0330-0400	United Kingdom, BBC WS	9610af	9955am	11730af	11955as
0300-0315 mtwhf	Uganda, Radio	3340do				0335-0355 vl	India, All India Radio	7110do	9955am	11830do	15135do
0300-0400	Ukraine, R Ukraine Intl	7150na	9550na			0338-0355 1&3rd m	Denmark, R Denmark Intl	7165am	9955am	7465am	9565am
0300-0330	United Kingdom, BBC WS	5970sa 15360as	6135af	7235va	7325sa	0340-0350	Greece, Voice of	7448na	9955am	9420na	9935na
						0345-0400 irreg	Burundi, Radio Nationale	6140do			
						0345-0400 as	Uganda, Radio	3340do			

SELECTED PROGRAMS

Sundays

- 0300 Australia, Radio: World News. See S 0000.
- 0300 USA, Monitor Radio Intl: Bible Lesson. Lesson-sermons from the King James Version of the Bible and Mary Baker Eddy's textbook.
- 0300 USA, WYFR Okeechobee FL (Satellite Net): The Quiet Hours. See S 0200.
- 0310 Australia, Radio: Book Reading. See S 0110.
- 0330 Australia, Radio: At Your Request. Dick Paterson plays favorite music.

Mondays

- 0300 Australia, Radio: World News. See S 0000.
- 0300 USA, Monitor Radio Intl: Sunday from the Mother Church. See M 0000.
- 0300 USA, WYFR Okeechobee FL: A Treasury of Favorite Hymns. See S 1500.
- 0308 USA, WYFR Okeechobee FL: The Open Forum. See S 0605.
- 0310 Australia, Radio: Sports Bulletin. See S 1120.
- 0320 Australia, Radio: Network Asia. See S 2320.
- 0336 USA, WYFR Okeechobee FL: Music. See S 1230.
- 0345 UK, BBC London (as pac/south as): Soundbyte (7th, 14th). See M 0615.
- 0348 USA, WYFR Okeechobee FL: Leading Little Ones to God. See S 1447.

Tuesdays

- 0300 Australia, Radio: World News. See S 0000.
- 0300 USA, Monitor Radio Intl: Monitor Radio News. See T 0000.
- 0300 USA, WYFR Okeechobee FL (Satellite Net): The Open Forum. See S 0605.
- 0306 USA, Monitor Radio Intl: Monitor Radio International. See T 0006.
- 0310 Australia, Radio: Sports Bulletin. See S 1120.
- 0320 Australia, Radio: Network Asia. See S 2320.
- 0330 USA, WYFR Okeechobee FL (Satellite Net): The End of the Day. Discover life with meaning through music.
- 0349 USA, Monitor Radio Intl: Letterbox. See T 0049.
- 0352 USA, Monitor Radio Intl: Religious Article from the CSM. See T 0052.

Wednesdays

- 0300 Australia, Radio: World News. See S 0000.
- 0300 USA, Monitor Radio Intl: Monitor Radio News. See T 0000.
- 0300 USA, WYFR Okeechobee FL (Satellite Net): The Open Forum. See S 0605.
- 0306 USA, Monitor Radio Intl: Monitor Radio International. See T 0006.
- 0310 Australia, Radio: Sports Bulletin. See S 1120.
- 0320 Australia, Radio: Network Asia. See S 2320.
- 0330 USA, WYFR Okeechobee FL (Satellite Net): The End of the Day. See T 0330.
- 0349 USA, Monitor Radio Intl: Letterbox. See T 0049.
- 0352 USA, Monitor Radio Intl: Religious Article from the CSM. See T 0052.

Thursdays

- 0300 Australia, Radio: World News. See S 0000.
- 0300 USA, Monitor Radio Intl: Monitor Radio News. See T 0000.
- 0300 USA, WYFR Okeechobee FL (Satellite Net): The Open Forum. See S 0605.
- 0306 USA, Monitor Radio Intl: Monitor Radio International. See T 0006.
- 0310 Australia, Radio: Sports Bulletin. See S 1120.
- 0320 Australia, Radio: Network Asia. See S 2320.
- 0330 USA, WYFR Okeechobee FL (Satellite Net): The End of the Day. See T 0330.
- 0349 USA, Monitor Radio Intl: Letterbox. See T 0049.
- 0350 UK, BBC London (eu): Waveguide. See W 0030.
- 0352 USA, Monitor Radio Intl: Religious Article from the CSM. See T 0052.

Fridays

- 0300 Australia, Radio: World News. See S 0000.
- 0300 USA, Monitor Radio Intl: Monitor Radio News. See T 0000.
- 0300 USA, WYFR Okeechobee FL (Satellite Net): The Open Forum. See S 0605.
- 0306 USA, Monitor Radio Intl: Monitor Radio International. See T 0006.
- 0310 Australia, Radio: Sports Bulletin. See S 1120.

- 0320 Australia, Radio: Network Asia. See S 2320.
- 0330 USA, WYFR Okeechobee FL (Satellite Net): The End of the Day. See T 0330.
- 0349 USA, Monitor Radio Intl: Letterbox. See T 0049.
- 0352 USA, Monitor Radio Intl: Religious Article from the CSM. See T 0052.

Saturdays

- 0300 Australia, Radio: World News. See S 0000.
- 0300 USA, Monitor Radio Intl: Monitor Radio News. See T 0000.
- 0300 USA, WYFR Okeechobee FL (Satellite Net): The Open Forum. See S 0605.
- 0306 USA, Monitor Radio Intl: Christian Science Sentinel Radio Edition. Discussions on how the Bible addresses the trends of thought of today.
- 0310 Australia, Radio: Ockham's Razor. Robyn Williams with straight, sharp talk about science.
- 0330 Australia, Radio: Soundabout. Kim Taylor and friends bring top new releases, a weekly chart countdown, and rock news from around the world.
- 0330 USA, WYFR Okeechobee FL (Satellite Net): The End of the Day. See T 0330.

International Callsign Directory

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FREQUENCIES

0700-0800	Australia, Radio	9860pa 15415as 17880as	12080pa 15510as	15240pa 15530as	15365pa 17715pa
0700-0730	Australia, Radio	11880as	13605as	15245as	
0700-0800 vl	Australia, VL8A Alice Spg	2310do			
0700-0800 vl	Australia, VL8K KATHERINE	5025do			
0700-0800 vl	Australia, VL8T Tent Crk	4910do			
0700-0800	Canada, CFCX Montreal	6005do			
0700-0800	Canada, CFRX Toronto	6070do			
0700-0800	Canada, CFVP Calgary	6030do			
0700-0800	Canada, CHNX Halifax	6130do			
0700-0800	Canada, CKZU Vancouver	6160do			
0700-0800	Costa Rica, RF Peace Intl	7385am	15050am		
0700-0727	Czech Rep, Radio Prague	7345eu	9530eu		
0700-0800	Ecuador, HCJB	9445pa	11615eu	21455au	
0700-0800 as	Eq Guinea, R East Africa	15186af			
0700-0800 mtwhf	Eq Guinea, Radio Africa	15186af			
0700-0715	Ghana, Ghana Broadc Corp	3366do	4915do		
0700-0730 vl	Italy, IRRS	3985va			
0700-0800	Japan, NHK/Radio	7230eu 11920as 21610as	11725as 15165me	11740as 17810va	11850pa 17815af
0700-0800 vl	Kenya, Kenya Broadc Corp	4885do	4935do	6150do	
0700-0800 vl	Kiribati, Radio	9825do			
0700-0800	Lebanon, Voice of Hope	9960eu			
0700-0800 asmtwh	Malaysia, Radio	7295do			
0700-0800	Malaysia, Voice of	9750as	15295au		
0700-0710	Malaysia, Voice of	6175as			
0700-0800	Monaco, Trans World Radio	7115eu			
0700-0715 mtwhf	New Zealand, R NZ Intl	11905pa			
0700-0758 as	New Zealand, R NZ Intl	11905pa			
0700-0750	North Korea, R Pyongyang	15340af	17765me		
0700-0800 vl	Palau, KHBN/Voice of Hope	9965as			
0700-0745	Romania, R Romania Intl	11740pa 17720pa	11840pa	15250pa	15270pa
0700-0800	Russia, Voice of Russia WS	15470as	15560as	17570as	17665as
0700-0710	Sierra Leone, SLBS	3316do			
0700-0800 vl	Solomon Islands, SIBC	5020do	9545do		
0700-0800	Taiwan, VO Free China	5950na			
0700-0800	United Kingdom, BBC WS	3955eu 7145va 9640va 11955as 15310as 17790as	6175eu 7325eu 9740as 12095va 15360va 17830af	6190af 9410eu 11760as 15070va 15400va 17885af	6195eu 9600af 11940af 15280as 15575me
0700-0730	17640va	17790as			
0700-0730	United Kingdom, BBC WS	6180eu	11780eu		
0700-0715	United Kingdom, BBC WS	6005af	7160af		
0700-0800	USA, KAIJ Dallas TX	5810am	9815am		
0700-0800	USA, KTBN Salt Lk City UT	7510am			
0700-0800	USA, KVCH Los Angeles CA	9975am			
0700-0800	USA, KWHR Naalehu HI	9930as			
0700-0800	USA, Monitor Radio Intl	7535eu			
0700-0800	USA, WEWN Birmingham AL	5825eu	7425na		
0700-0800	USA, WHRI Noblesville IN	5760am	7315am		
0700-0800	USA, WJCR Upton KY	7490na	13595na		
0700-0800 smtwhf	USA, WMLK Bethel PA	9465eu			
0700-0800	USA, WWCR Nashville TN	2390am	5065am	5935am	7435am
0700-0745	USA, WYFR Okeechobee FL	7355eu	9985eu		
0700-0800	USA, WYFR Okeechobee FL	13695af			
0700-0800 vl	Vanuatu, Radio	3945do	7260do		
0700-0800	Zambia, Christian Voice	6065af			
0700-0800	Zambia, ZNBC Radio 2	6165do			
0700-0800 vl	Zimbabwe, Zimbabwe BC	5975do			
0703-0710 mtwhf	Croatia, Croatian Radio	5920eu	7165eu	9830eu	13830eu
0705-0800	Swaziland, Trans World R	5055af	9500af	9650af	
0710-0800 vl	Papua New Guinea, NBC	4890do			
0730-0800	Australia, Radio	9580pa	9710pa		
0730-0755	Austria, R Austria Intl	6155eu	13730eu	15410me	17870me
0730-0745 s	Greece, Voice of	7450eu	9425eu	11645au	
0730-0735	India, All India Radio	15185do	15260do		
0730-0800 vl	Italy, IRRS	7125va			
0730-0800	Netherlands, Radio	9700pa	9720au	11895pa	
0738-0755 1&3rd s	Denmark, R Denmark Intl	7180va	7295va	9590va	13805va
0745-0800 s	Ghana, Ghana Broadc Corp	3366do	4915do		
0745-0755	Greece, Voice of	7450eu	9425eu	11645au	
0755-0800	Guam, AWR/KTWR	15200as			
0758-0800 as	New Zealand, R NZ Intl	9700pa			

0800-0900	Canada, CFCX Montreal	6005do			
0800-0900	Canada, CFRX Toronto	6070do			
0800-0900	Canada, CFVP Calgary	6030do			
0800-0900	Canada, CHNX Halifax	6130do			
0800-0900	Canada, CKZU Vancouver	6160do			
0800-0830	Chile, Radio Esperanza	6090sa			
0800-0900	Costa Rica, RF Peace Intl	7385am			
0800-0900 s	Denmark, Radio ABC	7570eu			
0800-0830	Ecuador, HCJB	11615eu			
0800-0900	Ecuador, HCJB	9445pa	21455au		
0800-0900 as	Eq Guinea, R East Africa	15186af			
0800-0900 mtwhf	Eq Guinea, Radio Africa	15186af			
0800-0805 s	Ghana, Ghana Broadc Corp	3366do			
0800-0900	Guam, TWR/KTWR	15200as			
0800-0900	Indonesia, Voice of	9525as			
0800-0900 vl	Italy, IRRS	7125va			
0800-0900 mtwhf	Italy, IRRS	3985va			
0800-0900 vl	Kiribati, Radio	9825do			
0800-0900	Lebanon, Voice of Hope	6280eu	9960me		
0800-0900	Malaysia, Radio	7295do			
0800-0825	Malaysia, Voice of	6175as	9750as	15295au	
0800-0820 mtwhf	Monaco, Trans World Radio	7115eu			
0800-0805 a	Monaco, Trans World Radio	9700pa	9720au	11895pa	
0800-0825	Netherlands, Radio	15180as	15230as		
0800-0850	North Korea, R Pyongyang	17860au			
0800-0830 s	Norway, Radio Norway Intl	15470eu	17900eu		
0800-0850	Pakistan, Radio	9730as	9955as	9965as	15140as
0800-0900 vl	Palau, KHBN/Voice of Hope	4890do			
0800-0900 vl	Papua New Guinea, NBC	9835va	11800pa	12025as	15470as
0800-0900	Russia, Voice of Russia WS	15560pa	15580as		
0800-0810	Sierra Leone, SLBS	3316do			
0800-0900 vl	Solomon Islands, SIBC	5020do	9545do		
0800-0900	South Korea, R Korea Intl	7550eu			
0800-0900	United Kingdom, BBC WS	6190af	9410eu	9600af	
		9740as	9805va	11760as	11940af
		11955as	15070af	15280as	15310as
		15400va	15575me	17640va	17790as
		17830af	17885af		
0800-0815	United Kingdom, BBC WS	3955eu	7145va	12095eu	
0800-0900	USA, KAIJ Dallas TX	5810am	9815am		
0800-0900	USA, KNLS Anchor Point AK	9615as			
0800-0900	USA, KTBN Salt Lk City UT	7510am			
0800-0900	USA, KWHR Naalehu HI	9930as			
0800-0900	USA, Monitor Radio Intl	7535eu	9845pa	11550pa	15665eu
0800-0900	USA, WEWN Birmingham AL	5825eu	7425na		
0800-0900	USA, WHRI Noblesville IN	5760am	7315am		
0800-0900	USA, WJCR Upton KY	7490na	13595na		
0800-0900 smtwhf	USA, WMLK Bethel PA	9465eu			
0800-0900	USA, WWCR Nashville TN	2390am	5065am	5935am	7435am
0800-0830 vl	Vanuatu, Radio	3945do	7260do		
0800-0900	Zambia, Christian Voice	6065af			
0800-0805 mtwhf	Zambia, ZNBC Radio 2	6165do			
0800-0900 vl	Zimbabwe, Zimbabwe BC	5920eu			
0803-0810 as	Croatia, Croatian Radio	5920eu	7165eu	9830eu	13830eu
0805-0835 mtwhf	Swaziland, Trans World R	4775af			
0815-0900 mtwhf	Nigeria, FRCN/Radio	3326do			
0816-0900 mtwhf	New Zealand, R NZ Intl	9700pa			
0830-0900 s	Armenia, Voice of	15270eu			
0830-0900 vl	Australia, VL8K Katherine	2485do			
0830-0900	Georgia, Radio	11910me			
0830-0840	India, All India Radio	7250do	15185do	15260do	
0830-0900	Netherlands, Radio	9720au	13700pa		
0830-0900	Slovakia, R Slovakia Intl	11990au	15460au	17550au	
0838-0855 1&3rd s	Denmark, R Denmark Intl	15220va	17855va		
0855-0900	Guam, TWR/KTWR	11830pa			

0800 UTC

0800-0900	Australia, Radio	6020pa	6080pa	9580pa	9710pa
		9860pa	15530as	17715pa	
0800-0900 vl	Australia, VL8A Alice Spg	2310do			
0800-0830 vl	Australia, VL8K Katherine	5025do			
0800-0900 vl	Australia, VL8T Tent Crk	4910do			
0800-0900 vl	Canada, CBC N Quebec Svc	9625do			



**Your Name
in Lights!**

... or at least in ink within the *Monitoring Times* Shortwave Guide. Please send us your "best catches" on the worldwide shortwave bands — QSLs, that is — and we will try to use them in future issues of *MT*. Your QSLs will be returned.

FREQUENCIES

0900-1000	Australia, Radio	5995as	7240as	9510as	9580pa
		9860pa	13605as	21725as	
0900-1000 vl	Australia, VL8A Alice Spg	2310do			
0900-1000 vl	Australia, VL8K Katherine	2485do			
0900-1000 vl	Australia, VL8T Tent Crk	4910do			
0900-0930 mtwhfa	Belgium, R Vlaanderen Int	6035eu	15545af	17595af	
0900-1000	Canada, CFCX Montreal	6005do			
0900-1000	Canada, CFRX Toronto	6070do			
0900-1000	Canada, CFVP Calgary	6030do			
0900-1000	Canada, CHNX Halifax	6130do			
0900-1000	Canada, CKZU Vancouver	6160do			
0900-1000	China, China Radio Intl	11755pa	15440pa	17690au	
0900-1000	Costa Rica, RF Peace Intl	7385am			
0900-0930	Czech Rep, Radio Prague	15640me	17485af		
0900-1000 s	Denmark, Radio ABC	7570eu			
0900-1000	Ecuador, HCJB	9445pa	21455au		
0900-1000 as	Eq Guinea, R East Africa	15186af			
0900-1000 mtwhf	Eq Guinea, Radio Africa	15186af			
0900-0950	Germany, Deutsche Welle	6160as	9565af	12055as	15225af
		15410af	17800af	21600af	21680as
		3366do	4915do		
0900-0915 mtwtf	Ghana, Ghana Broadc Corp	15200as			
0900-0915	Guam, TWR/KTWR	11830pa			
0900-1000	Guam, TWR/KTWR	11830pa			
0900-1000 vl/as	Italy, IRRS	7125va			
0900-0930 mtwhf	Italy, IRRS	3985va			
0900-1000	Japan, NHK/Radio	9610as	11850au	15190as	
0900-0930 vl	Kiribati, Radio	9825do			
0900-1000	Lebanon, Voice of Hope	6280eu	9960me		
0900-1000	Malaysia, Radio	7295do			
0900-0925	Netherlands, Radio	9720au	13700pa		
0900-1000	New Zealand, R NZ Intl	9700pa			
0900-1000 vl	Papua New Guinea, NBC	4890do			
0900-1000	Russia, Voice of Russia WS	7150va	9835pa	11800as	12025as
		15580as			
0900-0930	Switzerland, Swiss R Intl	9885pa	13685pa	17515pa	
0900-1000	United Kingdom, BBC WS	6190af	6195va	9410eu	9740as
		11750as	11940af	12095eu	15070va
		15190sa	15280va	15400va	15575va
		17640va	17705eu	17830va	17885af
0900-0915	United Kingdom, BBC WS	6065as	7180as	9580as	11760as
		11955as	15310as	15360as	17790as
0900-1000	USA, KAIJ Dallas TX	5810am			
0900-1000	USA, KTBN Salt Lk City UT	7510am			
0900-1000	USA, Monitor Radio Intl	7395sa	7535eu	9430as	13840pa
0900-1000	USA, WEWN Birmingham AL	5825eu	7425na		
0900-1000	USA, WHRI Noblesville IN	5760am	7315am		
0900-1000	USA, WJCR Upton KY	7490na	13595na		
0900-1000 smtwhf	USA, WMLK Bethel PA	9465eu			
0900-1000 as	USA, WVHA Greenbush ME	13825eu			
0900-1000	USA, WWCR Nashville TN	2390am	5065am	5935am	7435am
0900-1000	Zambia, Christian Voice	6065af			
0900-1000 vl	Zimbabwe, Zimbabwe BC	5975do			
0903-0910 mtwhf	Croatia, Croatian Radio	5920eu	7165eu	9830eu	
0915-1000	Ghana, Ghana Broadc Corp	6130do	7295do		
0930-0955 mtwhfa	Austria, R Austria Intl	6155eu	13730eu	15450as	17870au
0930-1000	Canada, CKZN St John's	6160do			
0930-1000	Mongolia, R Ulan Bator	11850as	12085as		
0930-1000	Netherlands, Radio	9720au	12065pa	13705pa	
0930-1000	Philippines, FEBC/R Intl	11635as			
0938-0955 1&3rd s	Denmark, R Denmark Intl	13800va	17855va		

1000-1100	Lebanon, Voice of Hope	6280eu			
1000-1100	Malaysia, Radio	7295do			
1000-1100 vl	Malaysia, RTM Kuching	7160do			
1000-1100 vl	Malaysia, RTM KotaKinabalu	5980do			
1000-1025	Netherlands, Radio	9720pa	11895au	13700pa	
1000-1100	New Zealand, R NZ Intl	9700pa			
1000-1100 vl	Papua New Guinea, NBC	4890do			
1000-1100	Philippines, FEBC/R Intl	11635as			
1000-1100	Russia, Voice of Russia WS	7150va	9835oa	11655as	11800pa
		12025as	15520as	17560as	17775as
		17870pa			
1000-1030	Switzerland, Swiss R Intl	6165eu	9535eu		
1000-1100	United Kingdom, BBC WS	5965na	6190af	6195va	9410eu
		9740as	11750as	11760as	11940af
		12095eu	13745va	15070va	15190sa
		15280va	15310as	15400af	15575va
		17640va	17705va	17790as	17830va
		17885af			
1000-1100	USA, KAIJ Dallas TX	5810am			
1000-1100	USA, KTBN Salt Lk City UT	7510am			
1000-1100	USA, KWHR Naalehu HI	9930as			
1000-1100	USA, Monitor Radio Intl	6095na	7395sa		
1000-1100	USA, Voice of America	5985va	6165am	7405am	9590am
		11720va	15425va		
1000-1100	USA, WEWN Birmingham AL	7425na	15665eu		
1000-1100	USA, WGTG McCaysville GA	6950am	9400am		
1000-1100	USA, WHRI Noblesville IN	6040am	6185am		
1000-1100	USA, WJCR Upton KY	7490na	13595na		
1000-1100	USA, WRMI/R Miami Intl	9955am			
1000-1100 as	USA, WVHA Greenbush ME	13825va			
1000-1100	USA, WWCR Nashville TN	5065am	5935am	9475am	15685am
1000-1100	USA, WYFR Okeechobee FL	5950na			
1000-1100 vl/m-f	Vatican State, Vatican R	5880eu	11740af	15210af	17550af
1000-1030	Vietnam, Voice of	5940as	7270as	7400as	9840as
		12020as	15010as		
1000-1100	Zambia, Christian Voice	6065af			
1000-1005 mtwhfa	Zambia, ZNBC Radio 2	6165do			
1030-1055	Austria, R Austria Intl	15450as	17870au		
1030-1057	Czech Rep, Radio Prague	7345eu	9505eu		
1030-1100	Finland, YLE/R Finland	13645as	15235au		
1030-1100	Guam, AWR/KSDA	9530as			
1030-1100	Netherlands, Radio	6045as	9650as	12065as	13705as
1030-1100	South Korea, R Korea Intl	11715am			
1030-1055	UAE, Radio Dubai	13675eu	15395eu	17825eu	21605me
1038-1055 1&3rd s	Denmark, R Denmark Intl	9480eu	15220na		

MT MONITORING TEAM

Next Reporting Deadline: October 18, 1996

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1000 UTC

1000-1100	Australia, Radio	5995as	7240as	9510as	9580pa
		9860pa	13605as	15170as	21725as
1000-1100 vl	Australia, VL8A Alice Spg	2310do			
1000-1100 vl	Australia, VL8K Katherine	2485do			
1000-1100 vl	Australia, VL8T Tent Crk	4910do			
1000-1100 vl	Canada, CBC N Quebec Svc	9625do			
1000-1100	Canada, CFCX Montreal	6005do			
1000-1100	Canada, CFRX Toronto	6070do			
1000-1100	Canada, CFVP Calgary	6030do			
1000-1100	Canada, CHNX Halifax	6130do			
1000-1100	Canada, CKZN St John's	6160do			
1000-1100	Canada, CKZU Vancouver	6160do			
1000-1100	China, China Radio Intl	11755pa	15440pa	17690au	
1000-1100	Costa Rica, RF Peace Intl	7385am			
1000-1100 s	Denmark, Radio ABC	7570eu			
1000-1100	Ecuador, HCJB	9445pa	21455au		
1000-1100 as	Eq Guinea, R East Africa	15186af			
1000-1100 mtwhf	Eq Guinea, Radio Africa	15186af			
1000-1100	Guam, AWR/KSDA	9370as			
1000-1100	India, All India Radio	13700as	15050as	17387au	17890as
1000-1100	Iraq, Radio Iraq Intl	13680eu			
1000-1100 vl/as	Italy, IRRS	7125va			

THANK YOU...

ADDITIONAL CONTRIBUTORS TO THIS MONTH'S SHORTWAVE GUIDE:

Capt. Ken Barry, Blackpool, England, Bob Fraser, Cohasset, MA; Kevin Hecht, Devon, PA; Jim Moats, Ravenna, OH; Giovanni Serra, *The Four Winds Rome*, Italy (via e-mail); Vern Weitzel, Australia (via e-mail) BBCMS; BBC World Media; BBC Summary of World Broadcasts; MARE Tip Sheet, DX Hotline, New Zealand DX Times; Internet Shortwave Newsgroups.

FREQUENCIES

1100-1200	Australia, Radio	5995as 9615as 15530as	7240as 9860pa 15565as	9510pa 13605as	9580pa 15170as			11760as 15070va 17640va	11940af 15220va 17705va	11955as 15310as 17830af	12095eu 15575va 17885af
1100-1200 vl	Australia, VL8A Alice Spg	2310do									
1100-1200 vl	Australia, VL8K Katherine	2485do									
1100-1200 vl	Australia, VL8T Tent Crk	4910do									
1100-1200	Canada, CFCX Montreal	6005do									
1100-1200	Canada, CFRX Toronto	6070do									
1100-1200	Canada, CFVP Calgary	6030do									
1100-1200	Canada, CHNX Halifax	6130do									
1100-1200	Canada, CKZN St John's	6160do									
1100-1200	Canada, CKZU Vancouver	6160do									
1100-1200	Costa Rica, R East World R	7375am	9725am	13750am							
1100-1200	Costa Rica, RF Peace Intl	7385am									
1100-1200 s	Denmark, Radio ABC	7570eu									
1100-1130	Ecuador, HCJB	9445pa	12005am								
1100-1200 as	Eq Guinea, R East Africa	15186af									
1100-1200	Eq Guinea, Radio Africa	9530as									
1100-1150	Germany, Deutsche Welle	15370af 17860af	15410af 21600af	17715af 17800af	17800af						
1100-1200	Iraq, Radio Iraq Intl	13680eu									
1100-1200 v/as	Italy, IRRS	7125va									
1100-1200	Japan, NHK/Radio	6120na	9610as	15350as							
1100-1200	Jordan, Radio	11970eu									
1100-1200	Malaysia, Radio	7295do									
1100-1200 vl	Malaysia, RTM Kuching	7160do									
1100-1200 vl	Malaysia, RTM KotaKinabalu	5980do									
1100-1125	Netherlands, Radio	6045as	9650as	12065as	13705as						
1100-1200	New Zealand, R NZ Intl	9700pa									
1100-1150	North Korea, R Pyongyang	6575na	9975na	11335na							
1100-1200 vl	Palau, KHBN/Voice of Hope	9730as	9985as	15140as							
1100-1200 vl	Papua New Guinea, NBC	4890do									
1100-1200	Russia, Voice of Russia WS	4740as 15560as 17870as	11655as 17560as	15460as 17755as	15520as 17775as						
1100-1200	Singapore, R Singapore Int	6015as	6155as								
1100-1130	Switzerland, Swiss R Intl	13635as	15415as	17515as							
1100-1200	Taiwan, Voice of Asia	7445as									
1100-1200	United Kingdom, BBC WS	5965na 9410eu	6190af 9580as	6195va 9740va	7180as 11750as						
								21660af			
1100-1130	United Kingdom, BBC WS	9700au							15190sa	15400eu	17790va
1100-1200	USA, KAIJ Dallas TX	5810am							9815am		
1100-1200	USA, KTRN Salt Lk City UT	7510am									
1100-1200	USA, KWHR Naalehu HI	9930as									
1100-1200	USA, Monitor Radio Intl	6095na							7395sa		
1100-1200	USA, Voice of America	5985va 9590am 15160va							6110va 9645va 15425va	6165am 9760va	7405am 11720va
1100-1200	USA, WEWN Birmingham AL	7425na									
1100-1200	USA, WGTV McCaysville GA	6950am									
1100-1200	USA, WHRI Noblesville IN	6040am									
1100-1200	USA, WJCR Upton KY	7490na									
1100-1200	USA, WRMI/R Miami Intl	9955am									
1100-1200 as	USA, WVHA Greenbush ME	13825am									
1100-1200	USA, WWCN Nashville TN	5935am								7435am	9475am 15685am
1100-1200	USA, WYFR Okeechobee FL	5950na								11830na	
1100-1130	Vietnam, Voice of	7285as								9730as	
1100-1200	Zambia, Christian Voice	6065af									
1105-1120	Pakistan, Radio	15470as								17900eu	
1115-1127	Zambia, ZNBC Radio 1	7220do									
1115-1200	Zambia, ZNBC Radio 2	6165do									
1130-1155	Austria, R Austria Intl	13730na									
1130-1200	Bulgaria, Radio	13790as									
1130-1200 vl	China, China Radio Intl	8660as								11445as	11700as
1130-1200	Ecuador, HCJB	15115na								21455am	
1130-1200	Finland, YLE/R Finland	11900na								15400na	
1130-1200	Iran, VOIRI	11875me								11930me	15260af
1130-1200 a	Monaco, Trans World Radio	7115eu									
1130-1155 s	Monaco, Trans World Radio	7115eu									
1130-1200	Myanmar, Voice of	5990do									
1130-1200	Netherlands, Radio	6045eu								7190eu	
1130-1200	Sweden, Radio	11650na								15240na	
1130-1200 f	Vatican State, Vatican R	15210as								15570as	17550au
1135-1140	India, All India Radio	9959do								11620do	11710do
1138-1155 1&3rd s	Denmark, R Denmark Intl	7295eu								17740af	15185do

SELECTED PROGRAMS

Sundays

- 1100 Australia, Radio: World News. See S 0000.
- 1110 Australia, Radio: Australian News. News about Australia.
- 1120 Australia, Radio: Sports Bulletin. Ten-minute reports on Australian, regional and international sport.
- 1130 Australia, Radio: Australia Today. The issues, the places, the characters that make up Australia.

Mondays

- 1100 Australia, Radio: World News. See S 0000.
- 1100 USA, WYFR Okeechobee FL (Satellite Net): News. World news summary.
- 1105 USA, WYFR Okeechobee FL (Satellite Net): Walk with the King. Advice for everyday Christian living.
- 1110 Australia, Radio: Australian News. See S 1110.
- 1120 Australia, Radio: Sports Bulletin. See S 1120.
- 1130 Australia, Radio: Innovations. Desley Blanch reports on Australian inventions and innovative practices.
- 1130 Finland, YLE Radio: News. See S 1230.
- 1130 UK, BBC London (am): Quiz Feature - Counterpoint. See F 0630.
- 1130 UK, BBC London (as pac): Quiz Feature - Counterpoint. See F 0630.
- 1130 UK, BBC London (south as): The Health of Planet Earth (7th, 14th). See W 0430.
- 1130 USA, WYFR Okeechobee FL (Satellite Net): News. See M 1100.
- 1140 Finland, YLE Radio: Economic Comments in the Finnish Press. See S 1248.
- 1145 Finland, YLE Radio: Business Monday. See S 1235.
- 1147 Finland, YLE Radio: Music. A popular music selection currently heard in Finland.
- 1149 Finland, YLE Radio: Background to the News. An in-depth look at current affairs items.
- 1154 Finland, YLE Radio: Finnish Press Review. Editorial opinion and reports on Finnish and world events.

Tuesdays

- 1100 Australia, Radio: World News. See S 0000.
- 1100 USA, WYFR Okeechobee FL (Satellite Net): News. See M 1100.
- 1105 USA, WYFR Okeechobee FL (Satellite Net): Walk with the King. See M 1105.
- 1110 Australia, Radio: Australian News. See S 1110.
- 1120 Australia, Radio: Sports Bulletin. See S 1120.
- 1130 Australia, Radio: Arts Australia. Karen Leng presents reviews and comment on current events within the Australian arts scene.
- 1130 Finland, YLE Radio: News. See S 1230.

- 1130 USA, WYFR Okeechobee FL (Satellite Net): News. See M 1100.
- 1135 Finland, YLE Radio: Cultural Topics. An insight into the culture of the Finnish people.
- 1142 Finland, YLE Radio: Environment Report. Weekly look at environmental issues in Finland.
- 1145 USA, WYFR Okeechobee FL (Satellite Net): Karen's Kitchen. Good health from the American Cancer Institute.
- 1147 Finland, YLE Radio: Music. See M 1147.
- 1150 Finland, YLE Radio: Health Topics. Medical news and developments in Finland.
- 1154 Finland, YLE Radio: Finnish Press Review. See M 1154.

Wednesdays

- 1100 Australia, Radio: World News. See S 0000.
- 1100 USA, WYFR Okeechobee FL (Satellite Net): News. See M 1100.
- 1105 USA, WYFR Okeechobee FL (Satellite Net): Walk with the King. See M 1105.
- 1110 Australia, Radio: Australian News. See S 1110.
- 1120 Australia, Radio: Sports Bulletin. See S 1120.
- 1130 Australia, Radio: Science File. Ian Wood examines the world of science, medicine and technology.
- 1130 Finland, YLE Radio: News. See S 1230.
- 1130 USA, WYFR Okeechobee FL (Satellite Net): News. See M 1100.
- 1135 Finland, YLE Radio: Variable Features. General topics about life in Finland.
- 1149 Finland, YLE Radio: Background to the News. See M 1149.
- 1153 Finland, YLE Radio: Finnish Press Review. See M 1154.
- 1154 Radio Netherlands: Documentary. Millennium. Part I (16th), Part II (23rd). See A 2354.
- 1154 Radio Netherlands: Documentary. Peter the Great. Dheera Surjan in this 3-part series examines how the monarch opened Russia to the world and his fascination with Dutch technology. Part II (2nd), Part III (9th).

Thursdays

- 1100 Australia, Radio: World News. See S 0000.
- 1100 USA, WYFR Okeechobee FL (Satellite Net): News. See M 1100.
- 1105 USA, WYFR Okeechobee FL (Satellite Net): Walk with the King. See M 1105.
- 1110 Australia, Radio: Australian News. See S 1110.
- 1120 Australia, Radio: Sports Bulletin. See S 1120.
- 1130 Finland, YLE Radio: News. See S 1230.
- 1130 UK, BBC London (south as) Material World (3rd, 10th, 17th). See M 1230.
- 1130 USA, WYFR Okeechobee FL (Satellite Net): News. See M 1100.

- 1135 Australia, Radio: Book Talk. Jill Kitson presents an entertaining mix of reviews and critical discussion of new books.
- 1135 Finland, YLE Radio: Variable Features. See W 1135.
- 1139 Finland, YLE Radio: Media Review. Coverage of all aspects of media news.
- 1149 Finland, YLE Radio: Background to the News. See M 1149.
- 1154 USA, WYFR Okeechobee FL (Satellite Net): Insight. A few minutes of discernment from Joel Niederhooc.
- 1155 Finland, YLE Radio: Finnish Press Review. See M 1154.

Fridays

- 1100 Australia, Radio: World News. See S 0000.
- 1100 USA, WYFR Okeechobee FL (Satellite Net): News. See M 1100.
- 1105 USA, WYFR Okeechobee FL (Satellite Net): Walk with the King. See M 1105.
- 1110 Australia, Radio: Australian News. See S 1110.
- 1120 Australia, Radio: Sports Bulletin. See S 1120.
- 1122 USA, WYFR Okeechobee FL (Satellite Net): The Bible Quiz. See S 0549.
- 1130 Australia, Radio: Talking Politics. A roundup of events in the Australian Parliament.
- 1130 Finland, YLE Radio: News. See S 1230.
- 1130 USA, WYFR Okeechobee FL (Satellite Net): News. See M 1100.
- 1136 Finland, YLE Radio: Starting Finnish. Finnish language lessons for English speakers.
- 1143 Finland, YLE Radio: Music Preview. A sampling of the music to be heard on the weekend edition of YLE.
- 1149 Finland, YLE Radio: Background to the News. See M 1149.
- 1153 Finland, YLE Radio: Finnish Press Review. See M 1154.

