Scanner Law Markup: See Legislative Update on Page 7

Vol. 16, No. 12 December 1997

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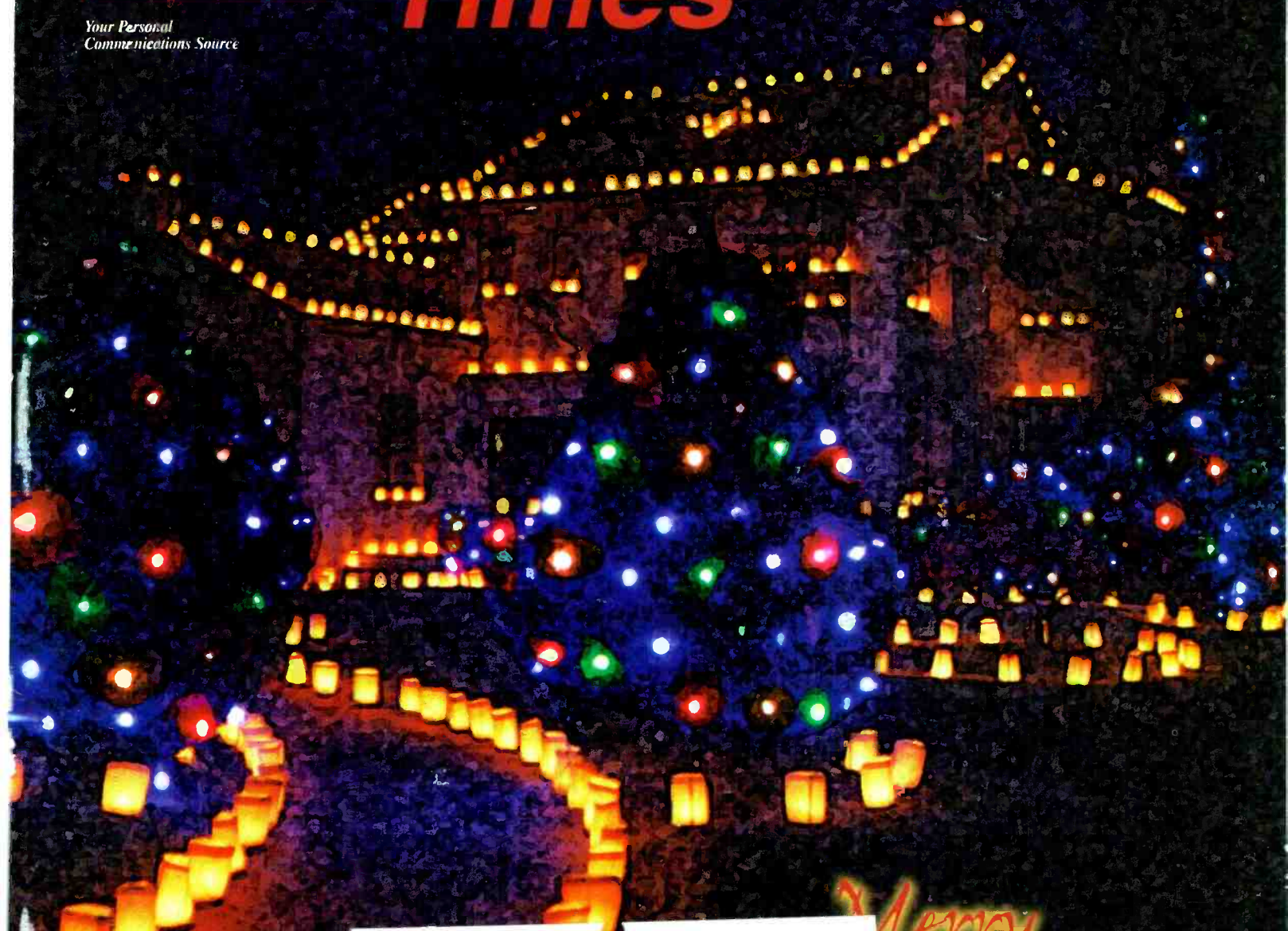

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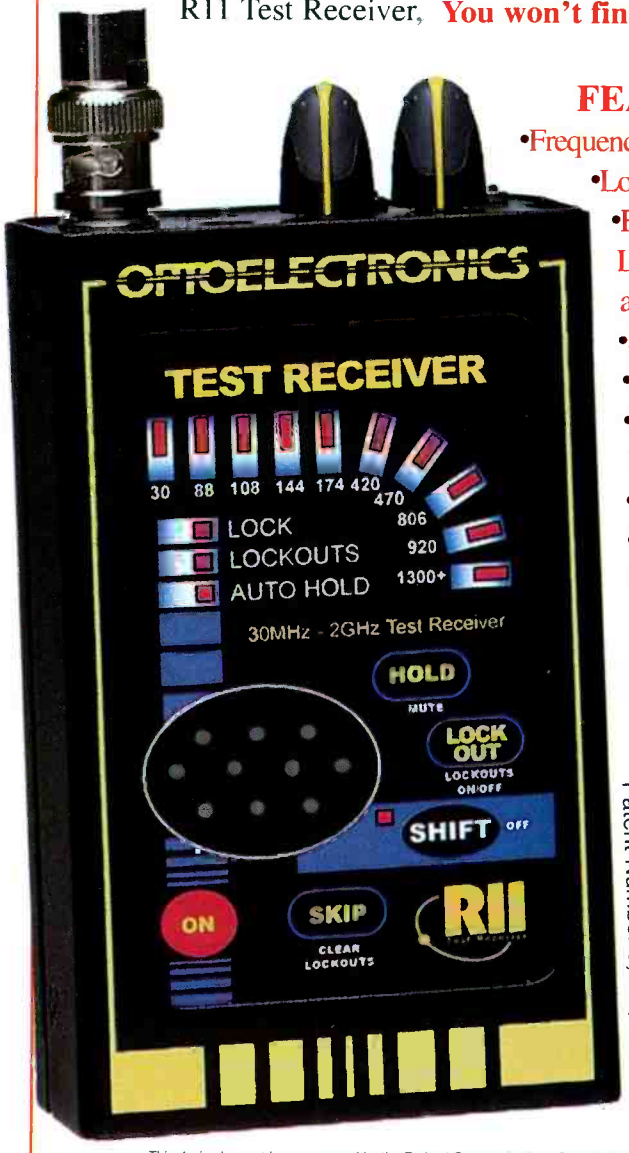

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Monitoring Times™

Vol. 16, No. 12 December 1997

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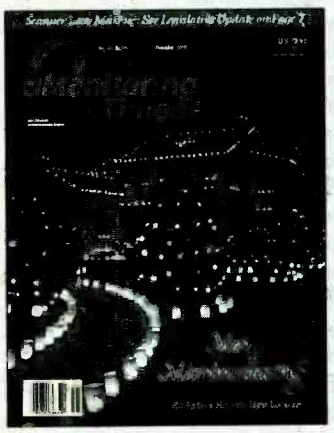

Cover Story

A Garden Galaxy of Lights

By Ernie Blair

Like many communities, the Huntsville Botanical Gardens put on a fabulous display of Christmas lights as a fundraiser for local charities. The only thing missing was seasonal music to make the occasion truly festive. But blaring music loud enough to be heard through closed car windows was not an acceptable solution.

Ernie and Carol Blair and friends came to the rescue with a low-powered FM stereo transmitter. Turn to page 8 to see how they did it, and you, too, can have lights, camera, *music*!

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GroveNet hosts the following managed lists free of charge to the hobby.

acars	ACARS mailing list
amfmtvdx	AM/FM/TV DX mailing list
atlantic	Aircraft monitoring over Atlantic
code30users	Hoka Code 30 demodulator users
code3list	Hoka Code 3 and Code 3 Gold decoder users
fedcom	Federal communications
hearsat-l	HearSat-l Mailing List
milcom	Military HF/VHF/UHF communications monitoring
scan-dc	Scanner radio topics in Washington, DC - Baltimore
trunkcom	For discussion about the new TrunkTracker scanners
wun	Worldwide UTE News Club List (Nonbroadcast SW Radio)

Example:
To subscribe to acars, send E-mail to majordomo@grove.net, with "subscribe acars" in body (no signature). Add "-digest" to subscribe to digest (a block of messages).

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DRAKE

LETTERS

New Business; Old Business

We welcome Jock Elliott to our writing staff this month. Jock wrote feature articles for us many years ago, and we're happy to see him back. Jock says he's a ham, SWL, and avid CBer, "radioactive since Dad dragged home a Zenith Transoceanic radio in 1957." He is a member of the *Passport to World Band Radio* receiver review panel, and has written for numerous publications. One of the creative uses he has found for Citizens Band can be heard every morning in the Capital Region of New York State, where he runs a commuter assistance network on CB Ch. 9 and 2 meter ham radio.

You may be surprised to see a column in this issue by Doug DeMaw, following the announcement of his death in September. Doug, being a conscientious and meticulous author, was always about two months ahead in his column preparation. We thought it would be in his nature to want to finish the year out, all neat and tidy. And, though he is gone, we weren't ready to say good-bye just yet.

A decision has not yet been made whether we will attempt to fill the spot left by his column with a similar topic, or whether we will take the opportunity to increase coverage in some other area. Competition for the two pages is already heating up!

This Gift Could Save a Life

"Here's an idea for those who puzzle over what to get our older parents for gifts. How about a radio for National Weather Service broadcasts? They are inexpensive, simple to operate, can run on batteries or AC, and many have an alarm feature for use during potential weather emergencies.

"The idea came to me last summer. Skywarn was activated as a series of unusually nasty storms approached. They were moving fast, hitting hard, and gave people little time to get under cover. Skywarn reports indicated a cell was moving right towards my mother's town, fifty miles from mine. I phoned and told her what was coming. She got the grandkids she was babysitting into the house. Less than five minutes later that area was hit by heavy rain, strong winds and lightning. The storm took down trees, branches and power lines. A couple of tornadoes touched down but, fortunately, not near in her area.

"Mom called back later and wanted to know how I could predict the storm so accurately. There followed a discussion of the NWS, Skywarn, 2 meter repeaters, etc. She sounded interested. A few days later she received an early birthday present: a weather radio with the local NWS frequency selected, a battery installed, and large, easy-to-see buttons for controls. She LOVES it! It's the first thing she listens to in the morning and she has used the alert feature several times.

"What next? I think a scanner is in order. I found an old 8-channel crystal controlled scanner at a yard sale. For a few dollars and some crystals she will have access to Skywarn and fire and police frequencies. Mom's eyesight isn't good, but with these two small radios she can find out what she needs by simply turning on the rigs. (If her eyesight was better I would consider a general purpose scanner. My Bearcat 890 and others has a weather alert function and, of course, can receive any frequencies used for Skywarn.)

"She is enjoying this 'new' world so much I am giving serious thought to a shortwave radio with preset memories. Just a few ideas that can add security and entertainment to someone's life."

—Jeff Poulin, KF4JSV, Manassas, VA

Great idea, Jeff! A new development in NOAA Weather Radio broadcasts now also allows the user to choose the National Weather Service (NWS) alerts and watches they want. Louis Boezi, NWS deputy director says, "If listeners are awakened at 3 a.m. for a severe weather warning 75 miles away, they may eventually tune out altogether. We don't want that to happen."

Look for a receiver capable of picking up Specific Area Message Encoding (SAME) alerts. The first SAME-capable receiver is available from Radio Shack, and other manufacturers may have theirs on the shelves in time for Christmas. — rb

SW Window to the World

"I have been producing *The Shortwave Report*, a 30-minute bi-weekly review of stories I hear on shortwave, here on K2YX Mendocino County Public Radio. The show is very popular and is beginning its third year. Your frequency listings are invaluable, and I give out your address on most shows. Please keep up the excellent, unique work.

"Our station airs NPR and Pacifica News, and the listeners are astounded to hear how differently events are described by other countries—and how many stories are not even covered by US radio.

"I listen and record off a Grundig Satellit 700: I love the memory arrangement, sound quality, and ease of using 12 vdc.

"Stay alive, SWL will be around for decades."

—Dan Roberts, Willits, CA

"Back When"

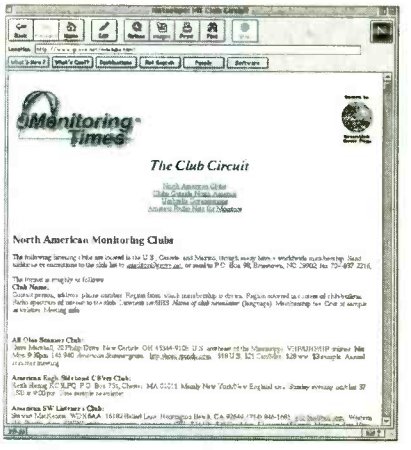
Harold Sibilla of St. Clair, Michigan, wishes there was room in *MT* for a page in which old-timers could share stories, pictures, knowledge from times past, which are gradually being lost to the hobby community. Here's just one of his tidbits ...

"Around 1930-33 the Canadian Gov't began issuing BC band licenses to hams already on. I have a 1932 verification from 10BG Brantford, Ontario—7.5 watts! The owner was still alive four years ago, and I got a letter and a second veri 60 years apart—can anybody top that?

"CFCO, CKNX, CKJAT are (also) an outgrowth of that—they're 1000 watts now."

We'll have more for you in 1998, as *Monitoring Times* heads for the millenium! A very blessed holiday season to you one and all.

—Rachel Baughn, *mteditor@grove.net*



You are Not Alone!

To find other radio hobbyists, consult **http://www.grove.net/mtclubs.html** for a listing of radio clubs and nets worldwide, or send an SASE for free list (NA only) to Club Circuit, PO Box 98, Brasstown, NC 28902.

No local club? Join a managed email list (see p.2) for your area of interest.

For hamfests in your area, visit **http://www.arrl.org/hamfests.html** or call the ARRL at 860-594-0200.

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Radio technology is about 100 years old.
Personal computers are about 20 years old.
Two significant technologies that changed the world.
Now united in WiNRADiO.
The world's most surprising communications receiver.

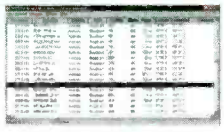
INTRODUCING VISITUNE™

NEW

The recent addition of our SpectrumScope to the increasing number of WiNRADiO features has opened a new door of possibilities, never available in the scanner world before. Our patented Visitune™ feature is one of them. Called "the ultimate scanning sensation" by one of our beta testers, Visitune™ brings a totally new experience to scanning. Imagine dragging your mouse across a scanned spectrum; click on a peak and you are tuned - then hold the mouse button down and keep dragging the frequency cursor. The receiver will tune continuously, smoothly following your hand movements, with the frequency spectrum visible in the background. You can also make the spectrum display update behind your cursor as you sweep. And, if you ever wondered why we made it possible to use more than one WiNRADiO in a single PC - now you will know; the background spectrum can show the situation on a band in real time while you are exploring the frequencies with your second receiver!

The WiNRADiO card: plug it in and transform your PC.

The WiNRADiO software: enjoy the virtual control panel.



The optional WiNRADiO Database Manager

WiNRADiO Advantages

- WiNRADiO front-panel functions are more flexible and powerful than those of a traditional radio.
- WiNRADiO has practically unlimited memory capacity and can be customized for specialized applications.
- New functions, for example databases, can easily be integrated with WiNRADiO.
- A single PC can contain and control more than just one WiNRADiO. Observe activity on several bands simultaneously.
- The processing power of a PC can be used to process WiNRADiO signals, using a Sound Card.
- The new patented tuning feature of WiNRADiO called Visitune™ makes using a radio receiver a new and enjoyable experience.
- No cables and power supplies are needed to use WiNRADiO with your PC. Get rid of that clutter on your desk!
- Programmer's information is supplied for special applications development.
- Specially developed shielding materials and innovative design methods prevent PC-generated interference from entering the receiver.

Easy to install!

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An Accident Waiting to Happen?

Even Aesop knew not to put all your eggs in one basket if you want to guarantee an omelet. It's been a problem for communities like Atlanta who have thrown all their agencies into a single trunked system. Where's the backup when the system goes down? Officers across the country have been scrambling to the phones to get their instructions.

Kansas City public safety agencies have spent two difficult years working with Ericsson to get their new $18 million system up to specifications. Now Ericsson wants their final payment, but the city government says not until they're satisfied.

When the city postponed a threatened lawsuit over the system, one police officer, Robert Blehm and his wife Jill Blehm, filed suit on his own behalf, blaming static in the system for getting shot in the leg when his call for back-up couldn't be heard because of static.

"It is simply inexcusable that this defective radio system endangers the lives and safety of our police officers and firefighters," said Blehm's lawyer, Gary C. Robb.

In Trenton, New Jersey, the fire officers' union has filed a grievance to prevent being forced to move to that city's new $6 million radio-dispatch system installed by Motorola.

"Does someone have to get killed before the administration does something about this system?" asked Policemen's Benevolent Association President Det. Robert Smith. Firefighters say they can't afford to take the risk. In September the system crashed five times in one week.

Trenton Mayor Douglas H. Palmer said, "I don't care about Motorola one way or the other. If they can't [provide the best system] we will get someone who can."

A Busy Year for the FCC

The Federal Communications Commission has shut down two pirates in recent months. One station on 89.9 MHz in Fort Walton Beach, Florida, was operated by James Pierrilus, who voluntarily handed over his equipment. The other, Community Power Radio in Sacramento, California, had its equipment seized when it ignored two earlier warnings. The FCC also won two district court cases regarding equipment seized from unlicensed operators last year in Minneapolis, Minnesota, and in Lutz, Florida.

Another Florida "pirate," however, has been taunting the FCC for two years. Doug Brewer has been operating "Tampa's Party Pirate" on 102.1 FM and has managed so far to stall FCC action. But FCC district director Ralph Barlow says, "Sooner or later I'll nail him."

Brewer is one of many pirates who would like to "go legal." A Virginia attorney has petitioned the FCC to establish a commercial low-power broadcast service in the expanded 1610-1710 kHz band to give such broadcast wannabe's a legal outlet for local radio operation.

CB and the FCC

The FCC reaffirmed fines against two stations operating citizens band radios out of band with high power, one in Melbourne, Florida, and the other in Puyallup, Washington.

The agency has also been conducting a major joint criminal investigation with the US Customs Service into the manufacture, importation, distribution, and sale of illegal CB radios and linear amplifiers. A number of arrests already took place earlier this year. The FCC announced in October ten more defendants charged with 27 counts of unlawfully importing and distributing illegal electronic equipment. They were also indicted with money laundering charges.

Victory for Outdoor Antennas

One good thing has come out of the 1996 Telecommunications Act. On the basis of changes in the communications law, the FCC overturned, for the first time, a local ordinance restricting satellite dishes in Meade, Kansas. Since then, the FCC has preempted three homeowner association restrictions on outdoor antennas in South Carolina, Texas, and Maryland.

The primary basis the FCC cites for the rulings is the following mandate: "On August 6, 1996, the Commission ... [adopted] the Rule, which prohibits governmental and private restrictions that impair the ability of antenna users to install, maintain, or use over-the-air reception devices. The Rule implemented Section 207 of the Telecommunications Act of 1996 ..., which requires the Commission to 'promulgate regulations to prohibit restrictions that impair a viewer's ability to receive video programming services through devices designed for over-the-air reception of . . . multichannel multipoint distribution service. . . .' The Congressional directive to the Commission promotes one of the primary objectives of the Communications Act of 1934: 'to make available, so far as possible, to all the people of the United States . . . a rapid, efficient, nation-wide, and world-wide wire and radio communication service with adequate facilities at reasonable charges. . . .'"

BULLETIN BOARD

Jan 10, 1998: Loveland, CO

Northern Colorado ARC will host its Superfest 9am-3pm at the Larimer Co Fairgrounds, 700 Railroad Avenue. VE exams, commercial exhibits, computer and radio goodies. Tables: Jeanene Gage N0YHY, 970-351-7327; Info: 970-352-5304. Talk-in 145.115 (- offset 100 Hz) or 146.85 (-)

Jan 17: St. Joseph, MO

The NW Missouri Winter Hamfest, sponsored by three local radio clubs, will be held at the Ramada Inn in St. Joseph at I-29 and Frederick Avenue. Mention hamfest for special room rate. Talk-in on 146.85 and 444.925. FCC exams, exhibitors, indoor flea market, free parking. Admission $3 or 2 for $5 at door. Contact Gaylen Pearson WB0W, 1210 Midyett Road, St. Joseph, MO 64506.

We welcome news clippings from your world of radio: Send to Rachel Baughn, editor, at the *MT* headquarters or to *mteditor@grove.net*. Thanks to this month's reporting team: Anonymous readers from various states; Valter Aguiar, Brazil; Bill Battles, New Hampshire; Harry Baughn. North Carolina; Kenneth Borndale, New York; Ed Cichorek, New Jersey; Gary Ellis, New Jersey; Herb Gesell, New York; Ken Hydeman, Ohio; Maryann Kehoe, Georgia; Kevin Klein, Wisconsin; Paul McDonough. Massachusetts; Richard Naness, New York; Bill Orrico N1IPY via email; Roger Parmenter, Massachusetts; Doug Robertson, California; Gene Sinko, Nevada; R. Vane, Maryland; and *W5YI Report*. Special thanks to Alan Henney, and Larry Van Horn.

HR 2369 LEGISLATIVE UPDATE

The Hobby Gets a Merry Christmas

At presstime we received news that HR2369 has gone through markup. Previously, Rep Tauzin, author of H.R. 2369 *The Wireless Privacy Act of 1997*, had sent a "Dear Colleague" letter to all the members of Congress on September 30. In this extraordinary document Tauzin said that H.R. 2369 "would not restrict citizens from listening to noncommercial (amateur and public safety) transmissions."

"The Wireless Privacy Act is not intended to prohibit scanners from intercepting noncommercial mobile radio services, like those in the emergency service or public safety bands. It is designed to protect users of commercial radio services—such as cellular telephone and personal communications services—from having their privacy revealed by electronic interception."

Tauzin also stated in his letter that he was working with the amateur radio community and the FCC to ensure that the legislation narrowly targets its prohibitions to reflect these goals.

Shortly after Tauzin's letter was sent to all the members of Congress, three more Congressional members signed up to cosponsor this anti-scanner legislation, making a total of nine: Markey (D-MA), Oxley (R-OH), Gillmor (R-OH), Eshoo (D-CA), K. McCarthy (D-MO), Manton (D-NY), Wynn (D-MD), C. Peterson (D-MN), and Deal (R-GA).

On October 29, following a continuous barrage of resistance to the broad-sweeping restrictions of the original Bill, a markup session substantially revised the original wording. The salient points are now as follows:

- Modifying scanners to receive prohibited frequencies is now prohibited under USC Section 302(b);
- The FCC shall deny authorization to any scanner which

- receives or may be readily altered to receive PCS frequencies (cellular frequency restrictions were already law);

- decodes digitized cellular, PCS, protected SMR, and encrypted radio communications (probably redundant; all such decoders are already prohibited under the provisions of the 1986 ECPA);

- decodes protected paging transmissions into readable text;

- FCC shall examine and may prescribe methods to regulate privacy of mobile telephone services which are shared with public safety;
- Section 605 of the Communications Act is amended making it unlawful to intentionally intercept, repeat, or publish any communications not intended for the listener except public safety, maritime, aircraft, government, hams, CB, GMRS, private land mobile, and broadcasting;
- marketing and modifying scanners for reception of protected services are subject to penalties as prescribed under Section 605.

Still not addressed is whether individuals may legally continue to own and trade cellular-capable or cellular-modified scanners. We'll continue to analyze and to watch the progress of HR 2359 as it moves through the legislative process. As it stands, however, it appears the radio hobby may have a much merrier Christmas!

For complete text of the revised Bill, see the *MT*/Grove website (**www.grove.net**).

Service Manuals Censorship

The rumor surfaced in October that Uniden, the largest manufacturer of scanner radios, and Radio Shack, the largest dealer of scanners in the United States, had discontinued selling scanner service manuals and schematics to the general public.

The report was confirmed in a phone conversation with Tony Magoulas, Radio Shack public relations, who said the company had stopped selling all of their scanner manuals/schematics to their customers at the request of the Federal Communication Commission (FCC). The FCC denies having made such a request.

Industry insiders have told *MT* that in March 1997, following the *Cellular Privacy: Is Anyone Listening? You Betcha!* hearing conducted by Rep. Billy Tauzin's (R-LA) House Subcommittee on Telecommunications, Trade and Consumer Protection, officials from Radio Shack, Uniden and the FCC met, and the two companies *voluntarily* offered to ban the sale of the technical scanner publications.

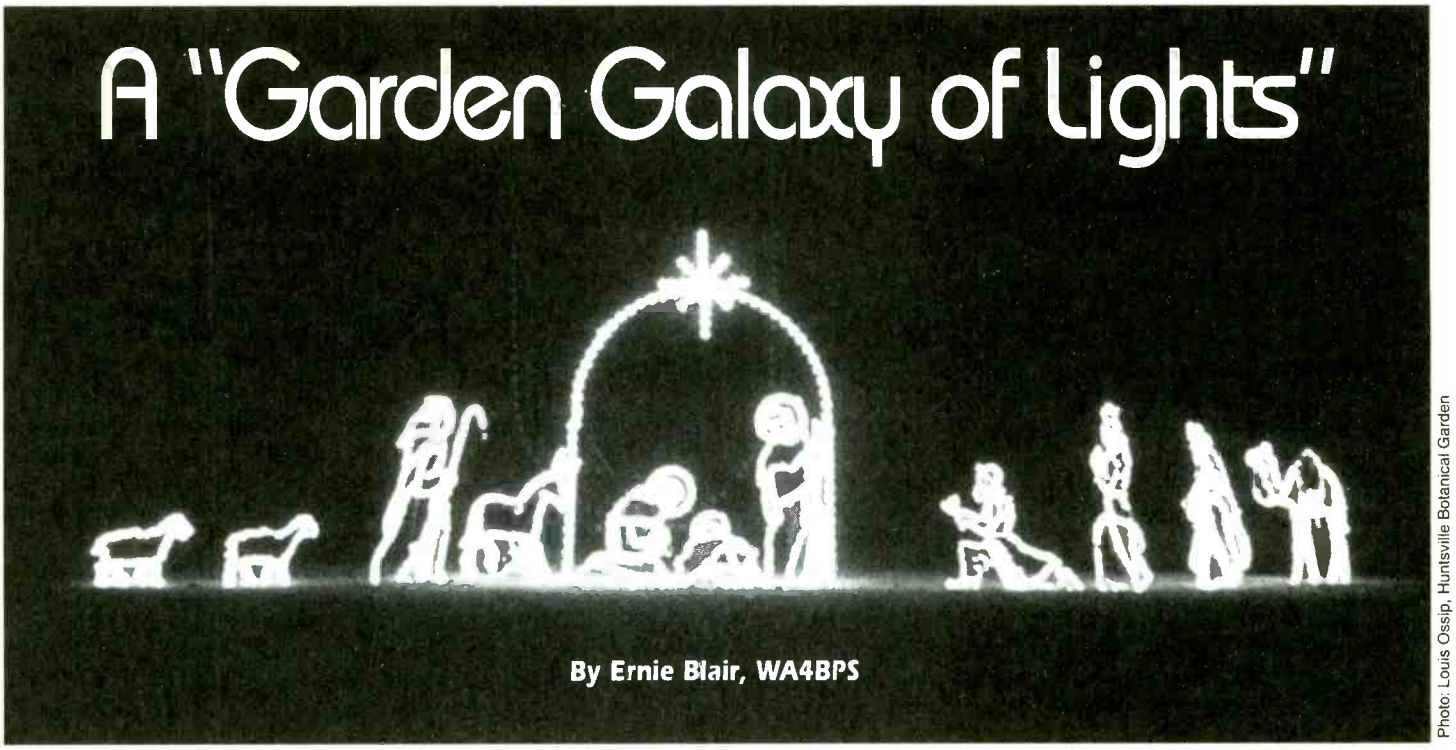
Additionally, Uniden requested that all future scanner certification applications be classified as "confidential" by the Commission to keep the technical information from the public, thus slowing the tide of cellular frequency restoration efforts.

Shortly after the Tauzin hearing, Uniden filed a petition with the FCC to stiffen scanner image rejection specifications (to stop the interception of cellular telephone conversations via the image reception method). Part of this petition included a provision to voluntarily stop producing double conversion scanners which are highly prone to image reception.

According to one press account, the FCC initially turned down Uniden's request to make the technical information private, citing the fact that service manuals and schematics were sold to the general public by the companies themselves. That is when the decision was made and offered by both companies to withdraw the material from the public domain.

Since most of the scanners in Radio Shack's "Pro" line are made for them by Uniden, in order for any ban of scanner technical information to be effective, Radio Shack's technical support system would have to be involved. It must be noted that both companies have large retail interest in the cellular telephone market and are members of the Cellular Telecommunications Industry Association (CTIA). Perhaps the cooperative overtures toward the Commission by the two companies are an attempt to reduce the anti-scanner sentiment that has been riding through Congress.

A "Garden Galaxy of Lights"



By Ernie Blair, WA4BPS

Photo: Louis Ossip, Huntsville Botanical Garden

Micro-broadcasting Brings New Music to Holiday Display

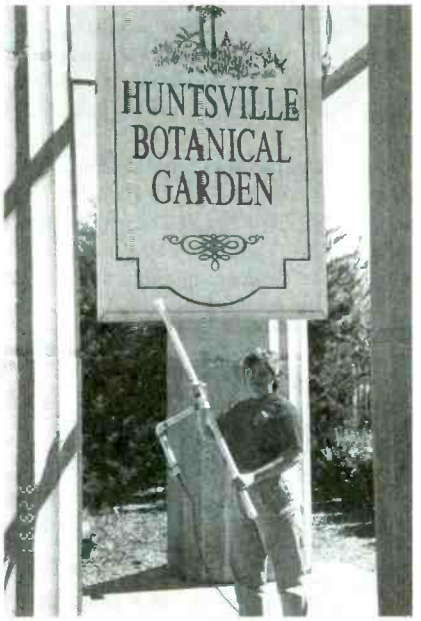
The Huntsville, Alabama, Botanical Gardens celebrates the holidays by filling its 112 acres of beautifully adorned gardens with spectacular lighted displays. About three hundred volunteers expend 13,000 hours of their own energy as well as megawatts of electricity to power millions of lights as a fund raiser for local charities. Donations of canned food and warm coats for the needy are additional fruits of hard volunteer work and dedication.

The "magnificent mile drive" carries viewers through fabulous lighting arrangements depicting swimming swans on a real lake, a space shuttle, a moon-landing, toy soldiers that salute each passer-by, roses, day lilies, a nativity scene, a menorah, Santa Claus and his reindeer, and a winter snow forest that completely surrounds each vehicle.

Huntsville's own Jurassic Park including huge dinosaurs is absolutely breathtaking at night. The "Galaxy of Lights" begins the day after Thanksgiving, and continues throughout the holiday season. (You can find the Gardens' yearly activities on the Web at **www.hsvbg.org**)

Putting a good thing to music

As planning progressed on the project, it became clear that seasonal music would add cheer to the exhibition, but blaring speakers throughout the gardens would not fit into the stately character of the park or the lighted displays. Besides, how would you hear the music with rolled-up windows in winter?



Carol Blair proudly displays the Ramsey MT-100 "antler" which gives outstanding coverage throughout the "miracle mile" loop of lights and sound.

The Gardens requested local radio stations to play holiday music in the evenings for the enjoyment of visitors driving through the "Galaxy of Lights." However, it soon became clear that the local broadcasters' normal programming requirements and the need to run commercials made uninterrupted music broadcasts impossible.

From movies to a galaxy!

For several years now, we have used "microbroadcasting" on the FM broadcast band at the City of Huntsville Park and Recreation's Summer Drive-in Movie Series (see *Monitoring Times*, June 1993). The movie audio is transmitted to car radios, and the results are excellent. It was suggested that perhaps low-power broadcasting — which worked extremely well at the drive-in movies — could provide the upbeat musical atmosphere for visitors to the "Galaxy."

Again challenged by a new radio application and an opportunity to play with our "toys," we dusted off the FM transmitter. First we had to look at whether there was a difference between drive-ins and drive-throughs. We found a lot of similar considerations between the two :

- Broadcasting to vehicles requires a vertical polarization, since most cars have a quarter wave vertical antenna for the FM band.
- The broadcasts must be perfectly legal. I've had my ham license for 25 years now and I'm not willing to jeopardize it—even to help out a good cause.
- Volunteers are involved, so the equipment is subject to abuse and had better be "armor-plated."
- The transmitter must be frequency stable for today's digitally tuned car radios.

But the differences were significant!

- Monaural transmissions were okay for the drive-in, but to get the most from music on hi-fidelity car radios, a stereo signal is required.
- Cars in motion experience a "picket-fencing" effect due to radio-wave multipath if signal strength is lacking.
- The larger coverage area far exceeds the drive-in's oversized parking lot.
- Commercial quality equipment is needed since it is largely unattended.
- A harsher environment is expected for the antenna—meaning cold, ice, and high winds for six full weeks.

Heat up the soldering iron.

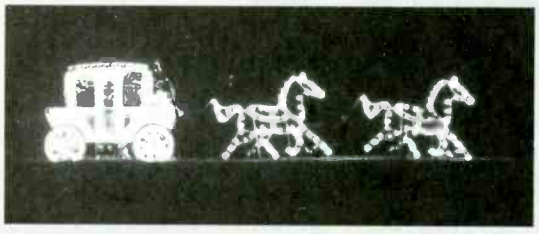
Last spring we built an FME 500-6 transmitter kit from Panaxis Productions for use at the drive-in movies. The FME is reasonably priced for its outstanding performance, and was constructed in a couple of evenings. It is a solid, commercial quality transmitter equipped with an extremely stable Phase Locked Loop oscillator.

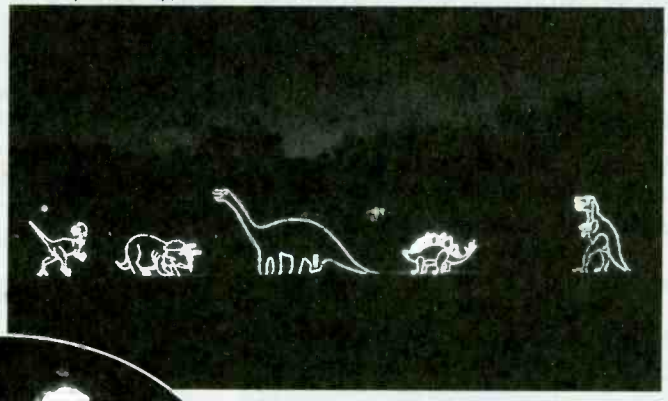
According to the kit's construction plans, "Stability exceeds that of broadcast service standards of + or - 2 kHz for both long and short term drift. Typical drift is less than 200 Hz." We found the FME's broadcast frequency precise and stable enough for even the most touchy of digitally tuned car stereos.

A class A/B buffer follows the direct FM oscillator, rather than the class C output incorporated in many transmitters available to the hobbyist. This feature of the FME design greatly reduces the likelihood of any significant harmonic content in the output. The PLL uses a precision crystal oscillator as a reference and is programmable over the entire FM broadcast band in 50 kHz increments. We

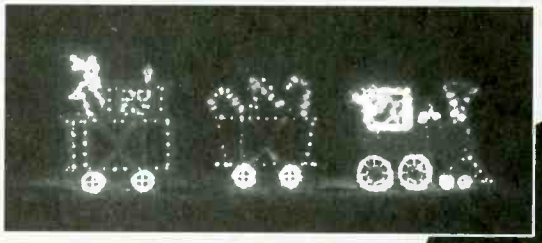
If it's Christmas, This Must be Huntsville

Photos by Louis Ossip, Huntsville Botanical Garden

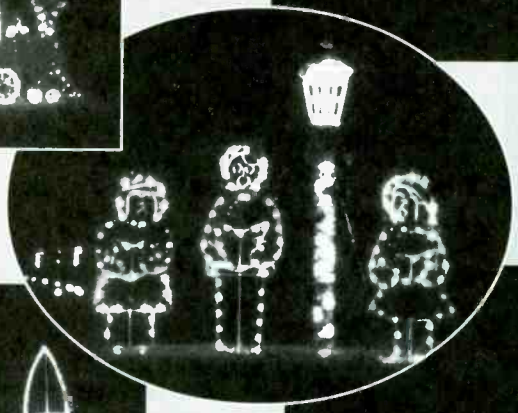


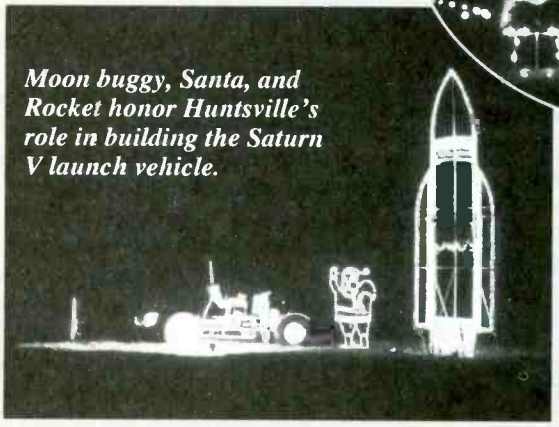


(Above) Huntsville's own Jurassic park features huge dinosaurs. Brilliant at night. A favorite with the kids.



(Top) Horse's legs "run" and carriage's wheels actually turn due to "chaser effect" lighting.





Moon buggy, Santa, and Rocket honor Huntsville's role in building the Saturn V launch vehicle.

Archway at end bids a farewell..."Happy Holidays"

found the Panaxis FME's output to be as clean as it is stable.

The FME's only limitation is that it broadcasts a monaural signal. When the "Galaxy" idea was presented, we ordered the companion kit, the Stereo Generator (SG) from Panaxis. It, too, went together easily in a couple of evenings.

The Panaxis SG adds audio processing and time division multiplex circuitry to generate the stereo signal for the FME. Crystal derived pilot and sub-carrier frequencies, precision IC amps, and double-balanced modulation techniques make the SG's stereo generation extremely clean. The kit's instructions state that FCC commercial broadcast service operating characteristics for FM stereo generation are met and/or exceeded. Our experience with the SG bears this out.

Both the FME and the SG package fit nicely in a single Radio Shack hobby chassis. Together they provide a high fidelity transmission with stereo separation so good that you can remove one of the stereo inputs at the transmitter and hear no cross-talk whatsoever on that channel when tuned by a stereo receiver.

And a good "antler" to boot!

We constructed a Ramsey MT-100 "Tru Match" folded dipole antenna kit and installed it in a vertically polarized position on top of the centrally located administration building at the Botanical Gardens. It was set up in line-of-sight to all areas of the garden drive-through. The MT-100's computer design provides proper impedance matching by incorporating a matching transformer which efficiently couples the broadband folded dipole antenna to the 75 ohm transmission line.

The station in operation.

A ferrite choke core is installed just prior to the feed point to prevent undesired radiation along the coaxial transmission line. We tested the antenna at several frequencies from 88 MHz to 108 MHz and measured an acceptably low SWR throughout the FM broadcast band.

The entire Ramsey MT-100 is enclosed in 1 inch, schedule 40 PVC pipe. We used PVC primer and glue to complete and seal the package. The result was a waterproof and extremely rugged antenna which holds up against whatever water, ice, and winds a north Alabama winter can throw at it.

Fortunately, the Gardens reside in a little valley which confines our broadcasted signal to the areas we wish to serve. With the Panaxis FME and SG, and the Ramsey MT-100 in place, we were set for effective and legal operation for the event.

Let's not forget the FCC

Despite the fact that several microbroadcasters are up and running on a few watts around the country, it is strictly illegal to operate an unlicensed transmitter in violation of FCC Part 15 regulations. It is important to go to every extreme to ensure that any unlicensed transmitter does not interfere in any way with any listener of a licensed broadcast.

We thoroughly checked out the FM frequency we were to operate on — making sure that we could not possibly interfere with legal broadcasts coming from cities anywhere around Huntsville. The Botanical Gardens themselves are removed from the town's residential sections and are set in a small valley which serves to contain our weak FM broadcasts. We tested very carefully to ensure that our micro-powered broadcasts provided no interference to anyone outside of the Gardens.

The Panaxis FME transmitter is designed to operate legally for this kind of application. When built properly, it complies to FCC regulations, Part 15. Power is limited to well under 50 milliwatts. Our testing verified that using such extremely low power in a geographically enclosed area would cause no harmful interference.

The entire compact station — CD player, mixer board, transmitter, power supplies, and computer-grade surge protector — protected from the elements and wayward volunteers in the administration building.

Makin' Music

Music is provided by CDs in rotation on a multi-disc CD player. This provides hours of uninterrupted, non-repeated music. An inexpensive Radio Shack mixer board and microphone allow Garden personnel to make emergency announcements as needed for traffic control or to clear the road for access by public safety/medical personnel. Fortunately, no problems requiring such announcements have arisen. The CD player is started and the transmitter turned on just prior to sunset, and turned off just after the last visitor completes the drive.

Nothing's perfect

There was a period of torrential rain which caused ground-fault protector circuits to repeatedly pop and require resetting. A couple of times during the rains, the transmitter's Phased Locked Loop circuit failed to lock back up when power was restored. This temporarily put us off the air. The situation was remedied by cycling the power on and off a few times, correcting the problem in every case.

We concluded that the PLL lock-up problem was caused by the huge power surges (resulting from megawatts of lighting) driving the PLL logic circuitry into false logic states. The purchase and installation of a computer-grade surge protector at the transmitter solved the problem once and for all.

A big round of applause for the radio hobby!

The music broadcasts brought many compliments from visitors, adding cheer to the visually appealing displays. More than 6000 cars, vans and buses brought over 18,000 people from all over the area. Volunteers as well as visitors were entertained by the music. The event itself was a huge success.

All expenses were recovered in the first year of the lighted winter splendor. Now that the up-front costs are covered, the benefiting charities are assured of profits in future years. Once again, our radio hobby was shared for the enjoyment and benefit of others!

Vendor Addresses:

Panaxis Productions
P.O. Box 130
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(916)534-0417

Ramsey Electronics
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Victor, New York 14564
(716)924-4560

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One Tandy Center
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1 (800) THE SHACK

Radio Navigation in the Baltic and Former USSR

Story and photos by Rimantas Pleikys
Minister of Communications and Information, Rep. of Lithuania

Until 1991 the three Baltic countries — Lithuania, Latvia, and Estonia — and the former USSR territories on the Baltic coast (Russian Federation) had in operation 47 low frequency (LF: 280 to 320 kHz) maritime radio beacons. Out of that number 24 were part of navigation systems and 23 transmitters were NDB's (non directional beacons). The latter beacons were arranged in chains of two to six or as stand-alone transmitters.

The former Soviet Union used five basic types of VLF/LF maritime radio navigation systems. (See Table 1).

TABLE 1: Marine Navigation

System type	Freq kHz	No. of trnsmtrs.	Guaranteed operating range, km.
RSDN-20	11.9 12.6 14.9	3	≤5000
MARS-75	77.6 77.7 77.8 (1)	3 to 4	≤1000
RSDN-3	100.0	3 to 5	1300 - 1600 (skywave ≤4000)
BRAS	1660 - 2110 (2)	3 to 6	150 -350
RS-10	≈1670 - 2110?	3 - 4	?

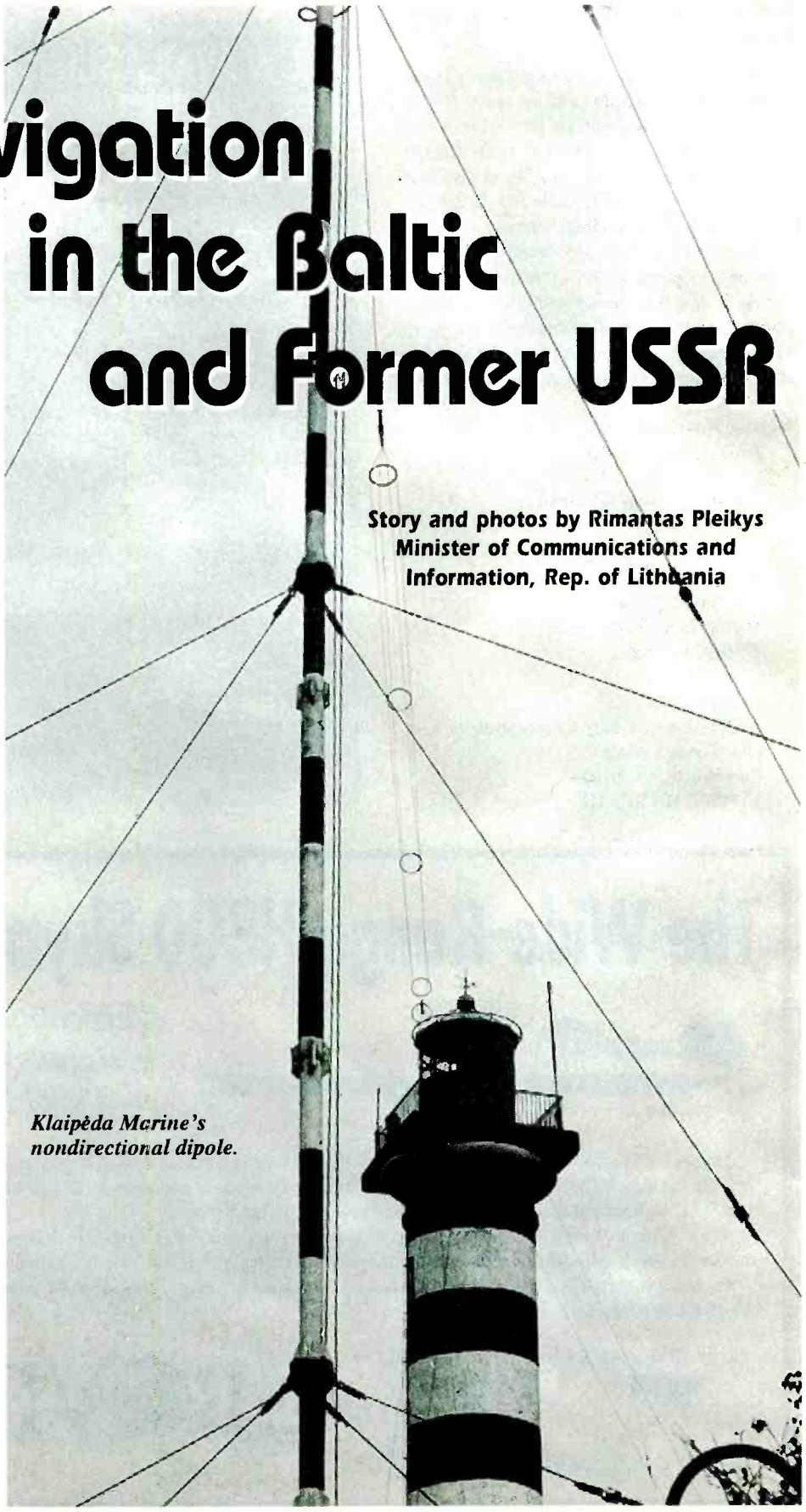
Remarks: (1) MARS-75 system was divided into three frequency groups, each covering 23 frequencies; listed are the major frequencies in the groups
(2) BRAS system was divided up into 18 frequency groups, each covering four frequencies.

The Baltic Chains

Three of these VLF/LF radio beacon systems were used to serve the fishing, commercial, military, passenger, and other ships traveling on the Baltic Sea. They were distributed mostly along the shorelines of Estonia, Latvia, Lithuania, and Russian Federation (Table 2).

In addition to the systems mentioned above, chains of LF maritime radio beacons are also in operation. In a typical six-station chain, every transmitter transmits (is on air) 1 minute and is off for 5 minutes. An "on-air" minute is composed of:

- **Beginning:** two-letter callsign, repeated four times



Klaipėda Marine's nondirectional dipole.

TABLE 2; The Baltic MaritimeNet

Name of chain	System	Radio stations	Freq kHz
Baltic Sea	MARS-75	Tallinn	77.6
		Sovetsk	77.7
		Wustrow	77.8
Gulf of Finland, Eastern part	BRAS	Goat Island	1684.6
		Stirsudden	2105.8
		Kaibolovo	1789.9
		?	1710.9
Liepaja	BRAS	Akmenrags	≈1684 to 1711
		Liepaja	
		Pape	
Semba	RS-10	Taran	1680.9
		Baltiysk	2101.2
		Dalny	1786.0
		?	1707.2
Taran	RS-10	Šventoji	1676.4
		Taran	2095.6
		Rozewe	1781.2
Kuršiu (Curonian)	RS-10	Šventoji	1671.4
		Nida	2089.3
		Taran	1775.9

- **Signal:** 20 to 25 seconds (for the ship to take a bearing)
- **End of session:** (callsign again, repeated twice)

If the chain consists of fewer than six stations then some of them would cycle more than once per 6 minute period. Stand-alone (not part of a chain) NDB maritime radio beacons would work continuously or 1 minute "on" and 5 minutes "off" (during assigned minutes per hour or according to a schedule).

Out of the 23 NDB LF radio beacons that operated on the eastern shore of the Baltic Sea, 19 worked in five chains of six, five, four, two, and two; and four were stand-alone. (See Table 3)

Sometimes the NDB radio beacons are mounted on buoys (ex. 309.5 kHz, Ventspils, "PM"). When a buoy loses its anchor the transmitter automatically shuts down.

The antennas used by these systems were typically "T" dipoles, horizontal or tipped to one side. They are either nondirectional or slightly figure "8" shaped.

The power of the coastal NDB's varied from 10 to 200 watts, with a range of 15 to 120 nautical miles.

NDB's are usually installed at lighthouses. Automatic NDB's operate without personnel at power levels of 50 W or less, and have a range of up to 50 nautical miles; they can be without call signs.

The former USSR manufactured NDB maritime radio beacons and named the transmitters not according to rated power, but according to range of reception. For example, ANRM-50 corresponds to an Automatic Navigational Radio Beacon with a range of 50 nautical miles (translation of Russian language acronym).

TABLE 3: Baltic LF Radio Beacons

NOB radio station	Freq kHz	Callsign	Modulation (1)	Tone, Hz	Operating range, nm
Kaibolovo	294.5	KA	A2A	670	60 (2)
South Aland	294.5	ЮГ	A2A	700	50
Moshchny	294.5	MH	A2A	750	75
Naissar	294.5	NG	A2A	750	75
Pakri	294.5	PA	A2A	950	80
Kübassaare	306.5	KR	A1A	-	100
Osmussaar	306.5	OR	A1A	-	80
Syrve	306.5	SY	A1A	-	100
Kolkasrags	306.5	KL	A1A	-	100
Ventspils (3)	312.5	WW	A1A	-	100
Akmenrags	312.5	AK	A1A	-	100
Liepaja	312.5	LB	A1A	-	100
Klaipeda	312.5	KA	A1A	-	120
Taran	312.5	BT	A1A	-	120
Baltiysk	312.5	BK	A1A	-	120
Mersrags	291.5	MR	A1A	-	15
Daugavgriva	291.5	DG	A1A	-	80
Ristna	318.5	RS	A2A	900	100
Vilsandi	318.5	VD	A2A	850	50
Nida	315.5	ND	A1A	-	20
Irbe	285.5	UX	A1A	-	35
Tallinn	300.5	TN	A2A	1000	50
Ventspils (buoy)	309.5	PM	A1A	-	20

Remarks:
(1) The modulation classes are:
A1A (CW not modulated)
A1B (the same; intended for automatic reception)
A2A (modulation signal, 300 to 1000 Hz).
(2) The actual power of the transmitters used cannot be determined. Figures are based on 25 watts for a 20 nautical mile range; 130 watts to reach 120 nm, etc.
(3) This beacon chain is in operation even now; the status of the others needs to be confirmed.

Standard frequency/time VLF radio stations are not normally used for stabilization of NDB carrier frequencies or for keeping a time synchronization. NDB radio stations operate instead with professional mechanical maritime (ship) clocks.

Every coastal radio station continuously monitors a communications receiver. The operator on duty listens to the signal of his own transmitter and to others on the chain. If an irregularity is recorded he notifies his colleagues working at other radio beacons by telephone.

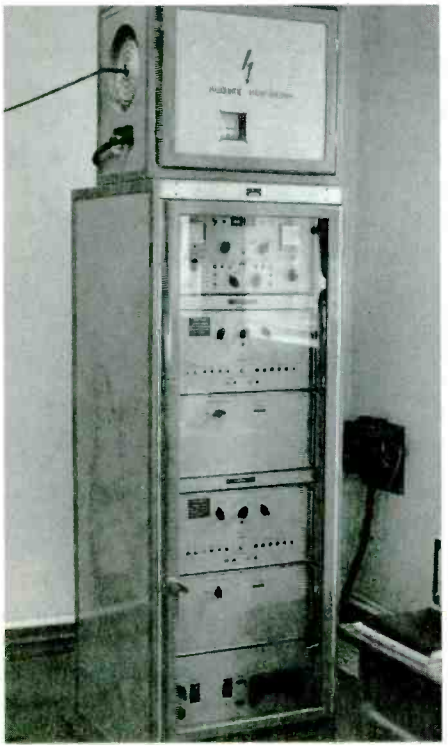
Navigation in Aviation

The transmitter power of LF NDBs used in aviation is typically 400 or 1000 watts. Every radio station is equipped with two transmitters: primary (modulation tone 1020 Hz) and reserve (400 Hz), modulation type A2A.

The antennas are "T" nondirectional dipoles.

Frequency allocations until 1995 were from 285 to 1500 kHz, according to the old USSR frequency allocation. After 1995 they were allocated frequencies from 285 to 500 kHz in accordance with ICAO standards.

In the previously-used system, two transmitter pairs were distributed on each end of the runway. The "closer radio beacon" was located 400 to 1000 meters from the end of the runway, with a 400 W/400 Hz modulation tone;and the "distant radio beacon" was sited



approximately 7000 meters from the end of the runway, with a 1000 W or 400 W/1020 Hz tone. One or the other NDB pair is turned on/off from the Air Traffic Control Tower, depending upon wind direction.

In the currently used system, "the closer radio beacons" are no longer there; both distant NDB's operate continuously and on different frequencies — for example, 365 kHz and 385 kHz (used at the Vilnius International Airport).

Left: The Klaipėda marine beacon transmitter at 312.5 kHz, callsign KA. Transmitter type KRM-300 operating at 130 watts. The system's signals are monitored 24 hours a day using the R-697 receiver (above). The marine NDB transmitter ANRM-502K at Nida, callsign ND, operating 25 W on 315.5 kHz (below).

TABLE 4: LF NDB Radio Beacons in Lithuania

Station	System	Cain	Freq kHz	Remarks
Šventoji	RS-10	Kuršiu (Šventoji, Nida Taran)	1671.4 2089.3 1775.9	Operated until 1991
Šventoji	RS-10	Taran (Šventoji, Taran, Rozewe)	1676.4 2095.6 1781.2	Operated until 1991
Klaipėda	NDB	Ventspils, Akmenrags, Liepaja, Klaipėda, Taran, Baltiysk	312.5	Klaipėda, callsign KA, 120 nm, 130 W, Tx: KRM-300
Nida	NDB	Stand-alone	315.5	Operated until the summer of 1996 at 631.3 kHz (malfunction) Now at 315.5 kHz

Remarks: The data presented in the table above is based upon information in USSR Ministry of Defence document "Radio Technical Aids to Navigation in the European part of the USSR," 1992

TABLE 5: Lithuanian Air Traffic Beacons

Site	Freq FHz	Callsign	Tx Type	Power, W	Application
Juodšiliai (Vilnius)	365.0	VIL	APR-7	1000	Airport
Belmontas (Vilnius)	385.0	AVN	PAR-10S	400	"
Karmėlava (Kaunas)	325.0	KAU	PAR-10S	400	"
Karmėlava (Kaunas)	343.0	KUS	PAR-10S	400	"
Dirvupiai (Klaipėda)	293.0	KLA	PAR-10	400	"
Palanga (Northern)	407.0	PNG	APR-7	1000	"
Palanga (Southern)	432.0	P:	APR-8	400	"
Šiauliai	307.0	SIA	PAR-10	400	"
Šiauliai	307.0	RDV	APR-8	400	"
Šiauliai	290 0	DL	PAR-8SS	250 (400?)	"
Šiauliai	290.0	SZ	PAR-10	400	"
Skaudvilė	372.0	SKD	APR-7	1000	Enroute
Rokiškis	286.0	ROK	APR-7	1000	Enroute

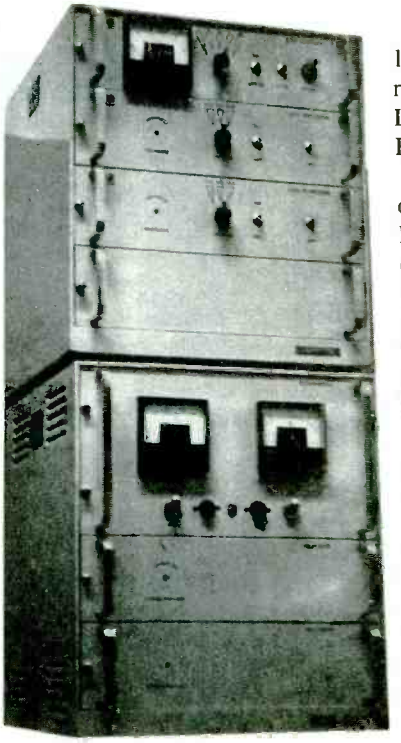


Table 5 is a list of the 13 LF air traffic NDBs registered with the Lithuanian State Radio Frequency Service.

The operating range of aero navigational NDBs runs from 50 km (400 W, daytime) to 500 km (1000 W, nighttime, especially over the sea). The reliable operating range is from 50 to 150 km.

In the event of a malfunction of an aircraft's VHF communications system, the NDB can be used to carry voice communications between the air traffic control tower and the flight crew.

The NDB transmitters used at Lithuania's airports were manufactured in the USSR between 1973 and 1988. Today, modern VOR-DME, DVOR-DME, and GPS navigation systems are being installed. It is for this reason that the old LF NDBs are not being modernized.

Also still in operation at the NDB transmitter site, 7 km from the runway, are the 75 MHz VHF zenith radiation markers.

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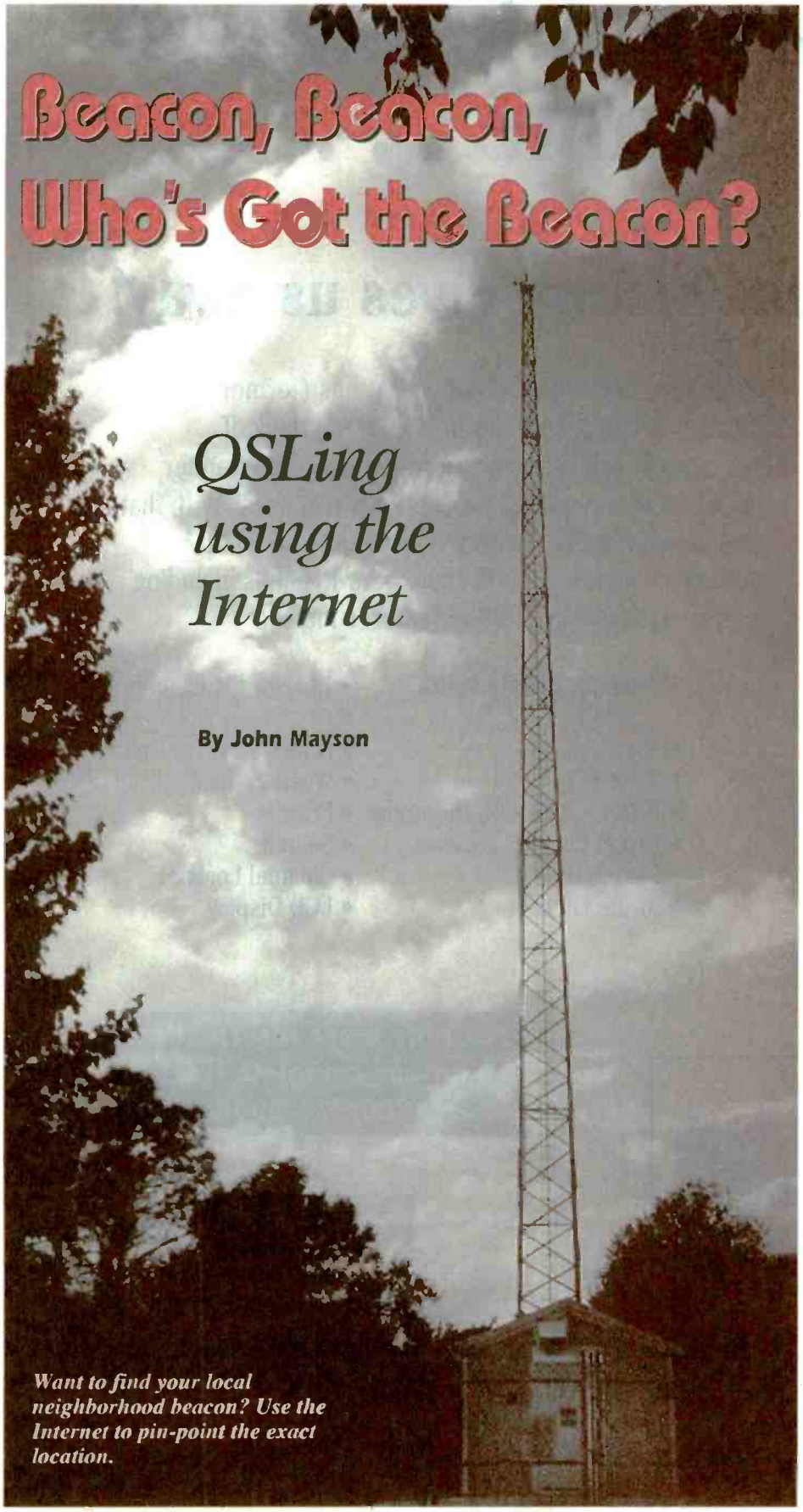
Beacon, Beacon, Who's Got the Beacon?

QSLing using the Internet

By John Mayson



Want to find your local neighborhood beacon? Use the Internet to pin-point the exact location.

After nearly ten years of listening to distant shortwave signals (DXing) and collecting verifications of their reception (QSLs), I discovered navigation beacons. I also learned that listening to and QSLing beacons is a whole new ball game. Unlike global broadcasters such as the BBC and Radio Nederland, operators of navigation beacons do not exist to entertain and inform radio listeners. In fact, they don't care what radio listeners think of their program content. They don't need to attract a wide array of listeners in order to justify their existence to the governments and advertisers who fund them. They exist for one purpose only... serving transportation by providing navigational aids, weather, and other pertinent information.

On the other hand, beacon operators are not ogres: Some of the engineers and technicians who maintain these transmitters are radio hobbyists themselves and understand the desire to receive verifications. Also, some genuinely enjoy learning how their signal is being received hundreds or even thousands of miles away. I have found that the Federal Aviation Administration, the United States Coast Guard, and Nav Canada are excellent verifiers, as are many municipally operated beacons.

Maybe you're exclusively a shortwave listener like I once was and you are wondering what a beacon is and why you even would want to listen to one, much less QSL it!

What is a beacon?

A beacon is simply a radio transmitter, at a known location, on a known frequency, which can easily be identified by the crew of a plane or ship. Instrumentation on the bridge of the ship or in the cockpit of the aircraft helps the crew to determine their location. Beacons may operate from the basement bands all the way into the gigahertz region.

The most popular target of DXers are nondirectional beacons (NDBs). Most NDBs operate between 190 kHz and 535 kHz, right below the mediumwave band. Nowadays even the most inexpensive receivers cover at least part of this band. I have a low-end radio that contains the longwave broadcast band, which ranges from 153 kHz to 279 kHz and is used in Europe, the Middle East, and Siberia. It was on this $40 portable that I became hooked, hearing (from my Florida location) beacons in

Georgia, Louisiana, North Carolina, and in far-away Massachusetts.

An NDB sends out a Morse code identifier usually one to three characters long and radiates a nondirectional signal pattern. Based on these signals, the automatic direction finder (ADF) on board ships and aircraft can then calculate a heading in which to travel. Unfortunately, NDBs are nearing the end of their usefulness. Satellite based technology and GPS systems provide much more accurate fixes.

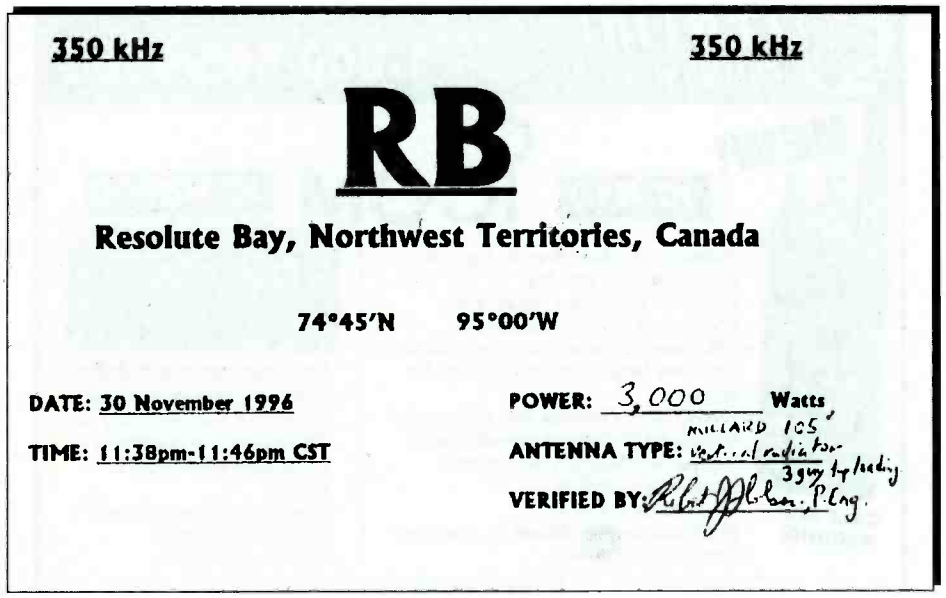
Hearing a beacon signal calls to mind the romantic image of a bush pilot flying his DC-3 across the frozen tundra, braving strong winds, and hanging on to every dit and dah from a far-off beacon to deliver him safely to his destination. The idea of a professional crew flying a corporate jet from Cleveland to Newark by relying on an orbiting satellite to bring them right to the threshold of their desired runway just doesn't have the same appeal.

Why QSL these devices?

I am acquainted with many DXers and I have found one absolute truth about them: they either have the "beacon bug" or they don't. Those of us who do, need no further justification for our hobby other than "because it's there." To those of you who find little to no excitement in listening to a series of Morse code letters sent over and over again, read on! I'm going to make a beacon chaser out of you yet.

One goal of mine is to receive a QSL from every state in the union, be it long-, medium- or shortwave. We have shortwave transmitters in states such as Florida, California, Texas, and South Carolina. We have 50 kW mediumwave transmitters in many states, too, but have you tried QSLing a mediumwave station in this country? Maybe I'm doing something terribly wrong, but I have had little success. And what about states such as, say, New Mexico, which is over 1400 miles from my home in central Florida? Unless I caught an awesome tropo opening, I had hardly a chance of hearing anything from the Land of Enchantment. That is, until I got serious about NDBs: Then I heard and QSLed "RO" on 305 kHz in Roswell, New Mexico.

Maybe your goal is to QSL every country, instead. I can hear a mediumwave station in Freeport in the Bahamas with local clarity, but they are quite tightfisted with their QSLs. It frustrated me that I could not get a QSL from a country a mere 150 miles away, especially when I could hear this country, day or night,


350 kHz 350 kHz

RB

Resolute Bay, Northwest Territories, Canada

74°45'N 95°00'W

DATE: 30 November 1996

TIME: 11:38pm-11:46pm CST

POWER: 3,000 Watts

ANTENNA TYPE: Millard 105 vertical radiator 33m ht loading

VERIFIED BY: Robert Gibson, P.Eng.

Using the Internet can help you QSL the ends of the earth.

on my car radio. I heard and QSLed beacon "BHF" on 326 kHz in Freeport and put another feather in my cap that way. Then, of course, there are places such as Greenland where, quite frankly, QSLing a beacon is about the only way you're going to verify them.

Still not convinced? One thing I love most about beacon chasing and which is often overlooked by DXers is the absence of a language barrier. A Morse code identifier is the same in English as it is in Spanish, French, Russian, and Urdu. Of course, writing the reception report in a foreign language is another story...

The dog that caught the car

You heard a beacon and now you want to send a reception report. Where do you send it? What information do you provide?

When I first heard "GNI" on 236 kHz while living in Atlanta I honestly thought I had the DX catch of the century. My small radio could barely pick up New Orleans' 50 kW WWL on 870 kHz and here I was listening to a beacon using a fraction of the power. I knew the beacon was located in Grand Isle, Louisiana. I addressed the envelope the best I could, but within days the envelope was returned because the postal service couldn't make heads or tails of the address I provided.

Publications such as the *World Radio TV Handbook*, fine as they are, aren't going to help either. They deal exclusively with broadcast stations. So where should you turn? If you have access to the Internet and the World Wide Web (WWW) the answer is right under your nose.

Before I fill you in on all of the URLs and HTTPs, I need to make a distinction. Not all beacons are created equal. Some are owned by the FAA, others by the Coast Guard. Still others are owned by municipalities or even foreign entities such as Nav Canada. Knowing who owns the beacon will determine how you start using the WWW to locate an address to send your report.

Unfortunately, this information generally cannot be found on the Web, for the Web lacks data on marine and most foreign NDBs. Instead, it's available in Ken Stryker's *The Aero/Marine Beacon Guide*, available for $15 from Ken. His guide lists the frequency, ID, shift, location, ownership, and power of virtually every beacon in the world, except Europe.

I will guide you through the process of locating addresses for several types of beacons. The first is a beacon owned by the FAA.

FAA

Let's say you just heard "SQT" on 257 kHz in Melbourne, Florida. First you need data about this beacon. The Internet is probably the best source for this. I know of two sites that provide excellent data on aero nondirectional beacons. One is operated by a ham WZ2B and can be found at **http://www.mdsroc.com/navaid**. The other is maintained on a site at my alma mater, Georgia Tech, and can be found at **http://www.cc.gatech.edu/db1/fly/navaid-info.html**. Using the WZ2B site I find that "SQT" is owned and operated by the FAA. Contacting the FAA about a beacon gets a little tricky. A popular method would be to send a reception report to the FAA in care of Melbourne International Airport. I have found this doesn't always work. In fact it rarely works. It's best to find a nearby FAA office. How? Again, the Internet.

Of all the on-line directories out there, I have found that Yahoo! works the best. Their URL is **http://yp.yahoo.com/yt.hm?&FAM=yahoo&CMD=FILL&SEC=start**. Enter the city and state where the airport is located. In this case I'll enter "Melbourne FL." When it says "Enter a business name or business type" enter "US FAA" (none of this has to be capitalized). I see that the nearest FAA office is located at "551 S Apollo Blvd, Melbourne, FL 32901." I will address my envelope as...

Federal Aviation Administration (FAA)
Attn: Aids to Navigation
551 S Apollo Blvd
Melbourne FL 32901

It is important you include "Aids to navigation" in the address.

Is there an easier way to do this? I'm sure there is, but I haven't found it. Other on-line directories are nice, but I don't always find what I need. A problem with the other on-line directories is you must give a specific city, or else get a listing for an entire state. Could you imagine how long a list of all FAA offices in California must be? And if you list a specific city, you might not get anything at all. Let's say you've heard a beacon in Atlanta. Well, the FAA offices are in College Park, Georgia. (You would've guessed that, right?) Going through Yahoo! has never failed me.

What about beacons not owned by the FAA?

Many beacons fall into this category. If they aren't owned by the FAA then they're most likely owned by a municipal government, a foreign government, or another federal entity like the USCG. First I'll deal with municipally owned beacon "BKV" on 278 kHz in Brooksville, Florida. Checking the WZ2B site, I see that "BKV" is owned and operated by the Hernando County Aviation Authority. The FAA has nothing to do with this beacon.

In these cases, I typically write directly to the airport. The best source for airport information is located at the Georgia Tech site, URL **http://www.cc.gatech.edu/db1/fly/airport-info.html**. I'll search by "geographic place name." I see the closest airport to Brooksville is BKV/Hernando County Airport. Don't be fooled: It's rare that the beacon identifier and the airport identifier are the same! I see the address for this airport is: "16110 Aviation Loop Drive, Brooksville, FL 34609." I will address my envelope as...

Hernando County Airport
Attn: Aids to Navigation
16110 Aviation Loop Dr
Brooksville FL 34609

Again, it's important you include "Aids to

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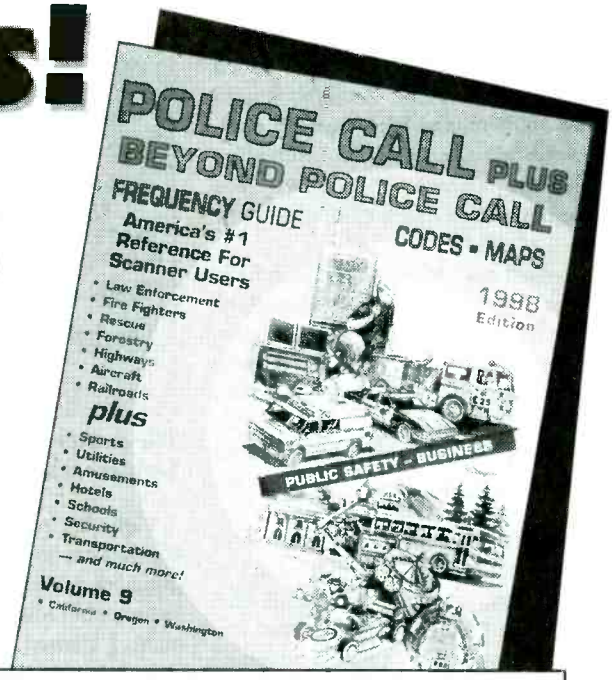

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Since its development in 1991, many of these tiny receivers have been used by universities for atmospheric ("sferics") and geological research. As you walk through sand or over gravel, you will hear the piezoelectric discharges of the granuals as they rub together. Strolling through your home or office, you can audibly detect the panorama of electromagnetic radiations from nearly anything with a power cord on it!

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Navigation" in the address. The person opening the mail might not have the slightest idea where to direct your letter.

Maritime beacons

In the United States a majority of maritime beacons are owned and operated by the United States Coast Guard. Here, the Web breaks down. The NDB related Web sites are dedicated to aviation and contain no information about maritime beacons. So how will you know whether you're listening to one or the other?