Saturdays

- 1100 Australia, Radio: World News. See S 0000.
- 1100 USA, WYFR Okeechobee FL (Satellite Net): Music. See S 1230.
- 1110 Australia, Radio: Australian News. See S 1110.
- 1120 Australia, Radio: Sports Bulletin. See S 1120.
- 1130 Australia, Radio: Business Weekly. See S 1610.
- 1130 Finland, YLE Radio: News. See S 1230.
- 1130 USA, WYFR Okeechobee FL (Satellite Net): For the Record. Community action news as reported by local AM station affiliates of Family Radio.
- 1135 Finland, YLE Radio: Focus. A Review of Finland's top news stories.
- 1153 Finland, YLE Radio: Nunti Latini. See S 1252.

FREQUENCIES

1200-1300	Australia, Radio	5995pa 9560as	6060pa 9615as	6080pa 9710as	7260as 15565as	1200-1300	United Kingdom, BBC WS	5965na 9410eu 11760as 15070va 17640va	6190af 9580as 11940af 15220va 17705va	6195va 9740va 11955as 15310as 17830af	7180as 11750as 12095eu 15575va 17885af
1200-1230	Australia, Radio	9860pa				1200-1300	USA, KAIJ Dallas TX	5810am	9815am		
1200-1300 mtwhf	Belgium, R Vlaanderen Int	13610na				1200-1300	USA, KTBN Salt Lk City UT	7510am			
1200-1300	Brazil, Radio Bras	15445na				1200-1300	USA, KWHR Naalehu HI	9930as			
1200-1230	Bulgaria, Radio	13790as				1200-1300	USA, Monitor Radio Intl	6095na	9355as	9430pa	9455sa
1200-1215	Cambodia, Natl Voice of	11940as				1200-1300	USA, Voice of America	6110va	9645va	9760va	11715va
1200-1300 vl	Canada, CBC N Quebec Svc	9625do				1200-1300	USA, WEWN Birmingham AL	15160va	15425va		
1200-1300	Canada, CFCX Montreal	6005do				1200-1300	USA, WGTG McCaysville GA	7425na	15665eu		
1200-1300	Canada, CFRX Toronto	6070do				1200-1300	USA, WGTG McCaysville GA	6950am	9400am		
1200-1300	Canada, CFPV Calgary	6030do				1200-1300	USA, WHRI Noblesville IN	6950am	9400am		
1200-1300	Canada, CHNX Halifax	6130do				1200-1300	USA, WHRI Noblesville IN	6040am	6185am		
1200-1300	Canada, CKZN St John's	6160do				1200-1300	USA, WJCR Upton KY	7490na	13595na		
1200-1300	Canada, CKZU Vancouver	6160do				1200-1300 s	USA, WRMI/R Miami Intl	9955am			
1200-1259	Canada, R Canada Intl	9640am	11855am	13650am		1200-1300 as	USA, WVHA Greenbush ME	13825va			
1200-1300	China, China Radio Intl	7385na 11660as	7410as 11795pa	9565as 15440au	9715as	1200-1300	USA, WWCR Nashville TN	5935am	7435am	9475am	15685am
1200-1230 vl	China, China Radio Intl	8660as	11445as	11700as	12110as	1200-1300	USA, WYFR Okeechobee FL	5950na	6015na	11830na	17750na
1200-1300	Costa Rica, Adv World R	5030am	6150am	9725am	13750am	1200-1230	Uzbekistan, R Tashkent	7190as	9715as	15295as	
1200-1300	Costa Rica, RF Peace Intl	7385am	15050am			1200-1300	Zambia, Christian Voice	6065af			
1200-1300	Ecuador, HCJB	12005am	15115am	21455am		1200-1300 mtwhf	Zambia, ZNBC Radio 2	6165do			
1200-1300 as	Eqt Guinea, R East Africa	15186af				1206-1300 occsnal	New Zealand, R NZ Intl	6105pa			
1200-1300	Eqt Guinea, Radio Africa	9530as				1215-1300	Egypt, Radio Cairo	17595as			
1200-1300	France, Radio France Intl	9805eu 15155eu	11600as 15195eu	11670as 15325af	13625am 15530ca	1230-1300	Australia, Radio	9580pa	11800pa		
1200-1230	Iran, VOIRI	11875me	11930me	15260af		1230-1300	Bangladesh, Radio	7185pa	9548as		
1200-1300	Iraq, Radio Iraq Intl	13680eu				1230-1255 s	Belgium, R Vlaanderen Int	13610na	15540as		
1200-1300 vl/as	Italy, IRRS	7125va				1230-1300	Bulgaria, Radio	15620as			
1200-1300	Malaysia, RTM	7295do				1230-1259	Canada, R Canada Intl	6150as	15195as		
1200-1300 vl	Malaysia, RTM KotaKinabalu	5980do				1230-1300 mtwhf	Finland, YLE/R Finland	11900na	15400na		
1200-1250	Myanmar, Voice of	5990do				1230-1235	India, All India Radio	4860do	6185do	17865do	
1200-1300	Netherlands, Radio	6045eu	7190eu			1230-1300 w	Indonesia, RRI Sorong	4875do			
1200-1206	New Zealand, R NZ Intl	9700pa				1230-1300	Mongolia, R Ulan Bator	9745as	12085as		
1200-1230 s	Norway, Radio Norway Intl	9590eu	13800eu	15305eu		1230-1300	South Korea, R Korea Intl	9570as	9640as	13670as	
1200-1300 vl	Palau, KHBN/Voice of Hope	9730as 15140as	9955as	9965as	9985as	1230-1300 mtwhf	Sri Lanka, Sri Lanka BC	15425as			
1200-1255	Poland, Polish R Warsaw	6095eu 11815eu	7145eu	7270eu	9525eu	1230-1300	Sweden, Radio	13740as	15240pa		
1200-1300	Russia, Voice of Russia WS	4740as 15510as	4975as	15110as	15435as	1230-1300	Thailand, Radio	9655as	9885as	11905as	
1200-1300	Singapore, R Singapore Int	6015as	6155as			1230-1300	Turkey, Voice of	9445na	9630na		
1200-1300	South Korea, R Korea Intl	7285va				1230-1300	Vietnam, Voice of	5940as 12020as	7270as 15010as	7400as 15305va	9840as 15480va
1200-1300	Switzerland, Swiss R Intl	6165eu	9535eu			1238-1255 1&3rd s	Denmark, R Denmark Intl	9590va	13800va		
1200-1300	Taiwan, VO Free China	7130au	9610as			1240-1250	Greece, Voice of	11645af			

SELECTED PROGRAMS

Sundays

- 1200 Australia, Radio: World News. See S 0000.
- 1200 USA, WYFR FL: Family Bible Reading Fellowship. See S 0000.
- 1210 Australia, Radio: Charting Australia. See S 0010.
- 1230 Australia, Radio: Report from Asia. A weekly roundup of Asian events.
- 1230 USA, WYFR FL: Music. Recordings of music with a religious flavor.
- 1239 USA, WYFR FL: Daily Grace. A word found in scripture and its meaning.
- 1250 USA, WYFR FL: Guidelines. A five-minute commentary on living from Harold Sala.

Mondays

- 1200 Australia, Radio: World News. See S 0000.
- 1200 USA, WYFR FL (Satellite Net): News. See M 1100.
- 1200 USA, WYFR FL: Family Bible Reading Fellowship. See S 0000.
- 1204 USA, WYFR FL (Satellite Net): Rise and Rejoice Radio Program. A mix of news, christian music, scripture, and advice to live by.
- 1210 Australia, Radio: Australiana. A variety of Australian topics are discussed in these 20-minute segments.
- 1215 UK, BBC London (am): The Health of Planet Earth (7th, 14th). See W 0430.
- 1218 USA, WYFR FL: The Family Bible Study. See M 0520.
- 1226 USA, WYFR FL (Satellite Net): The Christian Working Woman. Mary Welch provides advice for Christian women.
- 1230 Australia, Radio: International Report. See M 0430.
- 1230 UK, BBC London (am): Material World (7th, 14th). Alun Lewis examines how materials such as plastics have changed our lives.
- 1230 USA, WYFR FL (Satellite Net): News. See M 1100.
- 1231 USA, WYFR FL (Satellite Net): Great Commission News. News from the missions.
- 1246 USA, WYFR FL: The Radio Reading Circle. Readings from the classics of American literature.

Tuesdays

- 1200 Australia, Radio: World News. See S 0000.
- 1200 USA, WYFR FL (Satellite Net): News. See M 1100.

- 1200 USA, WYFR FL: Family Bible Reading Fellowship. See S 0000.
- 1204 USA, WYFR FL (Satellite Net): Rise and Rejoice Radio Program. See M 1204.
- 1210 Australia, Radio: Australiana. See M 1210.
- 1218 USA, WYFR FL: The Family Bible Study. See M 0520.
- 1226 USA, WYFR FL (Satellite Net): The Christian Working Woman. See M 1226.
- 1230 Australia, Radio: International Report. See M 0430.
- 1230 UK, BBC London (eu): Quiz Feature - Counterpoint. See F 0630.
- 1230 USA, WYFR FL (Satellite Net): News. See M 1100.
- 1231 USA, WYFR FL (Satellite Net): Great Commission News. See M 1231.
- 1246 USA, WYFR FL: The Radio Reading Circle. See M 1246.

Wednesdays

- 1200 Australia, Radio: World News. See S 0000.
- 1200 USA, WYFR FL (Satellite Net): News. See M 1100.
- 1200 USA, WYFR FL: Family Bible Reading Fellowship. See S 0000.
- 1204 USA, WYFR FL (Satellite Net): Rise and Rejoice Radio Program. See M 1204.
- 1210 Australia, Radio: Charting Australia. See S 0010.
- 1218 USA, WYFR FL: The Family Bible Study. See M 0520.
- 1226 USA, WYFR FL (Satellite Net): The Christian Working Woman. See M 1226.
- 1230 Australia, Radio: International Report. See M 0430.
- 1230 USA, WYFR FL (Satellite Net): News. See M 1100.
- 1231 USA, WYFR FL (Satellite Net): Great Commission News. See M 1231.
- 1246 USA, WYFR FL: The Radio Reading Circle. See M 1246.

Thursdays

- 1200 Australia, Radio: World News. See S 0000.
- 1200 USA, WYFR FL (Satellite Net): News. See M 1100.
- 1200 USA, WYFR FL: Family Bible Reading Fellowship. See S 0000.
- 1204 USA, WYFR FL (Satellite Net): Rise and Rejoice Radio Program. See M 1204.
- 1210 Australia, Radio: Australiana. See M 1210.

- 1218 USA, WYFR FL: The Family Bible Study. See M 0520.
- 1226 USA, WYFR FL (Satellite Net): The Christian Working Woman. See M 1226.
- 1230 Australia, Radio: International Report. See M 0430.
- 1230 USA, WYFR FL (Satellite Net): News. See M 1100.
- 1246 USA, WYFR FL: The Radio Reading Circle. See M 1246.

Fridays

- 1200 Australia, Radio: World News. See S 0000.
- 1200 USA, WYFR FL (Satellite Net): News. See M 1100.
- 1200 USA, WYFR FL: Family Bible Reading Fellowship. See S 0000.
- 1204 USA, WYFR FL (Satellite Net): Rise and Rejoice Radio Program. See M 1204.
- 1210 Australia, Radio: Australiana. See M 1210.
- 1218 USA, WYFR FL: The Family Bible Study. See M 0520.
- 1226 USA, WYFR FL (Satellite Net): The Christian Working Woman. See M 1226.
- 1230 Australia, Radio: International Report. See M 0430.
- 1230 USA, WYFR FL (Satellite Net): News. See M 1100.
- 1231 USA, WYFR FL (Satellite Net): Great Commission News. See M 1231.
- 1246 USA, WYFR FL: The Radio Reading Circle. See M 1246.
- 1254 Radio Netherlands: Documentary. Millennium. Part I (18th), Part II (25th). See A 2354.
- 1254 Radio Netherlands: Documentary. Peter the Great. Part II (4th), Part III (11th). See W 1154.

Saturdays

- 1200 Australia, Radio: World News. See S 0000.
- 1200 USA, WYFR FL (Satellite Net): Does God Love You?. Words for children.
- 1200 USA, WYFR FL: Family Bible Reading Fellowship. See S 0000.
- 1205 USA, WYFR FL (Satellite Net): Story Time. Saturday morning stories for children.
- 1210 Australia, Radio: Ockham's Razor. See A 0310.
- 1215 USA, WYFR FL (Satellite Net): Adventure Pats. An entertainment program for children.
- 1215 USA, WYFR FL: The Mailbag. See S 0517.
- 1230 Australia, Radio: Background Report. In-depth reports examining a broad range of influences that shape our world.
- 1230 USA, WYFR FL (Satellite Net): Danger is the Password. Entertainment for children.

FREQUENCIES

1300-1400	Australia, Radio	5995pa	7240as	9560pa	9580pa		9410eu	9515va	9590va	9740as
		9610as	11800pa				11750as	11760as	11940af	12095eu
1300-1330	Australia, Radio	6060pa	6080as	9510pa			15070va	15220am	15310as	15420af
1300-1355 mtwhfa	Belgium, R Vlaanderen Int	13610na	15540as				15575va	17640va	17705va	17830af
1300-1320	Brazil, Radio Bras	15445na				17885af	21470af	21660af		
1300-1330	Bulgaria, Radio	15620as				USA, KAIJ Dallas TX	5810am	5810am		
1300-1400 vl	Canada, CBC N Quebec Svc	9625do				USA, KJES Mesquite NM	11715na			
1300-1400	Canada, CFCX Montreal	6005do				USA, KNLS Anchor Point AK	7365as			
1300-1400	Canada, CFRX Toronto	6070do				USA, KTBN Salt Lk City UT	7510am			
1300-1400	Canada, CFPV Calgary	6030do				USA, Monitor Radio Intl	6095na	9355as	9385as	9455na
1300-1400	Canada, CHNX Halifax	6130do				USA, Voice of America	6110va	9645va	9760va	15160va
1300-1400	Canada, CKZN St John's	6160do					15425va			
1300-1400	Canada, CKZU Vancouver	6160do				1300-1330	USA, Voice of America	11715va		
1300-1359 mtwhfa	Canada, R Canada Intl	9640am	11855am	13650am		1300-1400	USA, WEWN Birmingham AL	9580na	11875na	15665eu
1300-1400	China, China Radio Intl	7385na	9715as	11660pa		1300-1400	USA, WGTG McCaysville GA	6950am	9400am	
1300-1330	China, China Radio Intl	7410as				1300-1400	USA, WHRI Noblesville IN	6040am	15105am	
1300-1400	Costa Rica, RF Peace Intl	7385am	15050am			1300-1400	USA, WJCR Upton KY	7490na	13595na	
1300-1330	Czech Rep, Radio Prague	11660eu	17845af			1300-1400 s	USA, WRM/R Miami Intl	9955am		
1300-1400	Ecuador, HCJB	12005am	15115am	21455am		1300-1400	USA, WRNO New Orleans LA	15420am		
1300-1330	Egypt, Radio Cairo	17595as				1300-1400 as	USA, WVHA Greenbush ME	15745eu		
1300-1400 as	Eq Guinea, R East Africa	15186af				1300-1400	USA, WWCR Nashville TN	9475am	12160am	13845am
1300-1400	Eq Guinea, Radio Africa	9530as				1300-1400	USA, WYFR Okeechobee FL	5950na	11830na	13695na
1300-1400	Iraq, Radio Iraq Intl	13680as				1300-1400	Zambia, Christian Voice	6065af		
1300-1330 vl/as	Italy, IRRS	7125va				1300-1330 mtwhf	Zambia, ZNBC Radio 2	6165do		
1300-1400	Malaysia, Radio	7295do				1303-1310	Croatia, Croatian Radio	5920eu	7165eu	13830am
1300-1400 vl	Malaysia, RTM Kuching	7160do				1330-1355	Austria, R Austria Intl	6155eu	13730eu	
1300-1400 vl	Malaysia, RTM KotaKinabalu	5980do				1330-1359 s	Canada, R Canada Intl	11855am	11935eu	21455va
1300-1325	Netherlands, Radio	6045eu	7190eu			1330-1359 mtwhfa	Canada, R Canada Intl	17820va		
1300-1400 occsnal	New Zealand, R NZ Intl	6105pa				1330-1359	Canada, R Canada Intl	9535as	11795as	
1300-1350	North Korea, R Pyongyang	9345as	9640eu	11740as	15230as	1330-1400	Guam, AWR/KSDA	9650as		
		15430as				1330-1400	India, All India Radio	11620as	13750as	
1300-1330 s	Norway, Radio Norway Intl	13800as	15340na			1330-1400 vl	Italy, IRRS	3985va		
1300-1400 vl	Palau, KHBN/Voice of Hope	9730as	9955as	9965as	9985as	1330-1400	Netherlands, Radio	9895as	13700as	15585as
		15140as				1330-1400	Sweden, Radio	9830as	13740na	15245na
1300-1400	Philippines, FEBC/R Intl	11995as				1330-1355	UAE, Radio Dubai	13675eu	15395eu	17630eu
1300-1356	Romania, R Romania Intl	9690eu	11940eu	15365eu	17720eu	1330-1400	Uzbekistan, R Tashkent	7190as	9715as	15295as
1300-1400	Russia, Voice of Russia WS	15460as	15560as	17755as		1330-1400	Vietnam, Voice of	5940eu	7270eu	7400eu
1300-1400	Singapore, R Singapore Int	6015as	6155as				12020eu	15010eu		
1300-1400 mtwhf	Sri Lanka, Sri Lanka BC	15425as				1335-1345	Greece, Voice of	15180na	15630na	
1300-1330	Switzerland, Swiss R Intl	7230as	7480as	13635as	15240as	1338-1355 1&3rd s	Denmark, R Denmark Intl	9590va	13800va	15305va
1300-1400	United Kingdom, BBC WS	5965na	5990as	6190af	6195va	1345-1400	Vatican State, Vatican R	9500as	11625as	13765au

SELECTED PROGRAMS

Sundays

- 1300 Australia, Radio: World News. See S 0000.
- 1300 USA, KNLS Anchor Point AK: Music/News/Commentary.
- 1300 USA, WYFR Okeechobee FL: Family Bible Reading Fellowship. See S 0000.
- 1310 Australia, Radio: Oz Sounds. Twenty minutes of music selections by Radio Australia announcers.
- 1330 Australia, Radio: The Europeans. See S 0130.
- 1333 USA, WYFR Okeechobee FL: Music. See S 1230.
- 1337 USA, WYFR Okeechobee FL: Daily Grace. See S 1239.

Monday

- 1300 Australia, Radio: World News. See S 0000.
- 1300 USA, KNLS Anchor Point AK: Music/News/Commentary.
- 1300 USA, WYFR Okeechobee FL (Satellite Net): News. See M 1100.
- 1300 USA, WYFR Okeechobee FL: Music. See S 1230.
- 1304 USA, WYFR Okeechobee FL (Satellite Net): Rise and Rejoice Radio Program. See M 1204.
- 1310 Australia, Radio: Asia Focus. Reporting on the commercial interrelationships of the Asia/Pacific Region.
- 1310 USA, WYFR Okeechobee FL: The Open Forum. See S 0605.
- 1330 Australia, Radio: The Australian Music Show. See S 0530.
- 1330 USA, WYFR Okeechobee FL (Satellite Net): The Family Bible Study. See M 0520.
- 1338 USA, WYFR Okeechobee FL: Creation Moments. See M 0638.
- 1348 USA, WYFR Okeechobee FL: Family Bible Counseling. See M 0648.

Tuesdays

- 1300 Australia, Radio: World News. See S 0000.
- 1300 USA, KNLS Anchor Point AK: Music/News/Commentary.
- 1300 USA, WYFR Okeechobee FL (Satellite Net): News. See M 1100.
- 1300 USA, WYFR Okeechobee FL: Music. See S 1230.
- 1304 USA, WYFR Okeechobee FL (Satellite Net): Rise and Rejoice Radio Program. See M 1204.
- 1310 Australia, Radio: Asia Focus. See M 1310.
- 1310 USA, WYFR Okeechobee FL: The Open Forum. See S 0605.
- 1330 Australia, Radio: Jazz Notes. The best of Australian jazz is

introduced by Ivan Lloyd.

- 1330 USA, WYFR Okeechobee FL (Satellite Net): The Family Bible Study. See M 0520.
- 1338 USA, WYFR Okeechobee FL: Creation Moments. See M 0638.
- 1350 USA, WYFR Okeechobee FL: The Basic Bible Study. See T 0650.

Wednesdays

- 1300 Australia, Radio: World News. See S 0000.
- 1300 USA, KNLS Anchor Point AK: Music/News/Commentary.
- 1300 USA, WYFR Okeechobee FL (Satellite Net): News. See M 1100.
- 1300 USA, WYFR Okeechobee FL: Music. See S 1230.
- 1304 USA, WYFR Okeechobee FL (Satellite Net): Rise and Rejoice Radio Program. See M 1204.
- 1310 Australia, Radio: Asia Focus. See M 1310.
- 1310 USA, WYFR Okeechobee FL: The Open Forum. See S 0605.
- 1330 Australia, Radio: Blacktracker. Mal Honess with an insight into the music and performance of Australia's aborigines.
- 1330 USA, WYFR Okeechobee FL (Satellite Net): The Family Bible Study. See M 0520.
- 1338 USA, WYFR Okeechobee FL: Creation Moments. See M 0638.
- 1348 USA, WYFR Okeechobee FL: Family Bible Counseling. See M 0648.
- 1354 Radio Netherlands: Documentary. Millenium. Part I (16th), Part II (23rd). See A 2354.
- 1354 Radio Netherlands: Documentary. Peter the Great. Part II (2nd), Part III (9th). See W 1154.

Thursdays

- 1300 Australia, Radio: World News. See S 0000.
- 1300 USA, KNLS Anchor Point AK: Music/News/Commentary.
- 1300 USA, WYFR Okeechobee FL (Satellite Net): News. See M 1100.
- 1300 USA, WYFR Okeechobee FL: Music. See S 1230.
- 1304 USA, WYFR Okeechobee FL (Satellite Net): Rise and Rejoice Radio Program. See M 1204.
- 1310 Australia, Radio: Asia Focus. See M 1310.
- 1310 USA, WYFR Okeechobee FL: The Open Forum. See S 0605.
- 1330 Australia, Radio: Australian Country Style. Graham Bell goes up country.

- 1330 USA, WYFR Okeechobee FL (Satellite Net): The Family Bible Study. See M 0520.
- 1338 USA, WYFR Okeechobee FL: Creation Moments. See M 0638.
- 1343 Guam, AWR/KSDA: Voice of Prophecy. See M 2345.
- 1350 USA, WYFR Okeechobee FL: The Basic Bible Study. See T 0650.

Fridays

- 1300 Australia, Radio: World News. See S 0000.
- 1300 USA, KNLS Anchor Point AK: Music/News/Commentary.
- 1300 USA, WYFR Okeechobee FL (Satellite Net): News. See M 1100.
- 1300 USA, WYFR Okeechobee FL: Music. See S 1230.
- 1304 USA, WYFR Okeechobee FL (Satellite Net): Rise and Rejoice Radio Program. See M 1204.
- 1310 Australia, Radio: Asia Focus. See M 1310.
- 1310 USA, WYFR Okeechobee FL: The Open Forum. See S 0605.
- 1330 Australia, Radio: Music Deli. Paul Petran present music from a variety of cultures.
- 1330 USA, WYFR Okeechobee FL (Satellite Net): The Family Bible Study. See M 0520.
- 1338 USA, WYFR Okeechobee FL: Creation Moments. See M 0638.
- 1348 USA, WYFR Okeechobee FL: Family Bible Counseling. See M 0648.

Saturdays

- 1300 Australia, Radio: World News. See S 0000.
- 1300 USA, KNLS Anchor Point AK: Music/News/Commentary.
- 1300 USA, WYFR Okeechobee FL (Satellite Net): Children's Bible Hour. Songs and stories for children.
- 1300 USA, WYFR Okeechobee FL: The Open Forum. See S 0605.
- 1310 Australia, Radio: Business Weekly. See S 1610.
- 1330 Australia, Radio: The Australian Scene. A state by state look at life in Australia presented by Denis Gibbons.
- 1330 USA, WYFR Okeechobee FL (Satellite Net): The Adventures of Captain Patch. Patch the Pirate takes the kids for a ride.
- 1330 USA, WYFR Okeechobee FL: Science Scripture and Salvation. Proving scientific principles with the Bible.
- 1343 Guam, AWR/KSDA: Voice of Prophecy. See M 2345.
- 1345 USA, WYFR Okeechobee FL (Satellite Net): Allegra. See W 1539.
- 1350 USA, WYFR Okeechobee FL: Farm Radio. See A 0648.

FREQUENCIES

1600-1700	Australia, Radio	5995pa 7260as 11695pa	6060pa 9580pa 11800pa	6080pa 9615va 12080pa	6090pa 11660pa	1600-1700	United Kingdom, BBC WS	3915as 9410va 11750as 17830af	6190af 9515na 12095as 17840va	6195va 9590na 15070as 21470af	7135as 9740va 15400af 21505af
1600-1700 vl	Canada, CBC N Quebec Svc	9625do				1600-1615	United Kingdom, BBC WS	5990as	7180as	7205as	17705af
1600-1700	Canada, CFCX Montreal	6005do				1600-1700	USA, KAIJ Dallas TX	13815am	15725am		
1600-1700	Canada, CFRX Toronto	6070do				1600-1700	USA, KTVN Salt Lk City UT	15590am			
1600-1700	Canada, CFPV Calgary	6030do				1600-1700	USA, KWHR Naalehu HI	6120as			
1600-1700	Canada, CHNX Halifax	6130do				1600-1700	USA, Monitor Radio Intl	9385af	11550eu	18930af	
1600-1700	Canada, CKZN St John's	6160do				1600-1700	USA, Voice of America	7125as	7215as	9645as	9700va
1600-1700	Canada, CKZU Vancouver	6160do				1600-1700	USA, WEWN Birmingham AL	11875na	13615na	15665eu	
1600-1700	China, China Radio Intl	4130af	11575as	15110af	15130af	1600-1700	USA, WGTG McCaysville GA	6950am	9400am		
1600-1700	Costa Rica, RF Peace Intl	7385am	15050am			1600-1700	USA, WHRI Noblesville IN	13760am	15105am		
1600-1627	Czech Rep, Radio Prague	5930eu	17485af			1600-1700	USA, WJCR Upton KY	7490na	13595na		
1600-1630	Ethiopia, Radio	7165af				1600-1700	USA, WRMI/R Miami Intl	9955am			
1600-1700	France, Radio France Intl	6175eu	11615me	11700af	12015af	1600-1700	USA, WRNO New Orleans LA	15420am			
		15210af	15460af	15530af		1600-1700 as	USA, WVHA Greenbush NE	15745eu			
1600-1650	Germany, Deutsche Welle	7225as	9875as	13690as		1600-1700	USA, WWCR Nashville TN	9475am	12160am	13845am	15685am
1600-1700	Germany, Deutsche Welle	7185af	9735af	11965af	17800af	1600-1700	USA, WYFR Okeechobee FL	11705na	11830na	15695eu	17750eu
1600-1700	Guam, AWR/KSDA	7540as				1600-1620 a	Vatican State, Vatican R	5880as	7250as		
1600-1615 mt	Guam, TWR/KTWR	11580as				1600-1630	Vietnam, Voice of	5940eu	7270eu	7400eu	9840eu
1600-1630 whfas	Guam, TWR/KTWR	11580as						12020eu	15010eu		
1600-1630	Iran, VOIRI	7290as	9635as			1600-1700	Zambia, Christian Voice	3330af			
1600-1700 vl	Italy, IRRS	3985va				1600-1610 mtwhfa	Zambia, ZNBC Radio 2	6165do			
1600-1630	Jordan, Radio	11970eu				1615-1630	Albania, R Tirana Intl	7155eu	9740eu		
1600-1700	Malaysia, Radio	7295do				1615-1700	United Kingdom, BBC WS	9510as	11860af		
1600-1625	Netherlands, Radio	9895as	13700as	15585as		1615-1630 a	Vatican State, Vatican R	9645eu	11810eu		
1600-1650 occsnal	New Zealand, R NZ Intl	6105am				1630-1659	Canada, R Canada Intl	7150as	9550as		
1600-1630 s	Norway, Radio Norway Intl	11860eu	13800eu			1630-1700	Egypt, Radio Cairo	15255af			
1600-1630	Pakistan, Radio	9425af	9515af	11570af	13590af	1630-1700	Slovakia, Adv World Radio	15620af			
		15555af				1630-1700	Slovakia, R Slovakia Intl	5915eu	6055eu	7345eu	
1600-1700 vl	Palau, KHBN/Voice of Hope	9955as	9965as	9985as		1630-1700	USA, Voice of America	11765af			
1600-1700	Russia, Voice of Russia WS	7240eu	7350eu	7440af	9480eu	1638-1655 1&3rd s	Denmark, R Denmark Intl	11860na	13800na	15540na	
		9830va	9880eu	9955eu	9975eu	1645-1700 mtwhf	Canada, R Canada Intl	9555va	11935va	15325eu	17820eu
		9530af				1650-1700	Eq Guinea, Radio Africa	15186af			
1600-1655	S Africa, Channel Africa	9530af				1650-1700 mtwhf	New Zealand, R NZ Intl	9875pa			
1600-1700	S Africa, Trans World R	9500af									
1600-1700	Slovakia, Adv World Radio	13590as									
1600-1700	South Korea, R Korea Intl	5975eu	9515af	9870af							
1600-1630 mtwhf	Sri Lanka, Sri Lanka BC	9720as	15425as								
1600-1700	Swaziland, Trans World R	9500af									
1600-1640	UAE, Radio Dubai	11795me	13675eu	15395me	17825me						

SELECTED PROGRAMS

Sundays

- 1600 Australia, Radio: World News. See S 0000.
- 1600 Guam, TWR/KTWR: Verse by Verse. See S 1500.
- 1600 USA, WYFR FL: Family Bible Reading Fellowship. See S 0000.
- 1610 Australia, Radio: Business Weekly. Business and finance developments in the Asia/Pacific region.
- 1615 UK, BBC London (af/am): Quiz Feature - Counterpoint. See F 0630.
- 1630 Australia, Radio: Report from Asia. See S 1230.
- 1630 UK, BBC London (south as): The Health of Planet Earth (6th, 13th). See W 0430.
- 1633 USA, WYFR FL: Music. See S 1230.
- 1637 USA, WYFR FL: Daily Grace. See S 1239.
- 1645 UK, BBC London (af): Soundbyte (6th, 13th). See M 0615.
- 1645 UK, BBC London (south as): Material World (6th, 13th). See M 1230.
- 1650 USA, WYFR FL: Guidelines. See S 1250.

Mondays

- 1600 Australia, Radio: World News. See S 0000.
- 1600 Guam, TWR/KTWR: Answers. Pat Robertson answers questions of ethics and other matters.
- 1600 USA, WYFR FL (Satellite Net): News. See M 1100.
- 1600 USA, WYFR FL: Family Bible Reading Fellowship. See S 0000.
- 1604 USA, WYFR FL (Satellite Net): On a Higher Plane. Advice for living on a higher level.
- 1606 USA, WYFR FL (Satellite Net): Freedom Under Fire. Attorney and author John Whitehead defends life, liberty, and family freedom.
- 1609 USA, WYFR FL (Satellite Net): Mission Network News. News about Christian missions around the world from the International Bible Society.
- 1610 Australia, Radio: Australia Today. See S 1130.
- 1614 USA, WYFR FL (Satellite Net): Music. See S 1230.
- 1615 Guam, TWR/KTWR: Pacific DX Report. See S 1500.
- 1618 USA, WYFR FL: The Family Bible Study. See M 0520.
- 1630 Australia, Radio: International Report. See M 0430.
- 1648 USA, WYFR FL: The Radio Reading Circle. See M 1246.

Tuesdays

- 1600 Australia, Radio: World News. See S 0000.

- 1600 Guam, TWR/KTWR: Search for Truth. Greg Neely evangelizes from Ontario, Canada.
- 1600 USA, WYFR FL (Satellite Net): News. See M 1100.
- 1600 USA, WYFR FL: Family Bible Reading Fellowship. See S 0000.
- 1604 USA, WYFR FL (Satellite Net): On a Higher Plane. See M 1604.
- 1606 USA, WYFR FL (Satellite Net): Freedom Under Fire. See M 1606.
- 1609 USA, WYFR FL (Satellite Net): Mission Network News. See M 1609.
- 1610 Australia, Radio: Australia Today. See S 1130.
- 1614 USA, WYFR FL (Satellite Net): Music. See S 1230.
- 1615 Guam, TWR/KTWR: Shortwave Bible School. See S 1530.
- 1618 USA, WYFR FL: The Family Bible Study. See M 0520.
- 1630 Australia, Radio: International Report. See M 0430.
- 1648 USA, WYFR FL: The Radio Reading Circle. See M 1246.

Wednesdays

- 1600 Australia, Radio: World News. See S 0000.
- 1600 Guam, TWR/KTWR: Bread of Life. Brother Jack Meeks with music and teaching.
- 1600 USA, WYFR FL (Satellite Net): News. See M 1100.
- 1600 USA, WYFR FL: Family Bible Reading Fellowship. See S 0000.
- 1604 USA, WYFR FL (Satellite Net): On a Higher Plane. See M 1604.
- 1606 USA, WYFR FL (Satellite Net): Freedom Under Fire. See M 1606.
- 1609 USA, WYFR FL (Satellite Net): Mission Network News. See M 1609.
- 1610 Australia, Radio: Australia Today. See S 1130.
- 1614 USA, WYFR FL (Satellite Net): Music. See S 1230.
- 1615 Guam, TWR/KTWR: The Macedonian Call. See S 1500.
- 1618 USA, WYFR FL: The Family Bible Study. See M 0520.
- 1630 Australia, Radio: International Report. See M 0430.
- 1648 USA, WYFR FL: The Radio Reading Circle. See M 1246.

Thursdays

- 1600 Australia, Radio: World News. See S 0000.
- 1600 Guam, TWR/KTWR: Friends in Focus. See S 1500.
- 1600 USA, WYFR FL (Satellite Net): News. See M 1100.
- 1600 USA, WYFR FL: Family Bible Reading Fellowship. See S 0000.
- 1604 USA, WYFR FL (Satellite Net): On a Higher Plane. See M 1604.
- 1606 USA, WYFR FL (Satellite Net): Freedom Under Fire. See M 1606.

- 1609 USA, WYFR FL (Satellite Net): Mission Network News. See M 1609.
- 1610 Australia, Radio: Australia Today. See S 1130.
- 1614 USA, WYFR FL (Satellite Net): Music. See S 1230.
- 1615 Guam, TWR/KTWR: The Macedonian Call. See S 1500.
- 1618 USA, WYFR FL: The Family Bible Study. See M 0520.
- 1630 Australia, Radio: International Report. See M 0430.
- 1648 USA, WYFR FL: The Radio Reading Circle. See M 1246.

Fridays

- 1600 Australia, Radio: World News. See S 0000.
- 1600 Guam, TWR/KTWR: Tempo. See S 1500.
- 1600 USA, WYFR FL (Satellite Net): News. See M 1100.
- 1600 USA, WYFR FL: Family Bible Reading Fellowship. See S 0000.
- 1604 USA, WYFR FL (Satellite Net): On a Higher Plane. See M 1604.
- 1606 USA, WYFR FL (Satellite Net): Freedom Under Fire. See M 1606.
- 1609 USA, WYFR FL (Satellite Net): Mission Network News. See M 1609.
- 1610 Australia, Radio: Australia Today. See S 1130.
- 1614 USA, WYFR FL (Satellite Net): Music. See S 1230.
- 1615 Guam, TWR/KTWR: Wonderful Words. No information available.
- 1618 USA, WYFR FL: The Family Bible Study. See M 0520.
- 1630 Australia, Radio: International Report. See M 0430.
- 1648 USA, WYFR FL: The Radio Reading Circle. See M 1246.