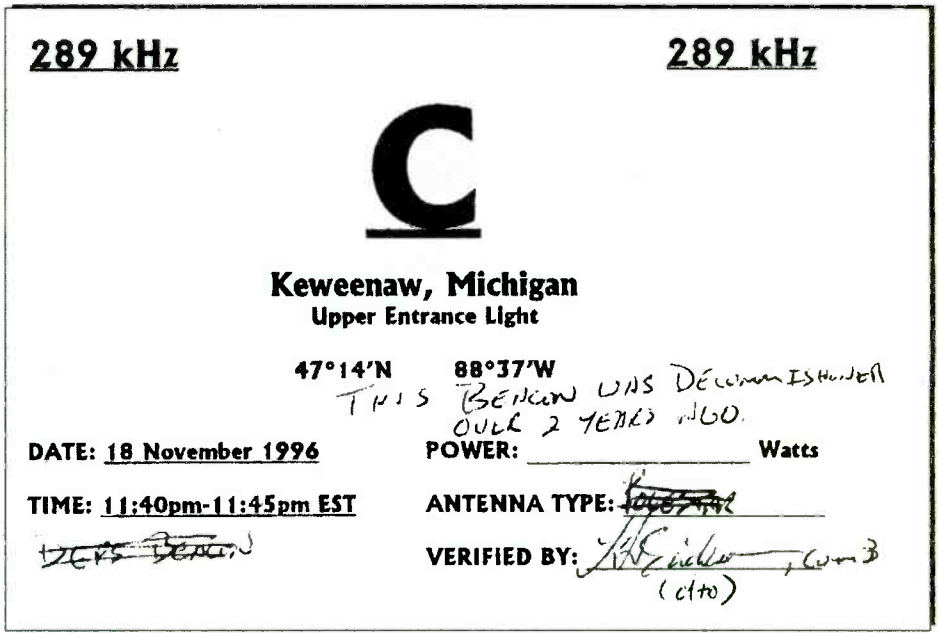
They make it easy for us. Aero beacons in the USA send an endless string of identifiers. Maritime beacons send identifiers for 50 seconds then send a single tone for 10 seconds. This cycle of identifiers and tones continues endlessly. If you hear this telltale sign, you know you have an American maritime beacon which is most likely owned by the Coast Guard.

My intent in this article is to explain how to use the Internet to help QSL beacons and I'm sticking to it. Sure, you will need a guide such as Ken Stryker's beacon handbook, but you will want to access the Coast Guard's web site to uncover where to send your reception report. Once you have used Ken's beacon guide to determine the location of the beacon, visit the USCG Web site at **http://www.dot.gov/dotinfo/uscg/units.html** for address information.

My anti-QSL

On evening I heard what I determined to be "C" on 289 kHz on the Upper Peninsula of Michigan. This beacon sent "C" 22 times for 50 seconds and followed it with a 10 second tone. I quickly started working on my reception report. Visiting the USCG Web site showed me that this beacon was located in the 9th Coast Guard District, headquartered in Cleveland. I sent my report to:

United States Coast Guard
Attn: Aids to Navigation
1240 E 9th Street
Cleveland OH 44199



The author's "anti-QSL" prepared form card. Sometimes the Morse code can be hard even on the best of us.

I quickly received a reply informing me that the beacon I "heard" had been decommissioned over two years ago! In spite of having an amateur radio license with a code requirement, I learned I was a little rusty copying code. I later determined I was actually hearing "Y" on 290 kHz in Yankeetown, Florida. Sadly, this experience will continue as more advanced forms of navigation become available. So much for my intrepid bush pilot.

Our neighbors to the north

Canada has recently gone through a big change with respect to aviation. Until November 1, 1996, all publicly owned beacons were owned and operated by Transport Canada. On that first day of November, all air traffic control centers, airport towers, flight service stations, radar installations, and — affecting us — electronic aids to navigation were transferred from Transport Canada to NAVCANADA, a private corporation.

Some DXers worried that this new private company would end Canada's excellent record of verifying reception reports. I can assure everyone first hand, that Navcanada is continuing this fine tradition. As I type this article, the Navcanada Web site, **http://www.navcanada.ca**, does not list the addresses for their six regions. However, based on my recent experiences with Navcanada, it appears the addresses for Transport Canada are valid for Navcanada. Perhaps they didn't move physically, or Post Canada forwards their mail to them. At any rate, the addresses for the six Transport Canada regions, which coincidentally are exactly the same as Navcanada's six regions, can be found at **http://www.tc.gc.ca/nov1_96/regions_e.htm**. However, you might also want to check Gayle Van Horn's QSL Page located at **http://www.grove.net/~larry/qsl.html** for any address updates for Navcanada.

Writing that report

I said before that NDBs are a whole different ball game. This applies to writing the report, too. Don't expect them to understand all of the technical jargon used by shortwave listeners and hams. SINPO, QSL, UTC, etc. will mean nothing to them. In fact, the entire idea of a reception report may be foreign to them.

Be sure to explain you're a radio hobbyist and why receiving a verification from them is meaningful to you. If you aren't enthusiastic about your hobby, why should they do you the favor of a confirmation? ... Yes, a favor! Their one and only responsibility is to navigation, nothing else. Be polite, courteous, and brief. When writing the report, use time local to the beacon (e.g. if the beacon is in Colorado, use Mountain Time.) Instead of confusing them

TABLE 1: URL Summary

WZ2B NAVAID site:	http://www.mdsroc.com/navaid
Georgia Tech NAVAID site:	http://www.cc.gatech.edu/db1/fly/navaid-info.html
Yahoo! Yellow Pages:	http://yp.yahoo.com/yt.hm?&FAM=yahoo&CMD=FILL&SEC=start
Airport Information Server:	http://www.cc.gatech.edu/db1/fly/airport-info.html
Coast Guard Information:	http://www.dot.gov/dotinfo/uscg/units.html
NAVCANADA	http://www.navcanada.ca
Transport Canada:	http://www.tc.gc.ca/nov1_96/regions_e.htm
MT's QSL Page:	http://www.grove.net/~larry/qsl.html
Author's Longwave Page:	http://www.spacecoast.net/users/jmayson/longwave.htm

with SINPO codes, either write out details of the signal strength, interference, etc. or offer a scale (e.g. 1=poor, 5=excellent, etc.).

Keep in mind, you're asking for verification that you did in fact hear *their* beacon. Simply saying you heard beacon "ABC" on 321 kHz isn't enough. On the other hand, you cannot comment on program content because there is none. There are two pieces of information you can provide which should prove you heard the beacon: the audio shift and the keying rate. The audio signal and carrier frequency of a beacon are separated by either 400 Hz or 1020 Hz. Granted, some beacons, particularly Cuban ones, stray from this convention, but most do conform.

What does this mean? Take beacon "GAS" on 362 kHz in Ohio. It uses a shift of 1020 Hz, meaning the carrier is found on exactly 362 kHz, while the audio is found on 363.02 kHz.. Beacon "SB" in nearby Ontario is also on 362 kHz, but it uses a 400 Hz shift, meaning its audio will be found at 362.4 kHz. If your receiver has sharp enough filters, you should easily be able to distinguish the two.

The second bit of information, the keying rate, should be self explanatory. When I first started DXing NDBs, I assumed all sent their identifiers at about the same rate. Boy, was I wrong! I have encountered beacons with 3-digit identifiers sending as fast as a beacon with a single digit identifier. I will generally time how long it takes the beacon to send 10 identifications (IDs), then convert that into IDs per minute. When reporting on Canadian beacons, I also time the length of the tone between IDs.

Last, but certainly not least, you must include a PFC and return postage. A PFC is a "prepared form card." Unlike broadcasters, beacon operators do not have their own QSL cards, so you need to make your own. You don't need anything fancy. I use the postage paid postcards available from the United States Postal Service and run them through a laser printer.

When sending reports to other countries, where United States postage is no good, I simply use a 4" by 6" unlined index card and include one US dollar to cover postage. If you don't have access to a laser printer, hand stenciling or typing a form letter will suffice.

Make this PFC as simple as possible. I provide space for the technician or engineer to enter the power, antenna type, and a signature or stamp. Remember above all that they are under no obligation whatsoever to provide you with a confirmation. Be polite and make this process as easy as possible for them, and you'll be more likely to experience success yourself.

The "Ultimate" LONGWAVE Receiving Setup

By Jacques d'Avignon

This MW/LW setup may not be pretty, but it's compact, convenient, and it works.

In the mid-1950's, many 12/24 volt LF beacon surplus receivers appeared on the market. At the time, the only low frequency (LF) transmissions that I knew to be found on that band were the air navigation (A/N) beacons between 200 and 400 kHz. Also interesting were the transmissions from the airport control tower on 278 kHz. If I recall correctly, all towers in North America were transmitting then in simulcast using the AM mode on 278 and 3023.5 kHz. (This last frequency surely has a long life: it is still use today as 3023 USB in the aviation field!)

That was my first experience with LF. Living not far from an airport, you could listen to the airport tower on 278 kHz and to the weather broadcasts at HH+15 and HH+45 being transmitted from the A/N range transmitter. All these small surplus receivers contained a switchable audio filter centered on 1020 Hz used to block off the A/N range signal so that you could hear the broadcast on the same transmitters. In case of an emergency, the control tower could also transmit on the beacon frequency, which is also when the audio filter would be used.

Low down communications

What else was down there? Eventually I could hear other signals but they were very weak and unintelligible. Finally, I took the receiver on a mobile expedition and suddenly, while passing under a high voltage transmission line, some voice and telemetry signals appeared. The power companies were using the lines as a telephone line between the various power stations!

This practice, I believe, no longer exists in North America but is still in use in New Zealand. Hey, if you are running wires all over the countryside why not use them for carrying messages and telemetry also? You had to be careful how you loaded the telephone circuits to the AC high voltage lines, though. If you did not follow the proper procedures you could be in for a shocking experience .

That same transmission mode, called "Carrier Current" (CC), was also used by the telegraph companies on the lines along the railroads; it was possible to multiplex many carriers on the same line and have as many as 50 different "circuits" on the same pair!

There were, in 1950/60, very few receivers commercially available for LF monitoring and the sensitivity was not very good. Some receivers were being imported from Europe,

where LF was (and still is) being used for broadcasting purposes, but the LF "craze" had not yet hit North America.

In the late 50's and early 60's the practice of broadcasting weather reports on the air navigation range stations was abandoned. With the advent of newer navaids, the range stations were decommissioned and turned into NDB's. That was easy to do: remove and scrap the outer four towers and leave the center one! Being involved in the weather business, the demise of the weather broadcasts was also when I lost interest in the LF part of the spectrum.

Today, there are a few remaining stations transmitting weather information on the LF NDB. One of those stations is Logan Airport in Boston. TUK 194 kHz in Nantucket also has weather information superimposed on the carrier.

LF Revival

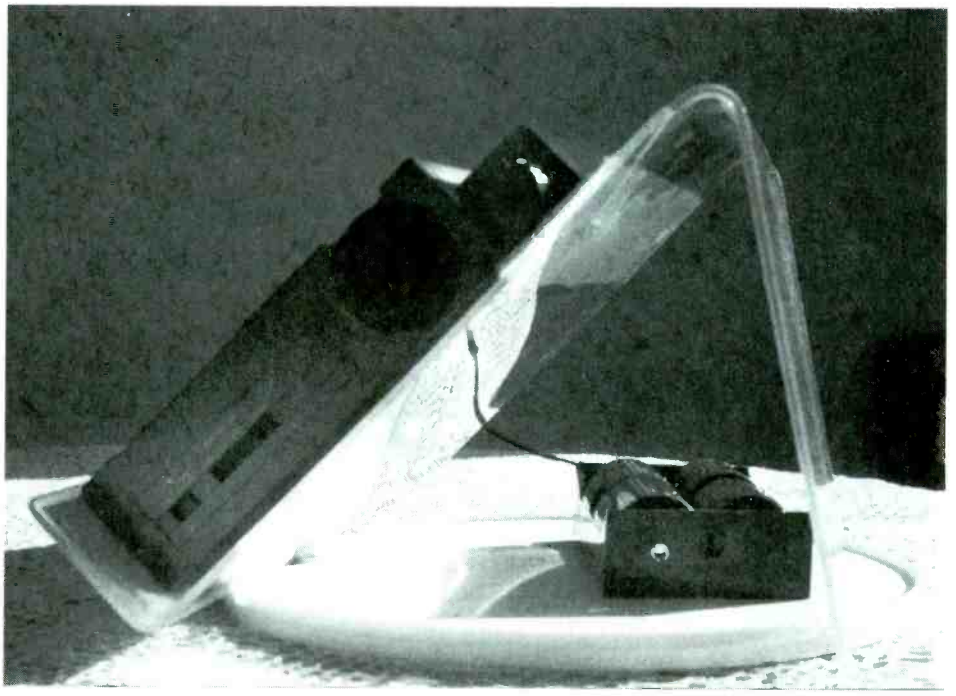
However, for the past three to four years my interest in LF has been rekindled. I suddenly started hearing about NDB DXing, the possibility of listening to the European broadcasters on LF, and other "weird" things. The receivers covering this band were now available, not only as desktop models, but also as portables.

The sensitivity of the new receivers was very good, but another factor was now coming into play to discourage you from listening in those frequencies: RFI (radio frequency interference) "wall to wall!" The street light outside your front door, your neighbor's light dimmers, the children's VCR, the touch lamps in the neighborhood, etc... (Notice that there is nothing in this list that is located in *my* listening room!)

Another transmission can also cause you some major problems: LORAN C on 100 kHz. I used to live less than 150 kilometers from the LORAN transmitter in northern New York. Anything that you install ahead of and plug directly to your receiver is liable to cause intermodulation problems, and in my case it did, big time! So some experimentation was in order.

The ideal LF station

After about a year of trial and error, I finally came up with the "ultimate" setup for LF monitoring. It is completely portable and not connected to the house current. It can thus be taken to some "quiet" area like a deserted island, the top of a mountain, a national park, or wherever the RFI is absent or at least greatly subdued.



Side view of the author's MW/LW setup shows the Sony ICF2010 with Q-Stick on the custom-molded plastic stand and turntable. External battery bracket holds 4 cells, instead of the three cells used in the internal compartment.

The receiver is a Sony 2010 with the two Kiwa filters installed. If you plug anything in the external antenna socket of this radio, the LF part of the spectrum becomes very "dead." This is due to a built-in attenuator that is switched on when the plug is inserted in the socket. This attenuator works very well from 150 kHz to about 2 MHz.

To cure this problem, I coupled a boosted signal to the internal ferrite of the Sony by using a "Q-Stick Plus" manufactured by Radio Plus (3635 Chastain Way, Pensacola, FL 32504). The unit that I use can be used for LF and MW. Besides being a booster on its own, this coupler can be used to inductively feed an antenna signal to the Sony, thus by-passing the attenuator described above.

At the Mohawk Valley DX camp in No-

Another view of the slanted support bent to accommodate the Sony and the Q-Stick.

vember 1996. I used this coupler to inductively feed the signal from a 2000-foot antenna to the Sony. Feeding a 2000-foot antenna directly into a 2010 is asking for trouble at any time, and more so if you suspect that there is precipitation static building up on the antenna .... The long antenna did not really add much to the signal strength already being boosted by the Q-Stick.

While the receiver and coupler worked very well together, the physical arrangement was very unstable. The Q-Stick also has to be positioned correctly (within 0.5 inch, more or less), over the internal ferrite to perform properly. What do you do? I went to my local plastic shop and had a slanted support bent to accommodate the Sony and the Q-Stick. See photo above. The support was then modified and added on to.

The strip behind the coupler is a band of Velcro. Small Velcro tabs are glued on the coupler, and once the proper location has been found, the coupler is pressed on the Velcro strip and will no longer move. The exact location of the coupler in relation to the internal ferrite is very important; by using Velcro you can position once for LW and forget it during your monitoring session. If you use the same setup for MW, you move the coupler to its new position, attach it to the Velcro, and you are in business. In my case, it is easier to reverse the coupler and have the tuning knob on the left. The Sony also has Velcro tabs underneath fastened to another strip to keep the receiver from moving around.

Finally, when doing some NDB DXing it is important to be able to move the receiver and ferrite antenna in azimuth. You can then null out some beacons and hear others in the null produced. In my case it is possible to null out a beacon on 391 kHz (3B) about 100 km from here and hear in this null the Puerto Rico beacon (DDP) on the same frequency.

This nulling ability is achieved by mounting the plastic holder on a kitchen turntable. This is simply a Rubbermaid turntable as normally used in your kitchen cupboard. The photographs clearly show that this holder is not a piece of art. It was designed in stages as each part was deemed to do the job correctly. Finally all the pieces were assembled to make a comfortable operating unit that can be taken in the field for "serious" NDB DXing.

Power to spare

If you are working in the field and wish to have some well-defined and clear nulls, you would want to have the equipment operated from batteries. It is a known fact that the 2010 does "eat" batteries at a good rate. If you decide to use nickel-cadmium batteries you will face two unrelated problems. The first one is that you are liable to get a worn battery compartment cover on the back of the 2010 as you keep opening and closing this compartment to change the batteries. The second problem is of a more technical nature.

The Sony compartment is built to lodge three D cells. The normal voltage of a set of fresh alkaline batteries would be 4.5V. If you use Ni-Cd instead, the voltage of three freshly charged batteries will only be 3.6V. It is a known fact that the 2010 will start to act strange and the audio will gurgle badly when the supply voltage drops around 3.2V. So when you use Ni-Cd batteries, you do not have a wide margin of operation.

Checking the voltage of the AC adapter sold with the 2010, the voltage was measured at 5.5V! Some experimenters are reported to have operated the Sony with a supply of 6.0V without problems. So why not go that route of slightly higher voltage and install the power source outside the battery compartment of the receiver? Kill two birds with one stone!

A 4-D cell holder was purchased from the hobby store and a connector compatible with the 2010 DC input socket was wired in. This battery holder is loaded with four D Ni-Cad cells and the start voltage is just over 5.2V after the batteries have been charged for a 12 hour period. It is interesting to note that one set of batteries will operate the 2010 for 12 hours and take 12 hours to recharge. So with two sets of batteries you could monitor on a continuous basis. The battery holder is Velcro'ed in under the receiver as you can see in the photo on page 23.

To date the results on LF with the combination of the Sony 2010 and the Q-Stick have been very interesting; the European broadcasters can be heard frequently from my living room and from more quiet locations. At the DX camp the reception of the Irish broadcaster on 252 kHz was armchair listening. The complete setup does offer the possibility of DXing in a quiet RF environment.

Now if you add a "Magic Wand Portable Antenna" (*Monitoring Times,* April 1996, page 15) and an antenna tuner, you have a full DC-to-Daylight monitoring package. Your only limitation will now be your power source. This problem was finally solved for me by using a 12V gel-cell battery with a DC to DC dual voltage converter. One output of the converter is 4.8V for the Sony 2010 and the other is 6V for the tape recorder. This arrangement will keep you monitoring for over 36 hours non-stop: that is when the gel-cell quits or you fall asleep.

Have fun and listen down below!

Code Practice Oscillator: A Good First Project

By Arthur Lee, WF6P, and Herb Decker, KJ6KS

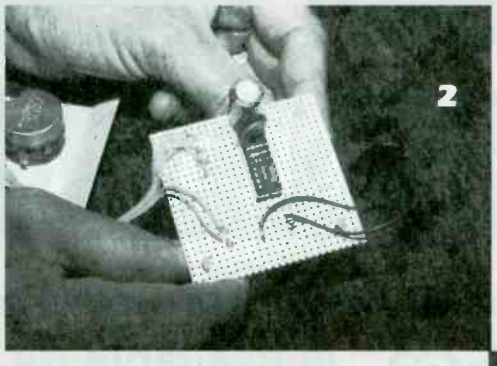
Probably the single, most useful piece of equipment a prospective ham can own is a code practice oscillator and key. As a teacher of Novice classes for the past five years, I have found that it is one of the most often asked-for items, yet an item that, if purchased commercially, can be quite costly. Gone from the shelves of most popular electronics supply houses are the old easy-to-assemble code practice oscillator kits and keys which were so plentiful, inexpensive, and readily available in the past. So, it appears that the only real solution today is to resort to the good old-fashioned ham tradition of do-it-yourself.

Many popular ham magazines have published practice oscillator diagrams over the years; surprisingly, the one or two we tried didn't work! Out of desperation, we turned to page 36-6 in the 1987 (and later) edition of the *American Radio Relay•League Handbook*. The diagram there, with only minor modifications, worked fine.

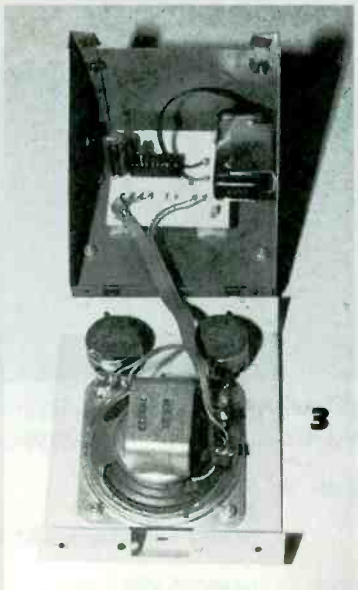
Listening to beacons is a great way to learn Morse code. While you're at it, why not try your hand at sending it, too? Following is a simple circuit for beginners to build to provide an audio tone as you practice tapping out the code.

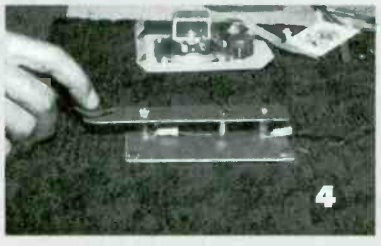
For the Basic Radio Communications course at Cabrillo College, Aptos, California, electronics instructor and lab technician Herb Decker, KJ6KS, assembled one dozen code practice oscillators, using on-hand materials *costing not more than $5*, less battery.

Due to non-availability in the local area at the time, and to reduce costs, the telegraph keys were ingeniously fabricated from scrap PC board materials and other common hardware by Loren Washburn, KB6NEO. The assembled code practice oscillators were placed within metal speaker boxes left over



(1) A wire-wrap gun is used to assemble to the perf board but hand wire-wrap tools work just as easily. Wire-wrapping techniques can be learned and perfected after a few minutes of practice. (2) Top view of the wired perf board shows location of components and connections which are soldered to the upper portions of the wire-wrap posts. Note that computer ribbon cable is separated for soldering to connections. Battery power leads are shown at right.





(3) Oscillator, fully assembled and ready for closing of the case. Plastic stand off posts snap into holes drilled into base of metal speaker box. The 9v battery holder is formed from scrap aluminum and screwed to the side of the cabinet. Pots are mounted below the speaker for external adjustment of tone and volume. (4) The manual key takes only a few minutes to fabricate from copper PC board scraps and screws. Note that the contact point gap is adjustable. PC board has sufficient springiness for comfortable feel while operating CW. (Finger position shown is for setting correct point gap purposes only, not for operating.) (5)The complete unit is low in cost, small in size, big in practicality, and easy to construct and use.

from previous class projects, although any wood or plastic box would also do. These boxes gave the projects a "professional" look, housed the components, and protected them from frequent student handling.

Construction Techniques

The actual construction was done using wire wrap tools and wire wrap components. The whole kit was first "breadboarded," using proto board (available in most electronics catalogs). The insertion of a 1 K ohm pot between the capacitor C3 and the speaker terminal LS1 enabled students to control volume as the oscillator normally puts out excessive sound through the small speaker and is quite loud.

The 555 timer chip was mounted on a 20 pin wire wrap socket. A 100mfd capacitor at 50 volts was substituted for C-3, as they were on hand in suitable quantities and were smaller in size. Wrap post pins were used for connections with wire wrap on the bottom and soldering on the top. The C-3 capacitor was soldered to the wire wrap pins after first passing the pigtails through the upper surface of the perf board. The resistors and mica capacitors were pressed directly into the 20 pin socket for a friction fit.

For a pleasing effect to avoid wiring "jumble" and to provide additional strength, wiring from the circuit board to the speaker and pots was computer ribbon material. Spacers, as legs for the perf board, were plastic stand-offs. The pots used for tone and volume control shown in the photos were the only ones available in "junk boxes" and were without protruding shafts or knobs, requiring a screwdriver for setting.

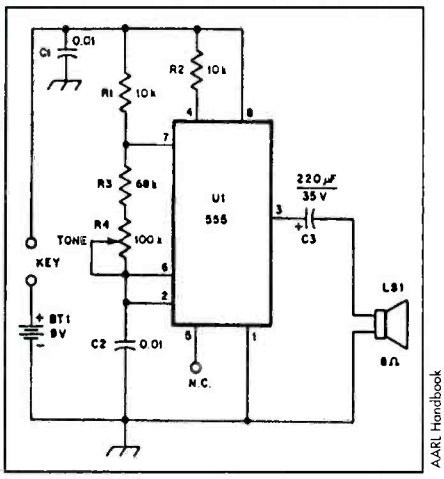


Fig. 1 — Schematic diagram of the code-practice oscillator. Radio Shack part numbers are given in parentheses.
BT1 — 9-V battery (23-553).
C1, C2 — 0.01-µF capacitor (272-131).
C3 — 220-µF, 35-V electrolytic capacitor (272-1029).
LS1 — 2-in loudspeaker, 8 Ω (40-245).
R1, R2 — 10-kΩ resistor, ¼ W (271-1335).
R3 — 68-kΩ resistor, ¼ W.
R4 — 100-kΩ potentiometer (271-220).
U1 — 555 IC timer (276-1723).

Assembly time of the oscillator by an inexperienced person should be about two hours, including drilling of holes in the perf board and mounting in the box. An experienced person can wire wrap the circuit board in about 23 minutes.

Key Tricks

Loren made the keys from scrap copper clad board, used for PC boards, which provided the necessary conductivity and "spring." The metal mounting posts were of hex spacer material, drilled and tapped to receive the hold down screws. The upper arm was insulated from the base. The contacts were made of standard screw hardware and locknuts, which allowed for adjustment. Rubber feet were glued on the base to keep the key from walking around the operating table when in heavy use.

Performance

After the kits were assembled, they all tested perfectly; however, an initial miswiring resulted in the chip being powered without an audible tone, thus bleeding down the batteries after one week. Tracing out the wiring diagram revealed the problem, which was easily and quickly corrected.

Both tone and volume controls were mounted on the front panel for ease of adjustment. Once in service, the keys and practice oscillators were found to be excellent, and easily as good as those we tested that were commercially built. Volume from the 2 inch speaker was more than sufficient and could be heard anywhere within a large room, even one of classroom size.

On Preparing for Morse Code Tests

By Arthur Lee WF6P

Although Morse code has been superseded by modern high speed computer communications, it is still a requirement for all amateur radio licenses but one. On the other hand, while the new question pool has become a tough hurdle to jump for most of us, the good old-fashioned Morse code has remained the same. Actually, learning the code has become easier than it was in the past. To help further, code exams have become easier as well. Today, examiners are given the latitude of giving multiple-choice tests where the examinee merely makes an "educated guess" at what was sent.

A proliferation of low-cost, computer chip code generating devices make learning on your own a breeze. Older, but still effective code tapes are available from mail order catalogs. The master learning tool, however, is the computer. Code teaching software reduces the drudgery of code learning, making it a "fun" experience. This software is widely available from ham clubs or computer user groups.

The American Radio Relay League (ARRL) transmits Morse code training sessions over eight different frequencies at various times each day, allowing you to practice copying code at speeds from five to 35 words per minute. Check **www.arrl.org/w1aw.html** for the schedule. Another great way to increase your code speed is to simply tune in and copy other amateurs while they are conducting their "QSOs."

Taking the Code Tests

Now comes the "proof of the pudding"—test day. The FCC has permitted volunteer examiner (VE) teams to allow the examinee to copy code by hand in the dit and dah mode; that is, write out the characters on paper as dots or dashes. To most code copiers, if you already know the character by sound and rote memory, it is simpler and quicker to jot down the character in the first place. However, it may act as an inducement to take the test.

Most VE teams use pre-taped tests and multiple-choice answers. Guessing is allowed, if not downright encouraged. Why not? If a ham is going to actually *use* the code, his license level doesn't mean he has to send and receive that fast.

As a VE administering code tests I urge candidates to give it a try. Any characters copied can be a clue to what the answer is. Example: If a call sign has an "X" in the answer and it is the only one on the answer sheet, and *somewhere* on your copy sheet you have an X, by process of

(Continued on Page 102)

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Egads, Foiled Again!

Fraud is on the run, according to the Cellular Telecommunications Industry Association (CTIA). At the annual Wireless Fraud '97 conference held recently in Orlando, industry investigators, law enforcement personnel, and security vendors gathered to discuss the latest efforts to combat fraud in cellular systems.

From its peak in 1995, losses due to "cloned" cellular telephones (see *PCS Front Line*, January 1997), the most significant source of fraud, have dropped in most major markets due in large measure to two technological solutions: authentication and radio frequency fingerprinting.

Authentication prevents cloning by requiring a cellular telephone to correctly answer a cryptographic challenge using a key that is known only the network and the legitimate phone. Since the key itself is never transmitted over the air, anyone monitoring the channel will be unable to answer the challenge correctly.

With at least 30% of cellular telephones now in service and almost all newly manufactured phones supporting authentication, the industry expects cloning to be virtually eliminated in the next few years. Even now, carriers that have already implemented authentication have seen drops in cloning fraud of 90% or more, with a corresponding relief in network congestion. As a representative of Los Angeles Cellular put it, "We were building additional capacity to support the cloners."

Radio frequency (RF) fingerprinting systems prevent fraudulent calls by comparing the "signature" of the cellular telephone transmitter to a stored copy. Each cellular telephone transmitter has a series of parameters that make it unique, including phase noise, rise time, harmonics, peak deviation, and other characteristics that vary from phone to phone. When a cell phone attempts to access the network with a signature that doesn't match the one on file, the call is "knocked down" and the presumed cloner is shut out.

To date more than two millions calls have been knocked down by RF fingerprinting systems, although the two vendors of such systems at present cannot share fingerprint databases with other. Cellular telephone "signatures" gathered on one vendor's system cannot be used on the other, leaving a gap that some fear may be exploited.

Future Fraud

Overall more than $300 million has been invested in antifraud technology. As attacks on the "air interface" become less and less successful, more attacks are expected on the cellular network, including hacking attempts on the computers that store customer data. More than 22,000 telecommunications switches are vulnerable to outsider penetration, and many of these are in unmanned facilities and administered remotely, protected only by a simple username and password. With the advent of competitive local service, more entry points into the telephone network will open up, increasing the risk for intrusion.

"Social engineering" of company employees by outside persons seeking information under false pretenses is also on the rise as new carriers scramble to staff their operations. Checking the background of these employees is important, as unscrupulous employees releasing unauthorized information also top the list of a telecommunications carrier's security weaknesses.

Because wireless carriers are in the credit-granting business, they are subject to the same kinds of fraud that other companies suffer, such as credit card and other credit-granting businesses. Increasing numbers of criminals are using false identification to apply for service with no intention of paying the bill. This subscription fraud is currently the fastest-growing area of wireless crime, and industry efforts are underway to apply procedures and policies from the financial services arena to limit such losses.

The CTIA sees itself as doing all this for the greater good of society, since the cellular telephone has become the "tool of choice for crooks" because of the anonymity and mobility it provides; by preventing fraud they help stop other crimes in which these thieves are usually involved.

Pager Eavesdropping

More than 40 million Americans now carry pagers, but messages sent over these broadcast systems are subject to interception as two recent, high profile events indicate.

In August, three men were arrested in New York and face a number of charges, including violating the Electronic Communications Privacy Act (ECPA) for allegedly intercepting pager messages destined for senior members of the New York police and fire departments as well as the mayor's office, the bomb squad, and a district attorney's office. The men are employees of Fort Lee, New Jersey-based Breaking News Network (BNN), which provides immediate notification of significant fire and news events in the Mid-Atlantic region via pager to thousands of subscribers, primarily media organizations including the Associated Press, the *New York Post*, and several New York television stations.

The U.S. Attorney's office claims these pager messages, deemed "too sensitive" to be broadcast over police radio, were received by BNN and contained such details as the location of state and federal officials, witnesses, and injuries to police officers. They also warned that "if you are using a paging system, your communications may not be secure... No governmental agency or business is immune from this illegal monitoring."

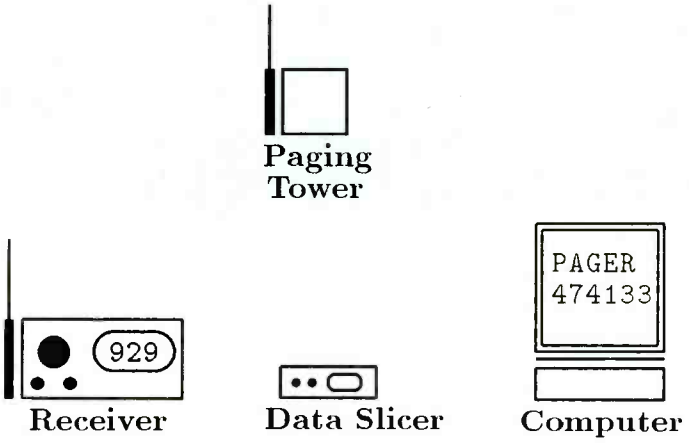
It appears that messages were intercepted via a radio receiver and pager decoding software as well as a number of "cloned" pagers. A person familiar with the case has suggested that BNN was caught retransmitting a false message deliberately sent out to trap them. If BNN passed along incorrect details that could only have come from the false message, police could prove they were involved in pager interception.

This is believed to be the first-ever prosecution for the interception of pager messages. If convicted, each of the three men could face five years in prison and a $250,000 fine on each charge.

■ White House Pagers

In September a transcript was posted on the Internet of what appeared to be messages from the White House staff and Secret Service paging system operated by the White House Communications Agency. The messages, sent during an April visit to Philadelphia by President Clinton and gathered by commonly available pager interception software, reveal on a minute-by-minute basis the departure of Clinton from Andrews Air Force Base, his arrival in Philadelphia, and his travel to Foster Stadium and later to the Wyndham hotel. Other messages show telephone callers waiting for the President that included Bob Dole and Chelsea Clinton, as well as a number of mundane messages regarding food, keys, sports scores, and personal comments.

The transcript was compiled and released to highlight the potential security risk inherent in such unencrypted broadcasting. A White House spokesman downplayed the event, stating that White House employees were told that the system was not secure and "as long as people are using the system properly and not putting sensitive information on pagers, there's no cause for concern."



■ Encryption

These events and arguments have not swayed law enforcement, as FBI Director Louis Freeh recently suggested to a Senate committee that use of strong cryptography by American citizens should be banned, since a potential criminal could hide their telephone calls and electronic mail behind a privacy shield that the FBI could not pierce.

The FBI has also been aggressive in strong-arming telecom equipment providers, according to the Telecommunications Industry Association (TIA). Under the 1994 Communications Assistance to Law Enforcement Act (CALEA), equipment manufacturers are required to provide wiretap access to law enforcement agencies under a set of industry agreed-upon guidelines. TIA is upset that the FBI has shut out equipment providers and attempted to convince carriers to purchase wiretap features that are more intrusive to privacy than the 1994 law allows.

The carriers themselves have also complained of the FBI's heavy-handed tactics in forcing implementation that goes beyond legal boundaries. In addition, this summer the CTIA requested that the FCC intervene and arbitrate the ongoing dispute between the FBI and the telecommunications industry as to the technical standards of the wiretap law. The final outcome of this remains uncertain as the October 1998 deadline for implementation of CALEA nears.

That's all for this month. More details and web page links are available at **http://www.grove.net/~dan**, and I welcome electronic mail at *dan@decode.com*. Until next month, happy monitoring!

FIGURE 1: Sample messages from Breaking News

NetworkNEWARK,NJ(ESSEX CO) W/F: 991 FRELINGHUYSEN AVE ENG.19 RPTS A FIRE IN AN 11TH FLR APT. TROUBLE FORCING ENTRY. RESCUE 1 RPTS AN VICTIM IN CARDIAC ARREST ON THE 11TH FLR PERFORMING CPR. SIGNAL 11 (A/H'S) BNN/145
9/6/97 4:16 PM

U/D SMITHFIELD RI- PLANE HAS EXPLODED AND IS ON FIRE. ALL VICTIMS ARE BELIEVED TO BE REMOVED PRIOR TO THE FIRE. BNN134
9/6/97 5:45 PM

QUEENS,NY *PERP SEARCH* 41ST AVE AND 21ST ST. PERP WANTED FOR A SHOOTING. ESU REQ POWER SHUT DOWN IN SUBWAY STATION. BNN53
9/6/97 10:36 PM

U/D MANHATTAN,NY *BARRICADED PERP* 435 EAST 105TH ST. PERP IS WANTED IN CONNECTION WITH A STABBING. ESU ON SCENE. BNN53
9/6/97 10:44 PM

HACKENSACK,NJ (BERGEN) *STOVE EXPLOSION* 40 PASSAIC ST. STOVE EXPLODED BURNING 1 VICTIM. UNK CONDITION. EMS ENR
9/6/97 10:55 PM

FIGURE 2: Portion of White House pager transcript

+---------- APR 27 09:24 AM ----------+
G0000052103 ==> EAGLE DEPART|ANDREWS. OP|142|
+---------- APR 27 09:49 AM ----------+
G0000052103 ==> EAGLE|ARRIVE.OP|142|
+---------- APR 27 10:14 AM ----------+
G0000053593 ==> EAGLE DEPART|PHILLY|AIRPORT 1012|AM...OP85|
+---------- APR 27 10:17 AM ----------+
G0000052034 ==> EAGLE|ENROUTE|FOSTER|STADIUM...OP85|
+---------- APR 27 10:27 AM ----------+
G0000054146 ==> EAGLE CALL|MR BOB DOLE|HOLDING CALL|SWBD OP#103|
+---------- APR 27 10:33 AM ----------+
G0000053593 ==> EAGLE ARRIVE|FOSTER|STADIUM...OP85|
+---------- APR 27 11:49 AM ----------+
G0000055532 ==> YOUR CAR IS BEING TOWED FROM MC SITE. RETURN ASAP
G0000053989 ==> THIS IS A TEST OF AF-1 GROUP PAGE. REQUESTED BY CDR RICHARDSON
+---------- APR 27 12:47 PM ----------+
G0000055538 ==> CALL THE AIRCRAFT
+---------- APR 27 01:09 PM ----------+
G0000052845 ==> EVERYTHING GOING CO DIAL TO AND FROM TRIP SITE, OUR ESCAPE PLAN IN EFFECT.COLE
+---------- APR 27 01:18 PM ----------+
G0000054197 ==> MEXICO CITY HAVING SAME PROBLEMS, COLE SENDS. THANKS FOR YOUR SUPPORT
+---------- APR 27 02:18 PM ----------+
G0000052170 ==> IF YOU DON'T COME BACK WITH FOOD....DON'T COME BACK---AIRBORNE!!!
+---------- APR 27 02:34 PM ----------+
G0000054489 ==> MINOR HOSTAGE SITUATION IN TEXAS..NOT MUCH KNOWN NOW..WILL ADVISE...PEOC
+---------- APR 27 02:42 PM ----------+
G0000052034 ==> EAGLE DEPART|FOSTER|STADIUM|ENROUTE|WYNDHAM|HOTEL...OP85|
+---------- APR 27 07:25 PM ----------+
G0000054013 ==> PLS CALL PHILLY SIG FOR MARY STEAMVIRGIN FOR 1ST LADY
+---------- APR 27 07:53 PM ----------+
G0000052034 ==> EAGLE DEPART|WYNDAM HOTEL|ENROUTE|CONVENTION|CENTER.|
+---------- APR 27 07:56 PM----------+
G0000052107 ==> EAGLE ARRIVE|CONVENTION|CENTER|
+---------- APR 27 09:01 PM ----------+
G0000052684 ==> EAGLE CALL|2ND REQUEST|CHELSEA|CLINTON|HOLDING CALL|SIGNAL|OPERATOR 142|

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Winter Scanner Planning

It's that season again. Winter is upon us and we're gearing up for the best scanning of the year. We've covered the tips and techniques for securing your antennas and retaping your connections before. This year, as I consider how to upgrade my antenna set before the weather sets in, I thought it might be interesting to discuss how to prepare the most complete winter-weather monitoring package.

For the past 20 winters or more, each time the good storms have hit I find I'm never as prepared as I would like to be. First, I still haven't found a good way to keep snow and ice from detuning all my yagis and freezing up my anemometer/wind vane. (Like most good scannists, I'm a weather nut, too). If anyone has any suggestions, short of mounting a space heater atop my antenna mast, please let me know. This has been truly annoying.

The second problem I've had is that I never have the right combination of scanners and antennas. I find I'm constantly pulling a scanner out, unscrewing an N-connector, and attaching a coax line to another scanner. I like to have my hottest receiver (an ICOM R-7100—although my BC-895 is nearly as sensitive) dedicated to "frequency-finding" during storms. I usually have my best omnidirectional antenna (an Austin Ferret) attached to the ICOM for that purpose.

This radio is then used for general tuning about the bands, using its multiple-search ranges or simply the VFO knob to see what new transmitters can be found. I also have a UHF, a VHF and an 800 MHz beam which I switch off to this receiver when I'm trying to pinpoint a particular frequency target.

However, I also like to have other scanners dedicated to monitoring specific regions or services during a storm and I often find I want that Austin antenna feeding one of these scanners. This year I've vowed to erect additional aerials so that I won't be saddled with the problem. (We'll report back on these new antennas as the project unfolds.)

Scanning in Atlanta is ripe for the picking. *See page 32.*

The Ultimate Scanner Set-up

If you have the luxury of multiple scanners, here are some thoughts on how this editor has planned to scan during a major winter storm (with limited apologies to those in Florida and southern California):

1) **Frequency Finding**

While you've got to love the ICOM R-7100, it does requires a rereading of the owner's manual practically every time you go to operate it. Therefore, I use the ICOM for tuning a specific range of frequencies or for sitting atop one specific channel, waiting out a transmission. (I've also tied a tone-reader into the discriminator of the ICOM so I can sniff out not only frequencies, but CTCSS and DCS tone codes.)

2) **Utility/Transportation/News Media/Buff Groups**

This is a critical radio during emergency monitoring. If you've got extra scanning capacity, you may even wish to split these services up into two or even three receivers. We've gotten on our soapbox before about the importance, and fun, of monitoring electrical crews during storms. Aircraft, bus, subway and train frequencies are equally enjoyable to scan. As always, the news media is great to monitor, particularly for breaking stories in communities you may not be monitoring.

3) **Trunked Systems**

This radio is only required if you live in an area with Motorola trunking. Many, such as those in Atlanta, live in an area with multiple trunked systems. Because the Uniden-Bearcat BC-895 (as well as the 235) only tracks one system at a time, you have to make a determination which system you want to monitor. Here in Massachusetts the answer is fairly easy. The main state police trunked system is the way to go. There are also trunked systems for Logan Airport, State Police in southeastern Massachusetts, for Cambridge, and for Boston (non-police and fire), but they are not quite as important. These systems will be trunk-scanned on a secondary basis in serious weather.

4) **Local Public Safety/Emergency Channels (Primary Radio)**

This is the radio you'll use when you want to narrow down what you're monitoring to only the essentials, such as:

- Your own town's police, fire, highway and civil defense
- Perhaps the same for adjacent communities; state police
- Local two-meter and 440 MHz Ham repeaters
- National Guard
- County and state emergency management
- Local county sheriff
- State Police

- State public works
- Red Cross and other emergency services (Coast Guard)
- News media and notification nets
- Intercity police and fire channels
- Local utilities

If you only have one scanner, this, obviously, is how you should program your radio. Also, generally speaking, you could use a back-of-the-set antenna to receive these local agencies.

5) **Metro Public Safety**

This radio is for monitoring police, fire and possibly highway department traffic on all communities in an arc (you determine how wide) around your own home town.

Optional Scanners

6) **Distant Public Safety**

Here in Massachusetts it's enjoyable to listen to the state and county authorities in New Hampshire, Maine, and Rhode Island. Depending on whether you've dedicated a beam to home-in on a state (in the aforementioned case we would be aimed either north or south), or are using a simple omni, you may need to split your scanners.

7) **Public Works**

This is for those DPW nuts who want to dedicate a radio to the snow crews. (The public works guys are usually the closest thing to *Seinfeld* you can find on a scanner.)

Scanner Overload?

Of course, with this many scanners running all at the same time you would probably be able to hear everything but process nothing. Some people have set up remote speakers around their monitoring shack so that the audio from different radios comes at them from different directions, making it easier to discern who is talking. Another way to achieve this effect is to run scanner control software programs (or BC-9000's), which provide an alpha-display of the transmitting agency.

Scanning software is helpful for another reason. If you only have one or two scanners, you can use the software to rapidly reprogram your radios to receive some of the above-listed services. That's one of the primary reasons for having so many scanners. You may not listen to all five or seven scanners at one time, but by dedicating their monitoring duties you won't constantly need to reprogram. And, by limiting what each scanner scans, you're more likely to hear a transmission of importance than on a scanner which is scanning upwards of 400 or more programmed channels.

Programming Problems

Some questions always arise out of the programming process: If I'm listening to all the communities in a 25-mile radius of me, in what order do I program the radio? Should it be:

BANK 1	
Ch.	Agency
1	Town A Police
2	Town A Fire
3	Town A Fireground
4	Town A Highway Department (DPW)
5	Town B Police
6	Town B Fire
7	Town B Highway Department
	etc., or,

BANK 1	
Ch.	Agency
1	Town A Police
2	Town B Police
3	Town C Police
	etc.
BANK 6	
151	Town A Fire
152	Town A Fireground
153	Town B Fire
154	Town C Fire
	etc.

This is a matter of personal preference. Please let us know your thoughts on the best way to handle this channel conundrum.

Back to Antennas

Finally, you've got to address antennas. As we discussed earlier, it's best if you can have a good outside antenna dedicated to each scanner, so that you're not constantly hooking-up and unhooking coax leads. Having five to seven scanners is a lot to ask, but having five or more antennas, too?! That's very unusual.

If you have the luxury to consider such a set-up (a tower, with side-arm masts is the best way to go for multiple-antenna mounting), there are still more considerations. Let's say you have one scanner dedicated to distant station monitoring, but some of the more interesting far-off signals require a UHF beam, while another low-band station is only receivable with one of your omni-directional discone antennas. You can go with multiple antennas for your "frequency finding" scanner and switch antennas using a rotary antenna switch, but your scanner will not automatically pick the proper antenna each time a signal is received; you'll have to do so manually. There are ways to overcome this problem that those with a technical/antenna background might discuss, but, in any case, these solutions usually require great expense or great loss of signal.

Simply put, there are no easy answers to either the programming or antenna problems. Heck, if the answers were easy, this hobby probably wouldn't be nearly as much fun.

Atlanta Scanning

Reader Eric B. Brandon writes us with an interesting persepective on his favorite frequencies and agencies to scan:

"Enclosed with this letter is an extensive listing for the news and traffic helicopter frequencies that I frequently monitor in the Atlanta area. I also sprinkled in a couple of other interesting aviation frequencies that may be of interest to your readers. Most of the news and traffic helicopter frequencies listed were first logged a few weeks before the Olympics were to begin here in Atlanta. I started the list to prepare for the predicted traffic problems during the Olympics so that I would be able to circumnavigate problem areas.

"I found that having all of these frequencies programmed into my scanner was a definite joy. Instead of normally flipping from station to station on my car radio in the attempts of catching a traffic report, but typically missing most of the report, I could hear the very latest report in its entirety and the off-the-air chit-chat every few minutes.

"Now with talk of possibly more highway construction to begin on Atlanta's highways, this list will be valuable not only to area residents, but to readers who plan on traveling through Atlanta on to other destinations.

"The second list I have enclosed consists of frequencies for parks and forests that I always monitor...almost religiously. I am a former park ranger of six years. Unfortunately, with all the federal budget cuts, federal positions are hard to come by... While I keep looking for work as a ranger, I keep my spirits and enthusiasm up by listening to what's going on in the field that I love so dearly.

"I live about 500 yards away from the Vickery Creek Unit of the National Park Service's Chattahoochee National Recreation Area, and last summer I volunteered to help fight a small forest fire there. Previously, the only type of fires that I had fought were prairie fires in North Dakota where I used to work, so this was quite a change.

"What I would be very interested in finding out, possibly in upcoming issues, is:

"The names/titles and frequencies for the fire fighting Hot Shot teams, as well as smoke jumper teams, that serve the southeast and/or states east of the Mississippi River.

"The names/titles and frequencies for private or commercial fire fighting aircraft which are typically leased or contracted out to the USFS or state forestry agencies. Ideally, I would also like to learn where their home base of operations is located."

Atlanta Area News and Traffic Helicopters

1	122.850	Helicopter UNICOM - Atlanta area	
2	122.850	Kroger Blimp - "Spirit of Atlanta"	Used as Atlanta police blimp at the Olympics
3	122.900	Monroe Parachute/Skydiving	Usually active every day
4	122.925	Helicopter UNICOM - Atlanta area	
5	123.025	Helicopter UNICOM - Atlanta area	Very active during Olympics
6	123.050	Helicopter UNICOM - Atlanta area	
7	123.075	Helicopter UNICOM - Atlanta area	
8	123.350	Bud-1 Blimp/Goodyear Blimps 3A and 4A	Also Lockheed test flight frequency
9	123.450	Kroger Blimp (Spirit of Atlanta)	Used as Atlanta police blimp at the Olympics
10	151.625	Goodyear Blimps 3A and 4A	Used during Olympics
11	151.625	Remax Hot-Air Balloon - to chase vehicle	Monitored in North Fulton County area
12	161.640	WGST - AM Traffic 'copter	Pilot: Keith Kallen
13	161.730	WZGC - FM Z-93 Traffic 'copter	Pilot: Jason Hurt
14	450.0875	WPLO - FM Traffic 'copter	
15	450.150	Sky Cam Helicopter	
16	450.250	WSB-TV Skycopter/traffic 'copter	
17	450.2875	WKLS - FM,"96 Rock Jet Patrol" Traffic Reports	
18	450.3125	WYAY Traffic 'copter	
19	450.350	WQXI - FM Tri-copter Traffic News	
20	450.350	WSTR - FM, "Star 94 Tri-copter Traffic Reports"	Pilot: Mike Oliver; also on 471.750
21	450.3875	Metro Traffic Control 'copter(s)	
22	450.450	WAGA-TV/AM Traffic 'copter	Pilot: Herb Emory
23	450.925	WSB - TV/AM Traffic 'copter	
24	455.0875	WKHX - FM "Kix Jet 'copter" Traffic 'copter	
25	455.250	WSB-TV Skycopter	
26	455.2875	WKLS - FM, "96 Rock Traffic Jet Patrol"	
27	455.3125	Unknown Traffic 'copter	Pilot: Keith Kallen; also on 476.7125
28	455.3125	WKHX - FM Traffic 'copter	
29	455.3875	Metro Traffic Control 'copter(s)	
30	455.550	Unknown Traffic 'copter	
31	455.650	WSB - FM B-98 Traffic 'copter	Pilot: Trooper Dave; also on 477.050
32	464.750	Goodyear Blimps	Blimp-to-blimp, used during Olympics
33	471.5125	Unknown Traffic 'copter	
34	471.650	Unknown Traffic 'copter	
35	471.7125	Unknown Traffic 'copter	
36	471.750	WSTR - FM, "Star 94 Tri-copter Traffic Reports"	Pilot: Mike Oliver; also on 450.350
37	471.7875	WXIA-TV, 11-Alive News Skywatch Traffic 'copter	
38	471.950	Unknown Traffic 'copter	
39	472.150	WSB-TV - News Helicopter - Remote Broadcast	Primarily TV audio normally
40	472.325	WSB-TV/AM Traffic 'copter	Pilot: Herb Emory
41	476.650	WSB - AM Traffic 'copter	
42	476.7125	WNNX - FM 99X - Chopper X Traffic 'copter	Pilot: Keith Kallen; also on 455.3125
43	476.750	WSTR - FM, "Star 94" Traffic 'copter	
44	476.7875	WXIA-TV, 11-Alive News Skywatch Traffic 'copter	
45	477.050	WSB - FM B-98 Traffic 'copter	Pilot: Trooper Dave; also on 455.650

U. S. Forest Service

168.775	Chattahoochee National Forest (Gainesville, Dahlonega, Blairsville)
168.625	Regional Headquarters - Atlanta dispatch to aircraft
168.650	Regional Headquarters - Atlanta dispatch to aircraft Note: Recently, a USFS aircraft preparing to depart for Titusville, FL, requested frequencies for the wildlife refuge at Merritt Island, FL - 141.300, 164.625, 163.150. Dispatch also noted the frequency for the Shuttle Landing Facility as 128.550.
135.975	Forest Fire Tanker Aircraft and Helicopter bucket drops (air base at Rome). This was monitored last year during large forest fire.

U. S. Army Corp. of Engineers (Lake Lanier and Lake Alatoona)

163.4125	Park Rangers and Power House
163.4357	"

Georgia Forestry Commission

151.400	Forest Fire Spotter Aircraft (fixed wing and occasionally rotary wing)
159.280	Forest Fire Spotter Aircraft (fixed wing)
159.285	Forest Fire Spotter Aircraft (fixed wing)
159.120	Gainesville Dispatch (WNNS 637)
159.225	Macon Dispatch, Rome Dispatch
159.240	Macon Dispatch, Athens Dispatch
159.360	Firefighting - ground units
159.390	Firefighting - ground units (Cherokee Co. Shop)
151.145	District - Administrative
151.370	District - Administrative (occasionally aircraft operations)

Georgia Department of Natural Resources

151.145	State Parks
151.475	State Parks (Black Rock State Police)
154.790	Stone Mountain Park - Police Dispatch
172.425	Fisheries Division - Hatchery (recent release of trout into Chattahoochee River for "National Take-A-Kid-Fishing Day" in the Roswell area)

Thanks for the superb information, Eric. We love the little nuggets of detail. Please keep it coming.

Bearcat Intercepts Trunked Radio

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USAF Global High Frequency System

It has been three years ago this month since we updated our readers on the most commonly monitored military radio network in the high frequency spectrum — the U.S. Air Force Global High Frequency System (GHFS).

On June 1, 1992, the Global HF System was created by consolidating several Joint Chiefs of Staff (JCS) HF networks, including the USAF Global Command and Control System (GCCS), the U.S. Navy High Command (HICOM) network, the U.S. Navy Icelandic ASW (Anti-Submarine Warfare) network, and the dedicated old Strategic Air Command Giant Talk system. The goal of the merger was to develop a worldwide non-dedicated HF network capable of providing C^2 (command and control) HF communications support to all authorized Department of Defense (DoD) aircraft, ship, and ground stations.

GHFS (nicknamed Global) is a worldwide network of 13 high-powered radio stations that provide air/ground HF command and control radio communications between various government/military agencies and U.S. military aircraft and ships. Allied military and other aircraft are also commonly heard on the GHFS network. While the U.S. Air Force runs the GHFS network for DoD, it is not dedicated to any service or command, but supports all authorized users on the basis of traffic priority.

Units using the GHFS usually contact and request service from this network using the general air-ground call sign *Mainsail*. Any of the global stations hearing the call sign *Mainsail* usually responds and provides the requested service for the aircraft or ship. Depending on the service required, the Global station responding to the request may ask the aircraft to change to a discrete frequency for improved and/or extended service.

Now let's take a look at some of the general services provided by the GHFS.

General Phone Patch and Message Relay

The most common communications monitored on GHFS are phone patches and message relay traffic. A phone patch permits direct voice communications between ground agencies and aircraft by electronically connecting telephone circuits to the radio transmitting and receiving equipment. Aircrew/ships requesting a phone patch must include all information necessary for the GHFS operators to complete the call, including the identities and location of the calling and called parties, and telephone numbers, if known.

These phone patches are monitored by the ground operators, and if radio reception isn't of sufficient quality to complete the patch, the Global radio operator will attempt to copy the traffic and relay it to the caller. All phone patches are supposed to be for official business only, but you will occasionally hear that definition stretched a bit.

Message relay is a service provided by Global operators of transcribing encoded or plain-text messages for aircraft or ground stations and forwarding them to the addressee by radio or landline (telephone). The text of these messages will be heard in several forms including: alphanumerics, code words, plain text, acronyms, and/or numerical sequences. When message data is critical, or when an incomplete transmission is suspected due to poor radio reception, the receiving station may request a "read-back" of the message. All message received by Global stations are accepted and delivered using the fastest means available according to the message's precedence and priority.

HF Radio Teletype (RTTY) and Autodin

Some Global stations can provide HF radio teletype (RTTY) and autodin relay services. According to one source, not all of the Global stations have autodin capability. Autodin is an acronym for automatic digital information network and is used by DoD to pass written message traffic among various units.

When RTTY/autodin traffic is passed, the Global station radio operator will pass an unpublished station discrete frequency to the aircraft, meet the calling party on that discrete frequency, and exchange keyboard or test traffic to ensure a satisfactory link before actual transmission of autodin traffic. RTTY traffic received for autodin injection is reformatted by Global radio operators prior to it being placed into the system. Messages received from autodin for HF relay to aircraft will be transmitted by the ground operator without reformatting. RTTY service presently provided is frequency shift keying (FSK) mode at 100 words per minute (75 baud), 850 Hz shift with a center frequency of 200 Hz (mark=1575 Hz and space=2425 Hz).

C^2 (Command and Control)

The Global system is used by military command and control agencies for military mission tracking/control. Aircraft using the Global system for these purposes normally transmit an initial contact/departure report to a Global station as soon as possible after leaving the point of departure. This message generally consists of the following information:

- Aircraft call sign
- Departure point and time
- Destination point and time
- Relay instructions for military C^2 agencies
- Remarks: Distinguished Visitor/VIP (DV) codes, special instructions, etc.

Emergency Assistance and Direction Finding

The Global system is capable of providing emergency assistance to aircraft. Distress and urgent situations are identified by the aircraft using the prowords "Mayday" or "Pan." While each Global station does not possess an HF direction finding capability, once an emergency has been identified, Global stations can coordinate direction finding efforts between aircraft and direction finding agencies/stations. This capability is also available to help locate suspected radio spectrum interference.

Message Broadcasts

Scheduled and unscheduled high priority Emergency Action Message (EAM) broadcasts are made by most Global stations on their published frequencies. Transmissions from aircraft on these frequencies during broadcast periods are supposed to be limited to emergency traffic only.

EAM transmissions are one of two types of high priority broadcast heard on Global primary channels. Tracking and attempting to analyze these EAM broadcasts is almost a hobby in itself. One of our regular *Ute World* contributors, Jeff Haverlah of Houston, Texas, is really hooked on these transmissions and has managed to uncover some very interesting background information. (*I confess I got him hooked.*) Much of the basic information below is from Jeff and we are indebted to him for his support to this column.

Since June 1992 Emergency Action Messages usually start out with a six-character preamble. The first two positions in a preamble are known as static characters and can be used to identify what type of EAM is about to be broadcast. These static characters can be "alpha-alpha," "numeric-numeric," "numeric-alpha," or "alpha-numeric." Since December 1994 the six-character preambles have been repeated three times, instead of twice, prior to an EAM broadcast.

The most common EAM by far is 26 characters in length, and the first two characters of its preamble will generally stay 'static' for a period of time that seems to vary between 9 to 26 days. From June 1994 to September 30, 1996, EAMs were commonly transmitted in 6/20/26 character sets. From October 1, 1996, to the present, this series of EAM transmissions has been dominated by 26 character sets with a somewhat rarer subset of 20 character EAMs.

An even more rare type of EAM is the variable character. Characters in the message are normally 35-88 in length with 44 characters being the most common. The largest known EAM to be broadcast in recent years was a 500-plus character EAM transmitted on the afternoon of May 19, 1995. At any particular time there seem to be two static sets of variable-character EAMs in use: There do not appear to be established time periods for set replacement.

Another major change occurred October 1, 1996. A new two-character static series appeared on the GHFS/Nightwatch nets. This new series consists of either 20 characters or a variable-character-count EAM using the same static-character set (first two character positions in an EAM transmission).

These static sets are apparently used exclusively for the 20/20 portions of the 20/20/26 character EAM broadcasts. They also seem to be used exclusively for the static sets that make up the "For ..." EAMs.

To illustrate how iteresting EAMs can be here is a tidbit noted by Jeff based on an EAM broadcast:

> "On the very day the United States and Russia announced the implementation of the re-targeting of each country's nuclear weapons, there was a huge EAM transmitted. I heard one of the operators say that he was sending a 300+ character EAM that day. ... The operator droned on and on for what seemed like forever."

The other type of high priority broadcast that is monitored on the GHFS frequencies is known as *Foxtrot*. These transmissions sound something like this:

> "Skyking, Skyking this is Offutt, Offutt, do not answer, time 0601, authentication six whiskey sierra. I say again (message is repeated) Offutt out."

Foxtrot broadcasts contain a higher priority message than EAM transmissions. It has been noted on numerous occasions that during an EAM, all of the Global stations will stop the broadcast to transmit a Foxtrot message and, when it is finished, resume the EAM broadcast.

According to one source I talked to, Foxtrot broadcasts are EAMs. They are messages that originate from U.S. Strategic Command (USSTRATCOM) for the operational forces. These are the most important military messages sent via radio.

We will never know what the content of the individual messages are, but it is still fun to monitor and analyze these cryptic messages.

Try this exercise

If you want to have some EAM fun try this: Find an active USSTRATCOM net (see the March 1997 *Utility World* column for the latest Zulu designator frequencies) and park on one of the active STRATCOM net frequencies. Eventually you will hear a unit with a USSTRATCOM call sign — same station each day with a different call sign — who will start transmitting the EAM. As soon as he is finished, tune your receiver to 11175, 11244 (or any other GHFS primary channel). Even better, use a second receiver, if possible.

Usually within a few seconds to a few minutes, a strong carrier will come up first on all or most GHFS frequencies (tuning up the transmitter), then Offutt (sometimes McClellan or Andrews) will pop up on the GHFS calling Mainsail or sometimes a tactical type call sign and will repeat the EAM you just heard on the Zulu channels. It will then be repeated by the rest of the GHFS ground stations.

Direct GHFS ATC Support?

The GHFS does not provide direct air traffic control (ATC) support to the aircraft that utilize this communications network. All military aircraft now get ATC support directly from civil/ICAO ATC facilities (more on these in next month's Utility World).

Finally, the Global stations operate on mutual frequencies to provide increased "global" coverage. The published frequency listing does not reflect the complete system of frequency authorizations. These published frequencies are used for initial contact, EAM broadcasts, and phone patch support. You will hear these Global stations move extended or special services requirements to other available discrete frequencies. Table One (see p. 37) is a complete listing of the published GHFS frequencies made available to *Utility World* from the Air Force.

I have also included a list of discrete frequencies that have been located for each Global station from my personal frequency list. It is far from complete, and if you hear a GHFS station on a frequency not listed in table one, I would love to hear from you. You should also watch Mystic Star frequencies very carefully, as quite a few of these channels are used by individual GHFS stations as discretes, in addition to VIP communications.

The GHFS frequencies offer the military HF monitor with some of the best concentrated listening available in the *Utility World* radio spectrum today. You don't have to wait long to hear activity on these frequencies and the short wait is usually rewarded with some excellent communication intercepts.

Now, it is time to see what our monitoring crew have been hearing this month in the *Utility World* radio spectrum. Gayle and I would like to wish each of you and your family a happy holiday season and best wishes for a prosperous 1998. Happy holidays de N5FPW SK.

Utility Loggings

Larry Van Horn

Abbreviations used in this column

AFB	Air Force Base
ANDVT	Advanced Narrowband Digital Voice Terminal
ARQ	Synchronous transmission and automatic repetition teleprinter system
ARQ-E/E3/N	Single channel ARQ teleprinter system
ARQ-M2/4	Multiplex ARQ teleprinter system with 2 or 4 data channels
CARB	Channel Availability and Readability Broadcast
CFL	Confidential Frequency List
Comms	Communications
CW	Continous Wave (Morse code)
DTRE	Direction des Telecommunications des Reseaux Exterieurs
DV	Distinguished Visitor
EAM	Emergency Action Message
ETA	Estimated Time of Arrival
GHFS	Global HF System
HF	High Frequency
MAP	Maghreb Arabe Presse
MFA	Ministry of Foreign Affairs
MOD	Ministry of Defense
m/v	Motor Vessel
Ops	Operations
PAP	Polska Agencja Prasowa
PAX	Passengers
RTTY	Radioteletype
SAM	Special Air Mission
SITOR	Simplex teleprinting over radio system
SITOR-A	Simplex teleprinting over radio system, mode A
SITOR-B	Simplex teleprinting over radio system, mode B
Unid	Unidentified
VIP	Very Important Person
81-81	Russian teleprinter mode

All transmissions are USB (upper sideband) unless otherwise indicated. All frequencies are in kHz (kilohertz) and all times are UTC (Coordinated Time Universal)

2514.0 Unid station at 0440 with 75 baud RTTY text. (De Berti Paol-Viale Serfontana, Morbio Inferiore, Switzerland)

2606.0 FUO-French Navy Toulon, France, at 2008 with 75 baud RTTY test tape. (De Berti Paol-Switzerland)

2666.0 Unid station with 5-figure CW groups at 2040. (Ary Boender-Spijkenisse, the Netherlands)

2705.0 Unid station in CW with 50 pips per minute all night long starting at 1925. (Boender-Netherlands)

2789.0 FUE-French Navy Brest, France, at 2013 with 75 baud RTTY test tape. (De Berti Paol-Switzerland)

2813.0 IGJ42-Augusta Radio, Italy, at 0513 with 100 baud RTTY test tape. (De Berti Paol-Switzerland)

2830.0 SPB-Szcecin Radio, Poland, with a SITOR-B traffic list at 2100. (Boender-Netherlands)

2840.7 DLGZ-m/v *BG21-Bredstedt* working German coast guard station at Cuxhaven at 1920. (Boender-Netherlands)

2843.0 PBB-Den Helder Radio, Nederland, at 0517 with 75 baud RTTY test tape. (De Berti Paol-Switzerland)

2844.0 ULX-Israeli Mossad station at 1900. (Boender-Netherlands)

2846.0 The weird sounding station again, transmitting (..-- ..-. - ..-) in CW at 1912. (Boender-Netherlands)

2890.0 GYA-Royal Navy London, UK, at 0521 with 75 baud test tape. MGJ-Royal Navy Faslane, UK, at 2018 with 75 baud RTTY test tape. (De Berti Paol-Switzerland)

3196.0 Prague Meteo, Czech Republic, with 50 baud RTTY meteo text at 1824. (De Berti Paol-Switzerland)

3764.0 PBB-Dutch Navy Den Helder, Netherlands, with 75 baud RTTY CARB broadcasts at 1435. (Boender-Netherlands)

4002.0 YRR2-Bucarest Meteo, Romania, with 50 baud RTTY meteo text at 1835. (De Berti Paol-Switzerland)

4211.0 IGJ42-Augusta Radio, Italy, with 75 baud RTTY test tape at 1837. (De Berti Paol-Switzerland)

4246.0 Unid NATO station, probably Royal Navy in the UK with a 100 baud RTTY transmission at 2058, online encrypted messages after 16 RY's and sync string VMGTCNJBH. (Boender-Netherlands)

4272.0 SPA-Gdynia Radio, Poland, with CW marker at 2052. (Boender-Netherlands)

4442.0 Air Force 2 working Andrews VIP regarding 0420 arrival at Andrews AFB. Comms noted at 0345. (Jeff Jones-CA)

4475.9 P-Russian Navy Kaliningrad, Russia, single letter HF CW marker at 2050. (Boender-Netherlands)

4717.5 ANDVT communications noted here at 0700. (Jones-CA)

4724.0 McClellan as lead GHFS station with a 6 (5SHADU)/20 (5S)/26 (6A) character EAM set over an eight minute period at 0422. (Jeff Haverlah-Houston, TX)

4742.0 SAM 375 departed MacDill 0325 with 0 DV + 0 PAX, ETA at Andrews AFB of 0530. 375 was working Andrews VIP at 0415. 54-Echo (British accent) working unid at 0516. (Jones-CA)

5095.0 CFH-Canadian Forces Halifax NS, Canada, using 75 baud RTTY text plus call at 0634. (De Berti Paol-Switzerland)

5430.0 Numerous one and two letter callsigns (e.g. Delta, Golf, Lime, Sierra, sometimes with Juliette added in front). Heard Texaco mentioned at 0255. (Jones-CA)

5471.6 LN2A-Norsk PTT Sveio, Norway, with CW marker and data burst at 2030. (Boender-Netherlands)

5691.0 Russian volmet with female announcer at 1120. (Harry Riddell-Rochester, NY)

5700.4 Delta-2-Victor working Habitat for signal checks at 2222. (Jones-CA)

5711.0 King 61 working Moffett Rescue with ops normal and authentication challenge at 0230. (Jones-CA)

5800.0 Overtone called and worked NIGHTWATCH 01 at 1239. (Haverlah-TX)

6536.0 PBC-Dutch Navy Goree Island, Netherlands, with 75 baud RTTY text at 1931. (De Berti Paol-Switzerland)

6709.5 Oriole working various stations. Avenger working unid station at 2127. At 2145 unid station called MOHAWK. (Haverlah-TX)

6715.0 Nightwatch 01 working Twin Bed and set Z160 as primary and Z175 as secondary network frequency at 0116. (Haverlah-TX)

6739.6 MacDill GHFS off frequency, with an EAM broadcast at 0517. Remained off freq for other EAM transmissions as well. (Haverlah-TX)

6556.0 Perth Aeroradio calling Ujang Pandang at 1105. Pandang replies, though signal weak. (Riddell-NY)

6761.0 Strike Hawk (sounded like) working Astra 57 regarding aerial refueling at 0436. (Jones-CA)

6830.0 SAM 375 (DV + 0 PAX) and five crew, departed MacDill at 0325, ETA Andrews AFB at 0530 working Andrews VIP at 0329. (Jones-CA)

6993.0 SPAR 19 working Andrews VIP with phone patch to Hilda East at 0125. (Jones- CA)

7440.5 ANDVT comms noted here at 1656. (Jones-CA)

7624.0 HZN47-Jeddah Meteo, Saudi Arabia, using 100 baud RTTY with meteo text at 0303. (De Berti Paol-Switzerland)

7831.0 Nightwatch 01 working Twin Bed, but was complaining of "too much QRM" (the common data tones on this freq) at 0116. Moved to Z160. (Haverlah-TX)

7846.5 ANDVT comms noted here at 2300. (Jones-CA)

8047.0 SAM 206 working Andrews VIP for new primary frequency and phone patch at 0158. (Jones-CA)

8535.0 6WW-French Navy Dakar, Senegal, using 75 baud RTTY test plus call at 0514. (De Berti Paol-Switzerland)

8992.0 MacDill with a 20-character EAM (6AHAOR..) At 2234. (Haverlah-TX).

9016.0 Overslide calling and working Nightwatch 01 (unheard here) at 0510. Mudguard then called and worked Overslide. At 0527, Mudguard requested a data check with Overslide, but begged off as "... his ACS is setting up for Playground." At 0605 Overslide (with noisy background picked up by his mic) broadcast a 26-character EAM. At 1427, Nightwatch 01 (weak here) broadcast a 26-character EAM taken from a McClellan 20/20/26 character EAM set transmitted slightly earlier on GHFS. At 1447 Nightwatch 01 worked Stiletto in clear voice and ANDVT. At 1517 Stiletto worked Nightwatch 01 and requested some data comms. At 1845 Stiletto worked Nightwatch 01 and moved to Z190. PACOM 01 working Hickam with a phone patch to Hickam weather. At 1450 MacDill called McClellan. At 1500 MacDill responds to McClellan and they both move to 11181.0. (Haverlah-TX)

9017.0 PACOM 01 working Andrews with a phone patch to Andrews VIP at 2022. (Haverlah-TX)

9023.0 Bigfoot Surveillance working Chalice Bravo with periodic signal checks at 2358. (Jones-CA)

9126.9 RFIJD-French Forces Libreville at 0514 with an ARQ-E3 96/386 idling. (Robert Hall-Capetown, RSA)

9250.8 FJY2-DTRE Kerguelen at 0520 with an ARQ-E3 96/386 idling. (Hall-RSA)

9270.0 ANDVT comms noted here at 0213. (Jones-CA)

9320.0 PACOM 01 (DV-2), ETA Hickam at 0630 working Andrews VIP with signal checks and phone patch regarding the possibility of flying with the Speckled Trout group at 0122. (Andrews VIP checking/using remote sites out of Yokota and Hickam.). (Jones-CA)

9835.2 Unid station at 0530 with an ARQ-M2 96/400 idling. Good tune. Not listed in Klingenfuss guide or *CFL*. (Hall-RSA)

9991.5 SAM 375 working Andrews VIP with phone patch traffic at 0100. (Jones-CA)

10204.0 Stiletto worked Nightwatch 01 at 1846. (Haverlah-TX)

10445.2 Maputo at 0559 with SITOR-A 5-character alphanumeric *urgente cryptograma* groups to Tete. (Hall-RSA)

10535.1 RDL-Moscow Naval? at 0604 with 50/250 RTTY. Unable decode. (Hall-RSA)

10544.0 SAM 375 working Andrews VIP radio for signal checks on Mystic Star F-577 at 0045. (Jones-CA)

10550.0 GFL23-Bracknell Meteo, UK, with 75 baud RTTY meteo text at 0913. (De Berti Paol-Switzerland)

10722.0 Unids (Spanish language) setting up data circuit and then into data comms. Had the same buzzsaw sound heard on US military long-haul circuits at 0605. (Jones-CA)

10872.0 P-Russian Navy Kaliningrad, Russia, single letter HF CW marker at 1656. C- Russian Navy Moscow, Russia, single letter HF CW marker at 1656. S-Russian Navy Arkhangelsk, Russia, single letter HF CW marker at 1656. (Boender-Netherlands)

11053.0 SAM 971 working Andrews VIP and SPAR 19 at 0135. (Jones-CA)

11084.0 Mocasin 04 working (in the blind) Coyote enroute site 30 at 0121. Mocasin 04 calling Mocasin 81 and Jetto 75. No joy at 0130. (Jones-CA)

11175.0 McClellan as lead GHFS station with a 20(5S)/20(5S)/26(SN) character EAM set over a seven minute period at 1426. McClellan as lead GHFS station with a 89-character EAM (WIOEU5..) at 1110. Nightwatch 01 working MacDill for a radio check and gone at 1417. Andersen, at good levels here, with a 6A.. EAM broadcast at 0530. (Haverlah-TX)

11181.0 MacDill working McClellan in voice and data at 1502. (Haverlah-TX)

11214.0 SAM 375 (0 DV + 0 PAX), working Andrews VIP with phone patches regarding a 0240 arrival at Andrews AFB (Jones-CA)