Saturdays

- 1600 Australia, Radio: World News. See S 0000.
- 1600 Guam, TWR/KTWR: The Word Today. A discussion of Biblical themes.
- 1600 USA, WYFR FL (Satellite Net): News. See M 1100.
- 1600 USA, WYFR FL: Family Bible Reading Fellowship. See S 0000.
- 1604 USA, WYFR FL (Satellite Net): Family Radio Weekend. See A 1400.
- 1610 Australia, Radio: Asia Focus. See M 1310.
- 1615 Guam, TWR/KTWR: Hope for Today. J. Otis Yoder evangelizes.
- 1617 USA, WYFR FL: The Mailbag. See S 0517.
- 1630 Australia, Radio: Background Report. See A 1230.
- 1649 USA, WYFR FL: The Bible Quiz. See S 0549.

FREQUENCIES

2100-2200	Australia, Radio	6060pa	6080pa	7240pa	7260as
		9580pa	9660pa	11660pa	11855as
		11880pa	11955pa	13605pa	13745pa
2100-2130	Australia, Radio	9860pa			
2100-2125	Belgium, R Vlaanderen Int	5910na			
2100-2200	Bulgaria, Radio	9700eu	11720eu		
2100-2200 vl	Cameroon, Radio Garoua	5010do			
2100-2200 vl	Canada, CBC N Quebec Svc	9625do			
2100-2200	Canada, CFCX Montreal	6005do			
2100-2200	Canada, CFRX Toronto	6070do			
2100-2200	Canada, CFVP Calgary	6030do			
2100-2200	Canada, CHNX Halifax	6130do			
2100-2200	Canada, CKZN St John's	6160do			
2100-2200	Canada, CKZU Vancouver	6160do			
2100-2200	Canada, R Canada Intl	7235eu	11690eu	13650eu	13670eu
		15150eu	15325eu	17820eu	
2100-2200	China, China Radio Intl	5220eu	6950eu	9920eu	
2100-2130	China, China Radio Intl	3985eu	11715af	15110af	
2100-2200	Costa Rica, RF Peace Intl	15050am			
2100-2200	Cuba, Radio Havana	13715eu			
2100-2200	Ecuador, HCBJ	15540eu	21455eu		
2100-2200	Egypt, Radio Cairo	15375af			
2100-2200	Eq Guinea, Radio Africa	15186af			
2100-2150	Germany, Deutsche Welle	7115as	9670as	9735af	9765as
		11755af	15135af		
2100-2130	Hungary, Radio Budapest	3975eu	5935eu	7250eu	9835eu
2100-2200	India, All India Radio	7410eu	9910eu	9950eu	11620au
		11715au	15225au		
2100-2200 vl/fas	Italy, IRRS	3980va			
2100-2200	Japan, NHK/Radio	6035as	9535as	9560as	11850pa
2100-2110	Japan, NHK/Radio	9570as	11685as		
2100-2105 vl	Kenya, Kenya Broadc Corp	4885do	4935do	6150do	
2100-2200	Lebanon, Voice of Hope	6280eu	9960me		
2100-2125	Netherlands, Radio	9860af	9895af	11655af	
2100-2135 smtwh	New Zealand, R NZ Intl	11735pa			
2100-2200 fa	New Zealand, R NZ Intl	11735pa			
2100-2200	Nigeria, FRCN/Radio	3326do	4990do		
2100-2200 vl	Papua New Guinea, NBC	4890do			
2100-2156	Romania, R Romania Intl	5990eu	7105eu	7195eu	9690eu
2100-2200	Russia, Voice of Russia WS	7240eu	7350eu	9480eu	
2100-2130	Serbia, Radio Yugoslavia	6100eu	6185eu		
2100-2200	Slovakia, Adv World Radio	6055eu			
2100-2130	Slovakia, Adv World Radio	9455af			
2100-2200	South Korea, R Korea Intl	6480eu	15575eu		
2100-2157	Spain, R Exterior Espana	6125eu	11775af		
2100-2110	Uganda, Radio	3340do			
2100-2200	Ukraine, R Ukraine Intl	5905eu	6010eu	6020eu	6080eu
		9560eu	9735eu	9875eu	
2100-2200	United Kingdom, BBC WS	3255af	3915as	3955eu	5975va
		6005af	6120as	6180eu	6190af
		6195va	7325eu	9410va	9740au
		11750sa	11835va	11955as	12095eu
		15070eu			
2100-2130	United Kingdom, BBC WS	9630af			
2100-2200	USA, KAIJ Dallas TX	13815am			
2100-2200	USA, KTNB Salt Lk City UT	15590am			
2100-2200	USA, Monitor Radio Intl	11550na	13770eu	13840pa	
2100-2200	USA, Voice of America	6035af	7415af	9760na	11870na
		15410af	11975af	13710af	15185va
		11855af	15445af	15580af	17725af
2100-2130	USA, Voice of America	11855af	12080af		
2100-2200	USA, WEWN Birmingham AL	7425na	13615na	13695eu	
2100-2200	USA, WGTG McCaysville GA	6950am	9400am		
2100-2200	USA, WHRI Noblesville IN	9495am	13760am		
2100-2200	USA, WJCR Upton KY	7490na	13595na		
2100-2200	USA, WMLK Bethel PA	9465eu			
2100-2200	USA, WRMI/R Miami Intl	9955am			
2100-2200 mtwhf	USA, WVHA Greenbush ME	9930eu			
2100-2200 s	USA, WVHA Greenbush ME	9930af			
2100-2200	USA, WWCR Nashville TN	9475am	12160am	13845am	15685am
2100-2200	USA, WYFR Okeechobee FL	17555eu	17845eu	21525af	
2100-2105	Zambia, ZNBC Radio 2	6165do			
2100-2200 vl	Zimbabwe, Zimbabwe BC	4828do			
2103-2110	Croatia, Croatian Radio	5895eu	7165eu		
2105-2200	Syria, Radio Damascus	12085na	13610eu		
2115-2200	Egypt, Radio Cairo	9900eu			
2115-2130	United Kingdom, BBC WS	15390am	17715am		
2130-2200	Australia, Radio	9610as	9645as	13755pa	15365pa
		17795pa	17860pa		
2130-2200	Guam, AWR/KSDA	15310as			
2130-2200	Iran, VOIRI	6175au			
2130-2200	Sweden, Radio	6065eu	9430na	9655af	

2200 UTC

2130-2145	United Kingdom, BBC WS	11680sa			
2136-2200 smtwh	New Zealand, R NZ Intl	15115pa			
2138-2155 1&3rd s	Denmark, R Denmark Intl	7205na	9495na	9590au	
2145-2200 a	Greece, Voice of	9425au			
2145-2200	United Kingdom, BBC WS	5990as	7160as	9580as	
2200-2300	Australia, Radio	9475as	9580pa	9610as	9645as
		9660pa	11660pa	11695pa	11855as
		11880pa	11955pa	13745pa	13755pa
		15365pa	17795pa	17860pa	
2200-2300	Canada, CBC N Quebec Svc	9625do			
2200-2300	Canada, CFCX Montreal	6005do			
2200-2300	Canada, CFRX Toronto	6070do			
2200-2300	Canada, CFVP Calgary	6030do			
2200-2300	Canada, CHNX Halifax	6130do			
2200-2300	Canada, CKZN St John's	6160do			
2200-2300	Canada, CKZU Vancouver	6160do			
2200-2300	Canada, R Canada Intl	5960am	9755va	13650va	13670am
		13740va			
2200-2230	Canada, R Canada Intl	5960am	11705as	15305am	
2200-2300	China, China Radio Intl	7110eu	9880eu		
2200-2300	Costa Rica, RF Peace Intl	7380am	15050am		
2200-2300	Cuba, Radio Havana	6180na			
2200-2245	Egypt, Radio Cairo	9900eu			
2200-2300	Eq Guinea, Radio Africa	15186af			
2200-2215	Ghana, Ghana Broadc Corp	4915do			
2200-2230	India, All India Radio	7410eu	9910eu	9950eu	11620au
		11715au	15225au		
2200-2230	Iran, VOIRI	6175au			
2200-2225	Italy, RAI Intl	5975as	9710as	11815as	
2200-2300	Lebanon, Voice of Hope	6280eu	9960me		
2200-2300	Malaysia, Radio	7295do			
2200-2225 mtwhf	Moldova, R Moldova Intl	7520eu			
2200-2300 smtwh	New Zealand, R NZ Intl	15115pa			
2200-2215	Nigeria, FRCN/Radio	3326do	4990do		
2200-2230 s	Norway, Radio Norway Intl	9485au			
2200-2300 vl	Palau, KHBN/Voice of Hope	9985as	11735as	13615as	
2200-2208 vl	Papua New Guinea, NBC	4890do			
2200-2300	Russia, Voice of Russia WS	7240na	11860na		
2200-2215	Sierra Leone, SLBS	3316do			
2200-2300	Slovakia, Adv World Radio	9455af			
2200-2205	Syria, Radio Damascus	12085na	13610eu		
2200-2300	Taiwan, VO Free China	15600eu	17750eu		
2200-2300	Turkey, Voice of	9560na	9655va		
2200-2300	UAE, Radio Abu Dhabi	9605na	9695na	9770na	
2200-2300	United Kingdom, BBC WS	3955eu	5905as	5975va	6175va
		6195va	9590va	9915va	11750sa
		11835va	11955as	12095eu	15400af
2200-2230	United Kingdom, BBC WS	9410eu			
2200-2300	USA, KAIJ Dallas TX	13815am			
2200-2300	USA, KTNB Salt Lk City UT	15590am			
2200-2300	USA, Monitor Radio Intl	7510eu	13770am	13840as	15405as
2200-2300	USA, Voice of America	7215va	9705va	9770va	11760va
		15185va	15290va	15305va	17735va
		17820va			
2200-2230 mtwhf	USA, Voice of America	6035af	7415af	12080af	13710af
2200-2300	USA, WEWN Birmingham AL	7395na	11820eu	13615na	
2200-2300	USA, WGTG McCaysville GA	6950am	9400am		
2200-2300	USA, WJCR Upton KY	7490na	13595na		
2200-2300	USA, WRMI/R Miami Intl	9955am			
2200-2300	USA, WRNO New Orleans LA	15420am			
2200-2300 smtwhf	USA, WVHA Greenbush ME	5850eu			
2200-2300	USA, WWCR Nashville TN	7435am	9475am	12160am	13845am
2200-2245	USA, WYFR Okeechobee FL	17845af	21525eu		
2200-2210	Zambia, ZNBC Radio 2	6165do			
2203-2210	Croatia, Croatian Radio	5985eu	7165eu		
2206-2300 fa	New Zealand, R NZ Intl	15115pa			
2210-2300 vl	Papua New Guinea, NBC	9675do			
2230-2255	Austria, R Austria Intl	5945eu	6155eu	9880eu	
2230-2257	Czech Rep, Radio Prague	9430na	11600af		
2230-2300	Russia, Voice of Russia WS	7125na			
2230-2300	United Kingdom, BBC WS	7325va			
2238-2255 1&3rd s	Denmark, R Denmark Intl	9495na	11840au		
2240-2250	Greece, Voice of	9425au			
2245-2300	Ghana, Ghana Broadc Corp	3366do	4915do		
2245-2300	India, All India Radio	7155as	9705as	9950as	11620as
		11660as			
2245-2300	Vatican State, Vatican R	7305as	9600as	11830au	

FREQUENCIES

2300-0000	Australia, Radio	9610as	9660pa	11645as	11660pa	2300-2330	United Kingdom, BBC WS	3915as			
		11695as	11855as	13745pa	13755as	2300-2315	United Kingdom, BBC WS	11835va			
		15365pa	17795pa	17860pa		2300-0000	USA, KAJI Dallas TX	13815am			
2300-0000	Bulgaria, Radio	7480na	9700na			2300-0000	USA, KTBN Salt Lk City UT	15590am			
2300-0000	Canada, CBC N Quebec Svc	9625do				2300-0000	USA, KWHR Naalehu HI	17510as			
2300-0000	Canada, CFCX Montreal	6005do				2300-0000	USA, Monitor Radio Intl	7510eu	13625pa	13770am	15405as
2300-0000	Canada, CFRX Toronto	6070do									
2300-0000	Canada, CFPV Calgary	6030do				2300-0000	USA, Voice of America	7215va	9705va	9770va	11760va
2300-0000	Canada, CHNX Halifax	6130do									
2300-0000	Canada, CKZN St John's	6160do						15185va	15290va	15305va	17735va
2300-0000	Canada, CKZU Vancouver	6160do									
2300-2359	Canada, R Canada Intl	5960am	9755am	11940am	13670am						
		15305am				2300-0000	USA, WEWN Birmingham AL	17820va			
2300-0000	Costa Rica, Adv World R	5030am	6150am	7375am	9725am	2300-0000	USA, WGTG McCaysville GA	7395na	11820eu	13615na	
		13750am	15460am			2300-0000 vl	USA, WHRI Noblesville IN	6950am	9400am		
2300-0000	Costa Rica, RF Peace Intl	7380am	15050am			2300-0000	USA, WJCR Upton KY	5745am	9495am		
2300-0000	Egypt, Radio Cairo	9900na				2300-0000	USA, WRMI/R Miami Intl	7490na	13595na		
2300-2350	Germany, Deutsche Welle	7235as	9690as	12045as		2300-0000 twhfa	USA, WRNO New Orleans LA	9955am			
2300-0000	Guam, AWR/KSDA	11775as				2300-0000	USA, WVHA Greenbush ME	7355am			
2300-0000	Guatemala, Adv World R	11775am				2300-0000 s	USA, WWCR Nashville TN	5850eu			
2300-0000	India, All India Radio	9705as	9950as	11620as	13700as	2300-0000	USA, WWCN Nashville TN	5065am	7435am	9475am	13845am
		15145as									
2300-0000	Japan, NHK/Radio	5965eu	9535eu	9560as	11850pa	2300-2315	Vatican State, Vatican R	7305as	9600as	11830na	
2300-0000	Malaysia, Radio	7295do				2300-2310	Croatia, Croatian Radio	5895eu	7165eu		
2300-2325	Moldova, R Moldova Intl	7520na				2310-2315	Kyrgyzstan, Kyrgyz Radio	4010eu	4050eu		
2300-0000	New Zealand, R NZ Intl	15115pa				2325-2336 mtwhfa	Lebanon, Voice of	6550eu			
2300-2315	Nigeria, FRCN/Radio	3326do	4990do			2330-0000	Australia, Radio	9645as	9850as	13605as	15240pa
2300-2350	North Korea, R Pyongyang	11700na	13650na								
2300-0000 vl	Palau, KHBN/Voice of Hope	9985as	11735as	13615as		2330-0000	Belarus, Radiosta Belarus	7250eu	12010eu	15180eu	
2300-0000 vl	Papua New Guinea, NBC	9675do				2330-2355	Belgium, R Vlaanderen Int	9925na	11690sa		
2300-2356	Romania, R Romania Intl	7105na	9570na	9625na	11940na	2330-2359	Netherlands, Radio	6020na	6165na	9845na	
2300-0000	Russia, Voice of Russia WS	7125na	7240na			2330-0000	Vietnam, Voice of	5940as	7270as	7400as	9840as
2300-0000	UAE, Radio Abu Dhabi	9605na	9695na	9770na				12020as	15010as		
2300-0000	United Kingdom, BBC WS	3955eu	5975va	6175va	6195va	2335-2345	Greece, Voice of	9395sa	9425sa	11595sa	
		7295as	9580as	9590na	9915va	2338-2355 1&3rd s	Denmark, R Denmark Intl	7275va	7490va	9485va	
		11750sa	11945as	11955as		2355-0000	Japan, NHK/Radio	9570as	11685au		

SELECTED PROGRAMS

Sundays

- 2300 Australia, Radio: World News. See S 0000.
- 2300 Guam, AWR/KSDA: Wavescan. A program for DXers and shortwave listeners produced at AWR's British studio.
- 2310 Australia, Radio: Sports Bulletin. See S 1120.
- 2320 Australia, Radio: Network Asia. John Westland conducts in-depth interviews and presents information about world, regional and Australian issues.
- 2320 Guam, AWR/KSDA: Pacific Island Journal. News and stories about the Pacific Islands.
- 2330 Guam, AWR/KSDA: AWR Magazine. News and interviews on Asian topics.
- 2345 Guam, AWR/KSDA: Digging Up the Past. A look at archeological discoveries and research.

Mondays

- 2300 Australia, Radio: World News. See S 0000.
- 2300 Guam, AWR/KSDA: Sounds of Inspiration. An adult Christian music program.
- 2310 Australia, Radio: Sports Bulletin. See S 1120.
- 2315 Guam, AWR/KSDA: Discovering the Bible. Recitation of scripture in story form.
- 2320 Australia, Radio: Network Asia. See S 2320.
- 2330 Guam, AWR/KSDA: The Bible in Living Sound. A dramatic look at the bible.
- 2345 Guam, AWR/KSDA: Voice of Prophecy. Write for an adult bible study program.
- 2345 UK, BBC London (as pac): Soundbyte (7th, 14th). See M 0615.

Tuesdays

- 2300 Australia, Radio: World News. See S 0000.
- 2300 Guam, AWR/KSDA: Sounds of Inspiration. See M 2300.
- 2310 Australia, Radio: Sports Bulletin. See S 1120.
- 2315 Guam, AWR/KSDA: Discovering the Bible. See M 2315.
- 2320 Australia, Radio: Network Asia. See S 2320.
- 2330 Guam, AWR/KSDA: The Bible in Living Sound. See M 2330.
- 2345 Guam, AWR/KSDA: Voice of Prophecy. See M 2345.

Wednesdays

- 2300 Australia, Radio: World News. See S 0000.
- 2300 Guam, AWR/KSDA: Sounds of Inspiration. See M 2300.
- 2310 Australia, Radio: Sports Bulletin. See S 1120.
- 2315 Guam, AWR/KSDA: Discovering the Bible. See M 2315.

- 2320 Australia, Radio: Network Asia. See S 2320.
 - 2330 Guam, AWR/KSDA: The Bible in Living Sound. See M 2330.
 - 2345 Guam, AWR/KSDA: Voice of Prophecy. See M 2345.
- Thursdays**
- 2300 Australia, Radio: World News. See S 0000.
 - 2300 Guam, AWR/KSDA: Sounds of Inspiration. See M 2300.
 - 2310 Australia, Radio: Sports Bulletin. See S 1120.
 - 2315 Guam, AWR/KSDA: Discovering the Bible. See M 2315.
 - 2315 UK, BBC London (af/am/eu): Soundbyte (3rd, 10th, 17th). See M 0615.
 - 2320 Australia, Radio: Network Asia. See S 2320.
 - 2330 Guam, AWR/KSDA: The Bible in Living Sound. See M 2330.
 - 2345 Guam, AWR/KSDA: Voice of Prophecy. See M 2345.

Fridays

- 2300 Australia, Radio: World News. See S 0000.
- 2300 Guam, AWR/KSDA: Sounds of Inspiration. See M 2300.
- 2310 Australia, Radio: Asia Focus. See M 1310.
- 2315 Guam, AWR/KSDA: Discovering the Bible. See M 2315.
- 2330 Australia, Radio: At Your Request. See S 0330.
- 2330 Guam, AWR/KSDA: The Bible in Living Sound. See M 2330.
- 2345 Guam, AWR/KSDA: Voice of Prophecy. See M 2345.
- 2354 Radio Netherlands: Documentary. Millenium. Part I (18th), Part II (25th). See A 2354.
- 2354 Radio Netherlands: Documentary. Peter the Great. Part II (4th), Part III (11th). See W 1154.

Saturdays

- 2300 Australia, Radio: World News. See S 0000.
- 2300 Guam, AWR/KSDA: Wavescan. See S 2300.
- 2310 Australia, Radio: Australia All Over. Join listeners across the island continent as Ian McNamara throws the spotlight on life in Australia.
- 2310 Australia, Radio: That's History. Interpretations of past events by Bill Bunbury/Steven Rapley.
- 2315 Guam, AWR/KSDA: Pacific Island Journal. See S 2320.
- 2330 Guam, AWR/KSDA: AWR Magazine. See S 2330.
- 2345 Guam, AWR/KSDA: Digging Up the Past. See S 2345.

Hello, Writers...

Do you have a topic you've always "thought about" writing up for Monitoring Times? Now is the time! Given our full-spectrum coverage, plus the interest in new technology on the one hand and nostalgia for the past on the other, there is no limit to appropriate subject matter to write about. Bone up on your research, warm up your pen, and you, too, can earn a little spending money!

Pitch your idea to the editor at mteditor@grove.net or call 704-837-9200 and ask for Rachel. Writer's Guidelines are available on the MT homepage at www.grove.net, or for an SASE.

PROPAGATION CONDITIONS, UNITED STATES

What happened to the propagation pages? you ask. Because of some necessary changes in the format of *Monitoring Times*, the two-page spread of propagation has been revamped. What has been calculated are six circuits that cover most areas of the world. The North American terminal of the circuits has been located in the middle of the USA. Normally, you will not find any major discrepancies between the forecasted frequencies for this location and those for your own location.

Both the table and graph depict the "Optimum Working Frequency" (OWF), which is the frequency where you are more likely to obtain the best reception—more than 90% reliability. This corresponds to the heavier middle line plotted on the previous graphs.

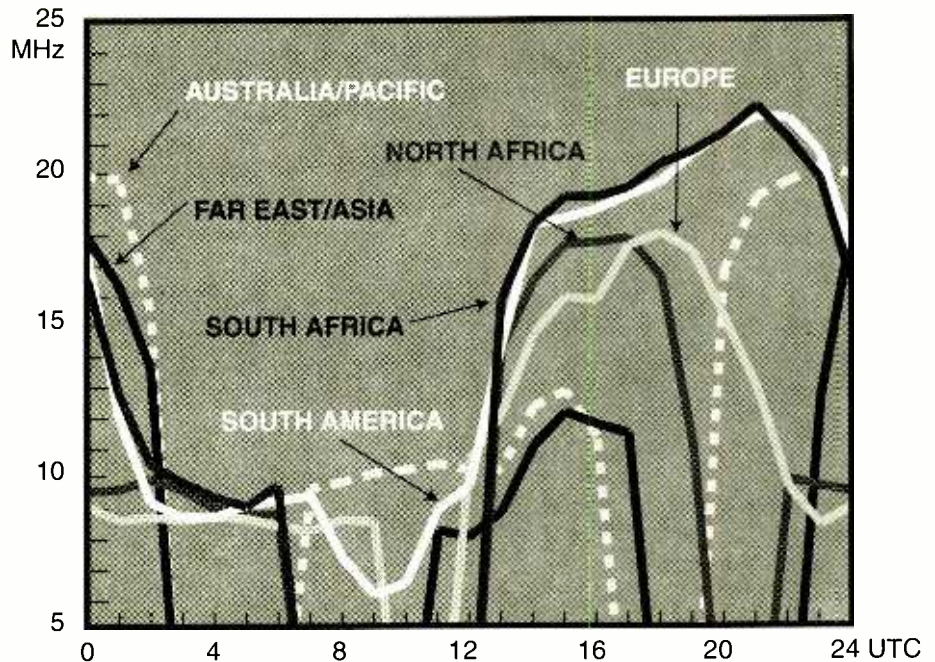
Sharp-eyed readers are likely to ask why the OWF drops to zero occasionally on the chart, whereas the previous graphs never did show such a low value. If you refer to past graphs you will see that at certain times, all the curves did meet—MUF (maximum usable frequency), OWF, and LUF (lowest usable frequency). In such cases the LUF was the controlling frequency: any transmissions below this frequency were very unlikely to be heard. However, since neither the MUF nor the OWF fell above that frequency, it meant the chance of propagation at that time from that location was nearly zero. The tabular format reflects this by occasionally dropping to zero, and the revised graphical presentation is based on the same numbers.

Remember, however: you should never treat predictions as gospel. It's always worth a quick scan across the bands to check current conditions and catch those rare and unpredictable band openings.

IS THE SUNSPOT NUMBER CRITICAL?

At times I have been asked what relationship there is between the MUF on a circuit calculated using a forecasted value of sunspot numbers (SSN) as opposed to using the real-time SSN value for the calculations (assuming they are different).

OPTIMUM WORKING FREQUENCIES U.S. Midwest



The increase in the MUF or OWF is definitely not proportional to the increase in SSN. For example: if, for a circuit to South America in the month of August 1996, you calculate the MUF using an SSN of 20, you get a value of 12.9 MHz. Even if we double the SSN to 40, the MUF only rises to 13.8 MHz. The correlation is not a straight line!

The best practice is to use the forecasted tabulated or graphed frequencies as a guide, and look around on each side plus or minus about 20%. In fact, the OWF that you will find in this page is approximately 85% of the MUF.

YOUR ASSIGNMENT

We need to know from you, the reader, which format you prefer: (1) the tabular format or (2) the composite graph. Both are illustrated on this page. If the tabular format

becomes the preferred one, we could afford the space to calculate the six circuits, or targets, for both the East and the West Coasts.

We also need to get a consensus about what is better suited to your needs: the MUF, for a reliability of 50%, or the OWF, where your reliability on the circuit is 90% or better. Send us a quick vote on a postcard, and, if you have the time, let us know how you use propagation forecasts in your listening or operating.

Once we have settled into a new format for the propagation page, I will discuss various propagation-related topics each month, such as the A and K indices and the latest flux value (obtained from the WWV broadcast at 18 minutes past the hour and from WWVH at 45 minutes past the hour). We will discuss how to use these, as well as how polar paths affect your reception, and other related topics.

Till next month, good DX.

Optimum Working Frequencies, MHz

UTC	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Midwest U.S. To:																									
SOUTH AFRICA	17.30	11.95	9.15	8.65	8.65	9.05	9.20	9.35	7.30	6.10	6.45	8.90	9.70	14.25	18.30	18.50	18.80	19.25	19.70	20.60	21.30	21.85	21.80	20.65	17.30
EUROPE	9.00	8.55	8.65	8.55	8.65	8.60	8.35	8.20	8.55	8.50	0.00	0.00	10.50	12.00	14.70	15.90	15.80	17.60	18.00	17.40	15.20	12.85	9.60	8.40	9.00
FAR EAST/ASIA	9.50	9.55	9.90	9.55	8.95	8.75	8.75	0.00	0.00	0.00	0.00	0.00	0.00	14.20	16.45	17.65	17.70	17.85	16.55	11.00	0.00	0.00	9.90	9.65	9.50
SOUTH AMERICA	16.50	12.70	10.40	9.80	9.30	9.00	9.70	0.00	0.00	0.00	0.00	0.00	0.00	15.80	18.30	19.20	19.20	19.50	20.30	20.70	21.30	22.20	21.10	19.80	16.50
NORTH AFRICA	17.90	16.30	13.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.20	8.00	8.80	11.00	12.10	11.70	11.40	0.00	0.00	0.00	0.00	0.00	12.60	17.90
AUSTRALIA/PACIFIC	19.90	19.80	15.50	0.00	0.00	0.00	0.00	9.60	9.80	10.10	10.20	10.40	10.20	10.20	12.30	12.80	11.30	0.00	0.00	0.00	16.80	19.20	19.70	20.20	19.90

Uncle Skip Rethinks His Antennas

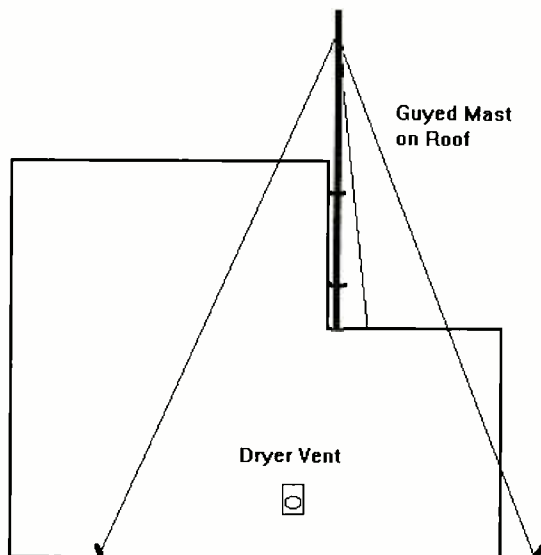
Eround this time every year I have been known to give the *MT* readers a report on the radio-related aspects of my summer vacation. Well, this year was a little different. No whirlwind trip to Disney World. No adventures in the outer reaches of Alaska. You see, this year my long-suffering spouse announced, "We are going to remodel the house!" By this she meant we were going to spend our expendable cash on repairing the stucco exterior of our Spanish style home.

Okay, so what does this have to do with radio? Quite a bit, actually. First my outside antennas had to come down so the workers could put up their scaffolding without hanging themselves on any of my strands of copperweld. No problem, I thought; I still have a few wires strung in the attic and most of my gear is also rigged for portable antennas such as whips and rubber duckies. I'd just operate "undercover" for a while.

Now the adventure begins. I came home from work one evening to see the work crew busily preparing the entire surface of my house to accept its new coat of stucco. This process involves covering every old stucco surface of the house with a sturdy wire mesh. If you want to conduct an experiment to show what was happening here, take any portable AM/FM broadcast band receiver, turn it on and then wrap the radio in aluminum foil. Guess what? You will notice that you can't hear anything because the foil forms a shield that prevents the radio signals from getting through. *These workers were turning my happy home into one great big Faraday shield!*

To prove the effectiveness of this stucco mesh as shielding, all I had to do was turn on any of my monitoring receivers that were currently dependent on attached whips. All signals were significantly attenuated, if they could be heard at all. The wires I had strung inside my roof were almost as useless, because the shielding on the stucco mesh came up along three sides due to the sloping nature of the roof. The proximity of the wire mesh to the attic wires also wreaked havoc with transmitting. As the paratrooper said when his backup chute also failed, "This just isn't going to be my day, is it?"

But remember that old saw: *There are no challenges, there are only opportunities.* I



had to figure out how I was going to play radio in a house wrapped in steel.

The truth of the matter is that many of you in the radio hobby face just this same dilemma. It doesn't have to come from a spouse's desire to update the exterior. Many modern buildings make extensive use of metals in their construction. Beams, studs, sidings, and even roofing materials can be made of metal which gets in the way of radio enjoyment. Many insulating materials used in post-energy-crisis construction have metalized reflective surfaces. In fact, I've been relatively lucky over the years not to have been faced with this problem head on in my own shack.

Well, this has obviously changed, and now I'm presented with an opportunity to rethink my entire antenna farm in light of the new construction. Given the shielding that my new stucco job has provided, I'm going to have to go with external antennas for all of my equipment. I'll also need to consider getting the antennas as clear as I can of all this metal. The approach I want to share with you this month is how to work with mast materials to get clear of metal monstrosities such as the building you're in.

■ The height can get you down

Of course, let's start out with a few words about safety, because antenna hanging is one of those tasks that can present some danger if care is not taken. Antenna work almost al-

ways requires a certain amount of climbing and clamoring over precarious surfaces. Take some time to think about safety first. Use sturdy, properly constructed ladders that are long enough to reach your antenna connections without forcing you to balance on the upper three steps. Do not use or move metal ladders in the area of power lines, phone lines, CATV lines, or any other wires or cables running into your house.

Your antennas should absolutely never be strung in such a way that they might come in contact with your electrical service or other services in any way. Also, take care when swinging your ladder around. Don't try to move a ladder that is already extended. Chances are that the extended ladder's point of balance will be out of your reach. This has made for some great slapstick comedies, but has probably maimed or even killed a few folks along the way. Take the time to reduce the ladder to its minimum size before moving it. This is yet another way to assure that the ladder will not hit a power line, crash through a window, or fall on someone's head.

As I've said many times before, buy or borrow a tool belt. Climbing up a ladder to do work is hard enough without needing to fish through your pockets for a screwdriver or a pair of wire cutters. Plan to carry all the tools you are likely to need. This not only avoids extra trips up and down the ladder, it prevents you from trying to use the wrong tool for the job—a situation that can often damage connectors and brackets beyond repair.

You should never go climbing around, or work up on a ladder without someone nearby in case of trouble. Since this person is likely to be on the ground—often right below you—they should wear a construction worker's hard-hat in case you drop something their way. Nothing is more likely to turn a significant other off to your hobby than getting hit on the head with a fumbled pair of pliers.

If you need to solder any connectors, do it at ground level. You may be trying to save some steps, but you just do not have enough control of a soldering iron or torch standing on a ladder. Hanging on to a roll of solder, a soldering iron, a connector, a cable, and a ladder are tasks that would make an octopus

nervous. Most connector work is usually a three-handed process to begin with, so get your hard-hatted friend on the ground to lend you a hand.

■ Plotting your moves

I've always felt that great antenna locations are where you find them. My newly stuccoed house presented an opportunity to practice what I have so often preached. I started out by making a map of my property. I noted the location of trees and other high places that could serve as antenna runs. When you do this for yourself, don't forget to mark the location of any power lines or other dangers in red. Measure the various distances and directions to get an idea of what the antenna possibilities might be. A comparison between your map and your existing antennas may be surprising.

This need to rethink my antennas pointed out some things that should be done differently, given the need to get higher than my house. In the past I had used an antenna mast mounted on my rear porch roof and extended above the top of my house. I planned to go higher than I had in the past to clear the house's metallic structure.

Antenna mast material can be found at most electronics supply stores. It usually comes in steel or aluminum, most often in five or ten foot lengths. Standard size is 1-1/4 inches. I have never been one for wimpy mast material. I've made good use over the years of galvanized pipe. This is overly strong and can be found in lengths greater than 10 feet.

If you choose to go "heavy duty" like Uncle Skip, remember that standard antenna mast brackets may not be strong enough to support this heavier pipe. So regardless of mast material, it would seem that adding another ten feet to my existing mast would seem to be no big deal. Wrong, Bunkey!

■ Finding the right guy

Taking the mast to that height means adding guy wires to stabilize it. The general rule for guying a mast is two sets of guy wires for a 30 foot mast and three sets for a 50 foot mast if they are "freestanding." My mast length with its new extension will be about 30 feet (I know my local zoning board doesn't read this magazine so I can tell you its real height), but the bottom half is stabilized by mounting brackets on the side of the house. I figured I could get by with one set of guys at about the 25 foot mark on the mast.

Guy wires should be installed in groups of three, spaced evenly around the mast at 120 degree intervals. The guy wires should extend

down to a distance of at least 60 percent of the mast height. Since I'm using a 30 foot mast on top of a 13 foot roof line, my guys should extend out around 26 feet at the base. A look at my handy-dandy map showed that this guy wire arrangement was possible if I moved the mast to one side of the roof. This also resolved another problem by allowing me a more direct path to the earth for my ground line.

If you're intending to do any HF amateur transmitting you need to go a step further. Break out an old math book and compute the guy wire length using the Pythagorean Theorem (It's easier than measuring the guys after you put them up). If you don't have a book handy with this theorem, rent *The Wizard of Oz* video. In it the Scarecrow recites the formula right after the Wizard gives him his brain.

As a ham you need to know the length of the guys to make sure they aren't "resonant" on any of the ham bands you intend to transmit on. This is especially important if you are using directional antennas, because this resonance can distort your antenna's pattern. At a guy length of about 50 feet, I was more than 10 percent away from any resonant length on the ham bands that I frequent.

The guy wire material needs to be strong. Galvanized stranded steel wire is most commonly used. One of the best books on this subject of tower and mast construction remains *The ARRL Antenna Handbook*, \$30, The American Radio Relay League, 225 Main St, Newington, CT 06111; ISBN 0-87259-473-4. This can be purchased directly from The League or from many of the booksellers listed in *MT*.