11217.0 King 29 working MacDill with a phone patch to an unid unit about an AR schedule at 0032. (Jones-CA)

11220.0 SAM 206 working Andrews VIP with phone patch traffic. Andrews using the ever troublesome Hickam/VOX remote site at 0203. Also SAM 26000 working Andrews VIP with phone patch to SAM Command at 2225. (Jones-CA)

11229.0 Truthful working Nightwatch 01 (unheard here) at 1227. At 1455 Nightwatch 01 (now very strong here) working Retention (very strong) and advised that Truthful was in the net but currently in monitor only status, and that the current traffic was HYKCLR and HYNP74. (Haverlah-TX)

11244.0 McClellan as lead GHFS station with a 20 (5S)/20 (5S)/26 (6A) character EAM set over a 14 minute period at 1648. (Haverlah-TX)

11460.0 SAM 201 working Andrews with phone patch traffic (to Howard base ops) at 1444. (Haverlah-TX)

11494.0 Nightwatch 01 working Teatime (or maybe Teetime?) in clear voice and extensive ANDVT comms at 1507. At completion of the ANDVT stuff Nightwatch 01 wished Teatime a safe flight and he would catch them later. Frequency then went quiet. (Haverlah-TX)

13242.0 Overtone called and worked MacDill who moved them to 15043.0 at 1425. (Haverlah-TX)

13245.0 Unid station working Nightwatch 01 (unheard here) and set Z220 as net secondary and Z205 as primary at 1707. (Haverlah-TX)

13440.0 SAM 375 (0 DV + 11) inbound MacDill with ETA of 0220, working Andrews VIP at 0015.(Jones-CA)

14656.0 SPW-Warsawa Radio, Poland, at 1333 with a voice marker calling all ships. (Boender-Netherlands)

14894.5 ANDVT comms noted at 1830. (Jones-CA)

15016.0 McClellan as lead GHFS station (Offutt's been off for over a month on this duty) as lead GHFS station with a 56-character (or maybe 55) EAM "FOR unid station" (sounded like "three" or "tree" at 1404). (Haverlah-TX) *Jeff, Offutt was off the air for their Scope Command equipment installation according to my sources. You should be hearing Offutt now-Larry.*

15043.0 Overtone called and worked MacDill who attempted to move him to 17973.0 (nothing heard here) at 1426. (Haverlah-TX)

16454.5 SPW-Warsawa Radio, Poland, with a CW marker at 1334. (Boender-Netherlands)

17400.3 5ST83-Antananarivo Meteo at 1129 with 100/401 RTTY weather codes. (Hall- RSA)

18040.0 TCY4-AA Ankara, Turkey, with 50 baud RTTY Turkish news at 1310. (Boender- Netherlands)

18042.9 RFTJ-French Forces Dakar, Senegal, at 1622 with 192/385 ARQ-E3 "Code de Voie" on TJD circuit identification. Unlisted Klingenfuss/*CFL*. (Hall-RSA)

18268.2 HBD-Probable MFA Berne, Switzerland, at 0932 SITOR-A. Lots of 5-letter groups to an unknown station. (Hall-RSA)

18297.0 RFQP-French Forces Jibouti, Jibouti, at 1005 with ARQ-E3 100/370 "Code de Voie." Unlisted Klingenfuss. (Hall-RSA)

18380.5 RFVI-French Forces Le Port, Reunion Island, at 1733 ARQ-E3100/400 "Code de Voie" on IRE circuit identification. (Hall-RSA)

18380.6 MOD Paris, France, at 1636 ARQ-E3 100/400 with 1253 5-letter groups. Hoka Code 3 Gold decoding groups in both ARQ-E3 and M2. (Hall-RSA)

18597.7 Spanish Embassy Kinshasa at 0850 with non-stop SITOR-A pulses for hours. (Hall-RSA)

18648.7 SOT2658-PAP Warsaw, Poland, at 1740 with SITOR-B frequency info. (Hall- RSA)

TABLE 1: Global HF System Published Frequencies

All times are UTC, all frequencies are in kHz, and the mode is USB.
Published frequencies: 4724, 6712, 6739, 8968, 8992, 11175, 13200, 15016, 17976 kHz.
Unpublished discretes: See individual stations below, plus 11214 and 11226 kHz

Andersen AB, Guam:	6739 (0900-2000), 8968 (24 hours), 11175 (24 hours), 13200 (2000-0900)
Andrews AFB, MD:	4724 (24 hours), 6739 (0001-1000), 8968 (24 hours), 11175 (24 hours), 15016 (24 hours), 17976 (1000-2400)
Unpublished discretes:	9016, 11181, 11244, 15043
Ascension Is:	6739 (1800-0600), 8992 (24 hours), 11175 (24 hours), 15016 (0600-1800)
Unpublished discretes:	9016, 13204, 14615, 14635, 18019, 18801
Croughton , UK:	4724 (0500-2300), 6712 (0500-2300), 8992 (0500-2300), 11175 (2300-0500), 13200 (2300-0500), 15016 (2300-0500), 17976 (2300-0500)
Unpublished discretes:	4894, 5078, 6731, 7927, 7933, 9057, 10427, 10881, 11129, 11181, 11220, 11244
Elmendorf AFB, AK:	4724 (24 hours*), 6739 (24 hours**), 8968 (24 hours), 11175 (24 hours), 13200 (24 hours*), 15016 (24 hours**), 17976 (24 hours)
Unpublished discretes:	6715, 9016
Hickam AFB, HI:	6739 (0400-1600), 8968 (24 hours), 11175 (24 hours), 13200 (1600-0400)
Unpublished discretes:	4745, 6715, 9016, 11181, 13242, 15043, 17973
Incirlik AB, Turkey:	4724 (24 hours), 6739 (24 hours), 11175 (24 hours), 15016 (24 hours), 17976 (24 hours)
Unpublished discretes:	4850, 7805, 7961, 8026, 11118, 11244, 11445
Lajes AB, Azores:	6739 (24 hours), 8968 (24 hours), 15016 (24 hours)
Unpublished discretes:	5739, 9023, 11271
MacDill AFB, FL:	6739 (0001-0900), 8992 (24 hours), 11175 (24 hours), 15016 (0900-2400)
Unpublished discretes:	6683, 6715, 6730, 9016, 10462, 11181, 11217, 11244, 13242, 14615, 15043
McClellan AFB, CA:	4724 (0400-1600), 6739 (0400-1600), 8968 (24 hours), 11175 (24 hours), 13200 (1600-0400), 15016 (1600-0400), 17976 (24 hours)
Unpublished discretes:	4745, 9016, 11058, 11181, 11244, 13242, 15043
Offutt AFB, NE:	6739 (2300-0800), 8968 (24 hours), 11175 (24 hours), 17976 (0800-2300)
Unpublished discretes:	9025, 9057, 10935, 11217, 11244, 15043
Thule AB, Greenland:	4724 (24 hours), 6739 (24 hours), 8968 (24 hours), 11175 (24 hours), 13200 (24 hours)
Unpublished discretes:	5711, 11181, 11244, 11271, 11494, 13242, 15091
Yokota AB, Japan:	4724 (1000-2100), 6739 (1000-2100), 8968

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Solving the Problem of "Wooden" Frequencies

Olav Grimdalen, of the Norwegian Telecommunications Administration in Oslo, writes in *Electronic DX Press:*

I've just returned from another HF coordination conference (HFCC) in Warsaw. We managed to solve most of the collisions, but there will always be some problems which we would have liked to solve in another way. Coordination is to negotiate to find solutions. Most of the delegates have understood this and do their best to help each other. Others were not too willing this time to help out.

In order to find out if administrations really would use the frequencies they had put down in their schedules, three monitoring stations will start monitoring the whole schedule of the HFCC group. This is to try to put an end to the use of "wooden" frequencies which have been implemented into the database during the conference. "Wooden" frequencies are those that may not be used by administrations — such are used as a trading object or to prevent others from using them. HFCC has urged members not to register frequencies unless they intend to use them. The results of the monitoring will be discussed during the next meeting, in Belgium in February.

ALGERIA R. Algiers, 3rd network, on odd 16295.12 with terrific signals one day at 1500-1900 including English at 1600-1700 but not on announced 11715, 15160; gone the next day (Maarten van Delft, Holland, DSWCI *DX Window*])

AUSTRALIA RA expected to have to let go another 20 staff members in Oct, such as in the English correspondence section reducing from five to one person or one sesquiperson, and a pro-forma letter rather than individual QSLs might be necessary, says Nigel Holmes on *Feedback* (BBCM) R. Australia has boosted the number of RealAudio streams from 80 to 200 and eventually will rise to 4000 available at once (Russell Naughton, RA webmaster on *Feedback* via BBCM) RA switched 5870 to 5890 from *1200 (gh) Probably caused by new N. Korean on 5872.3 (Hans Johnson, *Cumbre DX*)

AUSTRIA Portugal clash on 9655 was RDP's mistake, moved too early to a W97 frequency, as ORF then replaced it with 7325 for winter, at 0000-0300 but English retimed to 0130 only; to NAm also 1330 on 13730, and via Canada again both 0530 & 0630 on 6015 (ORF)

BELGIUM RVI W97 English reduced to only four on SW, and only one of them via relays now available for Dutch: 0830 Eu 6130, Au 13795; 1300 NAm 13680; 1730 Eu 5910, 9925, ME via Germany 11680; 1830 Af 13745 (RVI *Radio World* via Steven Cline, Edwin Southwell)

BOLIVIA New 10 kW station by SIM International, which used to have ELWA in Liberia, is R. Mosoj Chaski, Cochabamba. Will go on air as soon as licensed; studio construction is complete, and a programming team has moved in (Marlin Field, NASWA *Listeners Notebook*)

Heard for a few days in September was R. Nacional de Bolivia, La Paz on 4200.6 around 0200 (Horacio Nigro, Uruguay) In this country, "R. Nacional" stations are not government, but private or union-owned; the real radio-nacional is R. Illimani (Don Moore)

From an extensive survey of Bolivian SW activity during a visit in September: R. Libertad, La Paz, uses 5005 only for football game relay, Wed 2300-0200, Sat/Sun 1830-2230v. R. Ems. Bolivia, 4756v has been inactive for a long time, but plans to resume SW with new or repaired transmitters; current AM & FM sked is 1000-1300. R.-TV Colonia, Yapacani, 6557, has been inactive since August when transmitter was destroyed by thunder!; sked was 2100-0200 (Takayuki Inoue N., *Relámpago DX*)

BRAZIL R. Cultura audible at various times between 0900 and 1730 when 17815 is clear of other stations (Noël Green, England, *BC-DX*)

BULGARIA R. Bulgaria, W97 English hours: 1200 Eu on 15130 15290; 2000 & 2200 Eu on 7530 9700; 0000 & 0500 NAm on 7375 9485 (Andreas Volk, *BC-DX*)

BURMA [non] Democratic Voice of Burma, via Germany W97 daily 1245-1345 on 11850 ex-15330 (*BC-DX*)

CAMEROON After more than a year, the mysterious African on 3970 has been IDed as CRTV Buea at 2200 //4850 with presumed relay from Yaoundé; must be new transmitter as too strong for listed 4 kW (Bob Hill, MA, DSWCI *DX Window*)

CANADA Wojtek Gwiazda, who was active in the Coalition to Restore Full RCI Funding, has become the new host of RCI's *Mailbag* (gh)

RCI's new 25mb frequency to USA evenings is 11865, including English at 2300, 0000 and 0200. Same programs continue to Eu, NAm, but one UT hour later (via Bill Westenhaver, RCI)

The new CBC Northern Quebec, 9625 schedule has deleted *Cross Country Checkup* on Sunday afternoons, but still includes a lot of CBC English programming, especially on weekends (via Dave Jeffery, NY)

CKFX, 6080, Vancouver, is never coming back to SW; a modified 100-watt ham transmitter would have cost many thousands of dollars to get "type approved" by the government, and a 1 kW SW transmitter as much as $30K, per Jack Wiebe, CE (Ben Krepp, *Cumbre DX*)

CONGO R. Congolaise de la Liberté, 5985 was the new ID at 1800 and 1835 after Brazzaville fell in fighting; back at 1700 it was R. Democratique Congolaise. Not to be confused with VORGAN Angola also on 5985v after 1900 (Mahendra Vaghjee, Mauritius)

COSTA RICA RFPI's *Global Community Forum* for fourth quarter became live UT Fridays 0200-0300 on 7385, 7585 with call-ins, including *Far Right Radio Review* roughly every other week; taped interview segments only are repeated Sunday 2230-2300 (gh)

CROATIA [non] Croatian Radio, Zagreb, W97 relays via Germany: 0700-0800 on 11730 230° NZ; 0800-1000 on 11730 260° Au; 2100-2200 on 9590 160° SAf; 0000-0159 on 9505 240° SAm; 0200-0400 on 5840 320° WNAm and on 6120 300° ENAm (*BC-DX*)

CUBA Rising solar flux means the return of broadcast harmonics on the 18, 19, 23, 24 and even 30 MHz bands; already RHC heard on 18210 = 3 x 6070 at 1415, better signal than fading fundamental (gh, OK) RHC W97 add 6180 at 0500-0700 (Arnie Coro, *DXers Unlimited*)

RHC is running two separate contests with trips to Cuba as prizes. One asks you to answer a question about a poet, and the other to write an essay on worker's health; deadlines are in 1998, so if interested, ask RHC for entry forms, details (via Gigi Lytle)

[non] Anti-Castro Clandestine Radio Page has archives on stations and frequencies, and samples of actual transmissions: **http://www.geocities.com/CapitolHill/Lobby/8115/** (AFM, webmaster, *rec.radio.shortwave*)

CYPRUS TURKISH R. Bayrak writes: We still plan to be back on air before yearend. A new 7.5 kW transmitter is being manufactured by CCA in Fairburn, GA, but behind schedule. Installation planned for end of Nov (M. Tosun via Dan Henderson, *NU* via *Electronic DX Press*) E-mail: <tosun@cc.emu.edu.tr> (Tosun via Christoph Ratzer, *BC-DX*)

CZECH REPUBLIC R. Prague's W97 sked is effective only until Dec 31, as French, Spanish and German were expected to be cancelled after that date. The morning English to us remains, shifted to 1400-1430 still on 13580, and also to EAf on 21700; includes locally-recorded music, mostly jazz, Sats at 1404 (gh) Other W97 English to us: 2100 on 5930; 2230 & 0000 on 5930 7345; 0100on 6200; 0300 on 5930 7345 (via Michiel Schaay, *BC-DX*)

ETHIOPIA R. Ethiopia external service on 9560, 7165: 1200-1300 Somali, 1300-1400 Afar, 1400-1500 Arabic, 1600-1700 English with news at 1630, 1700-1800 French; also carries V. of Peace. UNICEF-funded humanitarian service in Somali at 1100-1200 on 11800, 9560. Separate R. Ethiopia National Service has English M-F 1030-1100 on 9705, 7110, 5990 (BBCM)

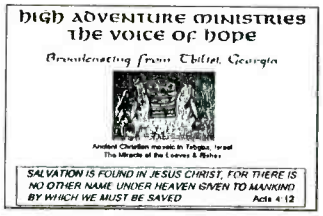
All times UTC; All frequencies kHz; * before hr = sign on, * after hr = sign off; // = parallel programming; + = continuing but not monitored; 2 x freq = 2nd harmonic; J-97=May-Sept; Z-97=Summer season; W-97=Winter season; [non] = Broadcast to or for the listed country, but not necessarily originating there.

[non] unID on 5910 via Germany, UT Sat only at 0100-0159 mentions Ethiopia, Somalia (Ivan Grishin, Ont., *World of Radio*) Our Nairobi unit identifies it as a new opposition station in Amharic, Rainbow Radio (*Keste Damena Radio*), the voice of peace and brotherhood, also announcing broadcasts to Eth/EAf Thu 1600-1700 on 15365, WEu Sat 1900-2000 on 6130 (Dave Kenny, BBC Monitoring) But seemingly absent from the W97 DTK schedule (gh)

FINLAND QSL manager of R. Finland has changed; report now to Raimo Makela, PL 113, 28101 Pori (Makela, *Electronic DX Press*)

GABON Disregard last month's item; it was not news, but a 1970 retrospective (Wolfgang Büschel)

GEORGIA "KVOH" via 100 kW Tbilisi W97: 1300-1530 SAs 9310 122°; 1430-2000 Eu 7520 332°; 1600-1700 EAf 9310 151°; 1600-2200 Eu 6290 302° (Bob German, George Jacobs & Associates via Wolfgang Büschel) These registrations may not be used in their entirety.



GERMANY DW's English to NAm at 0100, 0300, 0500 for fourth quarter made some changes such as *Mailbag* moved to UT Mon following the news, presumably still replaced by *World DX Meeting* the last week of month (Jim Moats, OH, *Review of International Broadcasting*) And the fourth quarter print issue of *tune in* was the last, to be replaced by program previews on Internet (Ivan Grishin, *R.I.B.*)

AWR in English via Jülich W97: 2030-2130 WAf on 9835 200° (via Michiel Schaay, *BC-DX*)

Telefunken and Berlin Technical University are registered for digital mode tests any day at 1000-1600 on 5900 60° via Jülich (*BC-DX*)

HUNGARY R. Budapest W97 English: Eu 2000 3975 9535, 2200 3975 9840; NAm 0200 6030 9840, 0330 6010 9840 (Andreas Volk, *Electronic DX Press*) 6030 may have a slight problem from R. Martí. But printed sked shows 11910 instead; also at 2000 9840 not 9535 (via Gigi Lytle)

R. Budapest heard all evening on 7950 = 2 x 3975 (Maarten van Delft, Holland, DSWCI *DX Window*) Five special weekly 7-minute Italian broadcasts were scheduled on R. Budapest in November (Luigi Cobisi, *The Four Winds*)

ICELAND RUV: Eu 1215-1440 [*sic*--used to be two separate broadcasts] 11402, 13860; 1855-1930 on 7735 9275; Ams 1410-1440 & 1935-2010 on 11402 13860; 2300-2335 on 9275 11402 (Icelandic NPR via Bob Padula, *EDXP*)

INDONESIA VOI English at 2000-2100 on new 7225 //9525 (Mikhail Timofeyev, Russia, DSWCI *DX Window*)

Altho RRI Surabaya is listed on 3976, it is believed inactive, and heard instead an ID for RRI Pontianak at 1515 after Jakarta news relay on 3976.1 (Juichi Yamada, Japan, *Jembatan DX*)

Several private and local government-run radio stations are under investigation for fraud—the latter for airing commercials illegally, the former for operating without a permit from the ministry (*Asia Pacific Broadcasting* via *Electronic DX Press*)

IRAQ RII's English kept changing times; in early October on some days it was at 2057-2157 on 11785, co-channel to DW in English and Brazil (Brian Alexander, PA, *World of Radio*) English heard at 0400 on 11787 mentioning another English at 1030 (Ben McNenly, Ont., *Cumbre DX*) Rep. of Iraq. R. on another bizarre frequency, 9114.7v at 1742-1922v* with anti-Sa'udi rhetoric //9715 (Bob Hill, MA, DSWCI *DX Window*)

IRELAND [non] West Coast Radio Ireland, via Germany, for W97: ENAm Thu 0100-0159 5905; Af Thu 1900-2000 11665; WEu Sat 1500-1600 6175 (*BC-DX*) A "5" day of week in the sked for 0100 indicates UT Fri instead of Thu (Ivan Grishin, Ont.) Threatened to cancel the Af broadcast if it didn't start getting response (Grishin and Finbarr O'Driscoll, *R.I.B.*)

JORDAN R. Jordan's director of foreign services, Jawad Zada, sent a letter to those who had sent reception reports as long as nine years ago, saying they have new state-of-the-art powerful computerized transmitters, and inviting letters to the twice-weekly *Friends Abroad* program, which during the English broadcast on 11690 time-shifted for winter to 1100-1730, should appear Thursdays at 1230 and Saturdays at 1530.

KOREA NORTH KCNA criticized reports of increased funding for R. Free Asia: With socialism frustrated and the people's cause of independence suffering setback in some countries, the imperialists are trying hard to obliterate the Chuche character and national character of other countries and gratifying their dominationist ambition (BBCM)

Frontline Soldiers Radio has three separate but similar programs on 1613, 2625 and 3025, all variable, at *1400-2000*; listen for ID and station jingle at approximately half past every hour. Spurs from 3025 are sometimes heard on 3013, 3057 (Sonny Ashimori, Japan, *hard-core-dx*) Then they were all inactive for at least a week (Ashimori, *Cumbre DX*)

KOREA SOUTH To commemorate 200th edition of my *DX Report* on RKI, AWR has been invited to provide special one-time broadcast for relay by RKI on regular English broadcasts Dec 21 and early Dec 22; special QSLs and three different sites possible—Kimje, Skelton, Sackville (Bill Matthews, OH) Such as 1137 UT Sun on Sackville 9650

KURDISTAN V. of Iranian Kordestan R., 3942 in Persian and Kurdish, announced sked 1400-1530, repeated 0330-0500. Freqs have varied in past in these ranges: 3875-3965, 4060-4370, 4630-4665, 4890-5080, 7050-7420 (BBCM)

[non] V. of Independent Kurdistan, Turkey, 6205, *1400-1527* with anthem, Kurdish talk and music, heavily jammed, but became better and better on USB (Finn Krone, Denmark, DSWCI *DX Window*)

V. of Independent Kurdistan, PKK mouthpiece hostile to Turkey, last heard in Sept 1995, was heard again in late August at 1400-1545* on 6205 (BBCM)

See **http://www.humanrights.de/~kurdweb** (Mathias Kropf, World DX Club *Contact*)

LAOS LNR, 6130, was weak but clear at 1140-1210 in early October with sunrise/sunset enhancement (J. D. Stephens, AL)

LIBERIA Star Radio started SW tests Sept 16 with 10 kW, usually 0500-0800, 1700-2000 alternating between 3400 and 5880 (Olav Nordli, DX Listeners' Club, Norway) Not 5890 as initially planned (gh) Collins transmitter actually at 4 kW, in 17 languages. Fax 231/227360; E-mail <libe@atge.automail.com> (George Bennett, Star Radio via Jerry Berg, *NU* via *Electronic DX Press*)

LITHUANIA [non] R. Vilnius mailbag, UT Sunday around 0045 on 5910 via Germany, said for W97 they would move to 5905, still at 0030-0100. Mailbag also heard on a UT Thu. Fax on 5907.5 will be just as big a problem, but away from another ute on 5915 (gh) 5907.5 is USAF Air Weather Service fax from Elkhorn, Offutt AFB, Nebraska (Larry Van Horn)

MALI [non] An English schedule from China Radio International dated May 5 was received in Oct with the former Mali relay frequencies 9710 and 11715 at 0000 and 0300 marked out; and the same for E&SAf at 1600 15130, 15110 replaced by 9565, 9620; 2000 & 2100 on 11715, 15110 replaced by 9535, 7180; but we suspect the new ones are Urumchi rather than Mali (via Gigi Lytle)

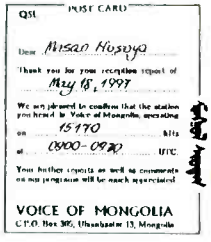
MÉXICO XERTA became a nightly fixture in Oct, testing 4800.7 all night with nothing but a variety of nice music and frequent IDs (gh) Once tests there are complete, may try 15120 next (Héctor García, México) 4800 became the best SW signal from Mexico here (Harry Helms, San Diego, **www.DXing.com**)

XERMX has a new manager, Martín Rizo Gavira (Héctor García)

R. Huayacocotla, 2390 sked is Mon-Sat 1200-1600, 2000-2400 (Nayarit DX Club via XERMX *Estación DX*) Perhaps one hour later now after DST. R. Ibero is relayed by R. Huaya daily at 2101-0950 (Erick Fernandez, R. Ibero via Stig H. Lindholm, WDXC *Contact*) Timezone for this unclear, maybe local

MONACO [non] Besides 9755, TWR in English at 0730 has also been using unannounced 9684.8v via Cerrik, Albania (Noël Green, England, *BC-DX*) W97 W97 English shows 9755 only, 0755-0920 daily, Sun 0745-0950, Sat -0935 (TWR via Gigi Lytle)

MONGOLIA VOM's new English schedule effective until March 28: 1200-1230 on 12085 Au, 1500-1530 on 9720 12085 SAs, 1930-2000 on 9720 12085 Eu (Niels A. Holst, Denmark, DSWCI *DX Window*) Choice of frequencies is not completely up to VOM. Sorry reception isn't better, but we have no relays. All VOM broadcasts come directly from Khonkhor station, 25 km east of Ulaanbaatar, with Soviet-made 100, 250 and 500 kW, curtain antennas built in mid-sixties. R. Ulan Bator English was launched on Jan 29, 1965, and renamed Voice of Mongolia on Jan 1, 1997. Curtains are aimed at these bearings: 126, 178, 230, 306, 358°. E-mail terminal is inconvenient and difficult to use so often respond to E-mail by P-mail; <radiomongolia@magicnet.mn> (David O'Connor via Uwe Volk, *BC-DX*)


QSL POST CARD

Dear Misao Hosoya

Thank you for your reception report of May 18, 1997

We are pleased to confirm that the station you heard is Voice of Mongolia, operating on 15170 kHz at 0800-0930 UTC.

Your further reports as well as comments on our programs will be much appreciated.

VOICE OF MONGOLIA
C.P.O. Box 365, Ulaanbaatar 13, Mongolia

We supplied a 2 kW SW transmitter for Saynshand in the Dornogobi desert, expected on air by end of Oct. Part of aid program for shepherds sponsored by Danish govt, likely with news, weather, educational programs. Reports wanted, on 4790 (Transmitter provider [ELCOR Costa Rica?] via Ludo Maes via Nikolay Pashkevich, *EDXP*)

NETHERLANDS RN's *Media Network* will decide in December whether to broaden the

program further with much less info on SW. Propagation review, certain station profiles, in-depth receiver reviews would disappear from the on-air version. Listeners were being surveyed about this (via Wolfgang Büschel)

NEW ZEALAND Paul Ormandy succeeds the late Arthur Cushen as purveyor of DX news on RNZI's *Mailbox*, UT Mon 0430 on 15115, 1130 on 9700, Thu 0830 on 9700 (gh) RNZI W97 effective to March 29: 1650 M-F 9810; 1853 (Sat 1858) 11735; 2052 (Sat 2059) 15115; 0458 11905; 0815 (Sat/Sun 0758)-1206 9700; 1206 occasional sport 6070 (RNZI printed schedule) Another version by E-mail shows the Sat start of 11735 at 1959, and the 1206 standby as 6105 (Adrian Sainsbury)

NICARAGUA R. Miskut, 5770-USB heard as late as 0319* one evening with variety of US, Spanish pops, ID, closing with anthem (Brian Alexander, PA)

NIGERIA [non] R. New Nigeria, as headlined last month, quickly replied by E-mail; besides the UT Sun 0100-0129 broadcast on 5910 via Germany to NAm, others were Sat 0600-0629 11995 to Af, Sun 1500-1529 6175 to CEu. Said they started June 12 (but apparently no one in the DX world noticed for three months until Ivan Grishin discovered them in Sept). Check **http://www.nagdhr.com** and the preferred E-mail address is <radioNNig@aol.com>, per Maureen Gold of RNN. Maybe it continues, but did not appear in the original W97 Deutsche Telekom sked (gh, *World of Radio*)

PAKISTAN R. Pakistan has only two powerful transmitters in good repair, and two more in disrepair marked as "v", including English: 0230-0245 7255, 15119-15125v, 15485, 17705v; 1100-1120 15520, 17835; 1600-1630 9515, 11565. This includes home service news at 1600 //3664v, 4790v, 5027v, 6070v, 9600v, and slow speed news at 1615 (Mikhail Timofeyev, St. Petersburg, NERRS Monitoring via DSWCI *DX Window*) Reports are welcomed by the Engineering Manager, PBC HQ, Frequency Management Cell, Broadcasting House, Islamabad (Noël Green, England, *Play-DX* via *The Four Winds*)

PAPUA NEW GUINEA Two more provincial stations were to close down, R. West New Britain, and R. North Solomons. R. New Ireland previously closed down. Funding supposed to come from provincial governments did not come through. Only R. East New Britain and R. Manus are continuing with sound financial help from their governments (PNG *Post-Courier* via BBCM)

Several other stations are no longer heard due to thievery and vandalism, probably inside jobs, or other breakdowns (Hans Johnson, *Cumbre DX*)

PARAGUAY LV del Chaco Paraguayo. Mennonite, continues plans for SW, with an antenna designed by Jim Heck formerly of HCJB; transmitter could be from 1 to 10 kW for regional coverage. Currently has two half-hours in English on MW (Arne Boschmann, LVCP, on HCJB *DX Partyline*)

PERU R. San Francisco Solano, 4750.1, blasting in 0052 with devotional, then strange mix of music, plugs for beverages (Henrik Klemetz, *Dateline Bogotá*)

R. Master, 5767.2, at 1150 ID from Moyobamba and Ecuadorian music; full ID at 1200 gave address Jirón 20 de Abril No. 308 (Rafael Rodríguez, Colombia)

PHILIPPINES NBC news relay in Tagalog from DZMM Manila heard on 13315-USB at 2314-2330* on a local Saturday morning, but not Sunday; previously on 13170v for fishermen at sea (Ralph Famularo, Japan, DSWCI *DX Window*)

RUSSIA R. Perm', 5290 at 2200-2000 has local programs throughout the day in Russian, and also relays R. Russia from Moscow (BBCM)

SAN MARINO R. San Marino International plans to start SW broadcasts Sat Dec 20; details at **http://www.exactweb.com/RSMI** (RSMI via Steven Cline, Harry Helms) Presumably pirate, but of interest if actually from SM. Tested already on a Sunday morning in Oct, 11410-USB with music, and weak signal widely heard in Europe, even New Zealand (gh) Transmitters are of 0.2 to 1 kW; plan to test the evening of Sat Dec 20 on 75, 41m; morn of Sun Dec 21 on 41 and 13m in Italian, German (RSMI website via Giovanni Serra, *The Four Winds*)

SA'UDI ARABIA BSKSA heard with ISB feeder on 10990 at 1607-1630—USB had Call of Islam service in Arabic //11965, 11780; LSB had pop music (Giovanni Serra, Italy, *The Four Winds*)

SEYCHELLES [non] FEBA via TWR Swaziland via Meyerton, South Africa in W97: 1527-1557 in Sena, Yao for Mozambique on 7265 (TWR via Bob Padula, *EDXP*) FEBA W97 shows new weekly English to SAs Fri 0800-0900 on 15540; still 1500-1530 (Sun/Mon 1545) on 11600, and separate Network program 1500-1558 Mon-Sat on 9810 (via Colin Miller via Wolfgang Büschel)

SIERRA LEONE Nigerian jets targeted SLBC in an air attack Oct 17 (David Crawford, *Cumbre DX*) 3316 not heard after that (Finn Krone, DSWCI *DX Window*)

SWEDEN R. Sweden English to NAm W97: 1230-1300 11650 15240; 0230-0300 7280; 0330-0400 7115 (*Note reduced number of broadcasts; only one in the morning - gh*) However, to As/Au at 0130 7265; 1330 9705 13740; 1430 11650 11880 15240. No more to Latin America (Andreas Volk, *Electronic DX Press*)

SWITZERLAND [non] SRI W97 relays via Germany: 1100-1330 13635 80° SAs; 1630-1815 5850 115° ME/EAf; 1830-2030 7410 40° NEu (*BC-DX*) SRI is reducing usage of its oldest transmitter in Switzerland, at Schwarzenburg—only on 31mb for Europe, and as backup for Lenk on 6165. Main unit for overseas is 500 kW Sottens (Christian Bruelhart, Switzerland, *BC-DX*)

SYRIA R. Damascus external service as monitored, on 13610, 12085: 1905 French, 2005 & 2105 English, 2215 Arabic, 2315-2430 Spanish; also on 13610 only 1800 Russian, 1805-1905 German (BBCM)

TAIWAN For W97 WYFR relay, normally all out-of-band, includes new 9630 at 2200-2400 in Mandarin (gh)

TURKEY VOT W97 English with new times, fqs: 1330 on 9630 15290; 1930 on 5960-USB, 6110; 2130 on 7200; 2300 on 6135 9655; 0400 on 7300 9685 17705 (via Michiel Schaay, *BC-DX*)

UKOGBANI BBC in Spanish is available on internet 15 hours a day, 0000-0400, 1000-2100 via **http://www.clarin.com.ar** (BBCWS via BBCM) Overnight it was in English instead (Joel Rubin, *rec.radio.shortwave*)

UNITED ARAB EMIRATES On good MUF days in Oct, UAE Radio, Dubai, booming in with best Eastern Hemisphere signal, in English at 1329-1351 on 21605, next best on 13675, also on 13630, 15395. Oddly enough, this broadcast was overlooked in the following (gh, OK) 0329-0350 12005 13675 15400 21485; 0529-0548 15435 17830 21700; 1029-1050 13675 15395 21605; 1600-1638 13630 13675 15395 21605 (Mikhail Timofeyev, Russia, NERRS Monitoring via DSWCI *DX Window*)

USA *World of Radio* expected for Dec-Feb on WWCR: Thu 2130 on 9475, Sat 0700 on 3210, 5070, Sat 1230 on 5070, Sun 0230 5070, 1000 3210, Mon 0400 3215, Tue 1330 15685 (gh) Another new *W.O.R.* affiliate is KNOR, 1400, Norman, OK, Saturdays 7 a.m. Central, thanks to John Carson, weekend programmer (gh)

Ham Radio & More, which previously lost its KFNN origination in Phoenix and network, but continued on WWCR only, announced it was giving up after Oct 26 (Pete Costello, NJ, *World of Radio*)

WGTG planned to start testing its second transmitter by Nov, and was looking for new clients with low, low rates. Initial test frequencies may differ from final spots expected to be near WWCR tropical outlets (gh)

I haven't heard WMLK 9465 in quite a while. Driving on I-78 past Bethel, I saw the gas station they were broadcasting from boarded up and the sign falling down, but antennas seem intact. Off the air? (Reuben Saltzer, *rec.radio.shortwave*) Whenever I check 9465 I don't hear WMLK either (gh) Check their new website: **http://www.AssembliesofYahweh.com/log.htm** (Thorsten Koch, *Caught in the Web*, DSWCI *DX Window*)

The only nighttime service of KJES, 7555, New Mexico, which does not seem to be on every night, is registered for W97 an hour later at 0200-0330 with an antenna beam change at 0300 from 335 to 20° (via Nikolay Pashkevich via Wolfgang Büschel)

Chuck Harder's For the People group has decided not to start their own SW station, too expensive; an AM station will be built instead in Florida (Hans Johnson, *Cumbre DX*)

R. Free Asia may get $30 million more than the current $10 million budget in order to augment broadcasts to China. Gingrich and Republicans as well as the Administration are working together on this. Legislators realize that US businesses are vehemently opposed to any restriction on trade with China. Yet they want to demonstrate in some other way that they are working to combat China's continuing repression of political dissent. They don't want to throw up their hands and do nothing. Building up RFA is the one solution that has emerged (Jim Mann, LA *Times* via Bob Mills, Mike Cooper) RFA began its 7th language, Khmer, on Sept 29 (VOA *Communications World*)

[non] The W97 Deutsche Telekom schedule for Jülich, Germany, 100 kW relays shows a client called "TOM." Ivan Grishin figured this must stand for The Overcomer Ministry, i.e. Brother Stair, who tested in August and was heard by Jim Moats to say he was going to buy 12 hours per day from DTK. Since Oct 26, he is scheduled thus: 1600-1759 6175 non-dir to CEu and 11985 115° ME/EEu; 0100-0259 6170 295° ENAm; 0200-0359 5840 310° CNAm and 6025 320° WNAm; 0600-0759 9500 255° Au/NZ (sked via BC-DX) Note that at the prime hour of 0200 he is on three frequencies at once to NAm, and presumably continues 24h on WWCR-4, part-time on WRNO (gh)

VENEZUELA Friendly Ecos del Torbes, 4980, is celebrating its 50th anniversary, and planned to issue a new pennant; one good time to listen is Sat 2200-2300 for *Recordando a gozar, muchachos* (Henrik Klemetz, Colombia, *Dateline Bogotá*)

R. Rumbos has been off SW for a while, but its *Noti-Rumbos* newscast at 2100 is carried by Ecos del Torbes, 9640; also Rumbos is now on RealAudio at **http://www.tycom.com.ve/rumbos/default.htm** And R. Nacional continues transmitting, we don't know to whom, only heard around 2125 on 9540; also had a website but has been disconnected (Jorge García Rangel, Venezuela)

VIETNAM VOV transmitting station is at Thoi Long in the O Mon district, with three 500 kW, two 1000 kW. In addition to use by the foreign language service of VOV, also by domestic service 18 hpd, and for Khmer ethnic group, and general program for Mekong Delta 6 hpd (Maarten van Delft, DSWCI *DX Window*) But nobody ever mentions any frequencies or even for sure if any of them are SW. No tremendous new signals or frequencies have been reported on SW (gh)

VOV Japanese service in mid-Oct changed to 9840 and 12020 (Sonny Ashimori, *hard-core-dx*) Probably 12020 ex-15010 for all transmissions (gh)

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

Broadcast Loggings

GLOBAL FORUM

Gayle Van Horn

0015 UTC on 4779.9
GUATEMALA: Radio Coatan. Spanish text from announcer to station ID at 0025. (Tom Messer, WI/*Hard Core DX*)

0030 UTC on 5030
COSTA RICA: Adventist World Radio. Religious music and IDs with terrific signal quality. (Messer, WI) Costa Rica's Radio for Peace Int'l noted on 15150 // 7385 at 0000-0215 in English. (Lee Silvi, Mentor, OH)

0106 UTC on 7345
CZECH REP.: Radio Prague. National news to Galaxy satellite schedule. (Howard J. Moser, Lincolnshire, IL) English news 1705-1727. (Silvi, OH)

0127 UTC on 6480
PERU: Radio Altura. Spanish. Local music to evening "comunicaos" and mentions of Huancabamba. Fair/poor signal. (Horacio A. Nigro, Montevideo, Uruguay/*Hard Core DX*)

0135 UTC On 5020
SRI LANKA: SLBC. Tamil songs and comments. Monitored at 1445 on 5020, with Islamic prayers to 1500 time tips. Newscast read by Abdoul Sayet in Tamil. (Mahendra Vaghjee, Rose Hil, Mauritius) SLBC noted on 15425, 1440-1502 in English. (Mark Veldhuis, Borne, Netherlands/*Hard-Core-DX*)

0250 UTC on 9745
ECUADOR: HCJB. Old time country and gospel music show. (Sue Wilden, Columbus, IN) Noted on 12005 at 1115. (Bob Fraser, Cohasset, MA)

0250 UTC on 9605
VATICAN STATE: Vatican Radio. Discussion on *The New Age*. (Wilden, IN) French service sign-on with IDs and religious text. English service sign-on at 0628 with IDs and newscast. (Jerry Witham, Keaau, HI)

0320 UTC on 4770
ECUADOR: Radio Centinela. Spanish. Regional news to jingles and ID to 0330*. Ecuador's **Radio Quito**, "la voz de la capital," on 4919 at 0420. (Will Passman, Germany/*Hard-Core-DX*)

0450 UTC on 13525 USB
AUSTRALIA: Defense Forces Radio. Music from Manchester group Oasis, running past top of the hour, station ID at 0502. (Witham, HI) *Great choice of music!-ed.*

0550 UTC on 9810USB
KIRIBATI: Radio Kiribati. Regional island music and brief announcements until English ID at 0600. News relay from New Zealand featuring reports from Asia. (Amber Hill, Anchorage, AK via Keaau, HI)

0610 UTC on 7255
NIGERIA: Voice of. *West Africa Today* program to IDs and health report. Hill, HI)

0630 UTC on 6130
GERMANY: Deutsche Welle. Report on German export dumping affecting Namibian breeder. (Wishnu Brata, Bandung, Indonesia/*Hard Core DX*).