■ Feeding the shack a line

Okay, now I have an antenna mast that will go high enough to clear my mesh covered residence, the next thing to do was find a good way to get my feedlines back into the house. Fortunately I had given this some thought before the stucco workers started slapping on their mud. I went to the local hardware store and picked up a standard 4 inch clothes dryer duct outlet. I cold-chiseled my way through the basement wall and installed this outlet convenient to my station. The workers then just meshed around this opening and continued on their task.

This little exercise in rethinking my antennas is just one set of possibilities. Starting with the premise that you can operate a monitoring station even from a radio-frequency (RF)-hostile environment if you remain tenacious, it follows that you can always find ways to have fun.

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Longwave Intrigue

While others lament the end of summer, I'm looking toward the brighter side. Along with nature's beautiful display of colors and its crisp autumn air, come improved listening conditions on the frequencies below 500 kHz. This is a great time to begin exploring the longwaves.

This column is devoted to keeping you informed of longwave news and providing you with the tips you need for peak reception. This month we have news of two solved mysteries, DX loggings, and other happenings from across the band. Let's start with the mailbag.

■ PYD Found

Regulars with *Below 500 kHz* know that West Coast DXers have been puzzled by mystery beacon **PYD** (414 kHz) since 1993. Despite efforts to locate this beacon through normal channels (databases, navigation aid bulletins, charts, etc.) no success was had. None, that is, until an *MT* reader decided to go into action. Armed with his low frequency (LF) receiver and a loop antenna, Don Tomkinson (California) set out to find this beacon once and for all.

His search led him to the Southern California International Airport (formerly George Air Force Base) in Victorville, California. Although the terrain prevented him from actually seeing the beacon, his DF bearings indicate that PYD is probably co-located with the VOR-DME shelters at the intersection of the North/South and East/West runways.

Nice work, Don. With PYD now found, the mystery remains as to why the beacon is not listed in any known directory or chart, and why no one (including the FAA) knows anything about the station.

A possible explanation was offered by Mike Hardester (NC) via the Worldwide Utility News (WUN) group. Mike faced a similar situation a few years ago with **CYV** (526 kHz). He eventually pinpointed the beacon to a military base and wrote for a QSL card from the station. He received his QSL, along with a note from the range officer that "CYV was not on FAA charts or supplements because it is not part of an approved instrument approach and is inside a restricted area which doesn't permit civilian VFR navigation."

Although PYD operates from a civilian airport, there may still be some military usage of the runways, owing to its former status as a military base. Any future news concerning PYD will be reported in this column.

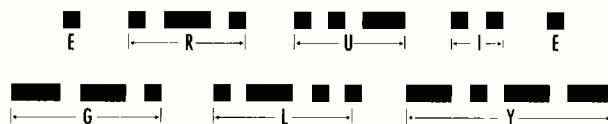
■ The Flip Side

Every once in a while, I get reports of strange IDs from beacons, consisting of too many characters and a very long dash after the ID. With these clues, I usually suspect Negative Keying, a rare transmitter defect where spaces become tones and tones become spaces. This results in an upside down image of the ID being heard over the air.

Jack Sippel (Kansas) recently heard such a beacon and contacted me via the Internet with his findings. The ID Jack heard was **ERUIE** appended with a very long dash. By plotting the Morse sounds on graph paper and filling in the inverse characters beneath it (see Figure 1), it could be seen that this was actually **GLY**, a 25 watt beacon in Clinton, Missouri.

Jack took the technique a step further and hooked his receiver's audio up to a computer sound card. He then ran a spectrograph of the signal at a 5 ms resolution, which made a clean visual record of the beacon's on/off keying. He could then clearly read the Morse characters for **GLY** on the screen. To my knowledge, this is the first time a computer has been used to solve a negative keying mystery.

NEGATIVE KEYING (ERUIE)



TRUE IDENTIFIER (GLY)

FIGURE 1: Negative keying can be solved by plotting the sounds you hear onto graph paper and then filling in the inverse image below it. Be sure to allow three blank blocks at the beginning, then fill in one block for a dot, and three blocks for a dash. Space the characters as follows: One block between individual Morse elements, three blocks between entire letters.

■ New Resources

- A new World Wide Web site for longwave listeners has been established at <http://www.netcom.com/~spmegrvy/index.html>. Maintained by Stephen P. McGreevy, this site

places a strong emphasis on natural radio, and also includes a wealth of general interest low frequency topics. Of particular note is a 10 article series by Sheldon Remington on *The Art of NDB DXing*. His in-depth series is excellent reading for any beacon hunter. For a list of other LF-related Internet sites, refer to the June '96 column.

- If building an antenna is in your fall plans, you might like to know about a recently discovered source for antenna wire. A 1/4 mile spool of galvanized 17 GA wire is available from Central Tractor stores for around \$10. Although intended for electric fences, its price, solderability, and strength make it an ideal choice for long LF antennas. As with any solid wire, care must be used to avoid kinking this line.

■ Loggings

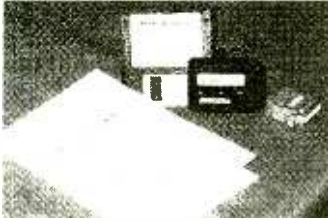
This month's loggings are from Al Hemmalin (Rhode Island). He used a Drake R8 receiver, Grove TUN-4 tuner, and a random wire antenna for these catches. Al notes that, with few exceptions, most of his intercepts were from Canadian beacons during this particular session. Typically, he gets a more balanced mix of northern and southern stations.

Your loggings, photos, and QSL cards are always welcome at *Below 500 kHz*. Send your favorite picks to me at P.O. Box 98, Brasstown, NC 28902. I can also be reached via e-mail at the address in the masthead of this column. See you in Atlanta at the Grove Expo!

TABLE 1: Selected Beacon Loggings

FREQ	ID	LOCATION
212	TS	Timmins, ONT
218	WK	Wabush, NFLD
221	HM	Hamilton, ONT
235	9H	Camp David, QUE
239	FE	Forestville, QUE
245	YZE	Gore Bay, ONT
266	YFH	Ft. Hope, ONT
272	YQA	Muskoka, ONT
280	QX	Gander, NFLD
300	ABL	Ambalema, Columbia
336	PV	Atlantic City, NJ
344	CL	Cleveland, OH
346	YXL	Sioux Lookout, ONT
353	HDT	Higuerote, Venezuela
390	UCA	Ciego De Avila, Cuba
410	BA	Columbus, IN

MESSAGE (PAGER) TRACKER



Overview: The Message Tracker allows a user with a 386, 486, or 586 Pentium computer and a VHF/UHF Receiver or scanner to decode and monitor digital pager signals. The Pager messages are displayed on the screen and can be saved automatically to disk with a time stamp. While running the program, a Signal indicator will

activate as soon as the frequency is active. If valid data is detected, the Data indicator will also activate along with the baud rate of the transmission. The Error indicator will activate if any uncorrectable error occurs. The pager address with any message is then displayed on the screen for you to view.

Message Tracker Product:

- One 3.5 HD Disk with Message Tracker software program
- 25 Pin Serial Interface Audio Adapter (SIA-100)
- User's Guide

Skywave Propagation Prediction Software

For Windows 3.1/Windows 95

Tell SKYCOM where you are, your transmitter power and antenna gain. Enter the current Sunspot Number or Solar Flux measurement. SKYCOM's windows simplify data entry. Pick a location from SKYCOM's database of over 400 call sign prefixes, using SKYCOM's database search tools or map. You can tailor the SKYCOM database to your own needs by adding additional locations. Instantly obtain prediction reports that tell you the best time and frequency for your transmission. You can also obtain a detailed report that lists the vertical critical frequency, frequency of Optimum Transmission, Signal to Noise ratio, and other data. SKYCOM 2.0 includes an on-line beam heading reference to the direct and long path bearing and distances (in miles and kilometers) from your home station to all locations in the SKYCOM database.



MONITORING ACARS with the new LOWE "AIRMASTER"

The monitoring of air band communications is a hobby that has become more and more popular over the last 10 years. In common with the rest of the communications field, there are far reaching changes in process in this area to cater to the requirements of air traffic control in the next century. ACARS is a very specialized data mode, and only decoders that have been specially designed for it will function. Until now, the only decoders that will work have been fairly expensive devices, as they use dedicated hardware to handle the decoding. The new Lowe Electronics Airmaster uses a small demodulator that plugs into the Com port on the back of a PC and takes its power from it. All the decoding of the data stream is handled by software running on the PC, which also enables some analysis of the messages to take place before they are displayed on the screen. Items such as the registration number of the aircraft, its flight number and the type of message are shown separately from the message text. Because the decoding requires a considerable amount of processing power, you will need at least a 386 PC to enable Airmaster to operate.



SCANCAT GOLD

Complete control of all functions supported by the radio through the standard manufacturer's interface.

SCANCAT allows you to:

1. Enter any one frequency and increment up-down from that point.
2. Enter any two frequencies and scan between them with ANY increment, time delay or pause.
3. Scan a file of frequencies, search by description or wildcards.
4. Create Databases of frequency files. Sort by any field, and save to disk and/or send to printer.
5. Create 30 personal "Preset" frequency BANDS for SW, aircraft etc. including increment and mode. The most popular presets are included in the program.



Cat 232 - Interface

- Supports Icom, AR8000/2700, YAESU and Scout.
- Comes with 6' cable, and adapters to fit all units within a single package (Must Specify Yaesu).
- Unlike "Single radio" adapters, the Cat 232 can be used with ANY radio supported, simply change the adapter, then "Plug and Play".
- Expandable in future with a simple add on adapter.
- No external power required. Draws power from computer.
- "Reaction Tune" scout with NO modifications to radio.



CopyCat - Pro

The only commercial available computer control program for the Universal M-7000 & M-800, AEA's PK-232 and the MFJ-1278

Standard CopyCat FEATURES:

- 32k incoming text buffer
- Pull down menus
- Mouse support (but not required)
- 20+ programmable macros
- Runs on any 640K PC compatible
- 50 page printed manual
- New improved online help

New CopyCat-PRO FEATURES:

- Control BOTH your TNC and radio simultaneously! Send commands to TNC and at same time, send frequency and mode to radio!
- NEW! Multiple pop-up windows for HELP, frequency files, and text editor. Instantly go between any of three windows with single keystrokes.
- Supports ALL SCANCAT frequency file formats, or create your own!
- NEW, easier, "Plain English" MACRO language for control of all radio and TNC functions.
- RADIO SUPPORT for most AOR, JRC, KENWOOD, ICOM, YAESU, plus LOWE's HF-150 and Watkins Johnson's HF-1000

AR8000 AOR

All Mode Wide-Band World Band Radio Receiver
A new breed of radio receiver which combines full computer compatibility with advanced wide-band radio receiver technology.

The AR8000 incorporates the latest PLL technology and offers a multitude of features including true carrier re-insertion SSB (CW) demodulation with 50Hz frequency steps. 4 level alpha numeric LCD indicates the frequency, signal strength, band scope and more. Selectable squelch system, auto-mode, auto-band-plan, serial communication port are all standard. There are a variety of scan/search commands to link banks, scan by mode, programmable delay scan, priority, auto memory store, step offset and a programmable power save circuit to increase the duration of operation from the NiCads. The list goes on and on!



Electronic Distributors

325 Mill Street
Vienna, VA. 22180

Ph: 703.938.8105
Fax: 703.938.4525



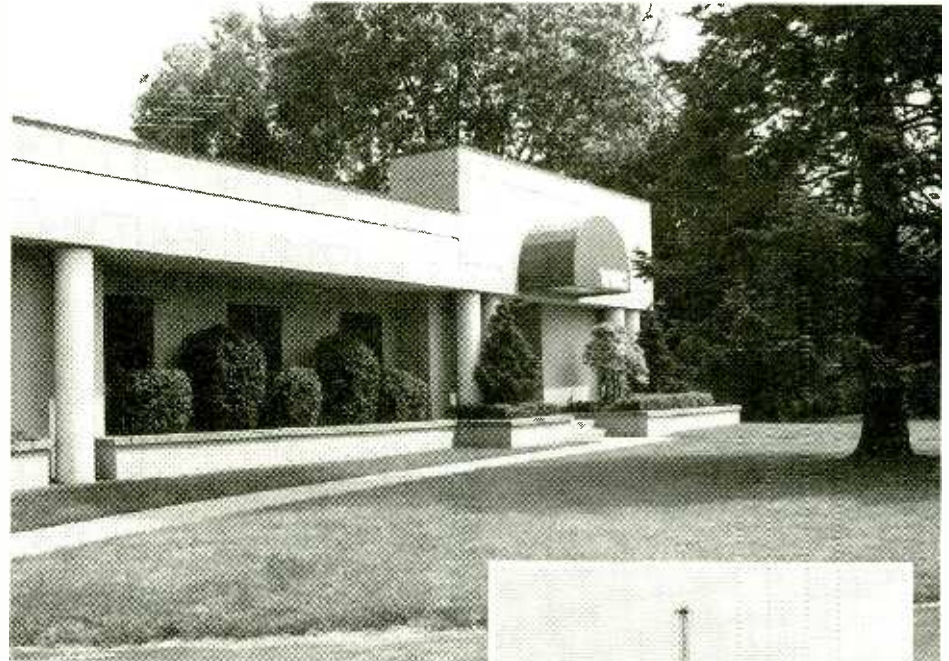
TV by the Numbers

In mid-July, the FCC and the television industry took some steps that will change the technical aspects of TV forever. The first commercial digital TV station is now on the air; a second station is under construction; and a third channel plan has been put up for consideration.

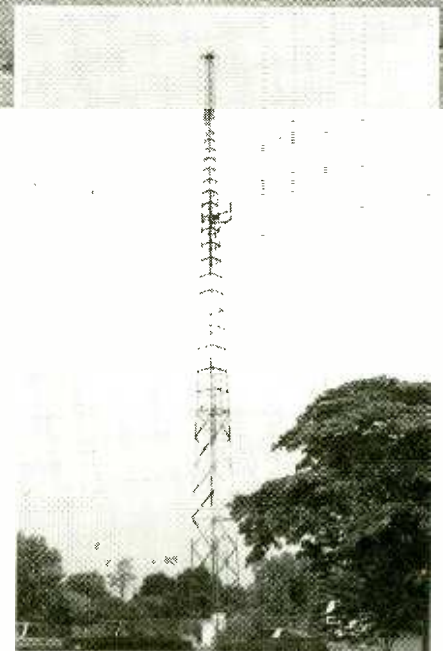
Digital TV got its start in the late 1980s. Scientists began discussing the possibilities of HDTV—a scheme for delivering crisper, sharper pictures. In fact, such a system had already begun in Japan, with signals delivered by satellite. A sharper picture requires transmitting more detail, a greater amount of picture information.

At first, research concentrated on ways of fitting this additional information into the existing TV channel without interfering with regular TV broadcasts. Other experiments sought a way of transmitting the additional information separately from the regular broadcast, but in a “compatible” way, one that would allow older TVs to receive the regular broadcast indefinitely.

As the 1990s came along, so did the idea of digital TV. While it would be totally incom-



Sue Wilden of Indiana sent these photos of a typical small-town radio station, WINC-1400 and 92.5 MHz Winchester, Virginia. This is the station where late country music star Patsy Cline got her start. At right is an excellent shot of WINC's AM antenna. The white stick about 3/4 of the way up the right side is a two-way radio antenna of some kind, probably for WINC's news department. You can't see them in this picture, but four wires drop from the top of this tower back to the ground. This “folded unipole” construction is supposed to improve the bandwidth of the antenna (and the station's frequency response).



patible with existing TVs, it also offered some major advantages. Of course, one of the biggest advantages would be a better quality picture and sound. Not only would more detail be transmitted, but because the signal would be digital, there would be virtually no noise or interference. Finally, stations would be broadcasting a data stream rather than a picture. This data stream could represent a high-definition picture—but it could also represent multiple regular pictures—or several CD-quality audio channels—or even very high speed access to the Internet.

As great as digital TV sounds, stations

can't ignore the compatibility issue. Existing analog TVs will not receive an intelligible picture from the new stations. Imagine the uproar if, suddenly one day, all pre-1996 TVs stopped working! There's really only one answer: allow stations to continue regular analog broadcasts on their existing channels, while allowing them to phase in digital broadcasts on new, second channels.

At this point, the government and two-way radio companies became very interested. If

Domestic-band DX Club Listings

It's been awhile since I've printed these addresses, and there has been a change at the WTFDA. These are the three largest North American clubs for AM/FM/TV DX enthusiasts. I encourage you to check them out:

International Radio Club of America
Box 1831
Perris, CA 92572-1831

National Radio Club
2840 S.E. Illinois Avenue
Topeka, KS 66605-1427

Worldwide TV-FM DX Association
P.O. Box 17333
Asheville, NC 28816

In all three cases, send a 32-cent stamp for a sample newsletter. Also, keep an eye on *Club Circuit* each month in *MT*; you might find a local club devoted to your interests.

DX TEST BULLETIN

every station's digital operation could be accommodated on UHF channels, then when analog TV is phased out, the VHF channels could be re-used for other radio services. New applications for two-way radio could be developed. And, the government could auction the VHF channels, earning large amounts of revenue without increasing taxes.

In 1993, the FCC released a proposal for UHF digital TV. Every existing station would receive a second channel, most of them UHF. In a very few cases, an existing UHF station would receive a VHF channel. They'd be expected to move their analog operation to VHF, use their existing UHF channel for digital TV, and return the VHF channel to the government when analog TV was phased out.

This plan, however, had its problems. Broadcasters weren't convinced it would provide interference-free service to viewers. Two-way interests wanted some of the high UHF channels for compatibility with existing cellular telephone equipment. (Cellular phones operate in what were TV channels 70-83.) So in July, the FCC released a second plan.

The new plan calls for the short-term elimination of ten more TV channels. Channels 50-69 would be auctioned, in most places (but the 96 existing stations there could stay until analog TV is phased out, and a few new digital stations would operate there as well). In the longer term, after analog TV is eliminated, the UHF channels freed up would be used to move digital operations out of channels 2-6 and 52-58. These additional 12 channels would also be auctioned, and all TV stations would operate in channel 7-51.

What does all this mean to you, the TV viewer? For a few years, not much. The technical standards are not yet final. In another year or two, you may expect to see digital TVs and VCRs hit the market. Congress has asked the FCC to begin issuing regular digital licenses in 1997, and you should expect larger stations to request these licenses and begin digital broadcasts by the end of next year. Strange-looking signals will begin appearing on unused channels. Eventually, only digital TVs will be sold, and analog broadcasts will be phased out.

Would you like to know what a digital TV broadcast will look like on a regular analog TV? So would I! But if you live near Raleigh, North Carolina, you have a chance to find out. On the same day the FCC released its new channel allocation table, the United States' first commercial digital TV station signed on the air. WRAL-HD operates on channel 32 from a tower near Auburn, North Carolina. So far, only test patterns have been transmitted.

These special broadcasts provide a unique opportunity to hear and identify the following stations. If you hear these broadcasts, please report to the address provided.

Sat Oct 5 - WYTI-1570 (PO Box 430, Rocky Mount, VA 24151), will test at 2500 W nondirectional (5,000 if power increase is granted before the test date) 12-12:30 am EDT. Morse code IDs, test tones, voice IDs and bluegrass music. Send reception reports to: Mr. Earl Shelton, Operations Manager.

Mon Oct 7 - WAPF-980 (PO Box 1649, McComb, MS 39648), will test at 5000 W nondirectional 2-2:30 am EDT. March music, polkas, test tones, voice IDs, Morse code IDs. Send reports to: Mr. Richard Watts, Chief Engineer.

Sat Oct 12 - KBNA-920 (2211 E Missouri Ave, Suite S-300, El Paso, TX 79903-3838), will test 2-2:30 am EDT. Morse code IDs, test tones, voice IDs. Test time divided between 360 W directional and 1000 W nondirectional. Phone calls (*none collect, please*) will be taken during the test at (915) 779-7550. Send reports to: Mr. David Stewart, Chief Engineer, e-mail 71210.2074@compuserve.com

Mon Oct 14 - WAKK-1140 (see WAPF for address) will test at 1000 W nondirectional 1:30-2:00 am EDT. March music, test tones, voice IDs, Morse code IDs. Send reports to: Mr. Richard Watts, Chief Engineer.

Sat Oct 19 - KAMA-750 (see KBNA for address) will test at 10,000 W directional daytime pattern 2-2:30 am EDT. Morse code IDs, test tones, voice IDs. Send reports to: Mr. David Stewart, Chief Engineer, 71210.2074@compuserve.com

Sat Oct 26 - WHLY-1580 (2010 S. Michigan, South Bend, IN 46613) will test at 1000 W nondirectional 6-7 am EDT. Morse code IDs plus 50's "doo-wop" and 60's music. Send reports to Mr. Mike Shannon, Operations Manager, Mike1580@aol.com (arranged by Lynn Hollerman and JD Stephens)

These tests were arranged by J.D. Stephens for the International Radio Club of America Courtesy Program Committee. (Send 32-cent stamp, or US\$1 or 1 IRC if overseas, to P.O. Box 1831, Perris, CA 92572-1831 for sample IRCA bulletin.)

NBC has filed another digital TV application. Their station would operate from the tower of WRC-TV in northwest Washington. This station will use channels 27, 30, 34, and 51.

■ Bits and Pieces

- In mid-May, a Phoenix, Arizona, FM station adopted a programming format that forced listeners to do a double-take. First, in early May, KTWC-FM switched to Christmas music. Then, the programming changed to sound effects—cows mooing, wind blowing, rushing water, etc.

Robert Brock of Phoenix wrote, asking "Has KTWC gone insane?"

It certainly sounds that way! But actually, this is fairly common in radio. It's called "stunting," and is generally done when a station is about to change the type of music played. The purpose is simply to draw attention to the station, and hopefully get some free publicity from the local newspapers and TV stations.

Christmas music and sound effects aren't all that "stunting" stations will use. I've heard

countdowns, construction noises, and even an "all *Louie, Louie*" format. One station in Syracuse, New York offered its listeners "your favorite parts from your favorite songs," playing 20-30 second excerpts from Top-40 records. If you hear something like this in your town, keep checking the station in question. Something is about to change.

- If you live in Pittsburgh, Pennsylvania, or close enough to DX its TV stations, expect some major changes. WQED-channel 13 has negotiated a complicated deal to improve their difficult financial position. First, they plan to swap their sister station, WQEX-channel 16, to religious group Cornerstone Television in return for Cornerstone's WPCB-channel 40. Then, they'll sell channel 40 to a commercial firm, and split the proceeds with Cornerstone. A simpler deal to simply convert channel 16 to a commercial station was rejected by the FCC: the channel had been reserved by the Commission for non-commercial service.

The days are getting shorter, and the DX is getting better. What are you hearing? Write me at Box 98, Brasstown NC 28902-0098, or by email at: 72777.3143@compuserve.com.

Colombian Clandestine Radio Patria Libre Returns

Despite negotiated settlements during the last two years between the Colombian government and several rebel opposition groups, the far leftist National Liberation Army (ELN) has continued its guerrilla campaign. Many DXers have wondered if this might lead to the return of the ELN's shortwave clandestine voice, **Radio Patria Libre**.

According to Henrik Klemetz of Colombia in *Dateline Bogota*, Patria Libre is back. He heard it announce a schedule of 1300 and 1700 UTC on 6250 kHz, although the 1700 broadcast is unconfirmed. The frequency has varied in the past, so it would be a good idea to tune around. As darkness increases at most North American locations in the fall, the 1300 time slot is becoming more realistic as a propagation path.

Historically, the government sometimes jams Patria Libre through co-channel broadcasts of a black clandestine, **El Pueblo Responde**. If you're tuning 48 meters for Patria Libre, look for activity from either the rebel station or the government jammer. Although Responde has been silent for the last couple of years, it could return.

Radio Democrat International

As we pointed out last month, this fascinating English language clandestine is now scheduled daily at 2100 UTC on 6205 kHz. *MT* reader Lee Silvi of Mentor, Ohio, notes them regularly with their anti-Nigerian government broadcasts. Check them out.

Greek MW Pirates

MT reader Zacharias Lianuas of Thessaloniki, Greece, sends in a list of more than a dozen pirates that operate irregularly in the expanded mediumwave band between 1620 and 1685 kHz. Powers vary between 250 and 5,000 watts. Here's a real DX challenge for medium wave listeners, although Zacharias says that because of unfortunate Greek postal laws, none of the stations provide QSLs. The internet at <http://compulink.gr/Users/zliangas/central.htm> has more information on these pirates.

RFS Mail Trouble

Bill O. Rights of pirate station *Radio Free Speech* checks in direct with a complaint



The "real" Radio KAOS QSL certificate and the "phony" KAOS verie.

about the United States Postal Service. A large pile of reception reports from listeners were delivered in a severely mangled condition from one of his maildrops. Thus, if you sent a report to Bill during the summer, and if you have not yet received a QSL, Bill sends his apologies. He promises a rapid QSL response to listeners who resubmit their reports, assuming that the Post Office does not shred them again.

KAOS Official QSL

Well, it's official. Joe Mama of **Radio KAOS** is sending out plenty of the attractive QSL certificates that we see this month. He confirms that the Maxwell Smart QSL sheets, which we also picture here, were distributed by somebody not connected with the station. Joe is philosophical about the hoax, noting that his pirate QSLs had been pirated.

What We Are Hearing

Your pirate logs are welcome via PO Box 98, Brasstown, NC 28902, or via the e-mail address at the top of the column. All frequencies are in kHz, with times in UTC. We have another record 53 stations reported here! Jerry Yares of Pensacola, FL, asks if pirates operate

in AM, upper sideband, or lower sideband. All three are used.

North American pirate stations listed here use the following addresses: PO Box 452, Wellsville, NY 14895; PO Box 109, Blue Ridge Summit, PA 17214; PO Box 28413, Providence, RI 02908; PO Box 146, Stoneham, MA 02180; PO Box 605, Huntsville, Alabama 35804; PO Box 17534, Atlanta, GA 30316; PO Box 510, 4010 Basel, Switzerland; 14 Stone Row, Coleraine, County Londonderry, Northern Ireland, UK; Boite Postale 130, F-92504 Rueil-Malmaison, Cedex, France; and Postfach 220342, D-42373 Wuppertal, Germany. For return postage, enclose three 32¢ stamps in the envelope to USA addresses. \$2 US or two International Reply Coupons go to foreign maildrops.

6YCAT- 6950 at 0130. Kit Kat Marley's shows are about cats in Jamaica. His transmitter is atop a marijuana tree. Addr: Providence. (Rich and Talea Jurrens; Katy, TX; Mike Prindle, New Suffolk, NY; Barry Williams, Enterprise, AL; John Mello, North Scituate, RI; William Hassig, Mt. Prospect, IL; Silvi) **Alan Masyga Project-** 6955 at 2345. Alan Parsons Project rock music is mixed with "tributes" to DXer Alan Masyga of Minnesota on this parody station. Addr: Providence. (Ranier Brandt, Germany [!]; Neil Wolfish, Toronto, Ontario; Howard E. Lyon, Oz; Jurrens)

Area 51- 6955 at 0130. This new one combines rock with sound effects. Addr: Wellsville. (Lyon)

Bullfrog Radio- 6955 at 2300. QSL's from this rock music pirate prominently feature a large frog. Addr: Wellsville. (Silvi; Williams; Jurrens)

Cat in the Hat- 6955 at 1900. Dr. Doolittle fans will enjoy their Broadway musical renditions of Dr. Seuss stories. Addr: Providence. (Randy Ruger, North Hollywood, CA; Bill McIntock, Minneapolis, MN; David Chapchuk, Scranton, PA; Jesse Rose, Hampdon, VA; Lyon; Jurrens; Prindle; Mello; Silvi; Hassig; Wolfish)

CHST- 6957 at 2230. Dr. Dumbo and Low Blow's Canadian DX humor has earned rave reviews. They poke fun at other Canadian pirates. Addr: None yet. (Bill Fleming, Liverpool, NY; Jurrens; Prindle; Rose; Silvi; Wolfish)

Free Hope Experience- 6955 at 0115. Major Spook has had to spend some time differentiating himself from a "fake" version that uses a slightly different call sign. Addr: Blue Ridge Summit. (Williams; Lyon; Silvi)

Infinity Minus One- "The Gatekeeper" laughs hysterically over rock music on this new operation. Addr: None; will QSL *The ACE* logs. (Wolfish)

KAMP- 6955 at 0200. The "Krazy Alan Masyga Project" is a parody of the other Alan Parsons/Masyga parody pirate. Got that? Addr: Blue Ridge Summit. (Alan P. Masyga, not connected with station, Winona, MN; Wolfish; Jurrens)

KNBS- 6956 at 0015. Phil Muzik is the grandfather of the marijuana advocacy stations. He's been sponsored for eleven years by the California Marijuana Cooperative. Addr: Wellsville. (Vince Havrilko; Tampa, FL; Pat Murphy, Chesapeake, VA; Silvi; Wolfish; Hassig)

KTLA- 6955 at 0000. This station has announced a format shift to alternative rock music. Addr: Providence. (Wolfish)

Live Wire Radio- 3910 at 0045. This rock music station is a *Europirate* log, not from a North American transmitter. With winter conditions returning, 75 meters should support great DX from Europe just before and after local sunset on weekends. Addr: Coleraine. (Prindle)

Microdot Radio- 6953 at 0300. This one has returned with rock music and a gruff voiced male announcer. Addr: Wellsville. (Jurrens)

Mystery Radio- 6955 at 0030. They air eclectic programming with few identifications, so this station name is sometimes accurate. Addr: Stoneham. (Chapchuk; Mello; Jurrens)

North American Pirate Relay Service- 6955 at 0100. Richard T. Pistek provides a relay transmitter on this side of the Atlantic for both European and domestic pirate programs. Our reporters heard their relay of German pirate **Sunshine Radio**. Addr: Wellsville for NAPRS, Cedex for Sunshine. (Tom Mazanec, Maple Heights, OH; Brandt; Hassig; Wolfish; Lyon; Jurrens; Silvi; Prindle)

Orson Wells Radio- 6957 at 0315. As the name implies, this station rebroadcasts old Orson Wells radio dramas. Addr: None. (Jerry Coatsworth, Merlin, Ontario)

Radio Azteca- 6948 at 2345. Bram Stoker's funny DX parodies have music from the old Bullwinkle cartoon between bits. Addr: Wellsville. (Brandon Artman, West Chester, PA; Silvi; Wolfish)

Radio Camouflage- Pat says that their QSL arrived from SRS Sweden for a January 1996 relay via **KDED**. Addr: It's confusing; try Providence. (Pat Griffith, Federal Heights, CO)

Radio CSA- 6955 at 0145. If there is a "classic country" music radio format, then this new station is an example. Addr: Wellsville. (Wolfish; Jurrens)

Radio Free Euphoria- 6955 at 1330. WARR is not the only marijuana legalization advocacy station on the pirate bands. Several others, such as this one, go back a long way in pirate history. Addr: Wellsville. (Wolfish; Jurrens)

Radio Free Speech- 6955 at 2245. Bill O. Rights continues his regular appearances on the pirate bands, often with genuine comedy by people like Bill Clinton and Oliver North with wording spliced for a humorous effect. This was Ray's first pirate; congrats! Addr: Wellsville. (Ray Carmen, Canton, OH; Cathy Zylka, North Tonawanda, NY; Prindle; Sivi; Murphy; Chapchuk; Lyon; Wolfish; Mello)

Radio Fusion Radio- 6955 at 2115. The fact that their signal has recently been heard worldwide, including in Europe and Asia, has had no impact on their rap music programming. Addr: Providence. (Mazanec; Jurrens; Wolfish)

Radio Garbanzo- 6955 at 0145. Fearless Fred and his sidekick Harry are back, which is great news. Garbanzo's programming is sometimes crude, but it always generates side-splitting laughter. Addr: Wellsville. (Lyon; Silvi; Wolfish; Rose)

Radio KAOS- 6955 at 0215. Joe Mama and Roger Wilco feature rock, comedy, and parody on their active station, which has been heard nationwide. Addr: Wellsville. (Williams; Jurrens; Silvi; Hassig; Mello; Ruger)

Radio Mauser International- 6948 at 2000. This veteran has returned with a self-described "rare" broadcast of late 60's rock mixed with coded messages to agents "trying to liberate the occupied territory." Addr: Old address invalid; they're working on a new one. (George Zeller, Cleveland, OH)

Radio Mirage- 6955 at 0115. This *Europirate* joins the parade of stations producing broadcasts specifically for relay in North America. Rock music is their staple. Addr: Wuppertal. (Wolfish; Jurrens)

Radio One- 6955 at 1800. This original remains the slickest production of the various numbered rock oldies stations. Addr: Wellsville. (Silvi)

Radio Nine- 6955 at 0400. The progression of stations named Radio One, Radio Two, and Radio Three has skipped a few numbers. The latest incarnation plays Beatles music and other rock. Addr:

Providence. (McIntock; Wolfish)

Radio Sparks- 6950 at 2330. Pirates are uncommon in Switzerland, but this Swiss rock music station has supplemented its IRRS Friday night show on 3955 kHz with North American pirate relays. Addr: Basel. (Zeller)

Radio Three- 6955 at 2315. Like Radio 1, 2, and 9, they feature rock, although of more recent vintage. Addr: None, QSL's logs in *The ACE*. (Rose; Hassig; Silvi)

Radio Two- 6950 at 0330. The low budget version of Radio One plays ancient rock oldies. Addr: Providence. (Paul Jablonowski, Greenfield, WI; Dick Pearce, Brattleboro, VT; Silvi; Pearce; Chapchuk)

Radio USA- 6955 at 0145. Mr. Blue Sky entered his leaky bathtub in the Olympic kayak race, but you didn't see him on the Gold Medal stand from Atlanta. Addr: Wellsville. (Monte Carroll, Nashville, TN; Mazanec; Fleming; McIntock; Murphy; Williams; Prindle; Rose; Silvi; Lyon; Wolfish; Hassig; Jurrens)

Radio USA (fake)- 6955 at 2000. They identify themselves as "The Real Radio USA," but this impostor is easy to spot. Its formula is attacks on pirate DXers such as Andrew Yoder. Addr: None, sometimes verifies logs in *The ACE*. (Silvi)

Radio Xanax- 6955 at 0215. Sedation is the mood on "The Relaxation Station." This new pirate's rock music reinforces the theme. Addr: Stoneham. (Lyon; Silvi; Rose; Wolfish; Fleming)

Radio Zebulon- 6055 at 2030. Sidekick Pirate Mordecai usually says little, but he's the butt of jokes on this one. They claim to be "more popular than a Glenn Hauser anagram contest." Addr: Atlanta. (Pearce; Hassig; Mello; Silvi)

RBCN- 6955 at 1930. Radio Bob has always transmitted comedy with a southern focus. With the games in Atlanta this year, he covered the "Coca Cola Olympics." Addr: Atlanta. (Charlie, Henderson, KY; Williams; Silvi)

The Fox- 6955 at 2200. This one's funniest production was probably its "Highway to God" religious parody, so they have been transmitting reruns. Addr: Blue Ridge Summit. (Mello; Williams; Silvi; Lyon; Chapchuk)

Up Against the Wall Radio- 6955 at 1700. Owsley still programs late 60's and early 70's rock mixed with comedy. Addr: Providence. (Chapchuk; Mello; Silvi)

Up Your Radio Shortwave- 6955 at 0000. Their slick liberal political commentary and comedy station is well produced, and thus is entertaining. As you might expect, their views on the Republican National Convention were negative. Addr: Blue Ridge Summit. (McIntock; Jurrens; Chapchuk; Silvi)

Voice of Harlem- 6955 at 0000. Mike copied an address from this rapper of 365 W 125th St., Box 2194, Harlem, New York, NY 10026, but it is not yet confirmed. (Brandt; Williams; Jurrens; Prindle)

Voice of the Blue and the Gray- 6955 at 2200. They tested in August, announcing that regular programming in the fall will be devoted to the Civil War. Addr: Providence. (Mazanec; Carroll; Hassig; Prindle; Rose; Silvi; Lyon; Fleming; Wolfish; Jurrens)

Voice of the Rock- 6950 at 0130. For two years in a row, Paul Art has used a portable ten-watt Radio Animal "Grenade" AM transmitter to broadcast for hours from an island offshore from Boston. Keep your ears open next summer! Addr: Providence. (Brandt; Prindle; Silvi; Zeller)

Voice of the Runaway Maharishi- 6956 at 0130. The Maharishi demands that you listen to his rock and comedy. The penalty for touching that dial and tuning away is unclear. Addr: Wellsville. (Mazanec; Hassig; Rose; Williams; Silvi; Wolfish; Prindle; Lyon; Fleming; Murphy)

VOXXX- 6956 at 0000. The programming on this risqué station is rated XXX. Addr: None. (Rose)

VXWT, Voice of Bizarro World- 6955 at 1530.

Pirates are sometimes bizarre. This new one works at it with commentary on events in the Northern South District of Bizarro World. Addr: None. (Zeller).

WARR- 6955 at 0200. Since its first appearance in early July, this new pirate has been heard several times on most weekends with its marijuana legalization advocacy format. When FCC busts were more

frequent in the old days, we seldom saw stations with regular activity like this. Addr: Still none. (Brandt; Mazanec; McIntock; Williams; Hassig; Lyon; Rose; Jurrens; Carroll; Fleming; Silvi; Mello; Pearce)

Weekend Music Radio- 6955 at 2300. This Scotland pirate is occasionally heard directly from Europe, but since they now produce shows specifically for North American relay, their audience has expanded. Addr: Coleraine. (Carroll; McIntock; Fleming; Rose; Wolfish; Lyon; Hassig; Silvi)

WLS- 6955 at 0330. Jack Boggan loves shortwave broadcast station interval signals, so he retransmits them on his pirate. The station anticipates sending out its 1,000th QSL later this year. Addr: Blue Ridge Summit. (Silvi; Rose; Lyon; Wolfish)

WMPR- 6955 at 2230. "Missing Persons Radio" is often missing from the bands for months or years, but their rock music shows have returned. Addr: None, rarely QSL's logs in *The ACE*. (Silvi)

WPN, World Parody Network- 6955 at 0130. Lee says that he heard "parodies" and "music," which is their normal fare. Addr: Huntsville. (Pearce; Silvi)

WPRS- 6955 at 0000. Announcer Willy B. Quiet at "Worldwide Pirate Radio Station" programs various rock and novelty music on his new station, which was pretty active during late summer 1996. Addr: None announced, Wellsville possible. (Rose; Williams; Jurrens; McClinton; Carroll; Wolfish; Lyon; Hassig)

WREC- 6955 at 0015. P. J. Sparx's Radio Free East Coast, a regular pirate band occupant, has a traditional rock music and comedy combination. Addr: Wellsville. (Chapchuk; Williams; Silvi; Ruger)

WRRN- 6955 at 2345. The World Republican Radio Network plugs Bob Dole during this election year, proving that all political viewpoints are heard on the pirate bands. Addr: Wellsville. (McIntock; Rose; Hassig; Wolfish; Silvi)

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Plotting the MUF

Predicting propagation conditions before going on the air can be a great time-saver, and something hams have been doing for years. You can use a chart like Jacques d'Avignon's monthly forecasts, pictured here, but for a really customized, up-to-the-minute forecast, why not do it yourself with a shareware program like the one we talk about this month?

With the sunspot cycle at its low point, working DX has been fairly difficult. It's not much fun to look around the bands and find little or no activity from the further reaches of the world. And getting up early or staying up late to work a particular area of the Earth can be a truly frustrating experience if propagation is poor.

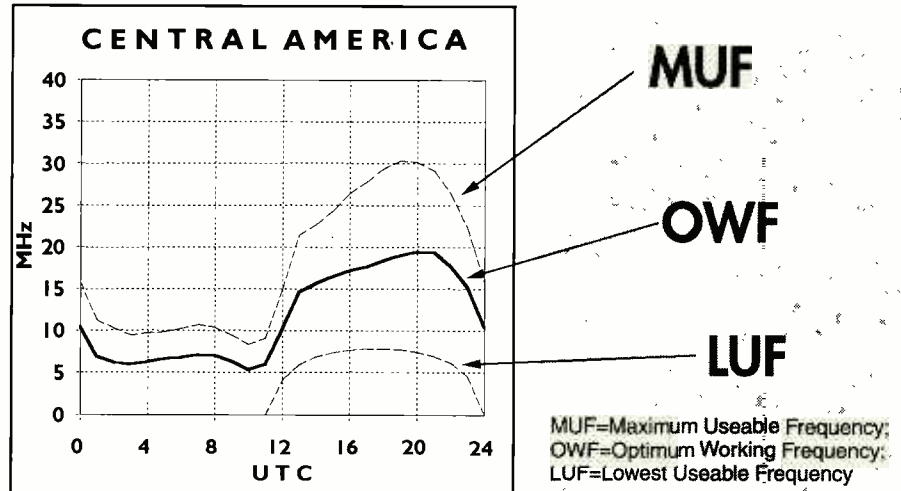
The answer to the problem is a handy computer program called Bandid. Bandid is available via shareware, costs about three dollars to try and \$25 to register with Jim Dolson, WB8ZBD (CompuServe 72411,1544). Once you use the program you will agree it is the best money you ever spent. When Bandid says no propagation is available to your target area, you can get some sleep or take the kids to the amusement park without any regrets.

This program does several things for you. First it will tell you the best frequency available to work a particular part of the world and the best time. It gives you the highest possible frequency (HPF), maximum usable frequency (MUF), frequency of optimum transmission (FOT), and lowest possible frequency (LPF).

Bandid can print the information in a tabular or graphic format. Besides giving you extremely useful propagation information, it has a table of DX prefixes and will give you beam headings from your home to anywhere on Earth.

Of course, you must provide Bandid with some basic information: your call letters, location (latitude and longitude), and the daily sunspot number or solar flux (though 65 is the lowest it seems to accept). The location of your shack can be acquired several ways; a good topographic map will do it, as will a global positioning system (GPS) receiver. Some communities have the information available at city hall, too.

The solar index (flux) can be obtained from WWV, located at Fort Collins, Colo-



rado, at 18 minutes past the hour (WWV transmits on 2.5, 5, 10, 15, 20 and 25 MHz.). Solar information is also available via WIAW (ARRL headquarter's station in Newington, Connecticut) during regular bulletin broadcasts.

Using the program is extremely simple and takes only a few minutes to become familiar. There is no documentation on the disk, but the program is menu-driven and self-explanatory.

If you can't find a copy of Bandid locally, I can provide a copy for you in DOS on 3-1/2 inch high density disk. Send your name and address and \$3.00 to me at: 6347 Chapmans Road, Allentown, PA 18106. The program is available for Apple machines, but I do not have the means to reproduce it for that format.

Don't forget that Jacques d'Avignon prepares forecasts as well for *Monitoring Times* (see his new format on page 67). You'll note some differences in terminology among amateurs, but the meaning is generally self-evident. The forecasts can provide you with a general indication of conditions, to which you can plug in the current sunspot/solar flux numbers from your time standard station (WWV in mainland US). As you note the correlation between the numbers and your logs for the session, you will begin to notice a pattern that you can use to predict conditions or to adjust forecasts to actual conditions.

■ Old Friends I Never Met

A few issues back I commented on present-day operating techniques and the practice of

treating each QSO (radio contact) like a contest contact. Quite a few of you responded to my request for comments, and I was frankly disappointed with the results. A slight majority felt on-air contacts should be treated like a contest, to be completed and gotten out of the way as soon as possible.

Being a dyed-in-the-wool rag chewer, I was of course upset with the results; I do hope the small cross-section of hamdom that responded is not an accurate measure of your readers' feelings on the subject.

I, for one, feel it is great to get to know the hams you meet on the air. Yes, we may only meet a small percentage of our contacts in person; but I well remember some great vacation trips that included visits to ham friends never before eyeballed. Some of my greatest thrills came when an Australian (VK) amateur that I had chatted with off and on for years paid a visit.

Another great experience was a visit from a British (G) ham who was a merchant seaman (radio op). We never talked on the air, but he sent me telegrams reporting my 160 meter signals from Africa, Near East, and Europe aboard his ship (British hams could not operate 160 maritime mobile at that time). He paid a visit to the port of Philadelphia, and we had three great days getting to know one another, and a tour through his ship (*MS Kumba*), which introduced me to a entirely new way of life.

Come on, folks, let's chew the rag! That's all for October; happy Halloween. 73 de Ike, N3IK.

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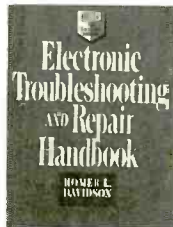
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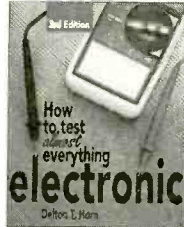
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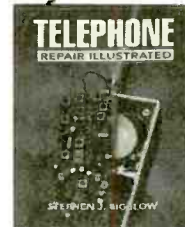
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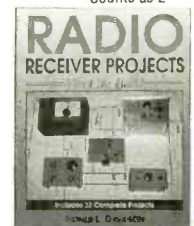
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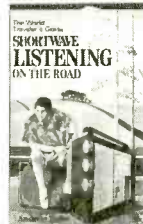
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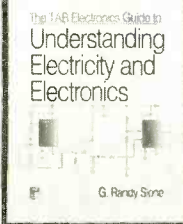
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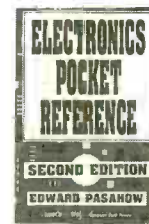
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Radio Beacons

Welcome aboard! By reader request, we will be devoting a portion of the column to a series of reports on radio navigation ground equipment (henceforth referred to as navigation aids or NAVAIDS).

Of all navigational aids, aircraft today rely most heavily on radio navigation. Radio navigation allows the pilot to fix the aircraft position in any kind of weather, conduct it from one point to another, and assists in approaches and landings under poor visibility conditions.

One disadvantage of radio navigation is that it relies on equipment—both in the aircraft and on the ground—that is subject to malfunction and interference.

The first airborne radio was used to inform the pilot of weather along his flight path. The gradual development of directional radio equipment made possible a system of radio routes, or beams, which eventually formed aerial highways.

Types of Radio Navigation Systems

Aeronautical radio navigation in the United States is accomplished using NAVAIDS facilities maintained by the FAA. Some of the more frequently used NAVAIDS include the following:

1. NDB: Nondirectional Radio Beacons
2. Directional Radio Beacons (inner, middle, and outer markers)
3. VOR: Very High Freq Omni Range (VHF)
4. TACAN: Tactical Air Navigation (UHF)
5. VORTAC: A combination of VOR and TACAN

The NAVAID equipment, both long and short range, is appropriately spaced along the airways to provide aircraft navigation guidance.

Non-Directional Radio Beacons

Non-directional radio beacon is a term used to describe a low or medium frequency (L/MW) NAVAID intended for use in airborne radio direction finding, instrument approaches, and where more precise holding patterns are required. NDBs are installed at or near airports to aid pilots in finding the airport. Most non-directional radio beacons operate in the frequency range of 190 to 535 kHz. They radiate a circular or nondirectional signal pattern, permitting reception from any point within the facility's range.

NDBs are classified according to their in-

tended use. Service volume consists of the altitude and distance limits of the facility where no interference will be received from adjoining aids with the same or closely spaced frequency assignments. As long as an aircraft's footprint intersects the radius of the beacon's coverage area, it will generally hear the beacon, regardless of altitude.

Compass Locators	Component of an instrument landing system—under 25 watts and 15 nautical miles radius (located near airports)
MH	NDB homing—less than 50 watts and 25 nautical miles (medium high)
H	NDB homing—50 to less than 2,000 watts and 50 nautical mile radius (high)
HH	NDB homing—2,000 watts or more and 75 nautical mile radius (extra high)

Some NDBs are capable of voice transmission; those which are not will have a "W" included in the class designator. On aero charts, the frequency will be underlined to indicate no voice capabilities. All class HH, H, and MH NDBs transmit a continuous 3-letter identifier in slow Morse code except during voice transmission.

Compass Locator Facilities transmit a continuous 2-letter identifier in Morse, even during voice transmissions.

Automatic Direction Finder (ADF)

Since NDBs do not furnish directional information to the pilot, but instead transmit a circular or nondirectional signal, the pilot needs to be able to convert the nondirectional signal to a directional one. This information is provided by the aircraft's automatic (or airborne) direction finder equipment. This equipment senses the direction to a low/mediumwave ground transmitter and displays a bearing from the aircraft to the transmitting station. Aircraft ADF equipment consists of a low/mediumwave receiver and a 360-degree indicator.

The ADF indicator found in a cockpit is sometimes called a radio compass. An ADF receiver can be tuned to any station transmitting between 190-1750 kHz. This band in-

cludes all nearly all non-directional radio beacons and most commercial broadcasting stations in the United States.

Although many pilots seldom use ADF equipment because of the somewhat simpler operation and interpretation of VHF/UHF Omni-Directional equipment (VORs—which we will address in a future column) there are many advantages to its usage, including:

1. A back-up navigation system in the event of omni-directional equipment failure.
2. A means of monitoring position en-route and providing data for plotting fixes.
3. A navigation system for use in areas and altitudes where omni-directional "line of sight" signals are unreliable.
4. Radio communications (receiver only) on the ground where UHF/VHF reception is impossible. Weather broadcasts and clearances can be received, for example, at points outside VHF/UHF "line of sight" range.
5. Auxiliary and standby navigation info on instrument approaches. One of the most common uses of ADF equipment is that flight service station specialists can help lost pilots to find their bearings using a "DF Fix."

Nostalgia Notes

Thanks to all of you who shared their "Connie" experiences with me following the May issue. I could have filled two more columns with your letters. Now I'd like to hear from some of you who've had experience with the DC-3 aircraft or its military counterpart—the C-47. We'll run the column in about six months.

Readers Corner

Barbara H., a flight attendant from Florida for a major airline, contributed the following. She says that she spends most of her free time monitoring the airbands and taking flying lessons. Her goal is to become an airline pilot. Thanks for the **Miami International Airport** frequencies, Barb.

Approach	Departure	Tower	Ground Control	Clearance	Delivery	ATIS
120.320	119.450	118.300	121.800	120.350		117.100
120.500	125.500	123.900	127.500	135.350		119.150
124.850	125.750	126.850				

Airline UHF Company Frequencies:

Continental	460.650, 460.700, 460.775
Delta	460.825;
Midway	460.650
Northwest	460.800, 465.800
TWA	460.875
United	460.725
Varig Brazilian Airlines	460.875, 465.875.

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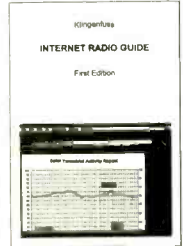
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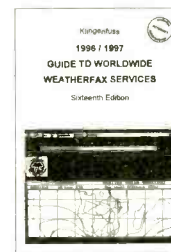
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Looking Back at the Olympics

The twenty-sixth Olympiad has come and gone from the City of Atlanta. In spite of the incident which marred the festive atmosphere, a good time was had by all—especially those that were monitoring the airwaves for new federal frequencies.

The federal government made a stellar performance. In some ways they were almost stealth-like. You knew they were there, but you could not see them. You knew they were there, because you could hear them throughout the federal spectrum of frequencies on the radio.

Most of the federal activity occurred in the 136-144 MHz range. It would appear that the Department of Defense Special Events unit set up communications for this year's Olympics just like they did during the 1984 games in Los Angeles, California.

The most consistent frequencies monitored were:

Frequency	Use
138.2250	Olympic Security; Ocoee River white water rafting venue (repeater output)
138.5000	Morris Brown/Clark—Sheriff Department (repeater output)
138.8750	Mariott Marquis—Fulton County Sheriff Department
139.0000	Scrambled channel
139.1750	Georgia Dome (exterior)
139.5125	Olympic Village—Red channel, input to 140.425.
139.7750	Aquatic Center/Georgia World Congress Center (Charlie channel)
139.8500	Aquatic Center
140.3125	Olympic Village—Gold channel (repeater output) Input was 141.475
140.4250	Olympic Village—Red channel (repeater output) Input was 139.5125
140.9750	Olympic Village—Blue channel, input to 141.225. This was for the Blue and Gold rovers.
141.1000	In-transit, route operations (repeater output) Input was 149.575
141.1750	Georgia Dome/Georgia World Congress Center (perimeter)
141.2250	Olympic Village—Blue channel (repeater output) Input was 140.975
141.2750	International Broadcast Center
141.4500	In-transit, escort operations (repeater output)
141.4750	Olympic Village—Gold channel, input to 140.3125
141.5000	Olympic Village
141.5250	Olympic stadium
141.9250	Aquatic Center perimeter security
142.7000	Georgia Dome (interior)
142.9250	Georgia Dome (perimeter)
143.0250	Fulton County Stadium (repeater output) unknown repeater input frequency
143.1500	Georgia Dome (interior)
149.5750	Repeater input to 141.100

Olympic Air Tac controlled the airspace over the games and was operating on 120.300 and 128.525 MHz. During practice exercises surveillance helicopters were heard on 123.025 and 242.4 MHz.

The FBI conducted their operations on the following frequencies:

167.2125	FBI Olympic Command Post
167.3375	Simplex
167.3875	Simplex
167.4875	Simplex
167.5375/163.8675	FBI SWAT Team—duplex channels
167.7625	Simplex

The Department of State (Office of Security) had their command post in Atlanta. They did not operate on their usual frequency of 409.625 MHz, as is their normal practice throughout the county. They were found on 417.8500 MHz. This might be a good channel to put in your scanners for additional State Department monitoring.

Military activities were found on a police channel of 460.425 MHz. They were using last name identifiers.

A source at the Olympics who wishes to remain anonymous reported that FEMA was operating a repeater in the 420 MHz amateur band. The frequency was 420.075 MHz, which was digitally encrypted.

As we have seen in the land mobile spectrum, and more recently in the 406/420 MHz band, trunked radios are becoming more popular. The following was the primary trunked system used at the Olympics:

935.3875	935.4000	935.4125	935.4250
936.3875	936.4000	936.4125	936.4250
937.3875	937.4000	937.4125	937.4250
938.3875	938.4000	938.4125	938.4250
939.3875	939.4000	939.4125	939.4250

Additional traffic was also monitored on 938.925 and 939.8875 MHz.

A commercial trunk on 936.4375, 937.4375, and 938.500 MHz was carrying Olympic traffic. Additional simplex traffic was monitored on 939.450 and 939.900 MHz.

A transportation trunk was monitored on 938.3875, 938.400, 938.4125, 938.425, and 938.4375 MHz.

No activity was monitored in the 30-88 MHz frequency range. This would preclude the use of the military PRC series radios, which operate in that region. As was observed on the television news, almost everybody

who carried a two-way radio was carrying either a trunked radio or a VHF handheld.

No federal activity was monitored in the 512-806 MHz range. This does not mean that there was no activity there. A lot of very short range remote pickup frequencies were in use there for the wireless microphones. Due to their very low output power, one would have to have been in the immediate vicinity to have heard them. There were reports of some unidentified two-way traffic around 510 MHz.

FEMA at the Olympics

The Federal Emergency Management Agency (FEMA) also had a noticeable presence in Atlanta. They

were heard on their usual VHF channels. During the time of the Olympics, I received a letter from a reader on the East Coast who wishes to remain anonymous regarding FEMA and some of their nationwide radio channels. Here is that list:



Disaster Response Portable Repeaters

138.225/141.875	139.950/142.975
138.575/141.950	139.950/143.250
139.450/142.425	140.025/143.250
139.775/143.475	140.025/143.000
139.825/143.000	141.850/143.800
139.925/143.000	142.375/143.050

Look for low power, simplex operations on the following VHF channels:

140.900	140.925	141.725	142.375	142.400	142.925
142.950	143.625				

There is limited FEMA activity in the 162-174 MHz range. A repeater pair has been observed during disaster relief operations on 165.6625/164.8625 MHz. Also check out 169.875 and 173.7875 MHz for handheld simplex operations.

In the 406-420 MHz range there is also a repeater pair that has been reported. In disaster situations watch 418.050/408.400 MHz. Look for short range, short term simplex operations on 417.600, 417.700, 418.050, 418.075, and 418.575 MHz.

■ The Feds on INMARSAT

A fertile area for federal monitoring that is often overlooked by listeners is the downlink signals from the various geostationary INMARSAT satellites. HF enthusiasts have reported numerous occasions in which communications from FEMA field personnel mention INMARSAT operations during disaster relief missions. INMARSAT downlinks are as follows:



1530-1544 MHz Ship and Portable Operations
1544-1545 MHz Aircraft Operations
3600-3620 MHz Shore Stations

The current constellation of INMARSAT satellites in geostationary orbit are as follows (courtesy of *Satellite Times* magazine):

Inmarsat 3 F1	64.0 East
Inmarsat 2 F1	65.0 East
Inmarsat 2 F3	178.0 East
Inmarsat 2 F4	54.0 West
Inmarsat 2 F2	15.5 West

If you would like more information on monitoring INMARSAT satellites see *Monitoring Times*, February and March 1994 issues, *Microwave Monitoring* by John Wilson. Complete INMARSAT receive systems can also be purchased from Swagur Enterprises, P.O. Box 620035, Middleton, WI 53562-0035, Phone/Fax 608-592-7409 or via email at swagur@execpc.com. You can also visit their web page at: <http://www.execpc.com/~swagur/>.

Another opportunity to learn more about monitoring federal agencies via INMARSAT will be at this month's Grove Communications Expo in Atlanta, Georgia. *Satellite Times* columnist Donald Dickerson will be conducting a forum during the Expo on how to get started in this exciting field of communications monitoring.

Besides FEMA, other United States government agencies and departments known to use INMARSAT satellites for communications include: American Forces Radio and Television Service (AFRTS); Bureau of Alcohol, Tobacco and Firearms (ATF); Bureau of Land Management (BLM); Bureau of Prisons; Drug Enforcement Administration (DEA); Department of Energy (DOE); Environmental Protection Agency (EPA); Federal Bureau of Investigation (FBI); Maritime Administration; NASA; State Department; Tennessee Valley Authority (TVA); U.S. Air Force; U.S. Army; U.S. Coast Guard; U.S. Geologic Survey; U.S. Marshalls Service; U.S. Navy; and the Voice of America—to name just a few!

■ Bureau of Prisons

I also received some e-mail from a person who wishes to remain anonymous due to his association with the Department of Justice. He described the prison system at the Federal Correctional Complex in Allenwood, Pennsylvania. There are four federal prisons there, all the way from a prison camp to a full penitentiary. The complex uses a Motorola trunked system operating in the 406-420 MHz band. The system has DES capability, but normally operates in the clear voice mode. The system also allows for system-wide communications.

The prison camp operates in the 170 MHz range on the usual Bureau of Prison channels. This channel plan is:

Chan	Frequency	Use
01	170.8750	Operations—simplex
02	170.9250	Operations—secondary simplex
03	170.6500	Tactical—simplex
04	170.8250	Tactical—simplex
05	170.9000	Tactical—simplex
xx	413.6625	Belt alarms

The body alarms are simplex transmitters which are activated by a staff member when an emergency arises. They send out an alarm along with accompanying audio.

■ Who is Cactus?

I also received a letter from a reader who was monitoring Air Force 2 when it recently landed in Hyannis Port, Massachusetts. It seems that a reference was made to their Echo/Fox network. The radio operator said he was securing from the Echo/Fox net and going to CACTUS. What is CACTUS?

CACTUS is the White House Communications Agency/Secret Service code name for Camp David. Camp David has a communications facility located near it that supports secure satellite communications with traveling White House parties. This facility (the Camp David downlink) is used by the White House secure switchboard (ROYAL CROWN) to establish secure UHF satellite communications with the traveling President and Vice-President.

The above is a reference to the UHF military satellite link to the Vice President's party. They carry a portable UHF satellite system with a little fold-up antenna capable of completing KY-58 secure voice links through CACTUS to ROYAL CROWN.

In addition to the UHF military satellite links, the CACTUS ground station also provides Ku-band and extra high frequency (EHF) Milstar satellite communication links to a very small dish antenna which is located on the HMX VIP Nighthawk helicopters from Ma-

rine Corps Air Station (MCAS) Quantico, Virginia, and the White House Communications Agency Chevy Suburban vehicles (callsign Roadrunner) which follow in presidential motorcades. The EHF frequencies involved are in the 30 GHz range up to the satellite and 20 GHz down to ground.

■ Those Crazy Gulf Towers Again!

I received a very interesting reply—again from someone who wishes to remain anonymous—regarding the towers out in the Gulf of Mexico (see August *Federal File*). Through this person's contacts with the Air Force and the Department of Defense, the following has come out: It seems they are listed as part of the special Over the Water Navigational Range and Calibration facility.

Earlier this year, or late last year, *Outside* magazine ran an article about a group of sailors who left port in Southwest Florida for a fishing trip in the Gulf of Mexico. They experienced a sudden storm and their boat overturned. All but one was lost and he was found several days later clinging to one of these towers.

The Air Force, FAA, Navy, etc., allegedly use these towers for navigational purposes. They are, however, a little bit like Groom Lake...everyone knows they are there, but you cannot find them on any government map or sectional chart. 'Almost any sailor who has sailed the Gulf waters knows about them, but he cannot find out any information about them. It seems the microwave links seen on the towers run from South Florida through the tower chain and up the west coast of Florida to around the Tampa area.

It seems there are additional towers like these which have been sighted in shallow waters off the coast of Louisiana and Texas. The microwave links on the Texas towers link back to the Johnson Space Center.

That's it for the Federal File: 'til next time, 73 de John WA4VPY.

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Universal's SCPC-200 Satellite Audio Receiver

For satellite TV enthusiasts it's one of the more interesting aspects of the hobby, and yet, for the vast majority of satellite TV owners, it is virtually unknown. I'm talking about single channel per carrier transmissions—known to satellite TV tinkerers simply as SCPC.

These signals are not to be confused with satellite audio subcarrier transmissions. Subcarriers are "piggy-backed" on the video carrier of the channel on which they are found. The best example of the latter is Mind Extension University, a full-time video channel on Galaxy 5 channel 21 carrying a variety of educational programming. Riding along on the video carrier is a collection of audio services known as "Super Audio." These are stereo broadcasts of music aimed at subscribers on Jones Intercable cable TV systems.

By contrast, SCPC transmissions are very narrow band radio signals, each sent to certain transponders on various satellites as a single carrier. These signals have very little guard space between carriers, so it's not unusual to have 30 or 40 SCPC signals on one transponder. The left and right channels of a stereo service are sent as separate carriers and require two SCPC receivers for stereo reception.

SCPC signals are not intended for the cable TV audience; they are generally radio networks whose transmissions are intended for affiliates of those networks. The most typical examples are sports networks, such as WGN Chicago, which carries Cubs baseball games. In season, football, hockey, basketball, college and professional sports are carried by various networks, and all can be found on SCPC.



Universal's SCPC-200 satellite audio receiver: Successful design and engineering triumph for consumers. (All graphics courtesy Universal Electronics, Inc.)

Tuning In SCPC Signals

Like audio FM subcarriers, SCPC signals aren't easily spotted. Without actually tuning around for them, you won't even know they're there. Unlike FM subcarriers, your satellite receiver won't be able to tune them in. A separate receiver capable of tuning the narrowband frequencies is needed.

In the early days of the TVRO hobby there were only two ways to receive SCPC channels. The first was to find a used commercial grade SCPC receiver (new ones used to cost in the \$10,000 range) or use a homebrew set-up using a TV band radio, a scanner, or other receiver capable of tuning the second IF of your satellite receiver (typically 70 MHz in those days). This method, however, had problems, not the least of which was that you had no idea where on the band your radio was tuning. The best you could do was guess.

A second problem was frequency drift. Tuning narrowband SCPC signals has always required stable TVRO components. The low noise block down converter (LNB), which amplifies the signal picked up at the dish, needs to be very stable in order to keep the receiver on frequency. When using the LNB to tune broad band video signals, any drift in the LNB goes completely unnoticed. Only when enlisting your LNB in very narrow band SCPC reception does the instability become apparent. Only the most expensive commercial grade LNBs were stable enough to keep SCPC receivers on frequency.

A third problem was memory. It might be necessary to store several hundred SCPC frequencies in a receiver to make access to the signals easy. Even if you used a scanner, without a stable LNB or a way to compensate for the difference in your LNB and

the reference LNB used in logging stations, frequencies in the memory would always be off.

A fourth problem involves the issue of companding. In order to cram as much fidelity as possible into such a narrow bandwidth, uplinkers use a system of compressing the signal as it's being transmitted and expanding the signal as it's being received. This is called "companding" and is done typically on a ratio of 1:1, 2:1 or 3:1. Signals compressed at 3:1 sound tinny and lack fidelity.

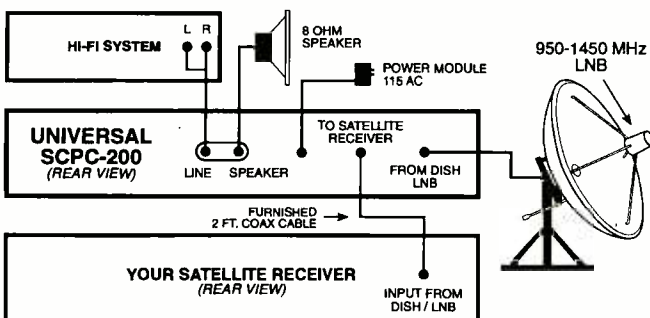
And finally, there's the problem of bandwidth. Frequency space on SCPC transponders is sold like real estate: the more territory you take up the more you'll be charged. Transmissions made in a narrow bandwidth take up less frequency space than the same signal transmitted in wide band. The difference, on hearing, is obvious. Wideband signals, received in the narrowband mode, sound over-modulated and distorted. Narrowband signals, received in the wideband mode, may not even appear to be there.

SCPC Solutions

Solutions to all these problems were addressed handily in commercial SCPC receivers. The problem was that these receivers, even on the used market, were priced beyond the range of most hobbyists. Recently, however, there has been a rush to the marketplace of quality, consumer-grade SCPC receivers which answer all of the reception issues discussed above. One of these is the SCPC-200 audio receiver from Universal Electronics, Inc.

Many *MT* readers will recognize Universal Electronics from the products they have produced for years for the RTTY/SWL listening field. Though this is not Universal's first foray into the field of consumer SCPC receivers, the SCPC-200 represents a major change in the concept of consumer SCPC receivers: it solves all of the problems previously encountered, and does so with style.

In fact, this is where the changes start. Previous attempts at consumer SCPC receivers fell short in the cosmetics department, but the SCPC-200 really looks like a serious piece of satellite equipment. The concise LCD display, minimal use of buttons, helpful tuning lights, even the rack handles indicate this is a quality piece of gear.



Hooking up the SCPC-200 to your satellite system couldn't be easier.

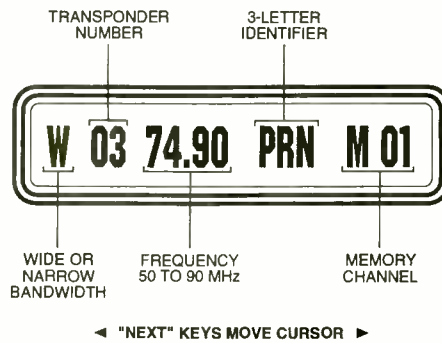
■ SCPC-200 Scores Big

To start, the SCPC-200's 14-page installation and operation manual is so thorough that you'll need little advance knowledge to get started. There are diagrams explaining how SCPC signals work; details on how to hook up the receiver to your current satellite system; tips on tuning, storing frequencies in memory, and much more. Also included with the manual is a nine-page *Satellite Radio Guide*, adapted from Universal's own quarterly publication (a subscription form is conveniently supplied on the last page).

The SCPC-200's design is practical as well as appealing. The trim, 12-inch-wide case is only 1-3/4 inch high and 8 inches deep. The well-laid-out front panel keeps the functions at a minimum, the information at a maximum, and the eye-appeal high.

The SCPC-200 is packed with useful features. Connections on the back allow the SCPC-200 to function as a 950-1450 MHz splitter. An "F" connector takes the signal from your LNB, and another "F" connector sends it back out to your receiver. In addition, one RCA connector for line-out allows you to send the audio output to your stereo receiver, while another RCA connector can power any small speaker you may wish to use.

The front controls are simplicity itself. Six round buttons control all of the receiver's functions, the results of which are shown on



A close look at the graphics on the LCD panel.

the adjacent LCD panel. Here the alphanumeric display indicates wide or narrow bandwidth; transponder channel being tuned; four-digit, second IF frequency readout; a three-letter broadcast service ID (which you write in when adding to the memory bank); and memory channel indicator. Next to the LCD are three lights lined up perpendicularly with two red LEDs separated by one green LED. This simple tuning device indicates when the carrier is center-tuned. The on/off/volume knob controls the external speaker.

Tuning in broadcast services couldn't be easier. If you like, you can just tune around as you would a shortwave radio and note any interesting frequencies. But it won't be long before you're searching for specific services. Universal includes a recent list of SCPC services with your radio, but these services are included in each issue of *Satellite Times* magazine as well.

As you tune in signals, the SCPC-200

automatically adjusts for companding. Once you have the signal properly tuned in, you'll be amazed at the crisp, clean audio from this receiver. In my "frequency-drift acid test." I set it up on Minnesota Public Radio which is on 24 hours a day. The next morning the SCPC-200 was sitting squarely on MPR: There was *no* drift through the entire night. In fact, I left it on MPR all day, returning to it again and again to check that it was still on frequency. It was, in spite of my eight year old, 40 degree LNB.

■ Drawing Conclusions

The SCPC-200 brings the world of commercial SCPC reception to the shelves of the home entertainment center, and it does so with style and at a reasonable price. Now you can enjoy drift-free reception of your favorite radio networks with crisp audio and the convenience of easily stored frequency memory. The clean design and competent construction makes this unit a welcome addition to your satellite equipment. Price of the SCPC-200 (RCV-28) is \$399.95 plus \$9.00 second day air shipping and handling from Grove Enterprises, 7540 Highway 64 West, P.O. Box 98, Brasstown, NC 28902-0098. Phone: (800) 438-8155, Fax: (704) 837-2126 or via e-mail at: order@grove.net. You can also check out the Grove web site at <http://www.grove.net> for their online catalog for more information.

SCPC Tuning Tips

The first thing you'll notice about tuning SCPC frequencies is that unoccupied band noise is very loud. It's similar to tuning your scanner with the squelch completely off. When you do come across a signal everything is immediately "full quieting."

Often you'll hear unmodulated carriers. Here, the band noise is gone but there's no apparent signal. That's because many of these services only operate a few minutes per hour. Look for activity on these "mystery" channels at the top or bottom of the hour; you'll most likely find that they are regional news services.

You may tune in a carrier but again find there's no audio other than some talking in the background. When someone suddenly starts talking, you realize that this was the open mike of a remote feed linked to the main studio across town or even across the country. Other times you'll come across 700 or 1000 Hz tones which, again, are usually regional news services on "stand-by" with a tone which tells affiliates they are on the right frequency. It's also not unusual to hear tape loops, where an announcer repeats the same message such as "...This is the Oakland A's radio network..." Again, the reason for this is to let affiliates know they've tuned to the right place.

You'll find that, as you use an SCPC receiver, having a guide such as Universal's *Satellite Radio Guide* or the center pages of *Satellite Time* is indispensable. There are nearly 200 separate SCPC frequencies listed in the current issue of *Satellite Times* including Sports Byline USA; XEPRS-AM, Tijuana, Mexico; Michigan News Network; KJAV-FM Alamo, Texas; Voice of Free China; easily half a dozen reading services for the sight impaired; virtually every major radio station in the U.S.; Radio Canada International; CNN Radio Network; virtually every college sports radio network; and this is just a small portion. As they say in the Okefenokee, "...You're lost without a guide."