0704 UTC on 7300
SLOVAKIA: Radio Slovakia Int'l. Norwegian minister's state visit and news of Slovakia's railway financial problems. (Moser, IL)

0945 UTC on 4549.42
BOLIVIA: Emisora Tropical. Spanish. Noted flute and drum music with announcer's voice-overs. Bolivia's **Radio 11 de Octubre** noted on 4630.83 at 1007-1015; **Radio Villa Montes Bolivia** on 4599.26 at 1000-1010. (Charles Bolland, Lake Worth, FL)

1010 UTC on 4955
COLOMBIA: Radio Nacional. Spanish. Male/female duo with commentary format. Poor signal, peaking briefly at 1012. (Bolland, FL)

1025 UTC on 2310
AUSTRALIA: VL8A Alice Springs. Morning programming // 2325 **VL8T Tennant Creek**, to fade-out bt 1035. (Lee Silvi, Mentor, OH) **Radio Australia** on 17750 at 0045. (Brata, IND); 13605 at 0605. (Hill, HI) 1145 on 9580, 1345 on 9410. (Fraser, MA)

1030 UTC on 4570.79
PERU: Radio Soledad. Spanish. Noted Peruvian huaynos music with canned ID breaks. Slight signal drift. Additional Peruvians logged as; **Radio Tarma** 1035-1050 on 4774.96; **Radio Huanta Dos Mil** 1014-1025 on 4747.37; **Radio Sicuani** 1029-1045 on 4826.26; **Radio Andahuaylas** 1034-1045 on 4840.08; **Radio Villa Rica** 1043-1100 on 4886.74; **Radio La Oroya** 1046-1100 on 4904.82 (Bolland, FL)

1045 UTC on 6810.5
PERU: Radio Onda del Rio Mayo. Regional commercials and mentions of "av Cajamarca, dengue...hospital de Nueva Cajamarca," to station ID. 6810 is frequency move from 6797. (Nigro, URG)

1135 UTC on 6120
CANADA: Radio Japan relay. Report on the Ainu boat launching ceremony. (Fraser, MA) Canada's **RCI** on 11855 at 1500. (Wilden, IN)

1140 UTC on 6130
LAOS: Lao National Radio. Weak but steady signal in the clear. Talks by woman in presumed Lao and haunting local music to clock chimes on the hour. Newscast with co-channel interferences. (J.D. Stephens, Madison, AL/*Hard Core DX*)

1410 UTC on 9530
Thailand: Radio Thailand. Long, boring script of National Education Plan and *Travel Thailand* segment. (Brata, IND).

1456 UTC on 11565
PAKISTAN: Radio Pakistan. Indian music on tabla and organ. Closing of *Typewriter Waltz* by Errol Garner to ID as, "ye Radio Pakistan he." (Klaus Elsebusch, Germany/*Hard-Core-DX*)

1504 UTC on 15521.2
BANGLADESH: Radio Bangladesh. Male/female duo in Bengali. Musical interludes and national news. (Veldhuis, NLD)

1515 UTC on 5012
ZIMBABWE: ZBC/Radio 2. Text in vernaculars to time check in English. Newscast to station ID and address and regional announcements. Announcement to frequency change at 1630 to the 90 meter band. Station followed with programming on 3306 kHz. (Vaghjee, MAU)

1655 UTC on 4925
INDONESIA: RRI-Jambi. Indonesian. English pop music to ID at 1659, followed by "song of the coconut islands" interval signal. Twelve second signal pause before top of the hour. (Veldhuis, NLD) **RRI-Jakarta** heard on 9630 at 0700. (Hill, HI)

1704 UTC on 5009.5
MADAGASCAR: RTV Malagasy. Great signal for easy-listening music and talk in Malagasy to ID and French text. (Veldhuis, NLD)

1740 UTC on 3320
SOUTH AFRICA: Radio Sonder Grense. Evening programming in English and Afrikaans with male DJ format. (Veldhuis, NLD) Audible 0425 on 3320. (Witham, HI) *This station's English translation is Radio Without Boundaries-ed.*

1742 UTC on 3380
MALAWI: MBC. *Hit Parade* show of western pop songs and male DJ's ID. SINPO: 34444. (Vledhuis, NLD)

1745 UTC on 6055
RWANDA: Radio Rwanda. French ID as, "vous ecoutez Radio Rwanda, it et 20 heures" *Le Journal News* program. (Vaghjee, MAU) Audible 1955 with IDs and Swahili on 6055. (Passman, Germany) Logged 2303 in French. (Mauno Ritola, Finland)

1807 UTC on 4935
KENYA: KBC. Strong signal for English news and ID. *Sports News* segment to fanfare music, time check, weather, and Elton John's tune *Nakita*. SINPO=44343 (Veldhuis, NLD)

1926 UTC on 17605
NETHERLANDS ANTILLES: Radio Netherlands Bonaire relay. *Four Minutes* program with mailman interview. (Fraser, MA; Wilden, IN)

1930 UTC on 15160
ALGERIA: Radio Algiers Int'l. English service noted to 2030. (Silvi, OH) English news from male's text. Noted multichannel interference on adjacent sides of 15160, // 11714.55 equally as good at times. (Mark J. Fine, Remington, VA)

2030 UTC on 5050
TANZANIA: Radio Tanzania. Highlife music to lady's vernacular text. Pop tune to Arabic newscast. SINPO=22342 (Zacharias Liangas, Thessaloniki, Greece)

2034 UTC on 7255
NIGERIA: Voice of Nigeria. English "tag team" discussion on Nigerian foreign relations. Grossly overmodulated signal, but otherwise great signal. (Fine, VA)

2055 UTC on 5100
LIBERIA: Radio Liberia Int'l. Arabic news to station ID at 2100. English programming including western music. World news and IDs. (Liangas, GRC)

2058 UTC on 5009.6
MADAGASCAR: RTV Malagasy. Afro music to talk in Makagasy. National anthem, three segments of station interval signal to 2100*. SINPO=44343 (Veldhuis, NLD)

2130 UTC on 3240
MOZAMBIQUE: Beira. Ex frequency 3273. Non-stop English and African music. "Beira" ID at 2159 to news relay from Maputo in Portuguese. Swahili talk following the news to 2206*(Vaghjee, MAU)

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.

Gayle Van Horn, gayle@grove.net

DXing.Com: The Web Resource for Radio Hobbyists

New to the radio hobby? This site is the place to start! Harry Helms, author of *The Shortwave Listening Guidebook*, welcomes all radio hobbyists to <**http://www.DXing.com/**>

DXing.com
The Web Resource For Radio Hobbyists

Here you will find introductions and reference material for the entire spectrum of radio, including shortwave listening, scanner monitoring, ham radio, plus the latest station schedules, news and information to help you get the most from your hobby. Harry's website is a must-see!

Chuck Boehnke and Jerry Witham recently informed me that the Hawaiian Puna DX Club, is looking for webheads to exchange DX information via email, and to establish friendship with DXers of the world. Chuck adds, "isn't that what DXing is all about ? We listen, learn and become friends!" Send your email to: <*punadxclub@mailcity.com*>.

Happy Holidays from QSL Report!

AUSTRALIA

Radio Australia via Carnavon, 17875 kHz. Full data QSL card unsigned. Frequency/program schedule and station stickers enclosed. Received in 35 days for an English report and one IRC. Received in 35 days for an English report and one IRC. Station address: P.O. Box 428G, Melbourne 3001 Victoria, Australia. (Mahendra Vaghjee, Rose Hill, Mauritius)

VL8K-Katherine, 2485 kHz. Full data QSL card unsigned. Frequency schedule and station stickers enclosed. Received in 30 days for an English report and one IRC. Station address: CAAMA Radio, P.O. Box 2924, Alice Springs, NT 0871 Australia. (Vaghjee, MAU)

CYPRUS

Cyprus Broadcasting Corp., 9760 kHz. Full data card unsigned. Received in 41 days for a taped report and one U.S. dollar. Station address: P.O. Box 4824, Nicosia. Cyprus. (Randy Stewart, Springfield, MO) *Cyprus is Randy's 100th country verified on shortwave. Congrats, Randy!-ed.*

FM/TV

WGTZ-FM 92.9. Full data prepared QSL card signed by Eugene Simmons-KC8BYE Contract Engineer. Received in 21 days for an English FM report and mint stamps. Station address: 717 East David Road, Dayton, OH 45429. (Robert S. Ross-VA3SW, London, ONT Canada/AMFMTVDX)

KLJC-FM 88.5. Full data prepared QSL card signed by Darrell R. Nikolaus-Chief Engineer. Received in three months for an English FM report and mint stamps. Station address: 15800 Calvary Road, Kansas City, MO 64147-1341. (Ross, CAN)

WNYO-TV Ch. 49. Full data prepared QSL card signed by Edward Marlatt-Chief Engineer. Business card, personal letter from the Engineer, and Program Listings. Received in three weeks for an English TV reception report and mint stamps (returned with reply). Station address: 699 Hertel Ave., Suite 100, Buffalo, NY 14207. (Ross, CAN)

WCMH-TV Ch. 4. Full data prepared QSL card signed by Ron Patterson-Asst. Chief Engineer. Business card and NBC logo key chain. Received in two months for an English TV reception report and mint stamps. Station address: P.O. Box 4, Columbus, OH. (Ross, CAN)

GABON

Africa No.1, 9580 kHz. Partial data QSL card and personal letter signed by Ombolo Kiobi. Received in six months for an English report and one IRC. Station address: Boite Postal 1, Libreville, Gabon. (Jose Moura, Washington, DC)

JAPAN

NSB/Radio Tampa, 3925/6055/9595 kHz. Full data globe/satellite card unsigned. Program/frequency schedule and souvenir Japanese stamps enclosed. Received in 12 days for an English report, one U.S. dollar, souvenir postcard and a SAE (used for reply). Station address: 9-15, Akasaka 1-chome, Minato-ku, Tokyo 107, Japan. (Gayle Van Horn, Brasstown, NC)

MALTA

Voice of the Mediterranean, 7440/7390 kHz. Full data QSL card unsigned.Station schedule and stickers enclosed. Received in 30 days for an English report. Station address: P.O. Box 143, Valletta CMR 01 Malta. (Vaghjee, MAU)

MEDIUM WAVE

WBBR-1130 kHz AM. Confirmation letter signed by Cullen Malley. Received in 30 days for an English AM report and a SASE. Station address: 499 Park Ave., New York City, NY 10022. (Moura, DC)

WGY-810 kHz AM. Full data verification on station letterhead signed by Bob Blanchard. Received in 15 days for an English AM report. Station address: One Washington Square, Albany, NY 12205. (Moura, DC)

WJR-760 kHz AM. Full data QSL card signed by Ed Buterbaugh. Received in 28 days for an English AM report. Station address:P.O. Box 100, New Orleans, LA 70181. (Moura, DC)

PIRATES

WREC/Radio Free East Coast, 6955 kHz USB. Full data card signed by P.J. Sparx. Received in 60 days for an English report. QSL maildrop: Box 1, Belfast, NY 14711. (Terry Jones, Plankinton, SD)

Radio Kaos, 6955 kHz USB. Letter and QSL certificate for *Farewell Broadcast*. Received in two months for English report. QSL maildrop: Belfast address. (Jones, SD)

WARR, 6955 kHz USB. Letter and full data QSL card *Nickle Bag*. Received in six months for an English report. QSL maildrop. Belfast address. (Jones, SD)

ROMANIA

Radio Romania Int'l, 11940 kHz. Full data QSL card unsigned. Station letter, program schedule and stickers enclosed. Received in 64 days for an English report and two IRCs. Station address: c/o English Dept., P.O. Box 111, Bucharest, Romania. (William R. Wilkins, Springfield, MO)

SHIP TRAFFIC

Sea-Land Atlantic KRLZ, 156.8/156.6 MHz (Container). Full data prepared QSL card verified. Received for an English utility report and mint stamps. Ship address: Sea-Land Service Co., Inc., P.O. Box 2000, Elizabeth, NJ 07207. (Hank Holbrook, Dunkirk, MD)

Global Link WWDY, 156.65 MHz (Cable Ship). Full data prepared QSL card verified. Received for an English utility report and mint stamps. Ship address: Transoceanic Cable Ship Co., Inc., 340 Mt. Kemble Ave., Room S110, Morristown, NJ 07960. (Holbrook, MD)

Crystal Ace WYQ2722, 156.8 MHz (Car Carrier). Full data prepared QSL card verified. Received for an English utility report and one U.S. dollar. Ship address: Mitsui Kinkai Kisen Co., Ltd., Mitsui Bldg.,-2nd Floor, 1-1 Nihonbashi-Muromachi 2-chome, Tokyo 103, Japan. (Holbrook, MD)

Seabulk Magnachem KCPG, 156.7 MHz (Chemical Tanker). Full data prepared QSL card verified. Received for an English utility report and mint stamps. Ship address: Hvide Shipping Inc., P.O. Box 13038, Ft. Lauderdale, FL 33316. (Holbrook, MD)

TAIWAN

Central BC System, 3335 kHz. Full data QSL card unsigned, stamped with station's seal. Received in 65 days for one IRC. Station address: No. 55, Pei-an Road, Taipei, Taiwan, Rep. of China. (Vaghjee, MAU)

UNITED STATES

WRNO, 15420 kHz. Partial data card unsigned of Louisiana World Exposition. Station schedule and stickers enclosed. Received in 45 days for an English report and an SASE. Station address: P.O. Box 100, New Orleans, LA 70181. (Moura, DC)

How to Use the Shortwave Guide

1: Convert your time to UTC.

Eastern and Pacific Times are already converted tc Coordinated Universal Time (UTC) at the top of each page. The rule is: convert your local time to 24-hour format; add (during Standard Time) 5,6,7, or 8 hours for Eastern, Central, Mountain or Pacific Times, respectively.

Note that all dates, as well as times, are in UTC; for example, a show which might air at 0030 UTC Sunday will be heard on Saturday evening in America (7:30 pm Eastern, 4:30 pm Pacific).

2: Choose a program or station you want to hear.

Some selected programs appear on the lower half of the page for prime listening hours—space does not permit 24-hour listings.

Occasionally program listings will be followed by "See X 0000." This information indicates that the program is a rerun, and refers to a previous summary of the program's content. The letter stands for a day of the week, as indicated below, and the four digits represent a time in UTC.

S: Sunday T: Tuesday H: Thursday A: Saturday
M: Monday W: Wednesday F: Friday

3: Find the frequencies for the program or station you want to hear.

Look at the page which corresponds to the time you will be listening. Comprehensive frequency information for English broadcasts can be found at the top half of the page. All frequencies are in kHz.

The frequency listing uses the same day codes as the program listings; if a broadcast is not daily, those day codes will appear before the station name. Irregular broadcasts are indicated "tent" and programming which includes languages besides English are coded "vl" (various languages).

4: Choose the most promising frequencies for the time, location and conditions.

Not all stations can be heard and none all the time on all frequencies. To help you find the most promising frequency, we've included information on the target area of each broadcast. Frequencies beamed toward your area will generally be easier to hear than those beamed elsewhere, even though the latter will often still be audible. Every frequency is followed by one of these target codes:

am:	The Americas	as:	Asia
na:	North America	au:	Australia
ca:	Central America	pa:	Pacific
sa:	South America	va:	various
eu:	Europe	do:	domestic broadcast
af:	Africa	om:	omnidirectional
me:	Middle East		

Consult the propagation charts. To further help you find the right frequency, we've included charts at the back of this section which take into account conditions affecting the audibility of shortwave broadcasts. Simply pick out the region in which you live and find the chart for the region in which the station you want to hear is located. The chart indicates the optimum frequencies for a given time in UTC.

Hot News

Compiled by Jim Frimmel

Selected Programs. The BBC World Service program listing is too large and complicated to publish in a single issue; consequently, we've decided to spread it over a three-month period. This issue contains the most important of BBC's three services, the AE (America/Europe) Stream. The AF Stream (Africa) will be in the January issue and AS (Asia) will follow in February. Note that the feature programs in these listings are in a generic format because they change from week to week.

Soap. Last month, BBC World Service introduced *Westway*, its first ever soap opera for radio. The setting is in Westway Health Centre located in Westgrove Park, London (fictitious), and the characters center around the medical offices of Dr. Margaret Sampson and her junior partner Dr. David Boyce. A male indian offfice manager, a young Nigerian female doctor, and a pair of female receptionists round out the permanent cast.

Westway is a 15-minute, twice-weekly production. Tune in on Tue 0030/0815/1515, Thu 0815/1515 and Fri 0030 in the AE Stream. A 30-minute "compilation edition" enables listeners to catch up with the week's episodes. It can be heard on Sat at 1901 and Mon at 0430.

New Zealand. Paul Ormandy of Oamaru, NZ, the host *Kiwi DX* on ZLXA's Radio Reading Service, now provides tuning tips for the South Pacific on Radio New Zealand International during the *Mailbox* show (0430 on 15115 kHz 1st and 3rd Mon, repeated Thu 0830 on 9700 kHz and Fri 1930 on 11735 kHz).

South Korea. Radio Korea International commemorates the 200th edition of its *DX Report* on December 22nd/23rd. Adventist World Radio will be joining them for a one-time relay broadcast. Special QSL's will be issued for verifications.

Ecuador. HCJB announces the following special holiday programs during December: *"How the Grinch Stole Christmas"* (Studio 9, 11th); *"The Call of the Andes"* (Studio 9, 18th, a rebroadcast of a 10-year old program about Christmas in Ecuador); *"Villancico Christmas Special"* (Studio 9, 19th, Carols sung in Ecuador and travel tips for the holidays), and *"Christmas Music in the Andes"* (Studio 9 special, 25th).

Waveguide Electronic Edition. Computer users can now get my hour-by-hour listing of shortwave broadcasts that are audible at my location in North Central Texas by sending E-mail to *frimmel@startext.net* with "Subscribe WaveGuide" in the subject and your name and location in the body of the message. Subscribers must be able to receive large text file attachments to E-mail.

WaveGuide is produced monthly (more frequently when necessary) and includes both a chronological and alphabetical listing of DX/Media programs. Only broadcasts which have actually been heard are included in *WaveGuide*. If you are not located in North America it may not be too useful to you; however, you are welcome to subscribe—and it's free!

Apologies. The editor and production staff wish to apologize for not catching the formatting error in the October issue. Many of you thought the continuous flow of frequency information without breaks between hours was our "new format"! Actually, that's the way it looks before the layout department works its magic on it. Somehow an unformatted file got sent to the printer and no one noticed. But you did!

0000 UTC SHORTWAVE GUIDE 7:00 PM EST 4:00 PM PST

Frequencies

0000-0100	Anguilla,Caribbean Beacon	6090am			
0000-0100	Australia, Radio	9660pa	12080pa	13605pa	13755pa
		15510pa	17750as	17795pa	
0000-0100 vl	Australia, VL8K Katherine	5025do			
0000-0100 vl	Australia, VL8T Tent Crk	4910do			
0000-0100	Bulgaria, Radio	7375na	9485na		
0000-0015	Cambodia, Natl Voice of	11940as			
0000-0100	Canada, CBC N Quebec Svc	9625do			
0000-0100	Canada, CFRX Toronto	6070do			
0000-0100	Canada, CFVP Calgary	6030do			
0000-0100	Canada, CHNX Halifax	6130do			
0000-0100	Canada, CKZN St John's	6160do			
0000-0100	Canada, CKZU Vancouver	6160do			
0000-0029	Canada, R Canada Intl	5960na	6040na	9535na	9755na
		11865am			
0000-0004	Croatia, Croatian Radio	9505sa			
0000-0027	Czech Rep, Radio Prague	5930na	7345na		
0000-0100	Ecuador, HCJB	9745am	21455am		
0000-0030	Egypt, Radio Cairo	9900na			
0000-0015 vl	Ghana, Ghana Broadc Corp	3366do	4915do		
0000-0045	India, All India Radio	7410as	9705as	9950as	11620as
0000-0100	Japan, R Japan/NHK World	6155eu	6180eu	13630as	13650as
0000-0100	Lebanon, Voice of Hope	9960va			
0000-0100	Liberia,LCN/R Liberia Int	5100do			
0000-0100	Malaysia, Radio	7295do			
0000-0100	Malaysia, RTM Kuching	7160do			
0000-0030	Netherlands, Radio	6020na	6165na		
0000-0100	New Zealand, R NZ Intl	15115pa			
0000-0057	North Korea, R Pyongyang	11845na	13650na	13760na	15230na
0000-0100 vl	Papua New Guinea, NBC	9675do			
0000-0100	Russia,Voice of Russia WS	5940na	7105na	7125na	7180na
0000-0100 vl	Solomon Islands, SIBC	5020do			
0000-0100	Spain, R Exterior Espana	6055am			
0000-0030	Thailand, Radio	9655af	9690af	11905af	
0000-0100	United Kingdom, BBC WS	5965as	5970am	5975am	6175am
		6195as	9410as	9590am	9915sa
		11750sa	11955as	15310as	
0000-0045	United Kingdom, BBC WS	3915as			
0000-0030	United Kingdom, BBC WS	7110as	9580as	11945as	15280as
0000-0100	United Kingdom, UCB	6200eu			
0000-0100	USA, KAIJ Dallas TX	5810am			
0000-0100	USA, KTBN Salt Lk City UT	15590am			
0000-0100	USA, KWHR Naalehu HI	7560as	17510as	17555pa	
0000-0100	USA, Monitor Radio Intl	7535am	9430am	15665as	
0000-0100	USA, Voice of America	7215as	9890as	11760as	15185as
		15290as	17735as	17820as	
0000-0030 twhfa	USA, Voice of America	5995am	6130ca	7405am	9455am
		9775am	11695am	13740am	
0000-0100	USA, WEWN Birmingham AL	5825eu			
0000-0100	USA, WGTG McCaysville GA	5085am			
0000-0100	USA, WHRI Noblesville IN	5745am	7315am		
0000-0100	USA, WINB Red Lion PA	11950am			
0000-0100	USA, WRMI/R Miami Intl	9955am			
0000-0100	USA, WRNO New Orleans LA	7355am			
0000-0100	USA, WWCR Nashville TN	5070am	7435am	9475am	13845am
0000-0100	USA, WYFR Okeechobee FL	6085na	9505ca		
0029-0059	Canada, R Canada Intl	5960na	9755na		
0030-0100	Iran, VOIRI	6050eu	9022eu	9685eu	
0030-0100	Netherlands, Radio	5905as	6020na	6165na	7305as
		9860as	11655as		
0030-0100	Sri Lanka, Sri Lanka BC	9730as	15425as		
0030-0100	Thailand, Radio	9655va	11905va	15395as	
0050-0100	Italy, RAI Intl	6010na	9675na	11800na	

Selected Programs

Sundays

0000 Bulgaria, Radio, Radio: News. Fifteen minutes of world and Bulgarian news.
0000 Ecuador, HCJB Quito (am): Adventures in Odyssey. Lively childrens' dramas from the "Focus on the Family" team.
0000 UK, BBC London (am/eu): Newsdesk. World news and dispatches from overseas and UK correspondents.
0010 Bulgaria, Radio, Radio: Topics of the Week. Headlines to the main points in the news.
0015 Bulgaria, Radio, Radio: News Behind the News. Background to a specific item of current affairs.
0030 Bulgaria, Radio, Radio: Folk Studio. Myths, legends, customs, and rituals associated with Bulgarian holidays.
0030 Ecuador, HCJB Quito (am): Musical Mailbag. HCJB staffers have a good time reading listener letters and playing music.
0030 UK, BBC London (am/eu): Letter from America. Alistair Cooke shares his inimitable view of contemporary American life.
0045 UK, BBC London (am/eu): Britain Today. News about Britain.

Mondays

0000 Bulgaria, Radio, Radio: News. See S 0000.
0000 Ecuador, HCJB Quito (am): Joni and Friends. Joni Erickson-Tada presents help and advice especially for the disabled. (www.netchurch.com/jaf/outreach/radio/radschd.htm)
0000 UK, BBC London (am/eu): Chimes of Big Ben (1). Hear the famous bells at this time on the first Monday of each month.
0000 UK, BBC London (am/eu): Newsdesk. See S 0000.
0005 Ecuador, HCJB Quito (am): Hour of Decision. See S 1200.
0015 Bulgaria, Radio, Radio: Timeout for Music. A wide variety of Bulgarian classical, pop and folk music is played.
0030 Bulgaria, Radio, Radio: Plaza Bulgaria. Thirty minutes about Bulgaria and things Bulgarian.
0030 Ecuador, HCJB Quito (am): Mountain Meditations. See S 1330.
0030 UK, BBC London (am/eu): Good Books. See S 0815.
0045 UK, BBC London (am/eu): Britain Today. See S 0045.

Tuesdays

0000 Bulgaria, Radio, Radio: News. See S 0000.
0000 Ecuador, HCJB Quito (am): Insight for Living. See M 1100.
0000 UK, BBC London (am/eu): Newsdesk. See S 0000.
0015 Bulgaria, Radio, Radio: Events and Development. A review of upcoming events this week.
0030 Bulgaria, Radio, Radio: Business and Finance. Economic news briefs and financial developments in Bulgaria.
0030 Ecuador, HCJB Quito (am): Focus on the Family. See M 1330.
0030 UK, BBC London (am/eu): Westway. The World Service's first-ever regular drama (soap opera) serial.
0045 UK, BBC London (am/eu): Britain Today. See S 0045.

Wednesdays

0000 Bulgaria, Radio, Radio: News. See S 0000.
0000 Ecuador, HCJB Quito (am): Insight for Living. See M 1100.
0000 UK, BBC London (am/eu): Newsdesk. See S 0000.
0015 Bulgaria, Radio, Radio: Events and Development. See T 0015.
0030 Bulgaria, Radio, Radio: Answering Your Letters. Replies to listener letters and Bulgarian Music.
0030 Ecuador, HCJB Quito (am): Focus on the Family. See M 1330.
0030 UK, BBC London (am/eu): The Farming World. Reports on new developments from around the world.
0045 UK, BBC London (am/eu): Britain Today. See S 0045.
0050 Bulgaria, Radio, Radio: Sports Roundup. A review of seasonal sporting events and scores.

Thursdays

0000 Bulgaria, Radio, Radio: News. See S 0000.
0000 Ecuador, HCJB Quito (am): Insight for Living. See M 1100.
0000 UK, BBC London (am/eu): Newsdesk. See S 0000.
0015 Bulgaria, Radio, Radio: Events and Development. See T 0015.
0030 Bulgaria, Radio, Radio: Cultural Review. A 30-minute summary of cultural events in Bulgaria, cultural newstips, and regional music.
0030 Ecuador, HCJB Quito (am): Focus on the Family. See M 1330.
0030 UK, BBC London (am/eu): From Our Own Correspondent. See S 0330.
0045 UK, BBC London (am/eu): Britain Today. See S 0045.
0054 Radio Netherlands: Documentary. 50th Anniversary Celebrations: From the Wireless to the World Wide Web (4th). See W 1254.
0054 Radio Netherlands: Documentary. The High "C's" (25th). See F 2354.
0054 Radio Netherlands: Documentary. The Netherlands is Full (18th). See F 1454.
0054 Radio Netherlands: Documentary. The Social Cost of Transformation (11th). See A 2354.

Fridays

0000 Bulgaria, Radio, Radio: News. See S 0000.
0000 Ecuador, HCJB Quito (am): Insight for Living. See M 1100.
0000 UK, BBC London (am/eu): Newsdesk. See S 0000.
0015 Bulgaria, Radio, Radio: Events and Development. See T 0015.
0030 Bulgaria, Radio, Radio: Lifestyle. A look at everyday life in Bulgaria.
0030 Ecuador, HCJB Quito (am): Focus on the Family. See M 1330.
0030 UK, BBC London (am/eu): Westway. See T 0030.
0045 UK, BBC London (am/eu): Britain Today. See S 0045.

Saturdays

0000 Bulgaria, Radio, Radio: News. See S 0000.
0000 Ecuador, HCJB Quito (am): Insight for Living. See M 1100.
0000 UK, BBC London (am/eu): Newsdesk. See S 0000.
0015 Bulgaria, Radio, Radio: Events and Development. See T 0015.
0030 Bulgaria, Radio, Radio: Straight from the Horse's Mouth. See M 0530.
0030 Ecuador, HCJB Quito (am): Focus on the Family. See M 1330.
0030 UK, BBC London (am/eu): From the Weeklies. Review of the British weekly press.
0045 UK, BBC London (am/eu): Britain Today. See S 0045.
0046 Bulgaria, Radio, Radio: Radio Bulgaria Calling. See S 1315.

0100

Sundays

0100 Ecuador, HCJB Quito (am): Latin and International News. Ten minutes of regional and world news.
0100 UK, BBC London (am/eu): Newsdesk. See S 0000.
0109 Ecuador, HCJB Quito (am): DX Partyline. Ken McHarg gives you plenty of information to help you get more fun out of shortwave listening.
0130 Sweden, Radio: Spectrum (1). Bill Schiller with the latest on Swedish music, drama, art, and film.
0130 Sweden, Radio: Sweden Today (3). George Wood presents voices from a wide range of people in the Scandinavian nation.
0130 UK, BBC London (am/eu): Variable Feature. Special features and new series.
0145 UK, BBC London (am/eu): Sports Roundup. The latest sports news.

Frequencies

0100-0200	Anguilla,Caribbean Beacon	6090am			
0100-0200	Australia, Radio	9660pa	12080pa	13605pa	13755pa
		15415as	15510pa	17750pa	17795pa
0100-0200 vl	Australia, VL8K Katherine	5025do			
0100-0200 vl	Australia, VL8T Tent Crk	4910do			
0100-0200	Canada, CBC N Quebec Svc	9625do			
0100-0200	Canada, CFRX Toronto	6070do			
0100-0200	Canada, CFVP Calgary	6030do			
0100-0200	Canada, CHNX Halifax	6130do			
0100-0200	Canada, CKZN St John's	6160do			
0100-0200	Canada, CKZU Vancouver	6160do			
0100-0200	Costa Rica,RF Peace Intl	7385am	7585am	15050am	
0100-0104	Croatia, Croatian Radio	9505sa			
0100-0200	Cuba, Radio Havana	6000na	9820na	9830na	
0100-0127	Czech Rep, Radio Prague	6200na	7345na		
0100-0200	Ecuador, HCJB	9745am	21455am		
0100-0150	Germany, Deutsche Welle	5960na	6040na	6085na	6145na
		9640na			
0100-0200	Germany,Overcomer Ministr	6170na			
0100-0115	Ghana, Ghana Broadc Corp	3366do	4915do		
0100-0200	Indonesia, Voice of	9525na			
0100-0125	Iran, VOIRI	9022eu	9585eu	9685eu	
0100-0200 h	Ireland,W Coast R Ireland	5905am			
0100-0110	Italy, RAI Intl	6010na	9675na	11800na	
0100-0200	Japan, R Japan/NHK World	11790na	11860as	11890as	13630na
		15500as	15590as	17810as	21610pa
0100-0200	Lebanon, Voice of Hope	9960va			
0100-0200	Liberia,LCN/R Liberia Int	5100do			
0100-0200 smtwh	Malaysia, Radio	7295do			
0100-0200 m	Malta, VO Mediterranean	13605am			
0100-0125	Netherlands, Radio	5905as	6020na	6165na	7305as
		9860as	11655as		
0100-0200	New Zealand, R NZ Intl	15115pa			
0100-0130 m	Norway, Radio Norway Intl	7465na	7545am		
0100-0200 vl	Papua New Guinea, NBC	9675do			
0100-0200	Philippines, FEBC/R Intl	15450as			
0100-0200	Russia,Voice of Russia WS	5930na	5940na	7105na	7125na
		7175na	12010na	12025na	12050na
		13640na	13665na	15425na	
0100-0130 mtwhfa	Serbia, Radio Yugoslavia	6195na	7115eu		
0100-0130	Slovakia, R Slovakia Intl	5930na	7300na	9440sa	
0100-0200 vl	Solomon Islands, SIBC	5020do			
0100-0200	Spain, R Exterior Espana	6055am			
0100-0200	Sri Lanka, Sri Lanka BC	9730as	15425as		
0100-0130	Switzerland, Swiss R Intl	6135na	9885na	9905ca	
0100-0200	Ukraine, R Ukraine Intl	5905eu	5915na	5940eu	6010eu
		6020eu	7150na	7205na	7290eu
0100-0200	United Kingdom, BBC WS	5965as	5970sa	5975am	6085am
		6145am	6175am	6195as	9410as
		9590am	9605as	11750am	11955as
		15280as	15310as	15360as	
0100-0200	United Kingdom, UCB	6200eu			
0100-0200	USA, KAIJ Dallas TX	5810am			
0100-0200	USA, KJES Mesquite NM	7555na			
0100-0200	USA, KTBN Salt Lk City UT	7510am			
0100-0200	USA, KWHR Naalehu HI	7560as	17510as	17555pa	
0100-0200	USA, Monitor Radio Intl	7535na	9430sa		
0100-0200	USA, Voice of America	7115as	7205as	9740as	9850as
		11705as	15250as	15300as	17740as
		17820as			
0100-0200 twhfa	USA, Voice of America	5995am	6130am	7405am	9445am
		9775am	13740am		
0100-0200	USA, WEWN Birmingham AL	5825eu			
0100-0200	USA, WGTG McCaysville GA	5085am			
0100-0200	USA, WHRI Noblesville IN	5745am	7315am		
0100-0200	USA, WINB Red Lion PA	11950am			
0100-0200	USA, WJCR Upton KY	7490na			
0100-0200	USA, WRMI/R Miami Intl	9955am			
0100-0200	USA, WRNO New Orleans LA	7355am			
0100-0200	USA, WWCR Nashville TN	3215am	5070am	5935am	7435am
0100-0200	USA, WYFR Okeechobee FL	6065na	9505na	11550as	
0100-0130	Uzbekistan, R Tashkent	7190eu	9375eu	9530eu	9715eu
		9740eu			
0100-0126	Vietnam, Voice of	5940na			
0125-0200	Netherlands, Radio	9860as	11655as		
0130-0055	Austria, R Austria Intl	7325na	9495am	9870am	
0130-0150	Greece, Voice of	5895na	6260na	7450na	9425na
		11645na			
0130-0200	Guam, AWR/KSDA	17645as			
0130-0200	Lithuania, Radio Vilnius	5910na			
0130-0200	Sweden, Radio	7265as			
0140-0159	Vatican State, Vatican R	7335au	9650au		

Selected Programs

Mondays

0100 Ecuador, HCJB Quito (am): Latin and International News. See S 0100.
0100 UK, BBC London (am/eu): Newsdesk. See S 0000.
0110 Ecuador, HCJB Quito (am): Saludos Amigos. An international friendship program with listener contributions presented by Ken MacHarg.
0130 Sweden, Radio: In Touch with Stockholm (1). See S 1230.
0130 Sweden, Radio: Sounds Nordic (2/4). See S 1230.
0130 Sweden, Radio: Weekend (3). See S 1230.
0130 UK, BBC London (am/eu): Variable Feature. See S 0130.