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Roll Your Own Directional Scanner Beam

My column in the November 1991 *MT* showed how to make a wideband scanner antenna: an off-center-fed-dipole (OCFD) similar to the Grove Enterprises Omni II. Roll your own or buy theirs: you get a darn decent antenna at a rock bottom cost.

This month, we're going to revisit the OCFD antenna, with a twist: *two* of them. But first, I need to tell you a little story of mystery, enlightenment, and discovery.

You see, I like off-center-fed-dipoles because they're cheaper than discons and other wideband omni antennas, and they work as well or better than any for all intents and purposes. To boot, you can stick only so many expensive discons in a given space. That same space can accommodate double or triple the number of OCFD's. If you're like me and run several scanners, you need several antennas.

■ The Mystery

Not long ago, I added one more antenna to my main mast, a home-made OCFD at the same level, but on the opposite side of the mast from a ten-year old Grove Omni. See Figure-1 for a depiction of that arrangement.

At first, I didn't notice anything unusual. But later, I had two scanners fired up on a NOAA weather station in Los Angeles, California, about 150-miles north of my post. (I use that distant NOAA station for a reference signal because of its extreme distance from, but good reception at my location.) I noticed right off that one scanner received the signal exceptionally well, while the other scanner just marginally detected it. Most unusual. A quick check disclosed that the scanner with my homebrew OCFD was the superior and the Grove Omni, the lesser.

Another quick check of a more distant NOAA station in Santa Barbara showed good signal on the homebrew OCFD while the Grove Omni's signal couldn't break the squelch. Without thinking further (*dumb!*), I assumed the old Grove Omni had seen better days. I had been wanting to try a similar antenna

from Antron, the ProScan Base Model PS-B, so the apparent demise of the Grove Omni made a good excuse to swap antennas.

Back in front of the scanners, I saw pretty much the same results as before. Say what? A quick look at the Grove Omni revealed a little corrosion (whaddya expect after 10-years?), but otherwise, it looked pretty good. The Antron PS-B couldn't have been faulty, so what was the matter? Basic tests of the coax and connectors didn't expose any problems. The scanners were okay, because swapping the antennas also swapped the results. Definitely an antenna matter. What now?

■ Smelling a Rat

I scanned a few other test reference signals and got conflicting results. Some signals came in better on the homebrew OCFD, while others were better on the Antron PS-B. I reinstalled the Grove Omni on another mast where it performed about halfway between the other two antennas. Hmmmm. Smelling a rat, I replaced the homebrew OCFD with the Grove Omni, which then pulled in that elusive Santa Barbara NOAA station. Aha! Directivity at play!

The mystery was solved and my suspicions confirmed when my son rotated the mast as I watched the two scanners. Sure enough, the weak signal completely disappeared from one scanner and reappeared on the other as the mast was rotated 180-degrees.

More data was acquired in short order. The antenna on the south side of the mast pulled in northerly stations much better, while the antenna on the north side of the mast

was better for southerly signals. Wow! Neat! I should have suspected directivity right off, caused by interaction (mutual coupling), but my thinking had been clouded by the assumption that the main mast would shield the two antennas and prevent them from interacting with each other. Not so.

■ Getting Serious

I've been accumulating data ever since and am utterly amazed. The discone antenna shown in Figure-1 can't pull in

certain distant stations at all, while the dual OCFDs a few feet below receive them with full quieting so long as the combination is pointed at the distant stations with the active antenna at the "rear" and the other antenna at the "front." Keep in mind that this is relative, because the antennas can work at the same time, each to a different scanner, with opposite results.

You can turn this to an advantage if you know what's going on and how to capitalize on this effect of interaction between two antennas.

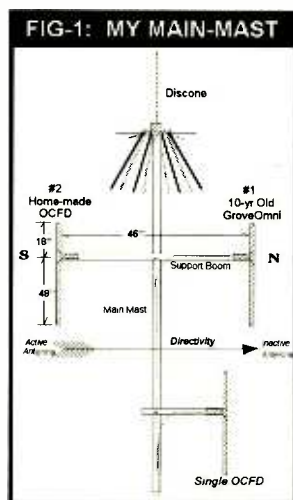
■ The Theory

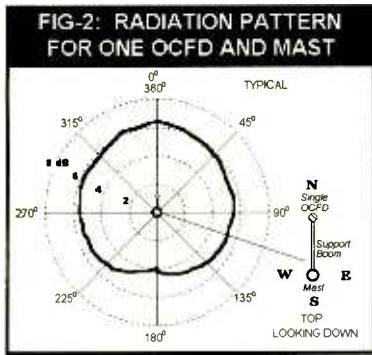
Forget a longwinded theoretical treatise here—you can get that in the *Radio Amateur's VHF-UHF Manual* or the *ARRL Antenna Handbook*, or any number of other publications. But let's talk practical applications and basics for a moment.

It's well known that two antennas placed within a wavelength of each other can "interact" by distorting the radiation patterns of each. This is an undesirable effect, especially where omnidirectional coverage is desired. Therefore, the old adage of a minimum separation of one wavelength between two or more antennas is well founded. For VHF-UHF antennas, this is about 33-feet at 30 MHz; 3.3-feet at 300 MHz; and 16 inches at 1000 MHz.

The rule of thumb pretty well applies to all objects, not just to so-called antennas. Even the presence of a metal mast can distort the radiation or sensitivity pattern of an antenna. This is pictured in Figures 1 and 2 for the case of a single OCFD mounted close to the mast. Figure 2 shows a typical skewed radiation pattern, where in the "forward" direction there can be as much as 2 dB difference from the opposite direction—enough to make the difference between hearing and not hearing. Figure-2 shows how signals from the back half of the pattern can be less well received than those on the front half.

An exception to this rule of thumb is when antennas are mounted above and below each other. The separation can be much closer without ill effects, because antennas are less sensitive off the ends than off their broad-sides. Figure-1 shows the case of a single OCFD mounted below a pair of OCFD's.





■ The Anti-Theory

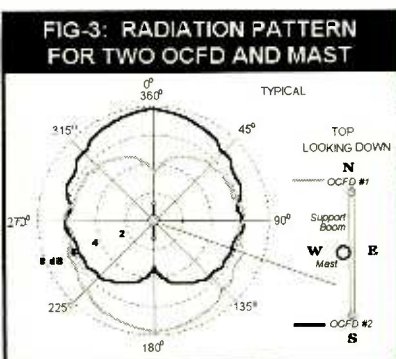
You can purposely disregard the “rule of thumb” and mount two scanner antennas fairly close to each other to produce a predictable and desirable interaction. One antenna and a nearby metal mast has a skewed pattern, but a second antenna exaggerates that skew. The result is poorer performance in one direction and significantly better performance in the opposite direction. Figure-3 shows how two OCFD’s mounted similar to that of Figure-1 can differ by as much as 5 dB or more.

Mounted as shown and operated with two scanners, this method can be deployed to let one scanner “favor” a certain direction while the other scanner favors the opposite direction. This means that not only can you “point” the relative front of the array at a desired distant transmitter, but you can also “point” the relative back of the array at an offending transmitter to minimize or even nullify any adverse effects.

Suppose there is an offensive pager transmitter near your location. You can arrange the antenna pattern so that its worst side points to the offender. This can reduce or eliminate interference from that site and still let you hear all there is to hear in other directions.

■ The Method

This “beam” or directional effect can be calculated using some simple math. By and large, the method is to space the two antennas within a half wavelength of each other. Figure 1 shows a spacing of 46 inches—a half-wave of 128 MHz. The 23 inch spacing to the mast is a half-wave of 256 MHz. (I chose that



length for the mechanical strength of the mount: It just so happened there was excellent directivity at 162 MHz, definitely between 128 and 256 MHz.)

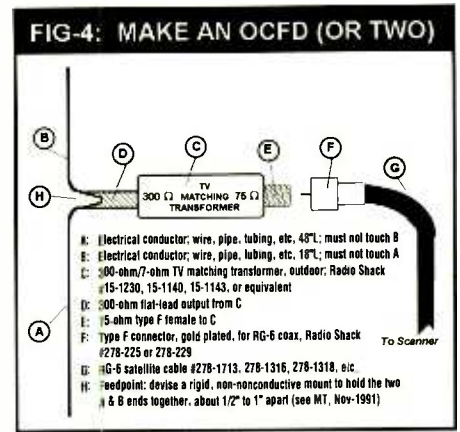
If you are an experimental sort, you won’t go by my “accidental” dimensions. Instead, you’ll install a suitable length cross/support boom on your main mast, and then devise a method by which the antennas at each end can be slid closer or further apart to optimize the desired effects.

It goes without saying that, for best results with less guesswork, your scanner needs an S-meter to show differences in signal strength. When you make a change and see signal strength go up or down, this gives a “feel” of whether you’re going in the right or wrong direction. My column and others here in *Monitoring Times* have featured S-meter projects over the years. Research them, or contact me by e-mail for specific suggestions for your scanner.

■ The Antennas

Although this article constantly refers to the OCFD antenna, all antennas fall under these guidelines. You can install two discone antennas, spaced about 30 to 60 inches apart for much the same effect. The antennas don’t even have to be alike. One discone and one OCFD, or one OCFD and another type of omni antenna will work the same way. See Figure-4 for details of rolling your own off-center-fed-dipole. If you want more detail and theory, ask *MT* for a reprint of my November 1991 column (send them \$2 plus SASE).

Another consideration when making a “beam” antenna from two separate antennas is making the mast rotatable. You need to be able to orient the antennas to a particular azimuth. I don’t think a motorized rotator is warranted, but you should make the mast free to turn from a comfortable ground or rooftop position.



For more info on the excellent Anttron antennas, contact ANTRON Antenna Division, PO Box 2744, Youngstown, OH 44507-0744; info (216) 788-9404, orders (800) 837-5516; or fax (216) 788-7709. See ads from Grove Enterprises elsewhere in this issue for access to info on their line of antennas.

■ Conclusion

You don’t have to have two scanners to enjoy the advantages of antenna directivity. If you have just one scanner, that’s fine: just keep the second download coax handy for easy swapping when you want to “look” in the other direction. A coaxial antenna switcher would be a nice flourish if you can make or find a low-loss unit designed for VHF-UHF.

Now, if you are super-gutsy, you can model a directional scanner antenna after an old tried and true CB beam of yesteryear, called the “Super Scanner.” Mount three identical OCFD’s 120 degrees apart around a mast and use a three-position selector switch to one scanner or to three separate scanners. The active antenna will be the forward “pointer” referenced to a line between the two inactive (reflector) antennas. The antennas’ off-set from the mast shouldn’t be too critical, but I’d stick to 18 to 24 inches.

Contact me by e-mail for guidance, if needed—and let me know of your results. I’ll publish your name and design for posterity.

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WiNRADiO: A Win-Win Situation?

We have waited long enough! Without introduction let's get right to this PC card receiver which covers 500 kHz to 1.3 GHz... You heard right: 1.3 GHz, or 1,300 MHz, minus the parts that the FCC requires to be removed. This is the ultimate all-in-one receiver: medium wave, shortwave, VHF, UHF and beyond. However, "Frequency coverage alone doth not a receiver make." (A quote from William Shakespeare's grandson Bill, I'm sure.)

Let's see how WiNRADiO operates.

■ A Quick Re-Cap of Computer Requirements

In last month's column we had an introduction to WiNRADiO. This month we will just look at my opinion of its operation after having spent a few weeks getting to know it.

As we saw last time, two software drivers for WiNRADiO are included with the hardware. The DOS version takes very little computing power and will operate fine in a 16 bit slot on a good ol' 286 with 640 kilobytes of random access memory (RAM), 12 kilobytes of hard drive space, and at least DOS 3.0, but remember, that's in the DOS mode. No fancy graphics. No point and click operation.

Control from DOS is strictly entering commands in text lines—not really the way most listeners want to "cover" the spectrum. However, for a specific application such as monitoring a fixed set of frequencies in a professional application, a simple Basic program could easily be made to perform simple, custom functions. A list of command line functions are included in the 150-page, well-written, instruction manual.

But let's be honest: For just plain having fun and enjoying the full spectrum, the Windows version is essential, and what we will use for this review.

■ Our Hardware

Let's use a 386DX 33 MHz computer with 4 megabytes of RAM, Windows 3.1, and a VGA monitor. 386s are now selling for around \$125 on the used market. This makes them a very good,

relatively fast, and inexpensive hardware test platform. (Anyway, I hate ripping apart my main Pentium computer for hardware testing purposes.)

We will use RG-8/U coax to feed a 200 foot long-wire for monitoring between 0.5 and 35 MHz. For higher frequencies we'll switch to a discone fed with Belden 9913 coax. By the way, for all of our discussions we have kept WiNRADiO's sensitivity control in the DX position, except where otherwise indicated. Okay. Let's get our ears on.

■ Using WiNRADiO as a VHF/UHF Scanner

From the main screen (Figure 1), let's scan the VHF NOAA weather band around 162 MHz. Although there are various methods of searching, we'll start with the simplest direct method of setting the start frequency on the large frequency display. Then we'll set the step frequency in the box on the right and then click on the double arrows, in the box below, to start the search. You will have to manually change the direction of search when it gets to the end of your desired range.

If you use the frequency range scan feature you don't have to be worried about going outside of your scan range. This works well if the signals are strong and you enable the AutoStore.

Getting WiNRADiO to stop on real signals is a bit of a balancing act. Using the squelch control on the right side of the panel is not all there is to it, as one would expect from using a "regular" scanner. Clicking on "Setup" in the box labeled Scanner (Figure 2), you will see an option labeled "Scanning sensitivity (squelch)." Here you will find an important, user-defined parameter called "Signal Thresh-

old." I found that using WiNRADiO as a VHF/UHF scanner required careful setting of both of these parameters in order to optimize results.

For example, searching the weather band without missing a station required setting the signal threshold value around 40. This was also pretty good for searching the 2-meter ham band. But going to the commercial FM band, the signal threshold had to be set to 70 before a useful search rate could be attained. However, once the proper setting is determined, the results are not bad.

This discussion of performance is not meant to be a rigorous specifications test. My impressions of WiNRADiO's overall sensitivity in the VHF band is pretty good when compared with Radio Shack, Yaesu, AOR, or other scanners. The UHF sensitivity appears to vary a bit across the frequency spectrum. There is no user-selectable selectivity control. However, with the wide frequency range and the relatively low price these factors are to be expected to some degree. Overall, as a basic, wide range, utility VHF/UHF receiver it works very well. But as a scanner, the 20 channels per second maximum scan rate needs improvement.

■ On To Shortwave!

With the propagation on shortwave what it is, and remains, regardless of the "flash" predictions of a turnaround, SWLing with any receiver is subject to the conditions of the day. The sensitivity seems pretty good across the whole range. In the AM mode, BBC on 9.515 MHz gave excellent audio quality. But weaker shortwave broadcast stations exhibited some problems with "phantom" interference. When the sensitivity control was set to "local," this removed some of the interference. So what's up?

■ New Antenna, Please

Sometimes input amplifiers of receivers designed to cover a very broad range of frequencies can cause problems. Strong stations you are not tuned to can be amplified and interfere with your target station. In military and professional receivers this inter-

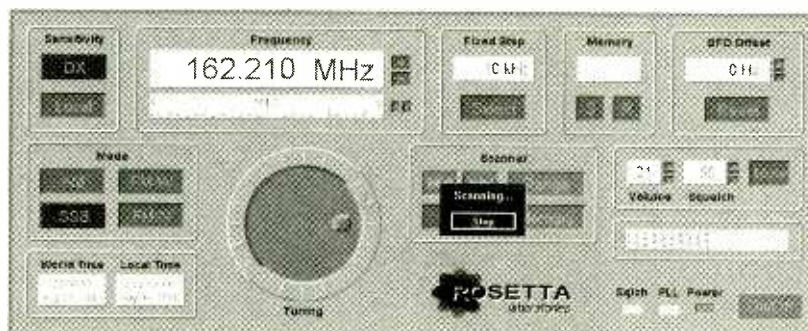


FIGURE 1

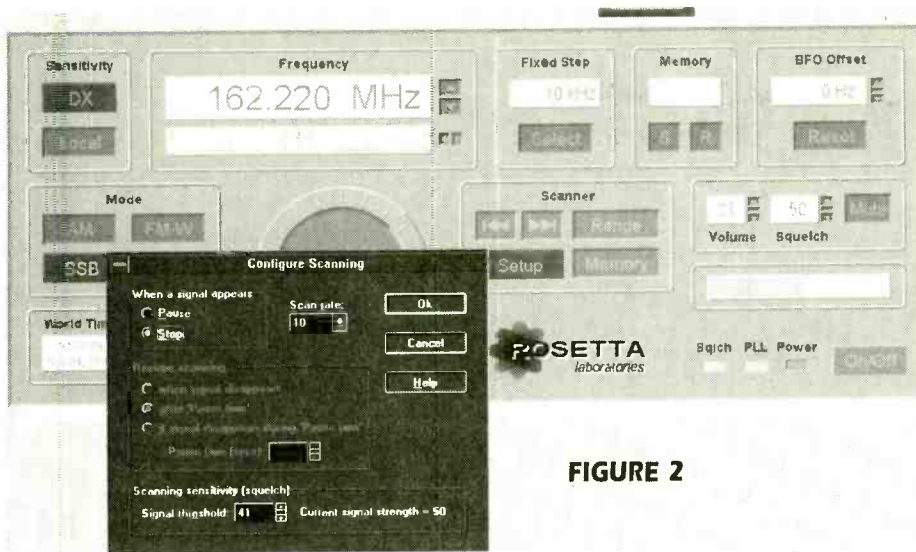


FIGURE 2

ference is stopped by having a whole bank of filters which are automatically switched into the input. These filters lower the offending signal strengths, causing them to be filtered out.

These filters are quite expensive. In fact, they make up a large part of the total cost of a military receiver. ComFocus' Software computer-based receiver (no longer available) made extensive use of such input filters. WinRADiO may need a bit of help in this area. However, this is not unusual for a medium-priced receiver. In fact, some higher-priced pieces of equipment suffer the same ills.

The problem can be reduced by using an external preselector, available from Grove Enterprises and others, or simply using a tuned antenna instead of a long wire. When a homemade, multiband, tuned antenna was substituted for the long wire, most of the interference disappeared.

A narrow AM selectivity position would also be greatly appreciated.

■ Can You Hear Donald Duck?

Going to the 20-meter ham band, I found that tuning and listening to single sideband (SSB), or Donald Duck talk was very easy. In fact, the BFO, which appears on the extreme right of the main screen, can be set five Hertz at a time for maximum clarity. This really works well. I tried WinRADiO with my Hoka and AEA digital mode demodulators/decoders with signals around 6.300 MHz. Getting perfect copy was quick and easy.

In the SSB mode—SSB, CW, AMTOR, FEC, and NAVTEX modes were also easily copied. It may be my imagination, but WinRADiO's selectivity seems to get narrower when you go to the SSB mode.

■ Is It a Win Radio?

The control software that runs WinRADiO is easy to use and does just about every basic function a listener requires. One thousand

station entries are possible in each file. The number of files is only limited by your hard disk space.

As a scanner, its 20 channels per second scan rate really is not competitive in 1996.

Its signal filtering is WinRADiO's main limiting factor in the receiver mode. But if the user is careful with the level of the input signal, the results are acceptable. As a wide coverage, computer controlled and contained utility receiver, WinRADiO is a unique and useful monitoring product. If you are in the market for a very wide coverage, computer controlled, utility receiver, at a below \$800 USD price (410 pounds sterling) WinRADiO is worth a serious look.

WinRADiO is made by Rosetta Labs Ltd of Australia. Their home page on the net is <http://www.kiss.com.au/winradio/>. It is distributed in the United States by Electronic Distributors who can be reached on (703) 938 8105. In the UK, Lowe is the WinRADiO distributor. Check them for the latest prices at <http://www.lowe.co.uk/> or call +01629 580800.

Special Limited-Time Offer from Grove:

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This compact, new PLL-synthesized, portable receiver is challenging the other top shortwave portables for features and value (see Magne Tests, September *MT*). And until October 31, 1996 (or until our supplies are exhausted, whichever comes first), it can be yours for only **\$259.95!**

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ACCESSORIES

ANT 3	Grove Mini Skywire Antenna	\$29.95
ANT 21	Select-A-Tenna	\$65.95
ANT 32	Kiwa Pocket Loop Antenna	\$119.95
BAT 2	D cell alkaline bat.	\$1.19 ea
SPK 11	Naval HTS speaker	\$29.95
TUN 4A	Grove TUN4A MinitunerPlus	\$99.95

SPECIAL EVENT CALENDAR

CLUB CIRCUIT

North American Club Listings A-L

All Ohio Scanner Club: Dave Marshall, 20 Philip Drive, New Carlisle, OH 45344-9108. U.S. northeast of the Mississippi; VHF/UHF/HF utilities. Net Mon 9:30pm 146.940. *American Scannergram*. \$18 U.S. \$21 Can/Mex. \$28 ww. \$3 sample. Annual summer meeting.

American SW Listener's Club: Stewart MacKenzie, WDX6AA, 16182 Ballad Lane, Huntington Beach, CA 92649, (714) 846-1685; wdx6aa@aol.com. Western US, Pacific, Asia. SWBC, utilities, longwave, clandestine. SWL \$24 US, \$25 Can/Mex. \$2 sample (\$3 ww). Meets 1st Sats 10am address above.

Association of Clandestine Enthusiasts (A.C.E.): Kirk Baxter, P.O. Box 11201, Shawnee Mission, KS 66207. US, Europe and Middle East, Pirate and clandestine. *The A.C.E.* \$20 US, US\$21 Can/Mex. US\$27 ww.

Association of Manitoba DX'ers (AMANDX): Shawn Axelrod, 30 Becontree Bay, Winnipeg, Manitoba, R2N 2X9 Canada, (204) 253-8644. Manitoba; LW, MW, SW, and VHF/UHF. Meets monthly. \$2.

Bay Area Scanner Enthusiasts: Bruce Ames, P.A.O., 105 Serra Way #363, Milpitas, CA 95035, (408)267-3244. Western U.S.; 25+ MHz. *Listening Post* (bi-monthly). Meets 2nd Mons. 7:30 Milpitas Police Admin Bldg. \$25 US, \$2 sample, or SASE for info.

Bayonne Emergency Radio Network (BERN): Ray Baron/Bob Frasca, P.O. Box 1203, Bayonne, NJ 07002-6203, 1-800-286-2876. Metro NJ, NY; Fire/disaster, pub safety.

Boston Area DXers: Paul Graveline, 9 Stirling St., Andover, MA 01810-1408, (508)470-1971, 50 mile radius Boston; 3-30 MHz. Meets 3rd Fri 7:30pm, The Lexington Club, Rte 4/225 1/4 mi W of Rte 128.

Canadian Int'l DX Club: Sheldon Harvey, 79 Kipps St., Greenfield Park, Quebec, Canada J4V 3B1, (514) 462-1459, fax (514) 671-3775. Canada nationwide/membership open to all; General coverage. *The Messenger*. \$28 Can, \$25 US, \$US30 or \$Can38 ww. \$2 sample. Meets 2nd Tues 7pm Montreal; several annual events.

Capitol Hill Monitors: Alan Henney, 6912 Prince Georges Ave, Takoma Park, MD 20912-5414, (301) 270-2531/5774 fax. DC, MD, No VA. So DE. Scanner bands. Frequency Forum BBS 703-207-9622 (8-N-1) *Capitol Hill Monitor*. \$10. Meets irregularly.

Central Florida Listeners Group: Andy Fountain KD40KJ, (407)898-6784. Central Florida; All bands. Net on 146.73 MHz Sun 8 pm. Meets 2nd Sats 12 noon. Conf #10 on Laser BBS (407)647-0031.

Central Indiana Shortwave Club: Steve Hammer, 2517 E. DePauw Road, Indianapolis, IN 46227-4404. Central Indiana; SW broadcasting, pirates, and the offbeat. *Shortwave Oddities*.

Central VA Radio Enthusiasts: Richard Rowland, POB 34832, Richmond, VA 23234-0832. Metro Richmond and vicinity. VHF/UHF. SASE. No newsletter, no dues. Meets quarterly in Richmond.

Chicago Area DX Club: Edward G. Stroh, 53 Arrowhead Dr., Thornton, IL 60476. 300 mile radius of Chicago; DXing all bands. *DX Chicago*. \$17, \$1 sample. Meets irregularly.

Chicago Area Radio Monitoring Association (CARMA): Ted & Kim Moran, Box 2681, Glenview, IL 60025. Chicago & midwest. Public safety & general coverage. CARMA BBS (630) 852-1292. Fax: (630) 612-0609. *CARMA Newsletter*. Meetings (Sats) and newsletter bi-monthly on alternate months.

Colorado Shortwave Listeners Club: Rob Harrington N0NNI, P.O. Box 370593, Denver, CO 80237-0593, 303-756-9455. Colorado residents. Longwave, shortwave. 35 cents plus SASE for info or Internet YABX92A@prodigy.com.

Communications Research Group: Scott Miller, 122, Greenbriar Drive, Sun Prairie, WI 53590-1706. Wisconsin area. Scanning.

DecalcoMania: Paul Richards, P.O. Box 126, Lincroft, NJ 07738, (908)591-2522. Worldwide AM, FM and collecting radio related items. *DecalcoMania*. \$10 US, \$11 Can/Mex, \$16 Eur, \$17.50 Asia/Pac.

DX Audio Service (National Radio Club): Ken Chatterton, P.O. Box 164, Mannsville, NY 13661-0164, (315) 387-3583; http://wcoil.com/80/-gnbc/ Worldwide. North American Broadcasters. *DX-Audio Service* (90-min.tape). Sample \$3.

Fire Net: Tom Kravitz, Box 1307, Culver City, CA 90232, 310-838-1436, internet mpage@netcom.com. All of California; fire, EMS, tied in with nationwide notification net.

Houston Area Scanners & Monitoring Club: Glen Dingley, 909 Michael, Alvin, TX 77511, (713) 388-1941. 75 mile radius of Houston, TX; scanning & SW. Paging network. *HASMC Newsletter*. Meets Jan & June.

Hudson Valley Monitors Association (HVMA): Patrick Libretti, P.O. Box 706, Highland, NY 12528. Mid-Hudson valley and surrounding counties; VHF/UHF. public safety. *The Hudson Valley Monitor*.

International 11 Meter Alliance: Allen Newton, Rt. 1 Box 187-A, Whitney, TX 76692, (817) 694-4047. Public safety, traffic handling, all bands, esp. 11 meters.

Int'l Radio Club of America (IRCA): Ralph Sanserino, P.O. Box 1831, Perris, CA 92572-1831. Worldwide; BCB/AM DX. *DX Monitor* (34 x) \$25 US, \$27 Can/Mex, \$28.50 ww. First-class stamp or 2 IRCs for sample.

Longwave Club of America: Bill Oliver, 45 Wildflower Rd., Levittown, PA 19057, (215) 945-0543. Worldwide; Longwave only. *The Lowdown*. \$18 US. \$19 Can/Mex. \$26 ww.

Oct 4-5	Ottawa, Canada	Quarter Century Wireless Assn / Keith Bedal, VE3GFI, 125 Ridgfield Cres., Nepean, ON, CAN K2H 6T4, 613-828-1870
Oct 4-5	Rochester, NH	HOSSTRADERS / Joe Demaso, K1RQG, HCR 78, Box 56, Bucksport, ME 04416, 207-469-3492, Fax: 207-469-0902
Oct 5	Peru, IN	Miami Co, Cass Co ARCs / Gary Donaldson, N9KQG, 3137 East SE Lakeshore Dr., Macy, IN 46951, 219-382-2203
Oct 5	Warrensburg, MO	Warrensburg Area ARC / Denise Haye, N0PVZ, 612 Foster Ln., Warrensburg, MO 64093, 816-429-5909
Oct 5	Rock Hill, SC	York County ARS / George Trunk, AB4BG, 2129 Squire Rd., Rock Hill, SC 29730, 803-327-4344
Oct 5	Belton, TX	Temple ARC / Mike LeFan, WA5EQQ, 1802 South 13th St., Temple, TX 76504, 817-773-3590
Oct 5	Special Event Stn	0800-2200 Pacific Time, Missionfest, sponsored by Christ Lutheran, Wichita Falls, TX, and Elm Lutheran of Lake Stevens, WA. 28.480, 21.340, 14.340, 7.260 MHz (+/- for QRM) Mike Crowell, N5UJA, 206-334-2540.
Oct 5-6	Boxboro, MA	New England Div Conv / Anthony Penta, WA1MWN, 66 Pleasant Ave., Lynnfield, MA 01940, 617-334-3945. Location: Boxborough Woods Hotel and Convention Center, Rt 1-495
Oct 5-6	Biloxi, MS	Mississippi Coast ARA / B.J. Byrd, KB5CSQ, 18316 Landon Rd., Gulfport, MS 39503, 601-832-3249
Oct 6	Bedford, IN	Hoosier Hills Hamfest / Dewey Sowders, WD9DKO, PO Box 891, Bedford, IN 47421, 812-279-5546
Oct 6	Huntington, IN	Huntington Co ARS / Ray Tackett, KC9DZ, PO Box 284, Huntington, IN 46750, 219-786-0057
Oct 6	Woodbury, NY	Long Island Mobile ARC / Mark Nadel, NK2T, 22 Springtime Lane, Levittown, NY 11756, 516-796-2366
Oct 6	Springfield, OH	Independent RA/ Bernie Corbin, N8XKF, 6483 Brush Hollow Dr., New Carlisle, OH 45344-9148, 513-882-6559, Fax: 513-882-6559. Location: Clark Co Fairgrounds, 1/4 mi N of I-70 (exit 59) and Rte 41, 8am-3pm. Talk-in 145.45(-). \$5 adm. Mt. Airy VHF RC / Paul Drexler, WB3JYO, 24 Main Blvd., Ewing, NJ 08618, 609-538-1687
Oct 11-13	Mesa, AZ	SW Div Conv / Robert Myers, W1XT, PO Box 17108, Fountain Hills, AZ 85269, 602-837-6492
Oct 11-13	Bakersfield, CA	Bakersfield ARA / Ed Harlander, KO6DY, 9204 Gig Harbor Ct., Bakersfield, CA 93312, 805-589-4163
Oct 11-13	Houston, TX	S Texas Conv, / Darrell Glueck, KK5LG, PO Box 890307, Houston, TX 77289-0307, 713-544-4829. Location: Humble Convention Center.
Oct 12	Tampa, FL	Egypt Temple ARA / Joseph Fara, WA4ZYG, 10408 Butia Pl., Tampa, FL 33618, 813-933-2322
Oct 12	Augusta, GA	ARC of Augusta / Richard Sturgis, KR4XN, 4547 Cox Rd., Evans, GA 30809, 706-860-3828
Oct 12	Nampa, ID	Nampa Hamfest, Computer Fair / Jay M. Dyer, WA7VEF, 2013 South Powerline Rd., Nampa, ID 83686, 208-467-3245, Fax: 208-466-4526
Oct 12	Alpena, MI	Thunder Bay ARC / Tom Twite, K8CHS, 322 Maple St., Alpena, MI 49707, 517-354-2469
Oct 12	Teaneck, NJ	Bergen ARA / Bruce Lemken, WG2Y, 47 Furman Dr., Emerson, NJ 07630, 201-967-7041
Oct 12	Bremerton, WA	North Kitsap ARC / Robert Tomas, N7KTP, 38119 Vista Key Dr. NE, Hansville, WA 98340, 360-638-1659
Oct 12-13	Memphis, TN	Mid-South ARA / Mary Moore, AC4GF, 5140 Woods Landing Cove, Memphis, TN 38125, 901-758-0661, Fax: 901-332-9245
Oct 13	Durham, CT	CT State Conv / Bill Wawrzniak, W1KFK, 5 Shire Dr., Wallingford, CT 06492, 203-269-8252. Location: Fairgrounds in Durham, Route 17. Talk-in 147.36/96. 9am-3pm, \$5 gen adm. (Steve Ford, WB8IMY, featured speaker)
Oct 13	Oakbrook Terr, IL	Chicago ARC / George Sopocko, WA9JEZ, 5631 West Irving Park Rd., Chicago, IL 60634, 312-545-3622
Oct 13	W Friendship, MD	Columbia ARA / Richard Frank, W9RZ, 12933 Kentbury Dr., Clarksville, MD 21029, 410-531-2933
Oct 13	Mason, MI	Lansing Civil Def Rptr. Assn. Central MI ARC / Jeff Oberg, KB8SXX, 4157 Sheffield Blvd., Lansing, MI 48911, 517-393-4713
Oct 13	Lincroft, NJ	Shore Area Hamfest/NJ State Conv / Al Jackson, NK2O, PO Box 635, Eatontown, NJ 07724, 908-922-8121
Oct 13	Queens, NY	Hall of Science ARC / Arnold Schiffman, WB2YXB, 81-22 250th St., Bellerose, NY 11426, 718-343-0172. Location: NY Hall of Sci parking lot, Flushing Meadow Park, 47-01 111th St., 9am. Talk-in 444.200 rptr, 146.52 simplex. \$5 adm.
Oct 13	Lima, OH	Northwest Ohio ARC / NOARC, PO Box 211, Lima, OH 45802, 419-647-6321
Oct 18-19	Starke, FL	ARC-Bradford Area / Lev Francis, K4SRA, 5751 SE 55th Terrace, Keystone Heights, FL 32656, 352-473-3511
Oct 18-20	Concord, CA	Pacific Div Conv / Mt. Diablo ARC, Richard Schulze, AA6OL, PO Box 272613, Concord, CA 94527-2613, 510-932-6125
Oct 18-20	Atlanta, GA	Grove Communications Expo '96 / Larry Van Horn, N5FPW, PO Box 98, Brasstown, NC 28902-0098, 704-837-9200
Oct 19	Seneca, PA	Fort Venango Mike and Key Club / Mary Housholder, N3QCR, 121 North Front St., Franklin, PA 16323, 814-437-2036
Oct 19	Gray, TN	Bristol, Kingsport, Johnson City ARCs / Wendell Messimer, K4ZHK, 175 East Highland Rd., Johnson City, TN 37601, 423-928-4407
Oct 19-20	W Palm Bch. FL	Palm Beach Rptr Assn. / Wayne Cunningham, AD4AK, PO Box 461, Lake Worth, FL 33460-0461, 407-697-4231
Oct 19-20	El Paso, TX	International Hamfiesta / Clay Emert, K5TRW, 109 Pasodale Rd., El Paso, TX 79907, 915-859-5502
Oct 20	Salem, IL	Centralia Wireless Assn / Alva King, WA9U, 776 Bethel Rd., Sandoval, IL 62882, 618-532-6606
Oct 20	Cambridge, MA	MIT RS, Harvard Wireless Club / Steve Fineberg, W1GSL, PO Box 397082, MIT Branch, Cambridge, MA 02139, Nick Alternburnd, KA1MQX, 617-253-3776

Send announcements of events or club information to: Editor, Monitoring Times, P.O. Box 98, Brasstown, NC 28902-0098. Fax 704-837-2216; e-mail mteditor@grove.net. See MT's homepage on www.grove.net for complete listings.

WHAT'S NEW?

PRODUCTS AND BOOKS OF INTEREST TO THE RADIO HOBBYIST

by Larry Miller

Guest reviewers: Bob Grove, Rachel Baughn

Cherokee Handheld

Despite the sudden death of *CB Magazine*, CB radio itself seems to be doing very well, thank you. Companies that heretofore ignored citizens band are now devoting space for it in their ads. Long-time CB manufacturers are even introducing new items.



Occasionally, an entirely new product comes along. Cherokee is the registered trademark of the Wireless Marketing Corporation, an Illinois-based company that's touting the new AH-27 handheld as "The World's Most Advanced 40 Channel Portable CB Radio." It's also quite possibly the smallest, measuring 5 x 2.25 x 1.5 inches, excusing antenna.