Tuesdays

0100 Ecuador, HCJB Quito (am): News. See M 1134.
0100 UK, BBC London (am/eu): Newsdesk. See S 0000.
0110 Ecuador, HCJB Quito (am): Studio 9. Ralph Kurtenbach and Curt Cole are the tour directors on your daily travel and adventure guide to life in Latin America.
0130 Ecuador, HCJB Quito (am): You Should Know. A contemporary view of issues and ethics with Leonard Kinzel.
0130 Sweden, Radio: Sixty Degrees North. See M 1230.
0130 UK, BBC London (am/eu): Seven Days. See M 1230.
0145 UK, BBC London (am/eu): Variable Feature. See S 0130.
0147 Sweden, Radio: SportScan. See M 1242.

Wednesdays

0100 Ecuador, HCJB Quito (am): News. See M 1134.
0100 UK, BBC London (am/eu): Newsdesk. See S 0000.
0110 Ecuador, HCJB Quito (am): Studio 9. See T 0110.
0130 Ecuador, HCJB Quito (am): El Mundo Futuro. Allen Graham with the world of science and technology and a "Computer Corner" segment.
0130 Sweden, Radio: Sixty Degrees North. See M 1230.
0130 UK, BBC London (am/eu): Discovery. See T 0630.
0146 Sweden, Radio: MediaScan (1/3). See T 1246.

Thursdays

0100 Ecuador, HCJB Quito (am): News. See M 1134.
0100 UK, BBC London (am/eu): Newsdesk. See S 0000.
0110 Ecuador, HCJB Quito (am): Studio 9. See T 0110.
0130 Ecuador, HCJB Quito (am): Ham Radio Today. John Beck with features, tips, news, and helps for radio amateurs.
0130 Sweden, Radio: Sixty Degrees North. See M 1230.
0130 UK, BBC London (am/eu): Omnibus. See M 0630.
0146 Sweden, Radio: Money Matters. See W 1246.

Fridays

0100 Ecuador, HCJB Quito (am): News. See M 1134.
0100 UK, BBC London (am/eu): Newsdesk. See S 0000.
0110 Ecuador, HCJB Quito (am): Studio 9. See T 0110.
0130 Ecuador, HCJB Quito (am): Woman to Woman. Focus on topics of concern. (www.gospelcom.net/woh/)
0130 Sweden, Radio: Sixty Degrees North. See M 1230.
0130 UK, BBC London (am/eu): Composer of the Month. See H 0730.
0146 Sweden, Radio: Horizon (4/5). See H 1246.
0147 Sweden, Radio: HeartBeat (3). See H 1247.

Saturdays

0100 Ecuador, HCJB Quito (am): News. See M 1134.
0100 UK, BBC London (am/eu): Newsdesk. See S 0000.
0110 Ecuador, HCJB Quito (am): Studio 9. See T 0110.
0130 Ecuador, HCJB Quito (am): Musica del Ecuador. See M 0630.
0130 Sweden, Radio: Newsweek. See M 1235.
0130 Sweden, Radio: Sixty Degrees North. See M 1230.
0130 UK, BBC London (am/eu): Variable Feature. See S 0130.
0154 Radio Netherlands: Documentary. 50th Anniversary Celebrations: From the Wireless to the World Wide Web (6th). See W 1254.
0154 Radio Netherlands: Documentary. The High "C's" (27th). See F 2354.
0154 Radio Netherlands: Documentary. The Netherlands is Full (20th). See F 1454.
0154 Radio Netherlands: Documentary. The Social Cost of Transformation (13th). Eric Beauchemin reports on the transition from centrally planned to market economies in Eastern Europe.

Hauser's Highlights

ITALY: AWR Forlì

W97 to Eu, Af:

0630-0800		7270
0800-0900	M-F	7230
0900-0930		7230
1000-1100		11795
1100-1230		7230
1300-1430		9665

(via Michiel Schaay, *BC-DX*)

NORWAY: NRK

W97 English on Sunday, UT Monday:

0700	11625 9590
0800	11625
1300	9590 9905 13800 13805
1400	13800
1600	13805 13800
1700	7560
1900	7485 9590 9960
2000	7570
2200	7570
0100	7465 7565
0400	7520

(RNI via Djaci F. Silva, *radioescutas*)

0200 UTC SHORTWAVE GUIDE 9:00 PM EST 6:00 PM PST

Frequencies

0200-0300	Anguilla,Caribbean Beacon	6090am			
0200-0300 twhfa	Argentina, RAE	11710am			
0200-0300	Australia, Radio	9660pa	12080pa	13605pa	15240pa
		15415as	15510pa	17750as	17795pa
0200-0300 vl	Australia, VL8K Katherine	5025do			
0200-0300 vl	Australia, VL8T Tent Crk	4910do			
0200-0210	Bangladesh, Bangla Betar	4880do			
0200-0230	Canada, Can Forces Net	9535ca	9780ca	11715ca	
0200-0300	Canada, CBC N Quebec Svc	9625do			
0200-0300	Canada, CFRX Toronto	6070do			
0200-0300	Canada, CFVP Calgary	6030do			
0200-0300	Canada, CHNX Halifax	6130do			
0200-0300	Canada, CKZN St John's	6160do			
0200-0300	Canada, CKZU Vancouver	6160do			
0200-0259	Canada, R Canada Intl	6155am	9535am	9755am	9780am
		11865am			
0200-0300	Costa Rica,RF Peace Intl	7385am	7585am	15050am	
0200-0204	Croatia, Croatian Radio	5840na	6120na		
0200-0300	Cuba, Radio Havana	6000na	9820na	9830na	
0200-0300	Ecuador, HCJB	9745am	21455am		
0200-0300	Egypt, Radio Cairo	9475na			
0200-0250	Germany, Deutsche Welle	6035as	7265as	7285as	7355as
		9515as	9615as	9815as	
0200-0300	Germany,Overcomer Ministr	5840na	6025na	6170na	
0200-0300	Honduras, LV Evangelica	4820am			
0200-0230	Hungary, Radio Budapest	6030na	9840na		
0200-0300 vl	Kenya, Kenya Broadc Corp	4885do	4935do	6150do	
0200-0300	Lebanon, Voice of Hope	9960va			
0200-0300 smtwh	Malaysia, Radio	7295do			
0200-0300 s	Malta, VO Mediterranean	15550au	17570as		
0200-0300	Netherlands, Radio	9860as	11655as		
0200-0300	New Zealand, R NZ Intl	15115pa			
0200-0230 m	Norway, Radio Norway Intl	7565am			
0200-0300 vl	Papua New Guinea, NBC	9675do			
0200-0300	Philippines, FEBC/R Intl	15450as			
0200-0256	Romania, R Romania Intl	5990na	6155na	9510na	9570na
		11940na	12990na		
0200-0300	Russia,Voice of Russia WS	5920na	5930na	5940na	7105na
		7125na	12050na	13640na	13645na
		13665na	13790na	15425na	
0200-0300 vl	Solomon Islands, SIBC	5020do			
0200-0300	South Korea, R Korea Intl	7275as	11725am	11810am	15575am
0200-0300	Sri Lanka, Sri Lanka BC	9730as	15425as		
0200-0300	Taiwan, Taipei Radio Intl	5950na	7130as	9680na	11740ca
		11825as	15345as		
0200-0300	United Kingdom, BBC WS	5970sa	5975am	6135af	6175am
		6195eu	9410va	9605as	11955as
		15280as	15310as	15360as	
0200-0230	United Kingdom, BBC WS	9590am	9915am		
0200-0300	United Kingdom, UCB	6200eu			
0200-0300	USA, KAIJ Dallas TX	5810am			
0200-0230	USA, KJES Mesquite NM	7555na			
0200-0300	USA, KTBN Salt Lk City UT	7510am			
0200-0300	USA, KWHR Naalehu HI	7560pa	17510as	17555pa	
0200-0300	USA, Monitor Radio Intl	5850na	7535na		
0200-0300	USA, Voice of America	7115as	7205as	9740as	9850as
		11705as	15250as	15300as	17740as
		17820as			
0200-0300	USA, WEWN Birmingham AL	5825eu			
0200-0300	USA, WGTG McCaysville GA	5085am			
0200-0300	USA, WHRI Noblesville IN	7315am			
0200-0300 s	USA, WHRI Noblesville IN	5760am			
0200-0300 mtwhf	USA, WHRI Noblesville IN	5760am			
0200-0300	USA, WINB Red Lion PA	11950am			
0200-0300	USA, WJCR Upton KY	7490na			
0200-0300	USA, WRMI/R Miami Intl	9955am			
0200-0300	USA, WRNO New Orleans LA	7355am			
0200-0300	USA, WWCR Nashville TN	3215am	5070am	5935am	7435am
0200-0300	USA, WYFR Okeechobee FL	6065na	9505na		
0215-0220	Nepal, Radio	3230do	5005do		
0230-0245	Pakistan, Radio	7255va	15120eu	15485va	17705va
0230-0300 vl/m-a	Philippines, R Pilipinas	11885me	15120me	15270me	
0230-0300	Sweden, Radio	7280na			
0230-0300	United Kingdom, BBC WS	7325am	9895am		
0230-0256	Vietnam, Voice of	5940na			
0230-0300 vl	Zambia, R Zambia/ZNBC 2	6165do			
0245-0300	Albania, R Tirana Intl	6115na	7160na		
0250-0300 sf	Greece, Voice of	5895na	6260na	7450na	9425na
0250-0300	Vatican State, Vatican R	7305ca	9605am		
0255-0300 vl	Zambia, R Zambia/ZNBC 1	4910do			

Selected Programs

Sundays

0200 Ecuador, HCJB Quito (am): Solstice. A musical program from HCJB-Australia for young people.
0200 UK, BBC London (am/eu): Newsday. Coverage of the breaking stories and a background briefing on the main news issues of the day.
0230 Sweden, Radio: Spectrum (1). See S 0130.
0230 Sweden, Radio: Sweden Today (3). See S 0130.
0230 UK, BBC London (am/eu): Music Review. News and views from the world of music.

Mondays

0200 Ecuador, HCJB Quito (am): Radio Reading Room. Readings from new Christian books.
0200 UK, BBC London (am/eu): Newsday. See S 0200.
0230 Ecuador, HCJB Quito (am): L'Abri Lectures. Dr. Francis Schaeffer is the speaker.
0230 Sweden, Radio: In Touch with Stockholm (1). See S 1230.
0230 Sweden, Radio: Sounds Nordic (2/4). See S 1230.
0230 Sweden, Radio: Weekend (3). See S 1230.
0230 UK, BBC London (am/eu): Meridian Arts. A weekly program about the world of the arts.

Tuesdays

0200 Ecuador, HCJB Quito (am): The Least of These. Ken MacHarg focuses on human needs around the world.
0200 UK, BBC London (am/eu): Newsday. See S 0200.
0230 Ecuador, HCJB Quito (am): Let My People Think. See S 1530.
0230 Sweden, Radio: Sixty Degrees North. See M 1230.
0230 UK, BBC London (am/eu): Meridian On Screen. The latest cinematic offerings are discussed.
0248 Sweden, Radio: SportScan. See M 1242.

Wednesdays

0200 Ecuador, HCJB Quito (am): Vital Signs. Join Karen Schmidt for a journey through the world of
0200 UK, BBC London (am/eu): Newsday. See S 0200.
0215 Ecuador, HCJB Quito (am): The Book and the Spade. The quest for biblical knowledge through archaeology.
0230 Ecuador, HCJB Quito (am): Unshackled. Pacific Garden Mission's radio drama.
0230 Sweden, Radio: Sixty Degrees North. See M 1230.
0230 UK, BBC London (am/eu): Meridian Arts. See M 0230.
0246 Sweden, Radio: MediaScan (1/3). See T 1246.

Thursdays

0200 Ecuador, HCJB Quito (am): Rock Solid!. A new one-hour program of contemporary (rock) Christian music.
0200 UK, BBC London (am/eu): Newsday. See S 0200.
0230 Sweden, Radio: Sixty Degrees North. See M 1230.
0230 UK, BBC London (am/eu): Meridian Arts. See M 0230.
0246 Sweden, Radio: Money Matters. See W 1246.
0254 Radio Netherlands: Documentary. 50th Anniversary Celebrations: From the Wireless to the World Wide Web (4th). See W 1254.
0254 Radio Netherlands: Documentary. The High "C's" (25th). See F 2354.
0254 Radio Netherlands: Documentary. The Netherlands is Full (18th). See F 1454.
0254 Radio Netherlands: Documentary. The Social Cost of Transformation (11th). See A 2354.

Fridays

0200 Ecuador, HCJB Quito (am): Radio Reading Room. See M 0200.
0200 UK, BBC London (am/eu): Newsday. See S 0200.
0230 Ecuador, HCJB Quito (am): Inspirational Classics. Scott and Judy Gillen of New Zealand with a program of sacred classical music. (http://iconz.co.nz/~gillen/ic.html)
0230 Sweden, Radio: Sixty Degrees North. See M 1230.
0230 UK, BBC London (am/eu): Focus on Faith. Alison Hilliard talks to church leaders about their hopes for the future.
0246 Sweden, Radio: Horizon (4/5). See H 1246.
0247 Sweden, Radio: HeartBeat (3). See H 1247.

Saturdays

0200 Ecuador, HCJB Quito (am): Inside HCJB. Paul Bell gives you a inside look at the Voice of the Andes.
0200 UK, BBC London (am/eu): Newsday. See S 0200.
0230 Ecuador, HCJB Quito (am): Walkin' in the Sunshine. Ben Cummings serves as your host for this
0230 Sweden, Radio: Newsweek. See F 1235.
0230 Sweden, Radio: Sixty Degrees North. See M 1230.
0230 UK, BBC London (am/eu): People and Politics. See F 2130.

Hauser's Highlights

SAIPAN: KHBI, W97

Times when both transmitters are not used for own Christian Science programs:
1500-1800
2100-2400
0100-0800
Times when only one is used:
0800-0900
1400-1500
2000-2100
0000-0100 (WSHB)
i.e., when probably used for R. Free Asia

SLOVAKIA: AWR

W97 in English to Eu, As, Af:

0400-0430		9465
0600-0630		11640
0700-0730		9435
0930-1030	Sat/Sun	9450
1700-1730		7325 & 9450
2030-2130		7265
2200-2230		6055

(via Michiel Schaay, *BC-DX*)

Frequencies

0300-0400	Anguilla,Caribbean Beacon	6090am			
0300-0400	Australia, Radio	9660pa	12080pa	13605pa	15240pa
		15415as	15510pa	17750pa	17795pa
0300-0400 vl	Australia, VL8K Katherine	5025do			
0300-0400 vl	Australia, VL8T Tent Crk	4910do			
0300-0400 vl	Canada, CBC N Quebec Svc	9625do			
0300-0400	Canada, CFRX Toronto	6070do			
0300-0400	Canada, CFVP Calgary	6030do			
0300-0400	Canada, CHNX Halifax	6130do			
0300-0400	Canada, CKZN St John's	6160do			
0300-0400	Canada, CKZU Vancouver	6160do			
0300-0329	Canada, R Canada Intl	6155am	9755am	9780am	
0300-0400	China, China Radio Intl	9690na			
0300-0400 vl	Costa Rica,Faro del Carib	5055do			
0300-0400	Costa Rica,RF Peace Intl	7385am	7585am	15050am	
0300-0400	Cuba, Radio Havana	6000na	9820na	9830na	
0300-0327	Czech Rep, Radio Prague	5930na	7345na		
0300-0400	Ecuador, HCJB	9745am	21455am		
0300-0330	Egypt, Radio Cairo	9475na			
0300-0350	Germany, Deutsche Welle	6045na	6085na	6185na	9535na
		9640na			
0300-0400	Germany,Overcomer Ministr	5840na	6025na		
0300-0400	Guatemala, Radio Cultural	3300do			
0300-0400	Honduras, LV Evangelica	4820am			
0300-0400 as/vl	Italy, IRRS	7120va			
0300-0400	Japan, R Japan/NHK World	17685pa			
0300-0400 vl	Kenya, Kenya Broadc Corp	4885do	4935do	6150do	
0300-0400	Lebanon, Voice of Hope	9960va			
0300-0400 vl	Lesotho, Radio Lesotho	4800do			
0300-0400 vl	Malaysia, RTM Kuching	7160do			
0300-0400 s	Malta, VO Mediterranean	15550au	17570as		
0300-0325	Netherlands, Radio	9860as	11655as		
0300-0400	New Zealand, R NZ Intl	15115pa			
0300-0400 vl	Papua New Guinea, NBC	9675do			
0300-0330 vl	Philippines, R Pilipinas	11885as	15120as	15270as	
0300-0400	Russia,Voice of Russia WS	5920na	5930na	5940na	7105na
		7125na	7175na	12050na	13640na
		13645na	13655na	13790na	15425na
0300-0330	S Africa, Channel Africa	5995af			
0300-0400 vl	Solomon Islands, SIBC	5020do			
0300-0400	Sri Lanka, Sri Lanka BC	9730as	15425as		
0300-0400	Taiwan, Taipei Radio Intl	5950na	9680na	11745au	11825as
		15345as			
0300-0330	Thailand, Radio	9655na	11905na	15395na	
0300-0315 mtwhf	Uganda, Radio	4976do			
0300-0330	United Kingdom, BBC WS	5970sa	6135af	7325am	9895am
		15360as			
0300-0400	United Kingdom, BBC WS	3255af	5975am	6005af	6175na
		6180eu	6190af	6195va	9410eu
		9600af	9605as	11760as	12095af
		15310as	17790as	21660as	
0300-0400	United Kingdom, UCB	6200eu			
0300-0400	USA, KAIJ Dallas TX	5810am			
0300-0400	USA, KTBN Salt Lk City UT	7510am			
0300-0400	USA, KVOH Los Angeles CA	9975am			
0300-0400	USA, KWHR Naalehu HI	7560pa	17510as	17555pa	
0300-0400	USA, Monitor Radio Intl	5850na	7535af		
0300-0400	USA, Voice of America	6035af	6080af	6115af	7105af
		7290af	7340af	7415af	9575af
		9885af			
0300-0330 smtwh	USA, Voice of America	4960af			
0300-0400	USA, WEWN Birmingham AL	5825eu			
0300-0300	USA, WGTG McCaysville GA	5085am			
0300-0400	USA, WHRI Noblesville IN	7315am			
0300-0400 s	USA, WHRI Noblesville IN	5760am			
0300-0400 mtwhfa	USA, WHRI Noblesville IN	5745am			
0300-0400	USA, WINB Red Lion PA	11950am			
0300-0400	USA, WJCR Upton KY	7490na			
0300-0400	USA, WRMI/R Miami Intl	9955am			
0300-0400	USA, WRNO New Orleans LA	7395am			
0300-0400	USA, WWCR Nashville TN	3215am	5070am	5935am	7435am
0300-0400	USA, WYFR Okeechobee FL	6065na	9505na		
0300-0310	Vatican State, Vatican R	7305ca	9605am		
0300-0400 vl	Zambia, R Zambia/ZNBC 1	4910do			
0300-0400 vl	Zambia, R Zambia/ZNBC 2	6165do			
0300-0400 vl	Zimbabwe, Zimbabwe BC	3396do			
0310-0340	Vatican State, Vatican R	7360af	9660af		
0329-0359 sm	Canada, R Canada Intl	6155na	9755na	9780na	
0330-0400	Albania, R Tirana Intl	6140na	7160na		
0330-0357	Czech Rep, Radio Prague	7350me	11600as		
0330-0400	Hungary, Radio Budapest	6010na	9840na		
0330-0355	Moldova, R Moldova Intl	7500na			
0330-0400 vl	Philippines, R Pilipinas	7730as	13770as	15330as	
0330-0400 twhfa	Portugal, R Portugal Intl	6150am	9570am		
0330-0400	Sweden, Radio	7115na			
0330-0400	Tanzania, Radio	5050af			
0330-0400	UAE, Radio Dubai	12005na	13675na	15400na	21485na
0330-0400	United Kingdom, BBC WS	9610af	11730af	11955as	15280as
0340-0350	Greece, Voice of	5895na	6260na	7450na	9425na
0345-0400	Burundi, Radio Nationale	6140do			
0345-0400	Tajikistan,Radio Dushanbe	7245as	9905as	11620as	
0345-0400 as	Uganda, Radio	4976do			
0356-0400	Zambia, Christian Voice	3330af	6065af		

Selected Programs

Sundays

0300 Ecuador, HCJB Quito (am): Alive!. Ron Hutchcraft.
0300 UK, BBC London (am/eu): World News. Broadcast on the hour of 5, 10, or 15 minutes in length.
0305 UK, BBC London (am/eu): World Business Review. A look back at the previous week's business and a preview of upcoming events.
0315 UK, BBC London (am/eu): Sports Roundup. See S 0145.
0330 Sweden, Radio: Spectrum (1). See S 0130.
0330 Sweden, Radio: Sweden Today (3). See S 0130.
0330 UK, BBC London (am/eu): From Our Own Correspondent. BBC correspondents comment on the background to the news.

Mondays

0300 Ecuador, HCJB Quito (am): The Sower. Michael Guido presents music and inspiration.
0300 UK, BBC London (am/eu): World News. See S 0300.
0305 UK, BBC London (am/eu): Write On. See S 0905.
0315 Ecuador, HCJB Quito (am): The Word Today. A discussion of Biblical themes.
0315 UK, BBC London (am/eu): Sports Roundup. See S 0145.
0330 Ecuador, HCJB Quito (am): Joy International. Dave Freeland hosts a program of Christian music.
0330 Sweden, Radio: In Touch with Stockholm (1). See S 1230.
0330 Sweden, Radio: Sounds Nordic (2/4). See S 1230.
0330 Sweden, Radio: Weekend (3). See S 1230.
0330 UK, BBC London (am/eu): The Works. Alun Lewis looks at the impact of tomorrow's technology.

Tuesdays

0300 Ecuador, HCJB Quito (am): Chords of Love. Music to encourage you.
0300 UK, BBC London (am/eu): World News. See S 0300.
0305 UK, BBC London (am/eu): World Business Report. See M 0905.
0315 Ecuador, HCJB Quito (am): Rendezvous. Dick Saunders presents Bible study and evangelism.
0315 UK, BBC London (am/eu): Sports Roundup. See S 0145.
0330 Ecuador, HCJB Quito (am): MasterControl. A magazine program of current topics, lifestyle issues, and Christian themes. (www.mastercontrol.org)
0330 Sweden, Radio: Sixty Degrees North. See M 1230.
0330 UK, BBC London (am/eu): Variable Feature. See S 0130.
0342 Sweden, Radio: SportScan. See M 1242.

Wednesdays

0300 Ecuador, HCJB Quito (am): Psychology for Living. See T 0600.
0300 UK, BBC London (am/eu): World News. See S 0300.
0305 UK, BBC London (am/eu): World Business Report. See M 0905.
0315 Ecuador, HCJB Quito (am): Rendezvous. See T 0315.
0315 UK, BBC London (am/eu): Sports Roundup. See S 0145.
0330 Ecuador, HCJB Quito (am): Stories of Great Christians. See T 0615.
0330 Sweden, Radio: Sixty Degrees North. See M 1230.
0330 UK, BBC London (am/eu): One Planet. See T 1830.
0345 Ecuador, HCJB Quito (am): Wonderful Words of Life. Messages from the Salvation Army.
0346 Sweden, Radio: MediaScan (1/3). See T 1246.

Thursdays

0300 Ecuador, HCJB Quito (am): CBF Presents. Christian activities in the Caribbean.
0300 UK, BBC London (am/eu): World News. See S 0300.
0305 UK, BBC London (am/eu): World Business Report. See M 0905.
0315 Ecuador, HCJB Quito (am): Rendezvous. See T 0315.
0315 UK, BBC London (am/eu): Sports Roundup. See S 0145.
0330 Ecuador, HCJB Quito (am): The Living Word. See T 1430.
0330 Sweden, Radio: Sixty Degrees North. See M 1230.
0330 UK, BBC London (am/eu): Variable Feature. See S 0130.
0345 UK, BBC London (am/eu): Variable Feature. See S 0130.
0346 Sweden, Radio: Money Matters. See W 1246.

Fridays

0300 Ecuador, HCJB Quito (am): Words for Women. Helpful ideas for family living.
0300 UK, BBC London (am/eu): World News. See S 0300.
0305 UK, BBC London (am/eu): World Business Report. See M 0905.
0315 Ecuador, HCJB Quito (am): Rendezvous. See T 0315.
0315 UK, BBC London (am/eu): Sports Roundup. See S 0145.
0330 Ecuador, HCJB Quito (am): Christians Broadcasting Hope. See H 1430.
0330 Sweden, Radio: Sixty Degrees North. See M 1230.
0330 UK, BBC London (am/eu): Assignment. See H 1830.
0346 Sweden, Radio: Horizon (4/5). See H 1246.
0347 Sweden, Radio: HeartBeat (3). See H 1247.

Saturdays

0300 Ecuador, HCJB Quito (am): Science, Scripture and Salvation. See M 0545.
0300 UK, BBC London (am/eu): World News. See S 0300.
0305 UK, BBC London (am/eu): World Business Report. See M 0905.
0315 Ecuador, HCJB Quito (am): Rendezvous. See T 0315.
0315 UK, BBC London (am/eu): Sports Roundup. See S 0145.
0330 Ecuador, HCJB Quito (am): Adventures in Odyssey. See S 0000.
0330 Sweden, Radio: Newsweek. See F 1235.
0330 Sweden, Radio: Sixty Degrees North. See M 1230.
0330 UK, BBC London (am/eu): Science in Action. See F 1530.

Frequencies

0400-0500	Anguilla,Caribbean Beacon	6090am			
0400-0500	Australia, Radio	9660pa	12080pa	13605as	15240pa
		15510pa	17795pa		
0400-0500 s	Australia, Radio	17750as			
0400-0500 vl	Australia, VL8K Katherine	5025do			
0400-0500 vl	Australia, VL8T Tent Crk	4910do			
0400-0500	Australia,DefenseForces R	13525as			
0400-0500	Canada, CBC N Quebec Svc	9625do			
0400-0500	Canada, CFRX Toronto	6070do			
0400-0500	Canada, CFVP Calgary	6030do			
0400-0500	Canada, CHNX Halifax	6130do			
0400-0500	Canada, CKZN St John's	6160do			
0400-0500	Canada, CKZU Vancouver	6160do			
0400-0429	Canada, R Canada Intl	6105me	9505me	9645me	
0400-0500	China, China Radio Intl	9560na	9730am		
0400-0500	Costa Rica,RF Peace Intl	7385am	7585am	15050am	
0400-0500	Cuba, Radio Havana	6000na	9820na	9830na	
0400-0500	Ecuador, HCJB	9745am	21455am		
0400-0450	Germany, Deutsche Welle	6015af	6065af	7225af	7265af
		9565af			
0400-0500 twhfa	Guatemala, Radio Cultural	3300do			
0400-0500	Honduras, LV Evangelica	4890am			
0400-0430	Iraq, Radio Iraq Intl	11787eu			
0400-0500 as/vl	Italy, IRRS	7120va			
0400-0500 vl	Kenya, Kenya Broadc Corp	4885do	4935do	6150do	
0400-0500	Lebanon, Voice of Hope	9960va			
0400-0500 s	Malta, VO Mediterranean	15550as	17570au		
0400-0430 mtwhfa	Mexico, Radio Mexico Intl	9705na			
0400-0458	New Zealand, R NZ Intl	15115pa			
0400-0430 m	Norway, Radio Norway Intl	7520na			
0400-0500 vl	Papua New Guinea, NBC	9675do			
0400-0456	Romania, R Romania Intl	5990na	6155na	9510na	9570na
		11940na	12990na		
0400-0500	Russia,Voice of Russia WS	5920na	5930na	6065na	7175na
		9825na	12000na	12050na	13640na
0400-0430	S Africa, Channel Africa	5955af			
0400-0430	Slovakia, AWR Europe	9465af			
0400-0500 vl	Solomon Islands, SIBC	5020do			
0400-0430	Sri Lanka, Sri Lanka BC	9730as	15425as		
0400-0430	Switzerland, Swiss R Intl	6135na	9885na	9905na	
0400-0430	Tanzania, Radio	5050af			
0400-0500	Turkey, Voice of	7300eu	9685as	17705au	
0400-0415	Uganda, Radio	4976do			
0400-0500	Ukraine, R Ukraine Intl	5915na	6020eu	6030na	7150na
		7205eu			
0400-0500	United Kingdom, BBC WS	3255af	3955eu	5975af	6005af
		6175am	6180eu	6190af	6195eu
		7160af	9410na	9600af	11760va
		11955as	12085af	12095va	15280as
		15310as	15575va	17640af	17790as
		21660as			
0400-0430	United Kingdom, BBC WS	9605as	9610af	9895am	11730af
0400-0500	United Kingdom, UCB	6200eu			
0400-0500	USA, KAIJ Dallas TX	5810am			
0400-0500	USA, KTBN Salt Lk City UT	7510am			
0400-0500	USA, KVOH Los Angeles CA	9975am			
0400-0500	USA, KWHR Naalehu HI	7560pa	17510am	17555pa	
0400-0500	USA, Monitor Radio Intl	7535eu	9835af		
0400-0500	USA, Voice of America	6035af	6080af	7170af	7280af
		7290af	7415af	9575af	9775af
		9885af			
0400-0500	USA, WEWN Birmingham AL	5825eu			
0400-0500	USA, WGTG McCaysville GA	5085am			
0400-0500	USA, WHRI Noblesville IN	7315am			
0400-0500 mtwhfa	USA, WHRI Noblesville IN	5760am			
0400-0500	USA, WINB Red Lion PA	11950am			
0400-0500	USA, WJCR Upton KY	7490na			
0400-0500	USA, WRMI/R Miami Intl	9955am			
0400-0500	USA, WRNO New Orleans LA	7395am			
0400-0500	USA, WWCR Nashville TN	3210am	5070am	5935am	7435am
0400-0500	USA, WYFR Okeechobee FL	6065na	9505na	9985eu	
0400-0430	Vietnam, Voice of	12020na	15010na		
0400-0500	Zambia, Christian Voice	3330af	6065af		
0400-0500 vl	Zambia, R Zambia/ZNBC 1	4910do			
0400-0500 vl	Zambia, R Zambia/ZNBC 2	6165do			
0400-0500 vl	Zimbabwe, Zimbabwe BC	3396do			
0415-0440 vl	Italy, RAI Intl	6010eu	7270na		
0415-0500 vl	Malawi, MBC	5993do			
0425-0500	Nigeria, FRCN/Radio	3326do	4770do	4990do	
0430-0500 m-f/vl	Lesotho, Radio Lesotho	4800do			
0430-0455	Moldova, R Moldova Intl	7500na			
0430-0500	Netherlands, Radio	6165na	9590na		
0430-0500	Swaziland, Trans World R	3200af	4775af	6100af	
0430-0500	Switzerland, Swiss R Intl	9905na			
0430-0500	United Kingdom, BBC WS	15420af			
0455-0500	Malaysia, Voice of	6175as	9750as	15295au	
0459-0500	New Zealand, R NZ Intl	11905pa			

Selected Programs

Sundays

0400 Ecuador, HCJB Quito (am): Latin and International News. See S 0100.
0400 UK, BBC London (am/eu): Newsdesk. See S 0000.
0409 Ecuador, HCJB Quito (am): DX Partyline. See S 0109.
0430 UK, BBC London (am/eu): Global Business. NEW! Roger White presents this weekly series of interviews, features and discussions with the movers and shakers of the international business community.

Mondays

0400 Ecuador, HCJB Quito (am): Latin and International News. See S 0100.
0400 UK, BBC London (am/eu): Newsdesk. See S 0000.
0410 Ecuador, HCJB Quito (am): Saludos Amigos. See M 0110.
0430 UK, BBC London (am/eu): Europe Today (Eu). See S 1700.
0430 UK, BBC London (am/eu): Westway Compilation Edition. Catch up on the week's episodes of the World Service's drama serial.

Tuesdays

0400 Ecuador, HCJB Quito (am): News. See M 1134.
0400 UK, BBC London (am/eu): Newsdesk. See S 0000.
0410 Ecuador, HCJB Quito (am): Studio 9. See T 0110.
0430 Ecuador, HCJB Quito (am): You Should Know. See T 0130.
0430 UK, BBC London (am/eu): Europe Today (Eu). See S 1700.
0430 UK, BBC London (am/eu): The World Today. See M 1630.
0455 UK, BBC London (am/eu): Off the Shelf. See M 0715.

Wednesdays

0400 Ecuador, HCJB Quito (am): News. See M 1134.
0400 UK, BBC London (am/eu): Newsdesk. See S 0000.
0410 Ecuador, HCJB Quito (am): Studio 9. See T 0110.
0430 Ecuador, HCJB Quito (am): El Mundo Futuro. See W 0130.
0430 UK, BBC London (am/eu): Europe Today (Eu). See S 1700.
0430 UK, BBC London (am/eu): The World Today. See M 1630.
0455 UK, BBC London (am/eu): Take Five. See T 0555.

Thursdays

0400 Ecuador, HCJB Quito (am): News. See M 1134.
0400 UK, BBC London (am/eu): Newsdesk. See S 0000.
0410 Ecuador, HCJB Quito (am): Studio 9. See T 0110.
0430 Ecuador, HCJB Quito (am): Ham Radio Today. See H 0130.
0430 UK, BBC London (am/eu): Europe Today (Eu). See S 1700.
0430 UK, BBC London (am/eu): Off the Shelf. See M 0715.
0454 Radio Netherlands: Documentary. 50th Anniversary Celebrations: From the Wireless to the World Wide Web (4th). See W 1254.
0454 Radio Netherlands: Documentary. The High "C's" (25th). See F 2354.
0454 Radio Netherlands: Documentary. The Netherlands is Full (18th). See F 1454.
0454 Radio Netherlands: Documentary. The Social Cost of Transformation (11th). See A 2354.

Fridays

0400 Ecuador, HCJB Quito (am): News. See M 1134.
0400 UK, BBC London (am/eu): Newsdesk. See S 0000.
0410 Ecuador, HCJB Quito (am): Studio 9. See T 0110.
0430 Ecuador, HCJB Quito (am): Woman to Woman. See F 0130.
0430 UK, BBC London (am/eu): Europe Today (Eu). See S 1700.
0430 UK, BBC London (am/eu): Outlook. See M 1405.
0455 UK, BBC London (am/eu): Science View. See S 2305.

Saturdays

0400 Ecuador, HCJB Quito (am): News. See M 1134.
0400 UK, BBC London (am/eu): Newsdesk. See S 0000.
0410 Ecuador, HCJB Quito (am): Studio 9. See T 0110.
0430 Ecuador, HCJB Quito (am): Musica del Ecuador. See M 0630.
0430 UK, BBC London (am/eu): The World Today. See M 1630.
0430 UK, BBC London (am/eu): Weekend (Eu). European magazine program co-produced by European broadcasters.
0455 UK, BBC London (am/eu): Off the Shelf. See M 0715.