Aside from 40 channels, the AH-27 features instant channel 9 and 10, a five channel memory, signal bargraph, dual channel watch, auto channel scan, and last channel recall. It also has what the manufacturer calls "proprietary battery life enhancement circuitry" for extended talk time.

I'm not sure of the suggested retail price for the Cherokee AH-27, but EEB offers it for \$129.95. You can call EEB (1-800-368-3270) for more information on the Cherokee line, or you can call the manufacturer direct at 800-259-0959 or visit their web site at <http://www.wireless-marketing.com>

Preparing for Trouble

When *The Big One Hits* is a 56 page book designed primarily for the amateur radio community that tells you what to do to prepare for survival and safety as well as perform disaster communications efficiently. Written by Jerry (KG6LF) and Jay (KN6BP) Boyd,

it's a book with useful information for any radio hobbyist. The price is quite affordable: just \$7.50 plus \$2.00 shipping. You can get your copy by sending a check or money order to Worldradio Books, P.O. Box 189490, Sacramento, CA 95818. Mention *MT* when you call.

Pager Handbook for the Ham

While all of us are familiar with, and many of us use, pagers, few of us have considered this application to amateur radio. Nonetheless, they have many valid uses, and Phil Anderson W0XI is eminently qualified to tell us how to do it. In *Pager Handbook for the Radio Amateur*, Anderson recommends the popular POCSAG protocol, listing the Motorola Bravo series as the best choice. He then describes the circuitry, assisted by quality line drawings, and includes data tables and simple crystal formulas to make the task easier.

Of course, there is a hook: Anderson's company, Kantronics—an excellent firm—provides the mating KPC-9612 paging encoder. The version 7.0 upgrade supports 512, 1200 and

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p a g e r s
a n d
r e p l a c e m e n t

crystals for ham and CAP frequencies as well. A good start for the digitally-inclined ham. *Pager Handbook* is \$14.95 from Kantronics, 1202 E. 23rd St., Lawrence, KS 66046; ph. 913-842-7745; fax 913-842-2021.

—BG



Radio Data Code Manual, 15th Edition

As digital communications become more prevalent on the shortwave bands, encoded (but not encrypted)

transmissions join the thousands of abbreviated numeric designators previously heard throughout the high frequency utility spectrum.

This newest edition of *Radio Data Code Manual*, 15th Edition, by Joerg Klingenfuss contains 600 pages of listings for meteorological data and telemetry, NOTAM ship and aircraft designators, standard and non-standard teleprinter systems, Morse and non-Morse telegraphy, and dozens of other codes. Accurate and comprehensive, packed with useful reference information. *Radio Data Code Manual* is by Klingenfuss Publications, Hagenloher Str. 14, D-72070, Tuebingen, Germany (70 DM plus 15 DM overseas air mail). Check with *MT* advertisers for stock.

—BG

Going for the Gold

Digital data alphabet soup such as the above can be decoded by the new Code 3-Gold VHF and shortwave decoder software. Its US distributor, Computer Aided Technologies, announced that the new software "uses the very best of software detection technology, and the very latest surface mount miniaturized electronics for the hardware interface." The dedicated interface is required for the software to work, but the software itself can be installed in multiple PCs—addressing one criticism of previous versions.

The standard package decodes ACARS, POCSAG, DTMF,

PACKET, BAUDOT, ASCII, SITOR, NAVTEX, PACTOR, FAX, and SSTV. With the addition of an optional "HF package," you'll be able to read nearly every decodeable system your receiver can pick up.

MT columnist Bob Evans received one of the first available copies of Code 3-Gold and has reviewed it in *Digital Digest*. Look for it in this issue on page 102. You can contact Computer Aided Technologies for more information and pricing at PO Box 18285, Shreveport, LA 71138, (318) 687-2555; <http://www.scancat.com/>

—RB

Spectrum Wall Chart



There's a new edition out of an old favorite. For nearly a decade, the colorful wall chart of the electromagnetic spectrum has been a steady item at Grove Enterprises. Printed by the National Telecommunications and Information Administration, the entire chart has now been updated and is in stock. Measuring 40"W x 30"H, the informative and very colorful wall chart shows what services are allocated which frequencies from 9 kHz through 300 GHz—the entire radio spectrum.

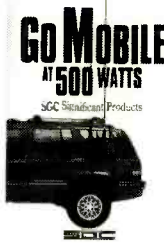
CHT-1 is \$9.95 plus \$2.50 shipping from Grove Enterprises, PO Box 98, Brasstown, NC 28902; ph. Toll-free 800-438-8155 or fax 704-837-2216.

—BG

500 Watt Mobile

It's one thing to put a scanner in the car—just plug it into a \$1.50 cigarette adapter and you're on your way. It's trickier to put a transmitter—like a CB or ham rig—in a vehicle. At the least, the antenna is more critical. But just

imagine running a 500 watt transmitter out of your car—be it ham or (God forbid!) CB—and you're in for some special considerations.



SGC, Inc., the company that runs those sharp ads for the SG-235 antenna coupler, has produced an 80-page booklet on the subject, called *Go Mobile at 500 Watts*. *Go Mobile* has chapters on the basic layout of a mobile system, on power supply for a 500 watt mobile system, on antennas and grounds, on noise and vibrations, and on installation tips, particularly for the Jeep Cherokee, a Cadillac, a GEO Tracker, and a GEO Metro. Installation tips apply to any vehicle, and any manufacturer's high frequency gear.

The book is marked \$19.95, but you can get one free by mentioning you saw it in *Monitoring Times*. To

get your copy of *Go Mobile at 500 Watts*, you can call 800-259-7331.

What? No Ground Plane?

Firestik Antenna Company has just introduced a new line of "No Ground Plane" CB antenna kits. The "no ground plane design," unlike most other transmitting antennas, does not require a reflective metal ground plane (i.e., a metal vehicle body) to work properly. This means that the antenna can be used almost anywhere for a variety of applications. So far they've been used on bicycles, motorcycles, fiberglass motorhomes, and truck cabs, boats, hot air balloons, hiker's back packs, and even a shopping cart.

There's a whole range of "No Ground Plane" Antennas; the tallest is the 4-foot Firestik with

spring mount and cable. It's just \$34.99 and you can order directly from Firestik (602-273-7151) or from your favorite dealer. Firestik's address is 2614 E. Adams St., Phoenix, AZ 85034. Mention the good people at *Monitoring Times* when you call.

Antennas Out of Thin Air

From the presses at PW Publishing comes *More... Out of Thin Air*, an anthology of antenna articles containing construction details on ham radio antennas from 1.8 to 430 MHz—verticals, beams, loops, dipoles, and even reviews of antenna-related accessories. Over 100 well-illustrated pages.

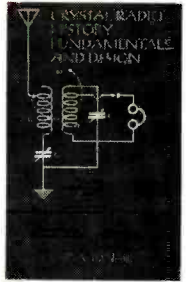
From PW Publishing Ltd., Arrowsmith Court, Station Approach, Broadstone, Dorset, UK BH18 8PW.

— BG

Crystal Radio

Few items in radio's past evoke the universal fascination with simplicity—voices from the vacuum—than the crystal set. How a piece of galena, some wire and a set of headphones can receive radio signals remains an allure to all of us.

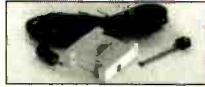
Crystal Radio: History, Fundamentals, and Design by P.A. Kinzie takes us on a nostalgic tour through the history of crystal radios, then opens up to an informative text with full instructions on building an assortment of crystal receivers of every imaginable configuration, from single stage to multiple-tuned selective sets. Line drawings illustrate the concepts. 121 pages.



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\$10.95 plus \$2.50 shipping from The Xtal Set Society, PO Box 3026, St. Louis, MO 63130; ph. 314-725-1172; fax 314-725-7062.

— BG

Going Back

JOIN THE EARLY DAYS OF RADIO SOCIETY



If you'd like to share in the experience of early radio, or pass the experience on to others, send for a sample copy of the *Early Days of Radio Society*. One of the goals of this start-up publication is to pass along plans for building early radio sets and parts; no doubt radio restoration will also become part of their publication as they gain in contributors. Send your enquiry plus \$2 to EDRS, 35 Burnett Circle, Alpharetta, GA 30201.

— RB

Micro Power Radio

We've noticed a classified advertisement for FM Micro Power Broadcasting in *Monitoring Times* and other publications. The ads say that you can "transmit many miles. PL mono/stereo. 88-108 MHz kit or assembled. 1-100 W.R.F. amps."

Intrigued, as always, with this aspect of our hobby, we called the company's number (604-642-2859). We were answered by a pre-recorded message indicating that the units come out of Canada. The firm which offers the units is called R. Scott Communications, who, when we later made contact, promised to send us more information and a review unit.

We continue to receive complaints from customers who claim to have ordered transmitter kits from Steve Dunifer's Free Radio Berkeley, but have not received their orders. While

we have no knowledge of specific orders, we do know that we waited a considerable amount of time for our review model. In fact, we had to make several phone calls—none of which were returned—before we were able to blast it loose. (And then when it came, we were pretty disappointed. See our review in the June '95 issue.)

While we understand that Dunifer is still on the air—and with a staff of 100 volunteers—it's apparent that the transmitter business is not the highest priority for the group.

More Business Briefs

Another One Bites The Dust. The Oklahoma Comm Center has been taken over by Tucker Electronics. Oklahoma Comm Center will be closed and the assets incorporated into Tucker's Garland, Texas, store.

According to Tucker, "The acquisition makes Tucker one of the largest amateur radio dealers in the country operating out of a single location."

It remains to be seen whether *U.S. Scanner News* will be filling the remaining subscriptions for the now-defunct RCMA. RCMA ran out of money after publishing its July issue; a press release indicating such an arrangement between it and *U.S. Scanner News* has been received. What's confusing is that at the same time that *U.S. Scanner News* is offering to take on the subscription debt of the bankrupt RCMA, *USSN* writers claim they have not been paid for their work in nearly a year.

This comes on the heels of yet another revelation that writers for at least two CQ Communications publications have also been left without pay—one of them, *CB Magazine*, was closed after its August issue.

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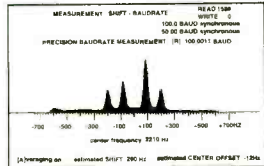
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See You At The Grove Comm. Expo Oct. 18, 19 & 20 1996

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- ARQ-E/ARQ1000 Duplex
- ARQ-N-ARQ1000 Duplex Variant
- ARQ-E3-CCIR519 Variant
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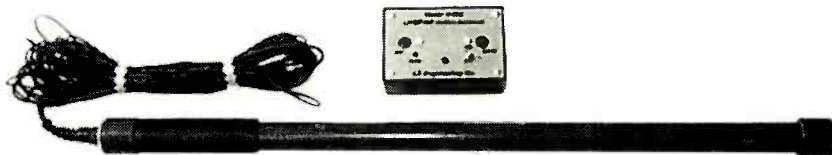
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LF Engineering Active Antenna

By Bob Grove

We find considerable interest in active antennas, but many of them work very poorly. What is an active antenna? It is a short (from a few inches to a few feet) metallic element with an amplifier at its base. Sometimes called an "E field" or "voltage probe" antenna, the short element detects very small signal voltages which are then, in turn, amplified and fed to the receiver.



While there are disadvantages—cost, power requirement, signal overload vulnerability, self-generated noise, environmental deterioration—the advantages—small size and wide bandwidth—are often overriding factors. With the good and bad points in mind, we decided to take a look at one of the newest active antennas on the market, the H-800 "SkyMatch" from LF Engineering Co.

Measuring just over two feet in length and a mere inch in diameter, the 12 ounce, PVC-enclosed and fully-weather-sealed antenna/amplifier assembly comes with 50 feet of small-diameter RG-174/U cable fitted with an RCA plug to attach to the host control box. The package includes a stainless steel hose clamp to secure the active assembly to a mounting pipe or mast up to 2" in diameter. A 24" RCA/RCA cable is also provided to attach the control box to the receiver. Unless your radio is a Sangean, however, you will need to provide an antenna adaptor.

The setup is powered by a 120 VAC wall adaptor (provided) or optional 9 volt batteries (two required); current consumption is a mere 10 mA, and that includes the indicator LED. There is no need for any controls (and none is provided) other than the on/off switch.

■ Wide frequency coverage

The antenna has an incredibly wide frequency response, from 10 kHz through 50 MHz, down a mere 3 dB at those end points. Just for kicks, we tested the unit clear up to 460 MHz and signals were receivable, although we would not recommend the unit as a substitute for a good outdoor scanner antenna, unless you are in a major metropolitan area and any additional antenna is out of the question.

Since the SkyMatch has signal delivery equivalent to a 100 foot dipole, longwave, mediumwave, and shortwave signal strengths are impressive. The internal electronics automatically match the inherently high impedance of the active antenna to the low impedance of the transmission line for excellent efficiency. As with any antenna, the SkyMatch should be mounted as high and distant from electrical power lines and large metal surfaces as possible.

■ Results were impressive

For a simple test, we placed the active antenna probe on a short wood mount about 10' off the ground, just outside the office building, and connected it to an inexpensive shortwave receiver.

The unit's AC adaptor was plugged into a convenient wall receptacle to provide power.

Our first (and lowest frequency) quarry was a local non-directional beacon (NDB) for aircraft, operating on a frequency of 335 kHz; it came thundering in, at least as loud as when monitored by a 136 foot wire antenna.

Next, the medium wave broadcast band. A normally weak, 770 kHz, community station about 20 miles away came booming in—I double-checked my tuning to make sure I was on the right frequency! Impressive: I'd never before heard them that loud here at the office. Similarly, two usually-S-9 AMers were 40 over. This thing works!

But how about intermod? After all, this is an active device, prone to generating interference from the mixing of powerful signals. Checking sum and difference frequencies between the two boomers, intermod was barely audible. Good news ... but such performance might have been expected with a unit claiming 90 dB dynamic range. Of course there was plenty of interference from some two dozen computers, their related peripherals, and various pieces of test equipment running simultaneously at the office, but that can't be blamed on the antenna!

■ The bottom line

For VLF and "sferics" enthusiasts who already have receiving equipment for the basement band and are looking for a good antenna, this is the one. Broadcast DXers will also like the signal catching ability of the little powerhouse, and so will shortwave enthusiasts who wish they had room for a big, outdoor antenna.

Scanner devotees will also find considerable satisfaction in the SkyMatch through at least 50 MHz, and probably well into high VHF. Most (probably all) commercial scanner antennas compromise reception below about 100 MHz; the SkyMatch will provide enormous improvement in the 25-54 MHz part of the spectrum when compared with scanner antennas.

But all good things must come to an end. The higher we go in frequency—UHF and 800 MHz especially—performance degrades rapidly. Still, in a pinch, some reception is probably possible in strong signal areas. Used within the limits of its intended frequency range, 10 kHz through 50 MHz, the LF Engineering SkyMatch may have no equal.

The H-800 SkyMatch active antenna is \$109 including shipping from LF Engineering Co. (17 Jeffrey Rd., East Haven, CT 06513; ph. 203-248-8851).



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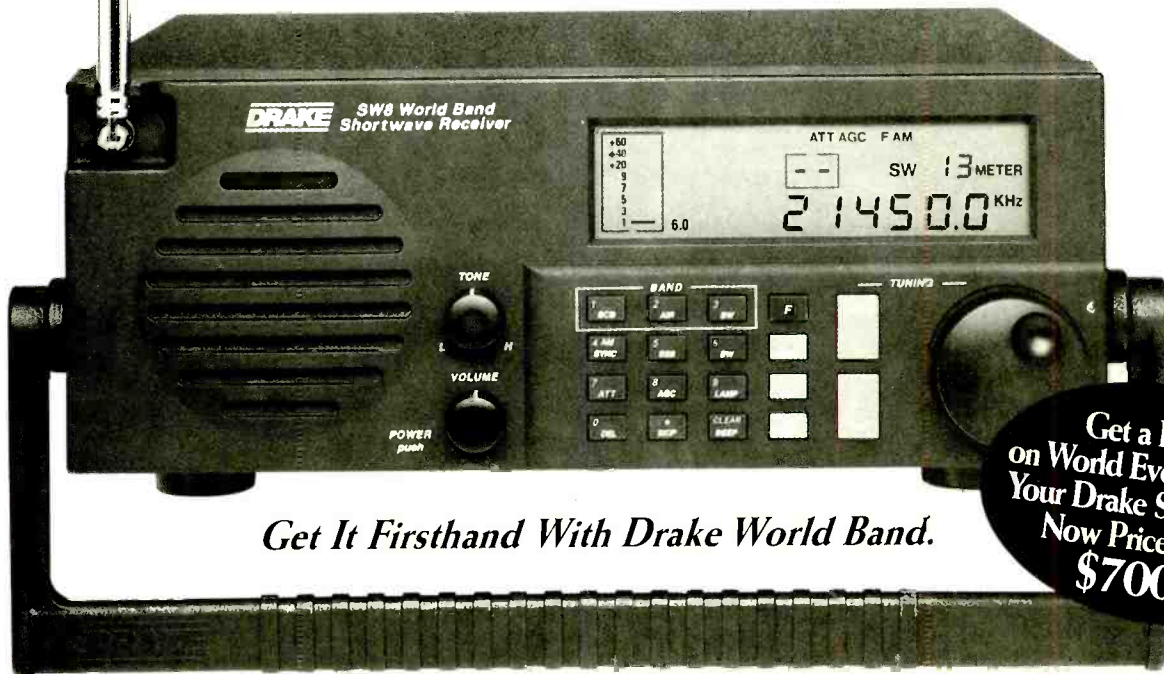
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BayGen Freeplay

The official history of BayGen starts with a Eureka genesis. "In the middle of a BBC documentary on AIDS in Africa, inventor Trevor Baylis jumped up from his chair and hurried to his research laboratory. If poor communications in Africa was the biggest barrier to better health education, Baylis reasoned, then he should find a way to improve the information. And what was that obstacle? Batteries!"

The rest you know, unless you've been off on a year-long DXpedition tuning in Indonesian locals. Baylis had not so much invented a battery-less radio as he did a publicity strategy that would turn out to be one of the most effective in recent times.

■ Freeplay generates stories, as well as electricity

The device: a battery powered AM/FM/SW portable, the Freeplay. Not good enough for a hot story? Then produced in recently democratized South Africa, former home of apartheid. Still not enough? Made with the blessing of none other than Nelson Mandela (throw in a couple of titled Brits for good measure). Not enough, again? Then, manufactured by a workforce that is largely black. All this, and you *still* want more? Okay, okay. The workforce includes many who are...handicapped.

Not only did this make for the ultimate in "man bites dog" stories, it was something—perhaps the only thing—that politicians from Newt Gingrich to Jesse Jackson could agree on. Here was genuine private enterprise solving genuine social problems, all with the blessing and support of a caring government.

It's too early to tell whether all this will produce a viable model for free enterprise as a vehicle for addressing social issues, or whether it will fade into oblivion as just another story *du jour*. But there's no question that Trevor Baylis has caught the imagination of much more than radio buffs and journalists hungry for a juicy story.



■ Airport nightmare, but great for emergencies

As a radio, the Freeplay, about \$100 in the United States, is surprisingly large. Too large, really, to take comfortably on airplane trips, which may be just as well. You can imagine the scene at airport security when the X-ray machine detects a large radio with a wind-up mechanism stuffed inside!

Its performance is, well, basic. Shortwave coverage is limited to 3-12 MHz, give or take, and even AM stops near 1600 kHz, well under the 1700 kHz upper limit found in North America. The Freeplay's performance is reminiscent of a cheap transistor portable from the Sixties, and its analog frequency readout is straight out of Alley Oop. There is nary a bell nor a whistle to be found.

While it's not the all-time champ of selectivity or much else, we found it able to pull in tropical-band DX catches under the right conditions. So while the Freeplay is not in the running for five-star status in *Passport to World Band Radio*, it isn't some kind

of joke. It really works.

Of course, nobody ever thought of the Freeplay to replace their Drake R8A. What it does, instead, is provide certainty of operation. For example, if you're out on a fishing trip near Jackson Hole, Wyoming, you won't find yourself out of touch because a couple of "AA" batteries petered out. And if you're in California when the next Big Shaker comes, you can reach for the Freeplay gathering cobwebs in your basement and be assured that it will bring you news from near and far.

Survivalists, too, will almost certainly take to the Freeplay like moss to a pond stone. One can almost imagine all the arm-wrestling champions in rural Montana eventually being Freeplay users.

■ Wind-up mechanism a potential headache

On the other hand, beach sand is not likely to help all that mechanical hardware do its stuff. Much has been made in media reports of the Freeplay's supposed robustness, but the truth is less exalted. With any electro-mechanical device, the most likely place for failure is in the mechanical section, and the Freeplay is no exception. Its wind-up spring system (see illustration) does not appear to be built for a lifetime of regular use, and fixing it is not the snap that has sometimes been suggested. Once the radio's six-month warranty

Radio Shack PRO-2046 Mobile Scanner

The Radio Shack PRO-2046 is a 100 channel scanner designed for mobile use. It is manufactured in the Philippines for Radio Shack by Uniden and descended from the Uniden/Bearcat BC760XLT and PRO-2026 variant. Although you might use a PRO-2046 in the house, Radio Shack markets the PRO-2046 specifically for mobile use, and a mobile power cord and mounting bracket are furnished.

While the older BC760XLT was also a mobile scanner, it was more amenable than the PRO-2046 to home use. Radio Shack does not include an AC power supply with the new PRO-2046. Furthermore, there are no rubber feet and no tilt bale to prevent the bottom of the metal cabinet from scratching furniture or to elevate the scanner so that one can hear the audio from the bottom-mounted speaker.

Frequency coverage is:

29.7-54.0 MHz (5 kHz steps)
108-136.975 MHz (12.5 kHz steps, AM mode)
137-174 MHz (5 kHz steps)
406-512 MHz (12.5 kHz steps)
806-956 MHz (12.5 kHz steps, minus cellular phone bands)

■ Memory Features

There are 100 programmable memory channels, organized in ten banks—a more flexible arrangement than the BC760XLT's five banks of twenty channels. Each channel can be locked out from the scan list, and a two second rescan delay is selectable on a per-channel basis. Empty channels are skipped automatically, but channels containing duplicate frequencies are not detected. Memory information is purported to be backed up for 14 days, which we didn't confirm.

The Hyperscan scheme used in the PRO-2046 is not quite as fast as the Turbo Scan employed in the Uniden BC3000XLT and BC9000XLT scanners. Our PRO-2046 scans three banks of assorted frequencies at a rate of 34 channels per second.

Turbo Scan technology, missing from the PRO-2046, sorts memory channels within each bank in frequency order. Presorted memory scanning allows the synthesizer to change frequency faster because the frequency change is always in same direction. This frequency sorting innovation, found in upscale Uniden models, is covered by United States



patent 5163161, assigned to Crum Development Corporation of Indianapolis back in 1992.

■ Three Search Modes

The PRO-2046 supports three types of searches: preprogrammed service search, direct search, and band search. Up to 20 frequencies may be locked out from a conventional or a service search.

Service search keys are provided for scanning preprogrammed frequencies in categories named DOT, Police/Fire/Emergency, Highway, and Public Service. While there are no Air or Marine search keys, the 11 NOAA weather frequencies are searched by pressing a "WX" key. The actual preprogrammed frequencies are not listed in the owner's manual, but should be. Several 800 MHz repeater input channels are preprogrammed, which is an aggravation in my geographical area, where many of them carry continuous data transmissions. A key for cellular phone searching is not provided, of course, but images of phone conversations are heard nearly full strength 21.7 MHz above their actual frequency.

A direct search facility permits searching up or down from the currently displayed frequency. Most scanners worth their salt allow the user to program upper and lower frequency limits and search between them. The PRO-2046, like the Uniden SC150 Sportcat, is more restrictive and enforces preprogrammed search limits. The Band key steps through the search limits by band: 29-54, 108-137, 137-144, 144-148, 148-174, 406-450, 450-470, 470-512, and 806-956 MHz. One cannot search between 146.61 and 147.39 MHz, for example, and must choose the coarse 144-148 MHz search limits instead.

The PRO-2046 supports ten monitor memories, which can be used for manually storing frequencies found during a search.

■ Getting Physical

The PRO-2046 is housed in a black metal cabinet, similar to, but wider than the BC760XLT. There's a lot of empty space inside the +7 inch deep PRO-2046. Most parts are mounted to the main printed circuit board, with another board holding the keypad and display, and smaller boards for the PLL and 800 MHz front end.

A small, incandescent bulb, recess-mounted inside a rubber boot, provides backlighting for the LCD display, as in the PRO-2040 base scanner. The FM detector, squelch, and final IF stage use the familiar MC3361CP chip (IC2). Baseband audio is available at pin 9, where we connected a CSI CD-1 communications decoder unit to display CTCSS tones.

■ Other Features

Our test unit, serial number 65000174, worked pretty well. We measured the sensitivity, image rejection, modulation acceptance, and audio output power, and the quantitative results appear elsewhere in this review. The sensitivity of our PRO-2046 is fair, and the modulation acceptance and the audio output quite reasonable. Our unit has minimal image rejection, but it's in the same league as other double conversion models.

Although the data skip key can be pressed to skip over some data signals after a 3 second pause, it is not designed for use in the AM mode, and is ineffective on many data signals.

■ Keypad Tricks

The owner's manual tells how to reset the scanner, clearing the memory channels, by pressing the 2 and 9 keys while turning the scanner on. By experimentation, we found that pressing and holding down various other keys while simultaneously turning on the PRO-

2046 produced the following results not documented in the owner's manual:

2, 9, Up arrow (squelch open): stores into memory channels 2-100 frequencies successively incremented from whatever frequency was programmed into channel 1 (overwrites previous contents of channels 2-100).

2, 9, scan: stores test frequencies into channels 1-20 and clears channels 21-100.

2, 9, E: lights all LCD segments and indicators

2, 9, S/S: searches 53.0-53.1 MHz

2, 9, data: searches 511.9-512.0 MHz

2, 9, program: searches 136.0-136.1 MHz

Overall

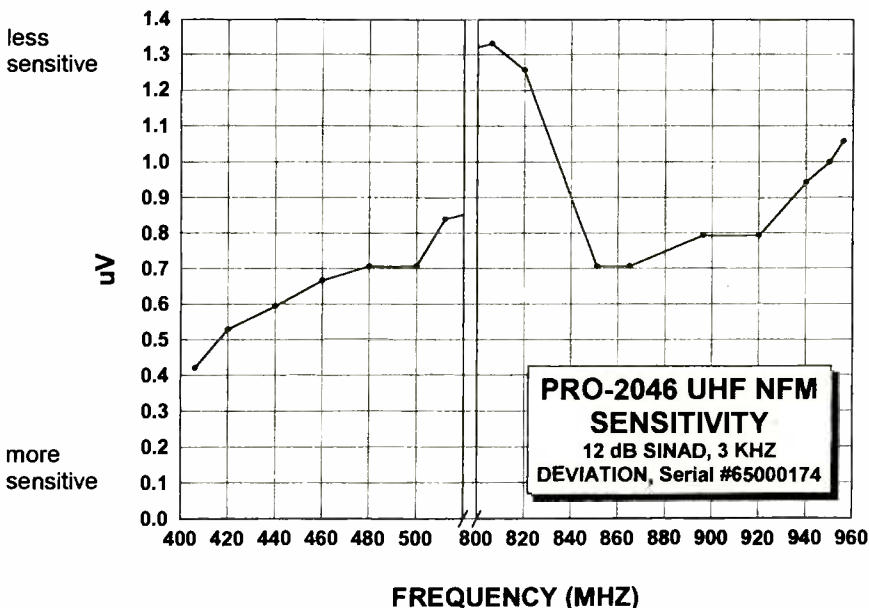
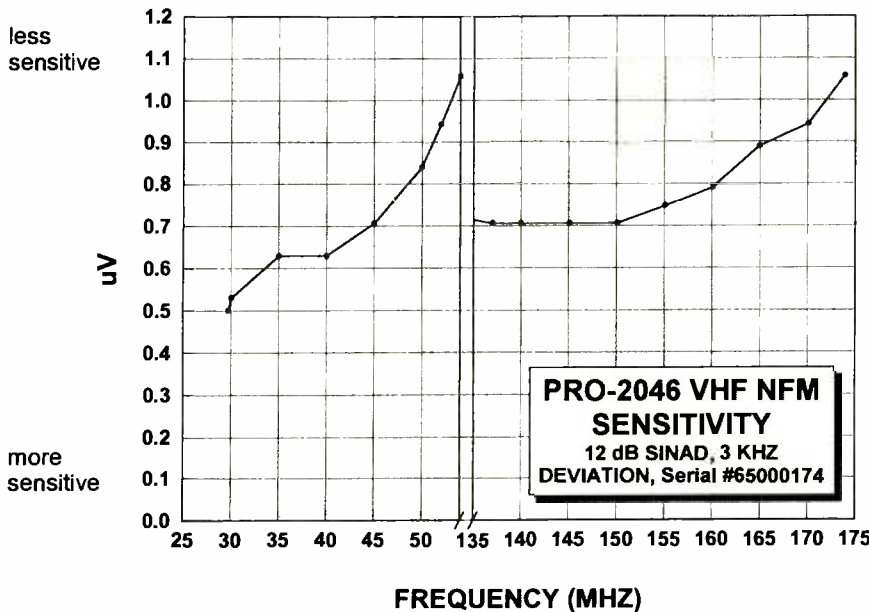
For professional use, the ultimate mobile scanner would have at least five watts of audio output, like the Electra/Bearcat BC-260. It would sport a fully lit keypad for night use, as found in the old Regency M400 and M100 scanners, and either be very small or have a detachable control head, as do some of the newer VHF/UHF ham transceivers.

The PRO-2046 suits the hobbyist well. It occupies a place in the market between the

demanding needs of the professional monitor at one extreme, and the occasional interstate traveler at the other. Although the selection of service search frequencies is not as rich nor as flexible as found in the Uniden BCT-7, the PRO-2046 we tested is easier to program, works reliably, and will probably be reasonably priced when discounted on sale.

Measured Specifications for PRO-2046, Serial #65000174

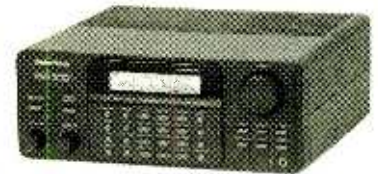
Intermediate Frequencies (IF):	10.85 and 0.45 MHz
FM SINAD Sensitivity:	see graphs
AM SINAD Sensitivity, measured at 120.1 MHz with a 1 kHz tone at 60 percent modulation:	0.84 uV
Rejection of images 21.7 MHz away:	43.5 dB at 40 MHz 15.5 dB at 155 MHz 8.5 dB at 460 MHz 1.5 dB at 860 MHz 1.0 dB at 900 MHz
Rejection of images 900 kHz away:	78 dB at 40 MHz
Modulation acceptance:	12.5 kHz
Audio output:	1.6 watt at 10 percent distortion
Practical scan rate:	34 channels/second



PRO-2042

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A Simple Receiver for the Beginner

All Electronics Corp. has listed a curious device in its catalogs for several years. The item is advertised as a complete receiver in one low cost TO-92 package. This "pill" has but three leads. It has 10 transistors on its substrate. After regarding this \$2.25 item with idle curiosity for three years I decided to buy two pieces and conduct some experiments. This IC-like device is manufactured by Plessey Semiconductors Ltd in the United Kingdom. It is identified as part no: ZN414Z.

The ZN414Z is made for use as a broadcast (BC), band tuned-radio frequency (TRF) receiver in hi-fi systems. It is not designed for service as a superheterodyne receiver, although it can be used as the intermediate frequency (IF) section of a superhet radio. I discovered also that a direct-conversion (DC) receiver can be made with this unit if a local oscillator (LO) signal is applied to the output of the device, as shown in Figure 2.

■ ZN414Z Characteristics

Maximum operating voltage is +1.6-volts. Therefore, a single 1.5-volt AA, C, or D cell will suffice as the power source. Maximum current drain is a mere 0.5 mA. This ensures that the battery will last almost through its normal shelf life.

The upper frequency limit for the ZN414Z is listed as 3 MHz, but I was able to obtain good performance, at slightly reduced overall gain, up to 4 MHz with my test circuits. The power gain from the antenna to a pair of earphones is 72 dB. The device has a built-in automatic gain control (AGC) circuit that has 20 dB of amplitude control.

The sensitivity of the overall circuit is a tad low for weak-signal work. Full specified audio output occurs with a 50 microvolt RF signal applied to the input tuned circuit. A simple transistor radio frequency (RF) amplifier stage ahead of the ZN414Z would provide good weak-signal response.

High-impedance earphones provide the greatest audio volume. Headphones with an impedance of 64 or greater ohms are suitable if an external audio amplifier is not used with

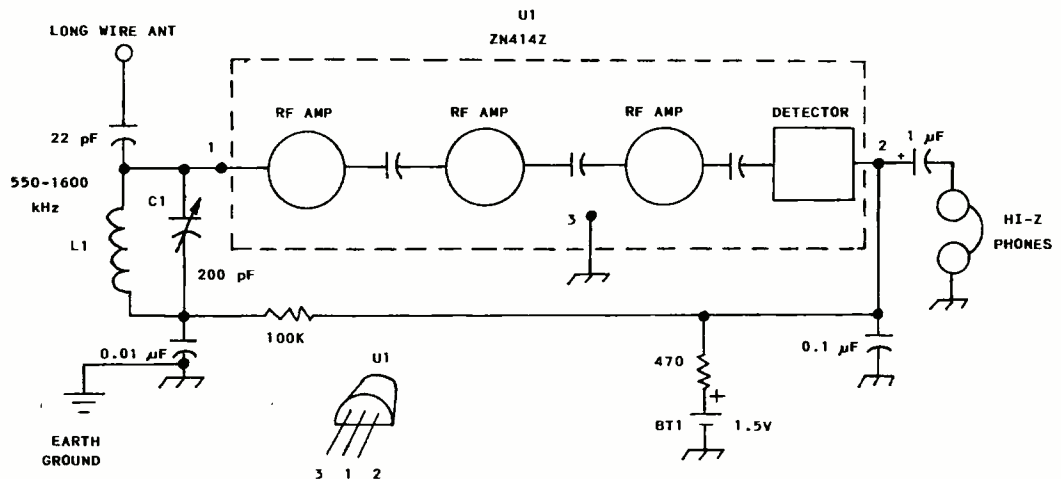


FIGURE 1: Circuit for a simple TRF radio using the Plessey ZN414Z 10-transistor IC. L1 consists of 131 close-wound turns of no. 20 enamel wire on a 5-1/2 inch length of 2-3/8 inch OD PVC tubing. L1 has 420 microhenries of inductance for tuning from 550 to 1600 kHz with a 200-pF variable capacitor (see text for toroidal coil data). The audio amplifier in Figure 2 can be added for greater headphone volume, and to permit using 8-ohm phones. Omit RFC1 if this is done.

the device. A transistor audio amplifier, such as that seen in Figure 2, is recommended for use with standard 8-ohm hi-fi phones.

■ A Basic TRF Circuit

Figure 1 shows how to use the ZN414Z as a TRF radio for the standard AM broadcast band. C1 and L1 are tuned to the frequency of interest. A high-Q (quality factor) coil is essential for L1 in order to ensure sufficient selectivity for separating the stations. A large coil with fairly heavy wire is needed to obtain a high-Q. In effect, the big coil and the tiny ZN414Z are not unlike the "tail that wagged the dog." The bulk of the physical size of the tuned circuit can be reduced if you are willing to wind L1 on an Amidon Assoc. FT-140-61 ferrite toroid core.¹ An inductance of 420 microhenries is required. Therefore, you will need to wind 54 turns of no. 20 enamel wire on the toroid core.

The input section of the ZN414Z is designed for very high impedance. Consequently, the device does not load the tuned circuit and spoil the Q. Please note that there are three RF amplifier stages ahead of the detector. Only five external components, other than the battery and phones, are required for the Figure 1 circuit. You should be able to tack the circuit together on a piece of perforated board, or similar, and have it operational in an hour or less.

■ Receiving SSB and CW on 160 Meters

Figure 2 shows how to add a variable frequency oscillator (VFO) and an audio amplifier to make the ZN414Z function as a direct-conversion receiver. The coil dimensions have been changed for operation from 1.8 to 2.0 MHz. RFC1 prevents the VFO energy applied to the U1 output from reaching the Q1 audio amplifier. This unwanted RF energy would otherwise prevent Q1 from functioning correctly as an audio amplifier. C4 helps to isolate the RF energy from Q1, because it is a bypass capacitor.

A VFO designed for the broadcast band can be used with the Figure 2 circuit if the Figure 1 coil inductance is used. The net result is enhanced reception, caused by increased detector gain. This is called "conversion gain." The tradeoff is that the BC stations will need to be tuned for zero beat to prevent a heterodyne (beat note) from being heard. Performance with the VFO is similar to that of a regenerative receiver, which should also be tuned for zero beat when copying AM signals.

■ The ZN414Z as an IF Amplifier

The data sheet that comes with the ZN414Z from All Electronics shows how to use this device as an IF amplifier section in a superhet receiver. An IF filter is used immediately after the mixer in the superhet receiver. The ZN414Z

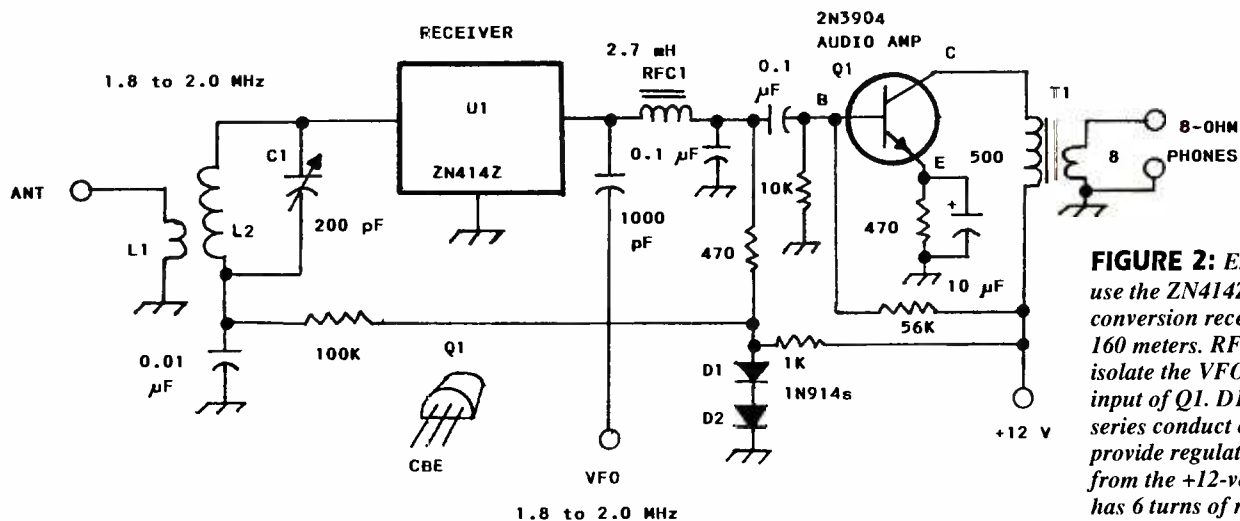


FIGURE 2: Example of how to use the ZN414Z IC in a direct-conversion receiver circuit for 160 meters. RFC1 is used to isolate the VFO energy from the input of Q1. D1, and D2 in series conduct at 1.4 volts to provide regulated voltage for U1 from the +12-volt supply line. L1 has 6 turns of no. 20 enamel wire over the ground end of L2. Winding L2 consists of 48 close-wound turns of no. 20 enamel on a 1.5-inch OD by 2 inch coil form. T1 is a miniature 500- to 8-ohm audio output transformer (Mouser). See text for references to VFO design.

is utilized after the filter to provide an IF amplifier and detector with 20 dB of AGC. A crystal-controlled beat frequency oscillator (BFO) can be added to allow reception of CW and SSB signals, as is done with the VFO in Figure 2. The BFO frequency must be 1.3 kHz above or below the IF, depending upon whether upper or lower sideband reception is desired. A tunable BFO that uses a coil and capacitor may be used to replace a crystal-controlled BFO.

Construction Notes

The 3-MHz upper frequency limit of the ZN414Z minimizes the need to maintain short, direct leads. This feature makes things easier for the novice builder. However, it is always wise to keep all RF-circuit leads short.

You may build the circuits described here on perforated board, or use point-to-point wiring with multilug terminal strips.

Tuning capacitor C1 can be burgled from a discarded AM-band transistor radio. Most of these receivers have two-gang variable capacitors with 75- and 125-pF sections. All you need do is wire the two sections in parallel to obtain a 200-pF capacitor. Alternatively, you can use a single-gang 365-pF variable capacitor. If you use a capacitor from a transistor radio you may want to add a 1/4-inch shaft to allow using a standard knob at the front panel. Adapters can be made from dowel rod that has been drilled and cemented to the original smaller shaft with epoxy glue.

If you opt for the circuit in Figure 2, be sure the VFO parts are mounted firmly to the chassis or PC board to prevent frequency shifts if the receiver is bumped. The VFO leads should be kept short and rigid. A vernier

drive for the VFO tuning capacitor will make tuning slower and smoother. Details for building simple VFOs are given in *W1FB's QRP Notebook* and *W1FB's Design Notebook*. Both are available from The ARRL, Inc.²

Most of the parts needed for the simple receivers in Figures 1 and 2 can be purchased by mail from Mouser Electronics.³ The ZN414Z is available from All Electronics Corp.⁴ or from Plessey distributors in the United States. However, you may wish to "shop around" in the many surplus electronics catalogs that are available. Don't overlook Radio Shack for the basic components you will need.

Closing Remarks

This article is aimed at those of you who have avoided experimentation because you feel that building simple equipment is beyond your ability. There is considerable satisfaction associated with building a receiver and hearing the signals it can bring to your ears. Certainly the cost of the projects described here are affordable for even those who live in "Poverty Gulch!"

Notes

1. Amidon Assoc., Inc., 3122 Alpine Ave., Santa Ana, CA 92704. Phone: (714) 850-4660. Catalog available.
2. AARRL, Inc., 225 Main St., Newington, CT 06111. Phone: (203) 666-1541.
3. Mouser Electronics, 2401 Hwy. 287 N., Mansfield, TX 76063-4827. Phone: 1-800-346-6873 for catalog or ordering.
4. All Electronics Corp., 14928 Oxnard St., Van Nuys, CA 91411. Phone: 1-800-826-5432 for parts or catalog.

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The HF Groundplane Antenna:

Mounted in the trees behind my home I have both a horizontal, halfwave dipole antenna and a quarterwave, 40-meter vertical, groundplane (GP) antenna (figure 1A). The dipole is mounted at about the height of the center of the GP. Both antennas perform quite well, and many of the same signals can be heard using either antenna. On some DX signals the performance of the GP is considerably better than the dipole. But the dipole pulls in some signals which the GP doesn't get, particularly close-in signals.

On the other hand, the GP is definitely better on long-haul DX. It's not as though the DX comes rolling in when using the GP and none is heard when using the dipole, but, rather, that some DX signals which I don't hear at all on the dipole are actually good copy on the GP.

The difference in performance between the two antennas just mentioned is to be expected. Consider that the dipole is about 30 feet above ground; this is close to a

quarterwave on 40 meters. At this height the signal's interaction with the earth under the antenna causes the antenna's reception pattern to be directed mainly upward. This upward-directed pattern is most responsive to signals arriving from relatively high angles, and this means it is best for receiving from stations relatively close-in—stations up to hundreds of miles, rather than thousands of miles, distant.

On the other hand, much of the GP's reception pattern is concentrated at low-angles, and signals from distant (thousands of miles away) stations typically arrive at low-angles. Thus the GP is a good, non-directional DX antenna.

■ Let's Build An HF Groundplane Antenna

1. To find the minimum height for the tie-point for this antenna use the formula: $H = 399 / \text{freq}(\text{MHz})$. For example, minimum height for a GP antenna at 15.25 MHz is $H = 399 / 15.25$ or 26.16 ft; at 7.2 MHz, mini-

mum height is at 55.4 ft. If you can't measure the height of your tree or other tie-point directly, you might consider shooting a fishing line over it with a slingshot or bow and arrow, and then pulling up a length of fishline to which you have attached pieces of tape every ten feet. Counting the number of these tape pieces between the treetop and the ground will give you a good idea of the height of your tie-point.

Actually, you can make the antenna shorter than this formula indicates, but then you cannot droop the groundplane radials to the optimum amount (see step 9). This will give you an antenna feedpoint resistance lower than the nominal 50 ohms in common use, and a higher SWR than if the droop angle were correct. For HF receive-only antennas, where received-noise is moderate or high, this increase in SWR probably won't cause you any loss in signal readability—even if you make the radials parallel to the ground.

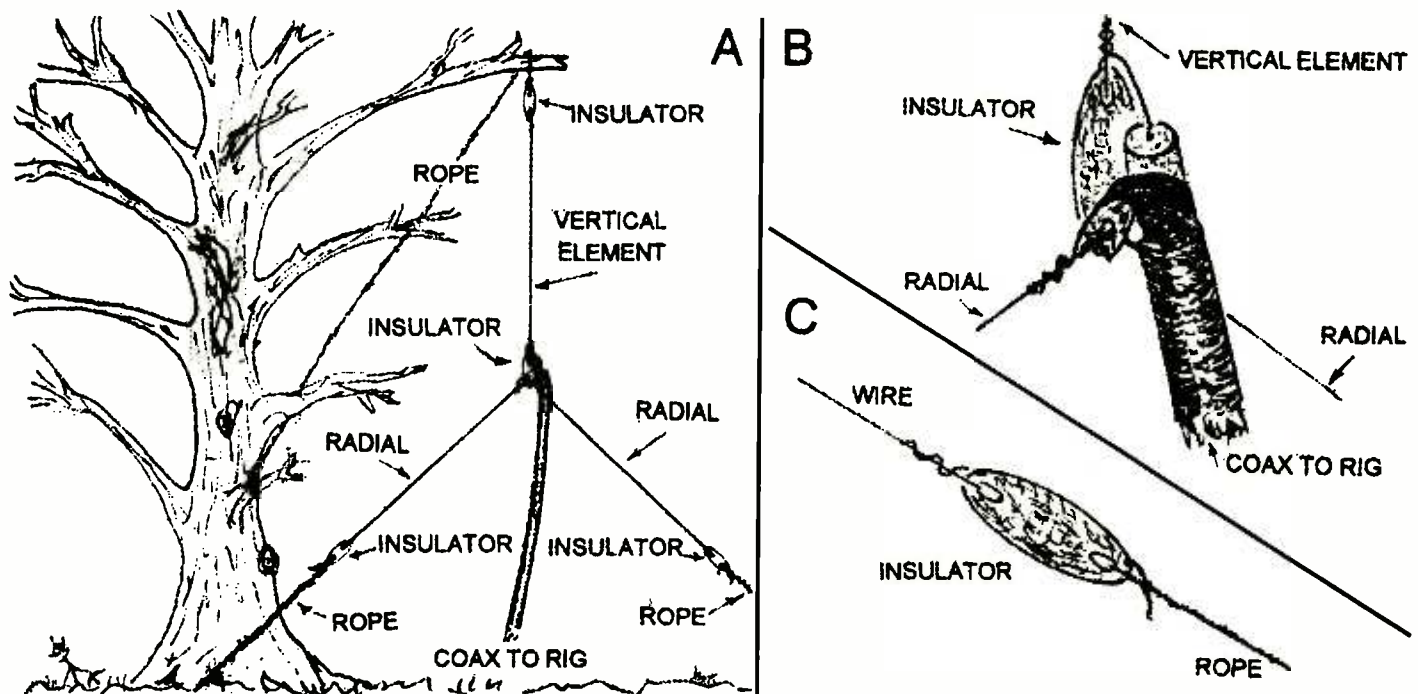


FIGURE 1: A groundplane antenna for HF operation (A), lead-in detail (B), and insulator detail (C).

2. The length of each element of the GP antenna is a quarter wavelength. You will need one vertical element and two to four radials; two is enough, but some prefer more. The length of a quarterwave in wire is found from the equation: $L = 234/\text{freq}$ (MHz). For instance, a GP for 7.2 MHz will have elements $234/7.2$ or 32.5 ft long. If you want to be able to solder your connections together it's best to use copper wire for the elements.
3. Cut the elements to length, leaving about 2 to 3 inches extra on each end to provide wire to wrap through the insulators.
4. Scrape the ends of the wire bright. Insert the ends in the insulators as shown in figure 1. Wrap the end of each wire back around itself as shown, and solder in place.
5. Attach the coax center conductor to the vertical element, and the coax outer conductor (shield) to the radials as shown in figure 1B. All radials are connected together at their top end and connected to the coax shield at the bottom of the insulator shown in figure 1B.
6. Protect the open end of the coaxial cable lead-in with coax sealant. For severe weather you can cover the sealant with black plastic electrical tape.
7. For pulling the antenna into place put a light rope over the high tie-point. If you use the slingshot-and-fishing-line mounting technique, use the fishing line to pull the rope into place. Also tie light ropes or cords to the bottom ends of the radials. These ropes will be used to position the radials.
8. Pull the vertical element into place, and tie the rope in that position.
9. Using the light ropes on the radial ends, position the radials so that they droop at about a 45 degree angle with the feedline as shown in figure 1A. Tie the ropes to some tie-point such as a stake driven into the ground at the correct point to make the angle between the radial and feedline correct.
10. If you live where lightning is at all likely, use some kind of lightning protection. The minimum I recommend is to disconnect and ground the antenna when it is not in

use, and never use the antenna in weather likely to produce lightning.
The antenna is now ready to use.

RADIO RIDDLES

■ Last Month:

I said "Electric currents flow in or on conductors, right? Well, what causes radio waves to leave an antenna, and fly off into space?" In reply, let me say that some scientists feel that there is no good way to logically explain radio wave emission. This is because such phenomena are best dealt with using quantum theory—a set of ideas usually not explainable in ordinary logical terms. On the other hand, the traditional, technical explanation which follows seems to have value in the practical or applied sense, so let's check it out.

As RF current from the transmitter flows on the antenna, this electron movement in the wire creates an electromagnetic (EM) field around the antenna. This field moves out from the antenna at approximately the speed of light. As the current flow in the antenna goes to zero—as it does twice per cycle of RF current—the EM field begins to collapse back into the antenna.

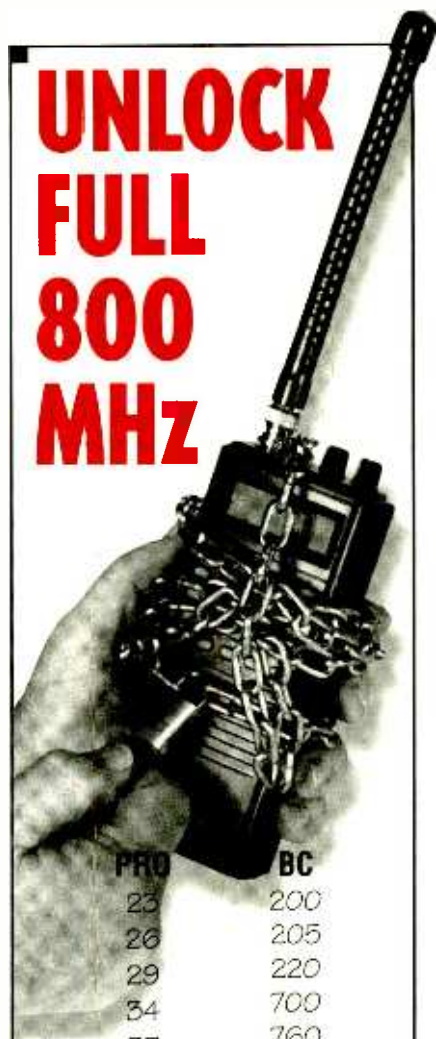
As the RF cycle continues, current begins to flow on the antenna in the opposite direction of the original current flow. This current flow causes a new field to move out from the antenna just as the initial field did, but with polarity opposite to the initial field. A portion of the initial field which was some large distance from the antenna when the initial current went to zero did not have time to collapse back into the antenna before this new field formed. This incoming portion of the initial field is now repelled outward again by the new field, and launched into space as a radio wave.

■ This Month:

Now that we have the radio wave on its way to your antenna, in the above answer to last month's riddle, what happens when the wave actually encounters your antenna? How does it change from being an EM wave propagated through space to become electrical current flowing in the wire of your antenna?

You'll find an answer for this month's riddle, and much more, in next month's issue of *Monitoring Times*. 'Til then, Peace, DX, and 73.

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"Going for the Gold" The Hoka Code3-Gold in Review

"Unlike many other hardware decoders, Code3-Gold makes it very easy for the beginner and expert alike to decode signals. Simply press [F1]. This starts a baud and shift measurement screen. Once one is happy that Code3-Gold is displaying sensible/reliable results—press the [Enter] key. Code3-Gold will then automatically analyse the Bitstream and if it is a system that it recognizes, automatically jump into the correct module and begin decoding. It cannot get any easier than that!"

(Code3-Gold Software Decoder Manual, page 1)

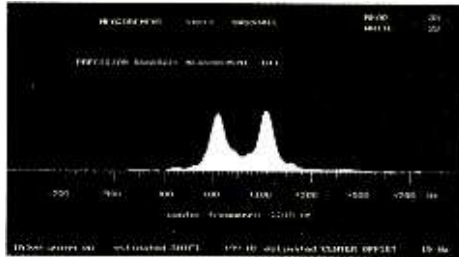
Hoka Electronics of the Netherlands revolutionized the decoding of digital signals when they first introduced the concept of placing all the DSP software within a PC-based software program, thereby harnessing the power of the computer as the FSK detector. Based on their professional (and expensive) Code30 package, their new Hoka Code3-Gold offering extends the capabilities of their current Code3 product.

■ Modes

In addition to the standard modes found on most decoders today, the Hoka Code3-Gold also includes a plethora of specialty modes not generally available to the digital monitor.

HF modes include:

ANNEX10 (aircraft SELCALs), ARQ-6-70, ARQ-6-90/98, ARQ-E, ARQ-N, ARQ-E3, ARQ-S (SI-ARQ), ARQ-SWE (SWE-ARQ), ASCII, Autospec, Baudot RTTY (IAT-2), Baudot F7BBn (2 channel), Coquelet Mk1 and Mk2, DCF 77 (Atomic Time), DUP-ARQ (ARTAC), Facsimile (FAX), FEC-A (100A/101 and Raw), FEC-S, GMDSS/DSC, Hellsreiber, HC-ARQ, HNG-FEC, Morse (CW), Packet Radio (AX25), PACTOR, Piccolo MK VI, POL-ARQ, ROU-FEC (RUM-FEC), SITOR AUTO ARQ/FEC CCIR 476-4 CCIR 626 Modes A & B, SITOR ARQ CCIR 476-4, CCIR 626 Mode B NAVTEX, SITOR RAW, Spread, SSTV (Martin-1), SYNOP decoder (AAXX/BBXX with 10,000 stations), TDM242 ARQ-M/4-242 CCIR 242, TDM342 ARQ-M2/4 CCIR 342-2, TORG-10/11 and Twinplex.



VHF modes include:

ACARS/SITA, DTMF, FAX (Meteosat), Packet, and POCSAG/Super POCSAG.

■ Installation and Configuration

The hardware interface consists of a simple serial port dongle (a software-specific interface) with a 9 pin connector on one end and a 25 pin connector on the other. Simply plug the appropriate end into one of your COM ports (ports 1 to 4 are supported). A short cable from the interface ends in an RCA female connector. Using an appropriate audio cable (not supplied), connect this to the audio-out of your radio receiver.

The interface requires very little audio signal to drive the unit. Although it will work well using the phones, speaker, or recorder output of your radio, you would be wise to choose a source that can be varied, since some of these audio sources have a fixed output level. I elected to connect it to the line out jack of my receiver and use the radio's RF control to adjust audio levels. The interface requires no external power, which makes it an excellent choice for portable or in-the-field work with a laptop computer.

Unlike previous Hoka offerings, the software is not copy protected. You could, for example, load it on both your laptop and desktop computers. However, the program will only run when the interface is plugged into the COM port. Given its capabilities, the program and all its files only take up a mere two megs of hard disk space.

Software installation from the supplied diskette is straightforward. Insert the diskette into your drive, type install, and the program automatically installs and decompresses itself. Various prompts appear, including a choice of language. Although the diskette labels the languages available, including

American, the only English choice you are given is UK.

The program launches automatically and you now must configure the system before you proceed. This process involves defining your monitor type, COM port, and Center Frequency (CF). Hoka's explanation for determining your receiver's CF is akin to instructions for calibrating an atomic clock! To make matters worse, Hoka Netherlands, Hoka England, and Hoka's American distributor all had different opinions—some conflicting.

Calibration is necessary to set your radio's mode to its appropriate offset frequency. For example, for an NRD-535D, a signal tuned on 13510.0kHz in USB will be found on 13508.5 if tuned in RTTY mode. Although much hocus-pocus is made of determining your radio's CF, in the final analysis, it's your choice, and only affects the displayed frequency, not the decoding of the signal.

■ System Requirements

An IBM PC or clone with a 386DX40 (or better) processor will do, although a 486 is highly recommended, as is MSDOS v3.2 or later, with at least 512 kilobytes free DOS memory and a spare serial port. Both VGA and SVGA up to 1024 x 768 are supported with up to 256 grayscale levels. It requires only 2 megabytes of hard disk space, but if you choose the option of writing decoded output to disk, you can significantly add to this requirement. It will run in a Win 3.1x DOS box, but does not run under Win 95 as yet (a Pentium will be required).

■ Documentation

The unit ships with a 51 page user's manual. As both a product end-user and a technical writer by profession, I believe the manual leaves a great deal to be desired. You must read through 32 pages of information before you encounter the installation instructions. Technical considerations are often presented in ambiguous tones (e.g. "when one is happy with"). The manual tries to encompass every phase of the hobby including a three-page dissertation on types of antennas. A detailed explanation of all the screen fields and messages would be more useful.

■ Performance

For HF modes, I split the signal from the line out jack of my NRD-535D receiver, feeding one audio cable to a Universal M-7000 and the other to the Hoka Code3-Gold installed on an NEC Versa SX/486/33 color notebook. For VHF modes, I substituted an ICOM R-7100 for the NRD-535D, and a Universal M-400 for the M-7000.

Prior to shift/speed analysis, I found it necessary to adjust the input signal level, since the unit requires very low audio levels. If the audio is overdriven, it is nearly impossible to get a correct shift/speed determination. Pressing the [F1] key displays the shift/baud rate tuning display. Signal averaging may be turned on or off. The roofing filter can be varied to narrow the bandwidth to assist in tuning. Upon pressing [Enter], the classification screen appears. When the confidence level percentage reaches 25%, the unit automatically switches over to signal decoding, with options to print or save the decoded text to disk.

Automatic shift/Baudrate determination, mode classification, and decoding is generally very fast and reliable for ARQ-M2, ARQ-E/3 and SITOR A and B signals. Idling SITOR B is often wrongly classified as ARQ-E/E3. Automatic tuning of Baudot RTTY signals, however, was hit and miss, with only about a 55% correct determination. Even operating the unit in manual mode, it was not able to decode RTTY signals that the M-7000 could easily handle. Cyrillic RTTY traffic decoded in the Latinized alphabet was prone to additional errors as the decoder momentarily faltered whenever it detected a 3rd-shift character.

FAX, PACTOR, and Packet were easily tuned from manual mode. Unfortunately, propagation conditions did not cooperate in allowing me to test the decoder's capabilities on some of the more elusive modes. Prior to returning to automatic analysis, after a spurious classification was made, the X key must be pressed several times or you will never be able to correctly auto-classify another signal. The manual states this key is used to return to the main menu. Obviously it performs more than this function—a fact that is not documented anywhere (thanks to Jim Springer of Computer Aided Technologies for this tip).

The only VHF mode I tested was ACARS. Here, this decoder is unique in that it identified uplink, downlink, and squitter transmissions, as well as NAK and ACK messages. However, the flight number remains buried in the message text. No description of any of the fields on the screen is presented in the manual.

POCSAG reception requires you to tap into the discriminator circuit board of your receiver—a modification that is not very practical, since it will void your radio's warranty.

■ Suggested Improvements

- Clean-up the program bugs, such as on-screen instructions to press various keys that result in no action, and descriptions of function keys not applicable to the program (e.g., F4 to change alphabets)
- Addition of a screen buffer to permit scrollbar of previously decoded text. In some modes (ACARS, for example) decoded text appears so fast you can't read it. Your only resort is to save it to a disk file and then go back and review it later.
- A option to inhibit the printing of spurious text characters, particularly in the 192/200 baud speeds of the various ARQ modes.
- Automatic audio input level control. Currently, as signal strength varies, you must tune each signal by going to the AD level scope screen. An interim solution would be to put a level indicator on the shift-speed measurement screen.
- The provision for optional alphabets, particularly Cyrillic.
- User definable defaults. Each time you start the program you must set your preferences: upper/lower case shift, multiple carriage inhibit, etc.
- Completely rewritten user documentation, focusing on product usability, with a comprehensive description and explanation of all screen fields and messages.

■ The Bottom Line

Despite Hoka's introductory statement to the contrary, this decoder is not meant for the novice. The quote "Once one is happy that Code3-Gold is displaying sensible/reliable results . . ." implies more than a cursory knowledge of baud and shift measurements relating to digital signals.

The perfect digital decoder does not exist. This aside, the Hoka Code3-Gold Version 1.2 doesn't measure up to Gold Medal class just yet. At best, it deserves the Bronze. To be fair, this is the first iteration of what is sure to become a popular decoder, and upgraded releases can only improve. While not perfect by any stretch of the imagination, if you are looking for a medium-priced decoder that supports a multitude of modes, performs adequately in many of them and exceptionally in others, and has the potential to be the Gold contender as it matures, then you should consider adding the Hoka Code3-Gold to your monitoring post.

■ Availability/Price/Support

The North American distributor for Hoka is Computer Aided Technologies (CAT) of Shreveport, Louisiana. CAT has long been a provider of quality interfaces for the scanner and shortwave radio enthusiast. Jim Springer's

company has an excellent reputation when it comes to product support—a fact to which I can personally attest. See their advertisement located elsewhere in this issue. The Code3-Gold lists at \$595.00 plus shipping.

■ The Welcome Mat

MT Readers are invited to visit my radio-related Web Site (still undergoing construction) at: <http://www.magic.ca/~revans/radio.html>. And I'll look for you this month at the Grove Expo in Atlanta, where we'll discuss more digital modes!

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Weather Alert Tone Correction

In our last issue we quoted an incorrect audio frequency provided to us by the National Weather Service for the severe weather alert tone transmitted on NWS VHF weather broadcast frequencies. An alert reader, Thomas Mitchell, pointed out the correct frequency, 1050 Hz.

Q. *Is there an electrical difference between white and black coaxial cables? (Tim Roger)*

A. No. According to a prominent manufacturer, the signal-carrying innards and moisture resistance are identical; only the vinyl jackets are different, resulting in somewhat better immunity from solar ultraviolet (UV) degradation over time.

Q. *On the Motorola "Astro" handheld radios, there is a row of buttons identified by dots and arrows, one of which is marked "HOME." What is the purpose of these keys? (Archie Standon, Eastchester, NY)*

A. The Astro is an advanced, feature-packed radio, allowing for a number of options to be selected for the user's tastes or requirements. These keys allow menu selection of these functions.

Q. *Can I improve my AM and FM reception on my Sony ICF-SW7600 portable using simple materials? Is there an optimum placement for my Sony AN-1 active antenna? (Abdulrahman O Almulhem, Alhassa, Saudi Arabia)*

A. For AM portables with internal ferrite rod loop antennas, setting a Select-A-Tenna next to it makes a world of difference. Much improvement is also offered by running a long, random wire (50 feet or so) from a high point down to the radio, wrapping several turns around it (top to bottom), then connecting the close end of the wire to a good ground like a metal water pipe, long rod driven into moist soil (hard to find in Saudi Arabia!), or even the third-wire ground of a three-wire electrical outlet (but NOT to a voltage-carrying terminal!).

For improved FM, an outdoor antenna

designed for that purpose is best. If your radio is not equipped with an external antenna jack for FM, you may still use the external antenna by attaching the coax center wire (or one wire of TV-type twin-lead) to the collapsed whip, and the shield of the coax (or other twin-lead wire) to a nearby chassis "ground" connection like a screw that goes into the metal framework, or the rim of an earphone jack.

The rules of the game are the same for active and passive antennas: high as practical, away from power lines or large metal surfaces.

Q. *Why doesn't NASA use the Space Shuttle for military purposes? (Robert Brock, Phoenix, AZ).*

A. The Department of Defense withdrew from the Shuttle program following the Challenger disaster.

Q. *My Kenwood R5000 receiver manual has a precaution about nearby transmitters when the receiver is still connected to an*

Bob's Tip of the Month

A recent column in *CQ* magazine (August 1996) coupled with an inquiry about the same device from a reader prompts this month's column. Are you aware that there is a new Radio Shack product that broadcasts your telephone calls all over the neighborhood? It's not a cordless or cellular phone, it's the #43-160 "Wireless Phone Jack System."

It's wireless all right, transmitting your conversations on approximately 3.03 MHz (FM mode) plus multiple harmonics (6.06, 9.09 MHz, etc.) throughout the HF spectrum and beyond! A companion

receiver (RS#43-161) receives the signals from another household location.

The unit is intended to act as a carrier current ("wired wireless") transmitter and receiver combination, but at those frequencies, the power lines radiate as much signal as they conduct, possibly more.

Is monitoring this system legal? It isn't covered under the devices listed under the Electronic Communications Privacy Act (ECPA), nor is it cordless or cellular. Let us know whether you hear any of these—or similar—devices polluting the airwaves with "private" telephone calls.

New Telephone Target

"My phone system is completely secure, Mr. Smith. I use wireless phone jacks!"



antenna. Do I need to ground the antenna connector? Use an antenna voltage protector? What is the proper way to protect the receiver from front-end burnout? (Jerry Brookman, Kenai, AK)

A. Low cost transistor radios may not be well protected from RF overload problems, but good receivers and transceivers are. Conventional lightning arrestors may be good for harmlessly shunting to ground electric sparks with potentials above 60 volts or so, but this is way above an RF signal which would pin your S-meter (only 50 millivolts or so, 1000 times lower than the lightning induced spark).

Fortunately, you have several protective devices going in your favor, including a relay which can detach the receiver from the antenna (or even ground the signal line), as well as surge-tolerant components that aren't quite as vulnerable as semiconduc-

Questions or tips sent to "Ask Bob," c/o MT are printed in this column as space permits. If you desire a prompt, personal reply, mail your questions along with a self-addressed stamped envelope (no telephone calls, please) in care of MT, or e-mail to bob@grove.net. (Please include your name and address.) The current "Ask Bob" is now online at our WWW site: www.grove.net

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tors of years ago. In any case, keep the antenna line disconnected from the receiver when transmitting, and preferably ground the antenna terminal on the receiver, and you probably won't suffer any problems using amateur power levels.

Q. Recently, while vacationing in Cape May, New Jersey, I heard the NOAA National Weather Service broadcast information received from various data buoys in the Delaware and Chesapeake Bays. Can these buoys be heard directly? (Rob Martens, Cinnaminson, NJ).

A. No. The buoys transmit their data in the 400-402 MHz range directionally upward to the GOES satellite, from which it is relayed to Washington, DC, then processed in Silver Spring, Maryland.



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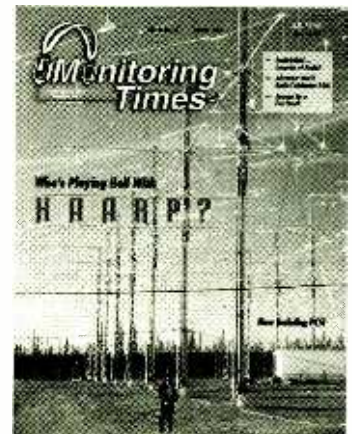
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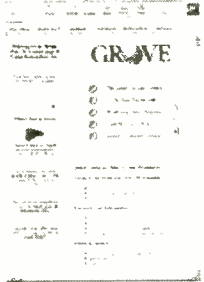
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By Bob Grove,
Publisher

The Pendulum Swings

If the recent increase in sales at Grove Enterprises are a fair guide to the industry, things are looking up. The past two months have been significantly better than the same time period last year. So what caused the downturn originally? Some dealers steadfastly hang on to the mistaken belief that the low sunspot count has caused sagging ham sales, but the No-Code Technician class licensee—by far the most rapidly-growing ham class—doesn't use the spectrum which is affected by sunspots.

In-fighting among the ham oligarchy, increasingly high cost of equipment, tasteless content of amateur communications, obsolete Morse code requirements for more useful license privileges, virtual abandonment of ham demonstrations, ready availability of alternative communications, high-tech saturation of the consumer marketplace, and the spectacular growth of the worldwide, inexpensive, interference-free, no-test Internet are more likely reasons for the moribund state of amateur radio. It is no longer a "gee whiz" draw to today's youth.

Scanner sales, too, have been severely truncated by the loss of cellular frequency coverage and the non-receivability of digitized communications. But perhaps comparing this year's sales with last year's is unfair. Over the previous two years we saw a buying frenzy as scanning enthusiasts scrambled to purchase those few remaining cellular-capable radios; we may well be feeling now the backlash of that scanner blitz—a scanner glut.

A drop in subscriptions, which was frightening at first, has leveled as well, showing an indication of the number of folks who still depend upon the print media for their information. Still, the general loss felt by publishers everywhere has been accompanied by an increasing number of bankruptcies, as witnessed by the loss of several of Wayne Green's and CQ's publications, the demise of RCMA, and so on.

We're unusual in that we make certain our writers are all paid what they were promised, and on time. This has created a tenaciously loyal stable of writers—the best in the business—and we're proud of that. As a result, the communications industry knows that *Monitoring Times* is the driving force in the monitoring community. Good products succeed and bad products fail after a few words in *MT* from our staff of experts.

While there has been an undeniable migration to the Internet, the rate has been more linear than logarithmic—they're joining fast, but not all *that* fast, and they're learning that while there is a lot of free information on the net, the freebies are frequently teasers, requiring the inquirer to spend money for the whole package.

Few publishers or dealers will review their actual business successes or failures. It's a matter of ego, not strategy. What harm can come from an honest admission that business is down 16 percent from last year? Ours is. Or that subscriptions have slumped 15 percent over the same time period? Ours did. After all, Fortune 500 companies post earnings and losses all the time, and creditors are interested in paybacks. It's a question of survival skills.

Fortunately, the Grove staff members are highly diversified; if one aspect of the business is on the downgrade and nothing we do can seem to save it, we reassign our skilled people into other, more productive areas. We know that they depend on us for their income; they are like a family to us, and we do everything we can to protect our family.

The result is that we have a powerful, dedicated, work force with cross-trained skills. When we decided to explore Internet marketing, we didn't need to hire anyone, we simply moved our dynamic team laterally into the new slot and they're having the time of their lives! It's challenging, gratifying, and profitable.

One example of our diversification (although by no means the most profitable!) is our collectibles division—you've seen some of the unusual items in the Grove catalog. I have great fun doing my old time medicine show at local festivals and school events, hawking "Dr. Bob's Aqua Pura." I have just finished attending auctioneering school and will soon have my auctioneering license. I'm looking forward to that as well, and it's a great way to find antiques!

Many of our advertisers are experiencing the benefits of our Internet web page services; if you would like to learn how you can profit from this marvelous marketing medium, call Melody on our toll-free line, (800) 438-8155.

Diversity is the key to survival: it is also a hallmark of Grove Enterprises. We are experiencing a renaissance in telecommunications, and *Monitoring Times* will continue to be the listening industry's flagship publication!

MT

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