Hauser's Highlights
SOUTH AFRICA: Channel Africa

W97 English:

0300-0330 &		
0400-0430		5955
0500-0530		9675
0600-0630		11900
1300-1455	Sat & Sun	9440 15330
		17675
1500-1530		9440
1600-1625		5955
1700-1730 & 1800-1830		15240

(Kathy Otto, SENTECH)

FREQUENCIES

0500-0600	Anguilla,Caribbean Beacon	6090am			
0500-0600	Australia, Radio	9660pa	12080pa	13605as	15240pa
		15510as	17795pa		
0500-0600 a	Australia, Radio	17750as			
0500-0600 vl	Australia, VL8K Katherine	5025do			
0500-0600 vl	Australia, VL8T Tent Crk	4910do			
0500-0600	Australia,DefenseForces R	13525as			
0500-0600	Bulgaria, Radio	7375na	9485na		
0500-0600 vl	Cameroon, Radio Cameroon	4850do			
0500-0600	Canada, CFRX Toronto	6070do			
0500-0600	Canada, CFVP Calgary	6030do			
0500-0600	Canada, CHNX Halifax	6130do			
0500-0600	Canada, CKZU Vancouver	6160do			
0500-0600	Costa Rica, Adv World R	5030ca	6150ca	9725ca	
0500-0600 as	Costa Rica, Adv World R	7375am			
0500-0600	Costa Rica,RF Peace Intl	7385am	7585am	15050am	
0500-0600	Cuba, Radio Havana	6180na	9820na	9830na	
0500-0600 vl	Cyprus, BRT International	6150do			
0500-0600	Ecuador, HCJB	9745am	21455am		
0500-0550	Germany, Deutsche Welle	5960na	6065na	7225na	7265na
		9565na			
0500-0600	Guyana, GBC/Voice of	3290do			
0500-0515	Israel, Kol Israel	7465na	9435na	17545na	
0500-0600 as/vl	Italy, IRRS	7120va			
0500-0600	Japan, R Japan/NHK World	6110na	6150eu	9835ca	11840as
		11895ca	11920pa	15230pa	
0500-0600 vl	Kenya, Kenya Broadc Corp	4885do	4935do	6150do	
0500-0600 vl	Kiribati, Radio	9810do			
0500-0600	Lebanon, Voice of Hope	9960va			
0500-0505	Lesotho, Radio Lesotho	4800do			
0500-0600	Liberia,LCN/R Liberia Int	5100do			
0500-0510 mtwhf	Malawi, MBC	3380do			
0500-0530 mtwhf	Mexico, Radio Mexico Intl	9705na			
0500-0525	Netherlands, Radio	6165na	9590na		
0500-0600	New Zealand, R NZ Intl	11905pa			
0500-0505	Nigeria, FRCN/Radio	3326do	4770do	4990do	
0500-0600	Nigeria, Voice of	7255af			
0500-0557	North Korea, R Pyongyang	11740as	13790as		
0500-0600 vl	Papua New Guinea, NBC	9675do			
0500-0600	Russia,Voice of Russia WS	5920na	5930na	6065na	7175na
		9825na	12000na	12050na	13640na
0500-0530	S Africa, Channel Africa	9675af			
0500-0600 vl	Solomon Islands, SIBC	5020do			
0500-0600	Spain, R Exterior Espana	6055am			
0500-0600	Swaziland, Trans World R	4775af	6100af		
0500-0515	Uganda, Radio	4976do			
0500-0600	United Kingdom, BBC WS	3255af	3955eu	5975am	6005af
		6175am	6180eu	6190af	6195va
		7120va	7160af	9410va	9515af
		9600af	9610af	9740as	11760as
		11940af	12095as	15310as	15360as
	15420af	15575va	17640af	17760as	
	17885af	21660as			
0500-0530	United Kingdom, BBC WS	15280as	17790as		
0500-0600	United Kingdom, UCB	6200eu			
0500-0600	USA, KAIJ Dallas TX	5810am			
0500-0600	USA, KTBN Salt Lk City UT	7510am			
0500-0600	USA, KVOH Los Angeles CA	9975am			
0500-0600	USA, KWHR Naalehu HI	7560as	17555pa		
0500-0600	USA, Monitor Radio Intl	7425af	7535eu		
0500-0600	USA, Voice of America	5970af	6035af	6080af	7170eu
		7295af	9700af	9775af	11825me
		11965eu	12080af	15205eu	
0500-0600	USA, WEWN Birmingham AL	5825eu			
0500-0600	USA, WGTG McCaysville GA	5085am			
0500-0600	USA, WHRI Noblesville IN	5760am	7315am	9930am	
0500-0600	USA, WINB Red Lion PA	11950am			
0500-0600	USA, WJCR Upton KY	7490na			
0500-0600	USA, WRMI/R Miami Intl	9955am			
0500-0600	USA, WRNO New Orleans LA	7395am			
0500-0600	USA, WWCR Nashville TN	3210am	5070am	5935am	7435am
0500-0600	USA, WYFR Okeechobee FL	5985na	9985af	11580eu	
0500-0520	Vatican State, Vatican R	5885eu	7250eu	9660af	11625af
		15570af			
0500-0600	Zambia, Christian Voice	3330af	6065af		
0500-0530 vl	Zambia, R Zambia/ZNBC 1	4910do			
0500-0600 vl	Zambia, R Zambia/ZNBC 2	6165do			
0500-0530 vl	Zimbabwe, Zimbabwe BC	3396do			
0505-0600	Swaziland, Trans World R	9500af			
0520-0530	Vatican State, Vatican R	9660af	11625af	15570af	
0525-0600	Ghana, Ghana Broadc Corp	3366do	4915do		
0530-0559	Austria, R Austria Intl	6015na	6155eu	13730eu	15410me
		17870me			
0530-0600	Japan, R Japan/NHK World	6110na	7230eu	11840as	11920pa
0530-0556	Romania, R Romania Intl	11790af	11940af	15250af	15270af
		15340as	17720as	17790af	
0530-0600	Thailand, Radio	9655eu	11905eu	15115eu	
0530-0548	UAE, Radio Dubai	15435as	17830as	21700as	
0530-0600 vl	Zambia, R Zambia/ZNBC 1	7220do			
0530-0600 vl	Zimbabwe, Zimbabwe BC	5975do			

SELECTED PROGRAMS

Sundays

0500 Bulgaria, Radio, Radio: News. See S 0000.
0500 Ecuador, HCJB Quito (am): Musical Mailbag. See S 0030.
0500 UK, BBC London (am/eu): Newsday. See S 0200.
0515 Bulgaria, Radio, Radio: News Behind the News. See S 0015.
0530 Bulgaria, Radio, Radio: Listeners' Choice. Some interesting items about Bulgaria and the top of the music charts.
0530 Ecuador, HCJB Quito (am): Afterglow. Don Johnson plays religious music.
0530 UK, BBC London (am/eu): Jazzmatazz. The request program that lives up to its title.

Mondays

0500 Bulgaria, Radio, Radio: News. See S 0000.
0500 Ecuador, HCJB Quito (am): Radio Reading Room. See M 0200.
0500 UK, BBC London (am/eu): Newsday. See S 0200.
0515 Bulgaria, Radio, Radio: Timeout for Music. See M 0015.
0530 Bulgaria, Radio, Radio: Straight from the Horse's Mouth. Discussion of a current matter affecting Bulgaria in an interview with a cognizant official.
0530 Ecuador, HCJB Quito (am): The Sower. See M 0300.
0530 UK, BBC London (am/eu): Europe Today (Eu). See S 1700.
0530 UK, BBC London (am/eu): Variable Feature. See S 0130.
0545 Bulgaria, Radio, Radio: Radio Bulgaria Calling. See S 1315.
0545 Ecuador, HCJB Quito (am): Science, Scripture and Salvation. Proving scientific principles with the Bible.

Tuesdays

0500 Bulgaria, Radio, Radio: News. See S 0000.
0500 Ecuador, HCJB Quito (am): The Least of These. See T 0200.
0500 UK, BBC London (am/eu): Newsday. See S 0200.
0515 Bulgaria, Radio, Radio: Events and Development. See T 0015.
0515 Bulgaria, Radio, Radio: Radio Bulgaria Spectrum. Thirty-minute digest on a wide variety of topics.
0530 Ecuador, HCJB Quito (am): Let My People Think. See S 1530.
0530 UK, BBC London (am/eu): Europe Today (Eu). See S 1700.
0530 UK, BBC London (am/eu): Outlook. See M 1405.
0555 UK, BBC London (am/eu): Take Five. A short series of human interest stories.

Wednesdays

0500 Bulgaria, Radio, Radio: News. See S 0000.
0500 Ecuador, HCJB Quito (am): Vital Signs. See W 0200.
0500 UK, BBC London (am/eu): Newsday. See S 0200.
0515 Bulgaria, Radio, Radio: Events and Development. See T 0015.
0515 Ecuador, HCJB Quito (am): The Book and the Spade. See W 0215.
0530 Bulgaria, Radio, Radio: Across the Map of Bulgaria. A travelogue program of historical sites and interesting places and people.
0530 Ecuador, HCJB Quito (am): Unshackled. See W 0230.
0530 UK, BBC London (am/eu): Europe Today (Eu). See S 1700.
0530 UK, BBC London (am/eu): Outlook. See M 1405.
0555 UK, BBC London (am/eu): Take Five. See T 0555.

Thursdays

0500 Bulgaria, Radio, Radio: News. See S 0000.
0500 Ecuador, HCJB Quito (am): Rock Solid!. See H 0200.
0500 UK, BBC London (am/eu): Newsday. See S 0200.
0515 Bulgaria, Radio, Radio: Events and Development. See T 0015.
0530 Bulgaria, Radio, Radio: Answering Your Letters. See W 0030.
0530 UK, BBC London (am/eu): Europe Today (Eu). See S 1700.
0530 UK, BBC London (am/eu): Outlook. See M 1405.
0550 Bulgaria, Radio, Radio: Sports Roundup. See W 0050.
0555 UK, BBC London (am/eu): Music Brief. A five-minute interlude.

Fridays

0500 Bulgaria, Radio, Radio: News. See S 0000.
0500 Ecuador, HCJB Quito (am): Radio Reading Room. See M 0200.
0500 UK, BBC London (am/eu): Newsday. See S 0200.
0515 Bulgaria, Radio, Radio: Events and Development. See T 0015.
0530 Bulgaria, Radio, Radio: Cultural Review. See H 0030.
0530 Ecuador, HCJB Quito (am): Inspirational Classics. See F 0230.
0530 UK, BBC London (am/eu): Europe Today (Eu). See S 1700.
0530 UK, BBC London (am/eu): Outlook. See M 1405.
0555 UK, BBC London (am/eu): Science View. See S 2305.

Saturdays

0500 Bulgaria, Radio, Radio: News. See S 0000.
0500 Ecuador, HCJB Quito (am): Inside HCJB. See A 0200.
0500 UK, BBC London (am/eu): Newsday. See S 0200.
0515 Bulgaria, Radio, Radio: Events and Development. See T 0015.
0530 Bulgaria, Radio, Radio: Lifestyle. See F 0030.
0530 Ecuador, HCJB Quito (am): Walkin' in the Sunshine. See A 0230.
0530 UK, BBC London (am/eu): Outlook. See M 1405.
0555 UK, BBC London (am/eu): Spotlight. Focus on the theater.

0600 UTC SHORTWAVE GUIDE 1:00 AM EST 10:00 PM PST

Frequencies

0600-0700	Anguilla,Caribbean Beacon	6090am				
0600-0700	Australia, Radio	9660pa	11880pa	12080pa	13605as	
		15240pa	15415as	15510as	17750as	
0600-0700 vl	Australia, VL8K Katherine	5025do				
0600-0700 vl	Australia, VL8T Tent Crk	4910do				
0600-0633	Australia,DefenseForces R	13525as				
0600-0700 vl	Canada, CBC N Quebec Svc	9625do				
0600-0700	Canada, CFRX Toronto	6070do				
0600-0700	Canada, CFVP Calgary	6030do				
0600-0700	Canada, CHNX Halifax	6130do				
0600-0700	Canada, CKZU Vancouver	6160do				
0600-0659 mtwhf	Canada, R Canada Intl	6050va	6150va	9740af	9760va	
		11905af				
0600-0700	Costa Rica,RF Peace Intl	7385am	7585am			
0600-0700	Cuba, Radio Havana	6180na	9820na	9830na		
0600-0700	Ecuador, HCJB	9745am	21455am			
0600-0650	Germany, Deutsche Welle	6045af	7225af	9565af	11765af	
		17820as	21705me			
0600-0700	Germany,Overcomer Ministr	9500au				
0600-0615	Ghana, Ghana Broadc Corp	3366do	4915do			
0600-0700	Guyana, GBC/Voice of	3290do				
0600-0700 vl	Italy, IRRS	3985va				
0600-0700	Japan, R Japan/NHK World	5975eu	6190na	7230eu	9505pa	
		9835na	11740as	11840as	11920pa	
		15550as	15570as	17810as		
0600-0700 vl	Kenya, Kenya Broadc Corp	4885do	4935do	6150do		
0600-0700 vl	Kiribati, Radio	9810do				
0600-0700	Lebanon, Voice of Hope	9960va				
0600-0700	Liberia,LCN/R Liberia Int	5100do				
0600-0700	Malaysia, Voice of	6175as	9750as	15295au		
0600-0700	New Zealand, R NZ Intl	11905pa				
0600-0630	Nigeria, FRCN/Radio	3326do	4770do	4990do		
0600-0700	Nigeria, Voice of	7255af				
0600-0700 vl	Papua New Guinea, NBC	9675do				
0600-0700	Russia,Voice of Russia WS	7270na	7345na	9825na	9895na	
		12025as	12055na	15470na	17570as	
		17795as	21790as			
0600-0630	S Africa, Channel Africa	11900af				
0600-0630	S Africa, Trans World R	11730af				
0600-0610	Sierra Leone, SLBS	3316do				
0600-0630	Slovakia, AWR Europe	11640af				
0600-0700 vl	Solomon Islands, SIBC	5020do				
0600-0700	Swaziland, Trans World R	4775af	6100af	9500af		
0600-0630	Switzerland, Swiss R Intl	5840eu	6165eu			
0600-0700	United Kingdom, BBC WS	5975am	6005af	6175am	6180eu	
		6190af	6195eu	7145as	7160af	
		7325va	9410va	9600af	9740as	
		11760as	11780eu	11940af	12095eu	
		15310as	15360as	15420af	15565va	
	15575va	17640af	17785as	17885af		
	21660as					
0600-0700	United Kingdom, UCB	6200eu				
0600-0700	USA, KAIJ Dallas TX	5810am				
0600-0700	USA, KTBN Salt Lk City UT	7510am				
0600-0700	USA, KVOH Los Angeles CA	9975am				
0600-0700	USA, KWHR Naalehu HI	7560as	17555pa			
0600-0700	USA, Monitor Radio Intl	7535eu				
0600-0630	USA, Voice of America	5970af	5995me	6035af	6080af	
		7170eu	7285af	11805eu	11825me	
		11950af	12080af	15205eu	15600af	
0600-0700	USA, WEWN Birmingham AL	5825eu				
0600-0700	USA, WGTG McCaysville GA	5085am				
0600-0700	USA, WHRI Noblesville IN	7315am	7315am	9930am		
0600-0700	USA, WINB Red Lion PA	11950am				
0600-0700	USA, WJCR Upton KY	7490na				
0600-0700	USA, WRMI/R Miami Intl	9955am				
0600-0700	USA, WWCR Nashville TN	2390am	3210am	5070am	5935am	
0600-0700	USA, WYFR Okeechobee FL	5985am	7355eu	9985eu		
0600-0700 vl	Vanuatu, Radio	3945do	4960do			
0600-0630 mtwhfa	Vatican State, Vatican R	5885eu	7250eu	9645eu	11740eu	
		15595va				
0600-0630	Vietnam, Voice of	5925as	10060as			
0600-0700	Yemen, Radio Aden	9780do				
0600-0700	Zambia, Christian Voice	3330af	6065af			
0600-0700 vl	Zambia, R Zambia/ZNBC 1	7220do				
0600-0700 vl	Zimbabwe, Zimbabwe BC	5975do				
0605-0700	Swaziland, Trans World R	9650af				
0630-0659	Austria, R Austria Intl	6015na				
0630-0700	USA, Voice of America	5995me	7170eu	11805eu	11825me	
		15205eu				
0630-0700 as	USA, Voice of America	5970af	6035af	6080af	7285af	
		11950af	12080af	15600af		
0630-0645	Vatican State, Vatican R	11625af	13765af	15570af		
0631-0640	Romania, R Romania Intl	9550eu	9665eu	11810eu	15365eu	
0645-0700	Romania, R Romania Intl	11740pa	11840pa	15250pa	15270pa	
		17720pa				

Selected Programs

Sundays

0600 Ecuador, HCJB Quito (am): Solstice. See S 0200.
0600 UK, BBC London (am/eu): Newsday. See S 0200.
0600 USA, VOA Washington DC (af/eu): VOA News. Ten minutes of worldwide news on the hour.
0610 USA, VOA Washington DC (af/eu): VOA Sunday. Interviews and features about science, sports, agriculture, and business, plus the latest American music.
0630 UK, BBC London (am/eu): In Praise of God. Weekly programme of worship and meditation.

Mondays

0600 Ecuador, HCJB Quito (am): Mountain Meditations. See S 1330.
0600 UK, BBC London (am/eu): Newsday. See S 0200.
0600 USA, VOA Washington DC (af): Daybreak Africa. Magazine program of African news, sports, features, and correspondent reports.
0600 USA, VOA Washington DC (eu): VOA News. See S 0600.
0610 USA, VOA Washington DC (eu): VOA Today. Up-to-the-minute news summaries, hourly business and sports updates, interviews on world news events, plus features on topics from movies to medicine.
0630 Ecuador, HCJB Quito (am): Musica del Ecuador. Jorge Zambrano presents a unique mix of Ecuadorian music and friendly chatter (highly rated).
0630 UK, BBC London (am/eu): Europe Today (Eu). See S 1700.
0630 UK, BBC London (am/eu): Omnibus. Each week a half-hour programme on practically any topic under the sun.

Tuesdays

0600 Ecuador, HCJB Quito (am): Psychology for Living. Clyde Narramore of California gives Christian advice on issues of today.
0600 UK, BBC London (am/eu): Newsday. See S 0200.
0600 USA, VOA Washington DC (af): Daybreak Africa. See M 0600.
0600 USA, VOA Washington DC (eu): VOA News. See S 0600.
0610 USA, VOA Washington DC (eu): VOA Worldwide. A daily morning program that provides in-depth analysis of global issues and events through daily roundtable discussions.
0615 Ecuador, HCJB Quito (am): Stories of Great Christians. Radio drama with Christian theme from the Moody Bible Institute. (www.moody.edu)
0630 Ecuador, HCJB Quito (am): Nightsounds. Christian music and thoughtful words from Bill Pearce.
0630 UK, BBC London (am/eu): Discovery. In-depth look at scientific research.
0630 UK, BBC London (am/eu): Europe Today (Eu). See S 1700.

Wednesdays

0600 Ecuador, HCJB Quito (am): Psychology for Living. See T 0600.
0600 UK, BBC London (am/eu): Newsday. See S 0200.
0600 USA, VOA Washington DC (af): Daybreak Africa. See M 0600.
0600 USA, VOA Washington DC (eu): VOA News. See S 0600.
0610 USA, VOA Washington DC (eu): VOA Worldwide. See T 0610.
0615 Ecuador, HCJB Quito (am): Stories of Great Christians. See T 0615.
0630 Ecuador, HCJB Quito (am): Nightsounds. See T 0630.
0630 UK, BBC London (am/eu): Europe Today (Eu). See S 1700.
0630 UK, BBC London (am/eu): Sports International. Live commentaries and interviews, features and discussions.

Thursdays

0600 Ecuador, HCJB Quito (am): Psychology for Living. See T 0600.
0600 UK, BBC London (am/eu): Newsday. See S 0200.
0600 USA, VOA Washington DC (af): Daybreak Africa. See M 0600.
0600 USA, VOA Washington DC (eu): VOA News. See S 0600.
0610 USA, VOA Washington DC (eu): VOA Worldwide. See T 0610.
0615 Ecuador, HCJB Quito (am): Stories of Great Christians. See T 0615.
0630 Ecuador, HCJB Quito (am): Nightsounds. See T 0630.
0630 UK, BBC London (am/eu): Europe Today (Eu). See S 1700.
0630 UK, BBC London (am/eu): Meridian Arts. See M 0230.

Fridays

0600 Ecuador, HCJB Quito (am): Psychology for Living. See T 0600.
0600 UK, BBC London (am/eu): Newsday. See S 0200.
0600 USA, VOA Washington DC (af): Daybreak Africa. See M 0600.
0600 USA, VOA Washington DC (eu): VOA News. See S 0600.
0610 USA, VOA Washington DC (eu): VOA Worldwide. See T 0610.
0615 Ecuador, HCJB Quito (am): Stories of Great Christians. See T 0615.
0630 Ecuador, HCJB Quito (am): Nightsounds. See T 0630.
0630 UK, BBC London (am/eu): Europe Today (Eu). See S 1700.
0630 UK, BBC London (am/eu): Variable Feature. See S 0130.

Saturdays

0600 Ecuador, HCJB Quito (am): Psychology for Living. See T 0600.
0600 UK, BBC London (am/eu): Newsday. See S 0200.
0600 USA, VOA Washington DC (af/eu): VOA News. See S 0600.
0610 USA, VOA Washington DC (af/eu): VOA Saturday. See S 0610.
0615 Ecuador, HCJB Quito (am): Stories of Great Christians. See T 0615.
0630 Ecuador, HCJB Quito (am): Nightsounds. See T 0630.
0630 UK, BBC London (am/eu): Meridian. One of the topical programs weekly about the world of the arts.

FREQUENCIES

0700-0800	Anguilla,Caribbean Beacon	6090am			
0700-0800	Australia, Radio	9660pa	11880pa	12080pa	13605pa
		15240pa	15415as	15510as	17750as
0700-0800 vl	Australia, VL8K Katherine	5025do			
0700-0800 vl	Australia, VL8T Tent Crk	4910do			
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	7585am		
0700-0704	Croatia, Croatian Radio	11730au			
0700-0800	Ecuador, HCJB	9365eu	9645pa	21455au	
0700-0800 as	Eqt Guinea, R East Africa	15186af			
0700-0800 mtwhf	Eqt Guinea, Radio Africa	15186af			
0700-0800	Germany,Overcomer Ministr	9500au			
0700-0715	Ghana, Ghana Broadc Corp	3366do	4915do		
0700-0800	Guyana, GBC/Voice of	3290do			
0700-0800 vl	Italy, IRRS	3985va			
0700-0800	Japan, R Japan/NHK World	7230eu	11740as	11840as	11850pa
		11910pa	15230af	15570as	17810as
		17815af			
0700-0800 vl	Kenya, Kenya Broadc Corp	4885do	4935do	6150do	
0700-0800 vl	Kiribati, Radio	9810do			
0700-0800	Lebanon, Voice of Hope	9960va			
0700-0715	Liberia,LCN/R Liberia Int	5100do			
0700-0800 asmtwh	Malaysia, Radio	7295do			
0700-0800	Malaysia, Voice of	6175as	9750as	15295au	
0700-0758 as	New Zealand, R NZ Intl	11905pa			
0700-0800 mtwhf	New Zealand, R NZ Intl	11905pa			
0700-0730 s	Norway, Radio Norway Intl	9590va	11625va		
0700-0800 vl	Papua New Guinea, NBC	9675do			
0700-0745	Romania, R Romania Intl	15370pa	17720pa	17790pa	17805pa
0700-0715 s	Romania, R Romania Intl	15370pa	17720pa	17790pa	17805pa
0700-0800	Russia,Voice of Russia WS	9875as	12025as	12055as	15470as
		17570as	17795as	17860as	21790as
0700-0710	Sierra Leone, SLBS	3316do			
0700-0730	Slovakia, AWR Europe	9435eu			
0700-0800 vl	Solomon Islands, SIBC	5020do			
0700-0735	Swaziland, Trans World R	6100af	9500af	9650af	
0700-0800	Taiwan, Taipei Radio Intl	5950na			
0700-0800	United Kingdom, BBC WS	5975na	6190af	7145as	7325eu
		9410eu	9600af	9610af	9740as
		11760as	11835af	11940af	11955as
		12095va	15310as	15360as	15485af
		15575va	17640af	17760af	17785as
		17830af	21660as		
0700-0800 as	United Kingdom, BBC WS	17885af			
0700-0715	United Kingdom, BBC WS	6005af	7160af		
0700-0730	United Kingdom, BBC WS	6180eu	6195eu	7325af	9410eu
		11780eu			
0700-0800	United Kingdom, UCB	6200eu			
0700-0800	USA, KAIJ Dallas TX	5810am			
0700-0800	USA, KTBN Salt Lk City UT	7510am			
0700-0800	USA, KVOH Los Angeles CA	9975am			
0700-0800	USA, KWHR Naalehu HI	7560as	11565pa		
0700-0800	USA, Monitor Radio Intl	7535eu			
0700-0800	USA, WEWN Birmingham AL	5825eu			
0700-0800	USA, WHRI Noblesville IN	5760am	7315am	9930am	
0700-0800	USA, WJCR Upton KY	7490na			
0700-0800	USA, WRMI/R Miami Intl	9955am			
0700-0800	USA, WWCR Nashville TN	2390am	3210am	5070am	5935am
0700-0800	USA, WYFR Okeechobee FL	7355eu	9985eu	13695af	
0700-0800 vl	Vanuatu, Radio	3945do	4960do		
0700-0800	Zambia, Christian Voice	6065af			
0700-0800 vl	Zambia, R Zambia/ZNBC 1	7220do			
0700-0800 vl	Zimbabwe, Zimbabwe BC	5975do			
0730-0800	Georgia, Radio	11805eu			
0730-0745 s	Greece, Voice of	7430eu	7450eu	9425au	11645au
0730-0800	Netherlands, Radio	9830pa	11895pa		
0730-0800 as	Palau, KHBN/Voice of Hope	9730as			
0730-0800	Switzerland, Swiss r Intl	5840eu	6165eu	9885af	11860af
		13635af			
0730-0800	United Kingdom, BBC WS	15400va	15565va		
0735-0800 as	Swaziland, Trans World R	6100af	9500af	9650af	
0740-0800	Guam, TWR/KTWR	15200as			
0745-0800	Albania, TWR Tirana	9685eu			
0745-0800 s	Ghana, Ghana Broadc Corp	3366do	4915do		
0745-0755	Greece, Voice of	7430eu	7450eu	9425au	11645au
0745-0800 as	Monaco, Trans World Radio	9755eu			
0755-0800 mtwhf	Monaco, Trans World Radio	9755eu			
0758-0800 as	New Zealand, R NZ Intl	9700pa			
0800-0900	Albania, TWR Tirana	9685eu			
0800-0900	Anguilla,Caribbean Beacon	6090am			
0800-0830	Australia, Radio	5995pa	9580pa	9710pa	11880pa
		12080pa	15415as	15510as	17750as
0800-0830 vl	Australia, VL8K Katherine	5025do			
0800-0830 vl	Australia, VL8T Tent Crk	4910do			
0800-0900 mtwhfa	Bhutan, Bhutan BC Service	5030do			
0800-0900 vl	Canada, CBC N Quebec Svc	9625do			
0800-0900	Canada, CFRX Toronto	6070do			
0800-0900	Canada, CFVP Calgary	6030do			
0800-0900	Canada, CHNX Halifax	6130do			
0800-0900	Canada, CKZU Vancouver	6160do			
0800-0900	Costa Rica,RF Peace Intl	7385am	7585am		
0800-0804	Croatia, Croatian Radio	11730au			
0800-0857	Czech Rep, Radio Prague	9505eu	11600as		
0800-0900	Ecuador, HCJB	9365eu	9645pa	21455au	
0800-0900 as	Eqt Guinea, R East Africa	15186af			
0800-0900 mtwhf	Eqt Guinea, Radio Africa	15186af			
0800-0805 s	Ghana, Ghana Broadc Corp	3366do			
0800-0900	Guam, TWR/KTWR	15200as			
0800-0900	Guyana, GBC/Voice of	3290do			
0800-0900	Indonesia, Voice of	9525as			
0800-0830 vl	Italy, IRRS	3985va			
0800-0900 vl	Kiribati, Radio	9810do			
0800-0900	Lebanon, Voice of Hope	9960va			
0800-0900	Liberia,LCN/R Liberia Int	5100do			
0800-0900	Malaysia, Radio	7295do			
0800-0825	Malaysia, Voice of	6175as	9750as	15295au	
0800-0900	Monaco, Trans World Radio	9755eu			
0800-0830	Netherlands, Radio	9830pa	11895pa		
0800-0815 mtwhf	New Zealand, R NZ Intl	11905pa			
0800-0900 as	New Zealand, R NZ Intl	9700pa			
0800-0830 s	Norway, Radio Norway Intl	11625au			
0800-0900 as	Palau, KHBN/Voice of Hope	9730as			
0800-0900 vl	Papua New Guinea, NBC	9675do			
0800-0900	Russia,Voice of Russia WS	9875as	12025as	12055as	15470as
		17570as	17795as	17860as	21790as
0800-0900 f	Seychelles, FEBA Radio	15540as			
0800-0810	Sierra Leone, SLBS	3316do			
0800-0900 vl	Solomon Islands, SIBC	5020do			
0800-0900	South Korea, R Korea Intl	9570au	13670eu		
0800-0805 as	Swaziland, Trans World R	6100af	9500af	9650af	
0800-0900	United Kingdom, BBC WS	6190af	7325eu	9410eu	9740as
		11750as	11760as	11940af	11955as
		12095eu	15310as	15360va	15400af
		15485va	15575va	17640va	17760as
		17785as	17830af	21660as	
0800-0900 as	United Kingdom, BBC WS	15565va	17885af		
0800-0815	United Kingdom, BBC WS	7145pa	11835af		
0800-0900	United Kingdom, UCB	6200eu			
0800-0900	USA, KAIJ Dallas TX	5810am			
0800-0900	USA, KNLS Anchor Point AK	6150as			
0800-0900	USA, KTBN Salt Lk City UT	7510am			
0800-0900	USA, KWHR Naalehu HI	7560as	11565pa		
0800-0900	USA, Monitor Radio Intl	7535eu	9845au	15665eu	
0800-0900	USA, WEWN Birmingham AL	5825eu			
0800-0900	USA, WHRI Noblesville IN	7315am	9930am		
0800-0900	USA, WJCR Upton KY	7490na			
0800-0900	USA, WRMI/R Miami Intl	9955am			
0800-0900	USA, WWCR Nashville TN	2390am	3210am	5070am	5935am
0800-0900	Zambia, Christian Voice	6065af			
0800-0900 vl	Zambia, R Zambia/ZNBC 1	7220do			
0800-0900 vl	Zimbabwe, Zimbabwe BC	5975do			
0815-0900 mtwtf	Nigeria, FRCN/Radio	3326do	4770do	4990do	
0816-0900 mtwhf	New Zealand, R NZ Intl	9700pa			
0820-0900 vl	Chile, R Esperanza	6089am			
0830-0900	Australia, Radio	5995pa	6080as	9580pa	9710pa
		12080pa	15415as	15510pa	17750as
0830-0900 vl	Australia, VL8A Alice Spg	2310do			
0830-0900 vl	Australia, VL8K Katherine	2485do			
0830-0900 vl	Australia, VL8T Tent Crk	2325do			
0830-0855	Austria, R Austria Intl	6155eu	13730eu	17870me	
0830-0855	Belgium, R Vlaanderen Int	6130eu	13795au		
0830-0900 fas/vl	Italy, IRRS	7120va			
0830-0900	Lithuania, Radio Vilnius	9710eu			
0830-0900	Netherlands, Radio	5965pa	9830pa	13700pa	
0830-0900	Slovakia, R Slovakia Intl	11990au	15460au	17570au	
0830-0900	United Kingdom, BBC WS	15280as			
0855-0900	Guam, TWR/KTWR	11830au			

FREQUENCIES

0900-0920 as	Albania, TWR Tirana	9685eu			
0900-1000	Anguilla,Caribbean Beacon	6090am			
0900-1000	Australia, Radio	6080as	9580pa	11880as	
0900-1000 vl	Australia, VL8A Alice Spg	2310do			
0900-1000 vl	Australia, VL8K Katherine	2485do			
0900-1000 vl	Australia, VL8T Tent Crk	2325do			
0900-1000	Canada, CFRX Toronto	6070do			
0900-1000	Canada, CFVP Calgary	6030do			
0900-1000	Canada, CHNX Halifax	6130do			
0900-1000	Canada, CKZU Vancouver	6160do			
0900-0935 vl	Chile, R Esperanza	6089am			
0900-1000	China, China Radio Intl	9785pa	11755pa		
0900-1000	Costa Rica,RF Peace Intl	7385am	7585am		
0900-0904	Croatia, Croatian Radio	11730au			
0900-1000	Ecuador, HCJB	9645pa	21455au		
0900-1000 as	Eqt Guinea, R East Africa	15186af			
0900-1000 mtwhf	Eqt Guinea, Radio Africa	15186af			
0900-0930	Finland, YLE/R Finland	9760as	15225as		
0900-0950	Germany, Deutsche Welle	6160au	7380as	9565af	11715as
		15145af	15410af	17800af	17810as
		21600af			
0900-0915 mtwtf	Ghana, Ghana Broadc Corp	3366do	4915do		
0900-0955	Guam, TWR/KTWR	11835as			
0900-1000	Guyana, GBC/Voice of	3290do			
0900-1000 fas/vl	Italy, IRRS	7120va			
0900-0930 vl	Kiribati, Radio	9810do			
0900-1000	Lebanon, Voice of Hope	9960va			
0900-0915	Liberia,LCN/R Liberia Int	5100do			
0900-1000	Malaysia, Radio	7295do			
0900-0935 a	Monaco, Trans World Radio	9755eu			
0900-0950 s	Monaco, Trans World Radio	9755eu			
0900-0920 mtwhf	Monaco, Trans World Radio	9755eu			
0900-0925	Netherlands, Radio	5965pa	9830pa	13700pa	
0900-1000	New Zealand, R NZ Intl	9700pa			
0900-1000 as	Palau, KHBN/Voice of Hope	9730as			
0900-1000 vl	Papua New Guinea, NBC	4890do			
0900-1000	Russia,Voice of Russia WS	9825as	9875as	12025as	17795as
		17860as			
0900-1000 vl	Solomon Islands, SIBC	5020do			
0900-1000	United Kingdom, BBC WS	5965as	6190af	6195as	9410eu
		9740as	11750as	11765va	11940af
		11945as	12095eu	15190sa	15360as
		15400af	15485va	15565as	15575va
		17640va	17705eu	17830af	21660as
0900-0915	United Kingdom, BBC WS	7325eu	15310as	15360pa	17785as
0900-0945	United Kingdom, BBC WS	9580as	11760as	11955as	15280as
0900-1000	United Kingdom, UCB	6200eu			
0900-1000	USA, KAIJ Dallas TX	5810am			
0900-1000	USA, KTBN Salt Lk City UT	7510am			
0900-1000	USA, KWHR Naalehu HI	11565pa			
0900-1000	USA, Monitor Radio Intl	7395sa	7535eu	9355as	13840au
0900-1000	USA, WEWN Birmingham AL	5825eu			
0900-1000	USA, WHRI Noblesville IN	5760am	7315am	9930am	
0900-1000	USA, WJCR Upton KY	7490na			
0900-1000	USA, WRMI/R Miami Intl	9955am			
0900-1000	USA, WWCR Nashville TN	2390am	3210am	5070am	5935am
0900-1000	Zambia, Christian Voice	6065af			
0900-1000 vl	Zambia, R Zambia/ZNBC 1	7220do			
0900-1000 vl	Zimbabwe, Zimbabwe BC	5975do			
0915-1000	Ghana, Ghana Broadc Corp	6130do	7295do		
0930-0955	Austria, R Austria Intl	15455as	17870au		
0930-1000	Canada, CKZN St John's	6160do			
0930-1000	Georgia, Radio	11910eu			
0930-1000	Netherlands, Radio	7260as	9810as		
0930-1000	Philippines, FEBC/R Intl	11635as			
0930-1000 as	Slovakia, AWR Europe	9450eu			
0935-0950 s	Albania, TWR Tirana	9685eu			

1000 UTC

1000-1100	Anguilla,Caribbean Beacon	6090am			
1000-1100	Australia, Radio	6080as	9580pa	11880as	
1000-1100 vl	Australia, VL8A Alice Spg	2310do			
1000-1100 vl	Australia, VL8K Katherine	2485do			
1000-1100 vl	Australia, VL8T Tent Crk	2325do			
1000-1100 vl	Canada, CBC N Quebec Svc	9625do			
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	9785pa	11755pa		
1000-1100	Costa Rica,RF Peace Intl	7385am	7585am		
1000-1030	Czech Rep, Radio Prague	17485af	21705me		
1000-1100	Ecuador, HCJB	9645pa	21455au		
1000-1100 as	Eqt Guinea, R East Africa	15186af			
1000-1100 mtwhf	Eqt Guinea, Radio Africa	15186af			
1000-1100	Guam, AWR/KSDA	11790as	15170as		
1000-1100	Guam, TWR/KTWR	9865as			
1000-1100	India, All India Radio	11585au	11735au	13700au	15050au
		17387au	17840au		
1000-1100 fas/vl	Italy, IRRS	7120va			
1000-1020 tfa	Kazakhstan, Radio Almaty	9620eu	11720eu		
1000-1100	Lebanon, Voice of Hope	9960va			
1000-1100	Malaysia, Radio	7295do			
1000-1100 vl	Malaysia, RTM Kuching	7160do			
1000-1100 vl	Malaysia,RTM KotaKinabalu	5980do			
1000-1100	Netherlands, Radio	7260as	9810as		
1000-1100	New Zealand, R NZ Intl	9700pa			
1000-1100	Nigeria, Voice of	7255af			
1000-1100 as	Palau, KHBN/Voice of Hope	9730as			
1000-1100 vl	Papua New Guinea, NBC	4890do			
1000-1100	Philippines, FEBC/R Intl	11635as			
1000-1100	Russia,Voice of Russia WS	11655as	11820as	11880as	15470as
		15560as	17795as	17860as	
1000-1100 vl	Solomon Islands, SIBC	5020do			
1000-1100	United Kingdom, BBC WS	5965va	6190af	6195am	9410eu
		9740as	11750as	11760as	11765va
		11940af	12095eu	15310as	15485va
		15565as	15575me	17640af	17705af
		17885va	21660as		
1000-1100 as	United Kingdom, BBC WS	15190am	15400am	17830af	
1000-1030	United Kingdom, BBC WS	15360as			
1000-1100	United Kingdom, UCB	6200eu			
1000-1100	USA, KAIJ Dallas TX	5810am			
1000-1100	USA, KTBN Salt Lk City UT	7510am			
1000-1100	USA, KWHR Naalehu HI	11565pa			
1000-1100	USA, Monitor Radio Intl	6095am	7395sa	9355as	15725as
1000-1100	USA, Voice of America	5985pa	6165am	7405am	9590am
		11720pa	15425pa		
1000-1100	USA, WEWN Birmingham AL	5825na	7425eu		
1000-1100	USA, WGTG McCaysville GA	9400am			
1000-1100	USA, WHRI Noblesville IN	6040am	9495am	9930am	
1000-1100	USA, WJCR Upton KY	7490na			
1000-1100 as	USA, WRMI/R Miami Intl	9955am			
1000-1100	USA, WRNO New Orleans LA	15420am			
1000-1100	USA, WWCR Nashville TN	2390am	3210am	5070am	5935am
1000-1100	USA, WYFR Okeechobee FL	5950na			
1000-1030 mtwhfa	Vatican State, Vatican R	5885eu	9645eu	11740eu	15595va
		17550va			
1000-1030	Vietnam, Voice of	5940as	7270as	7400as	9840as
		12020as	15010as		
1000-1100	Zambia, Christian Voice	6065af			
1000-1100 vl	Zambia, R Zambia/ZNBC 1	7220do			
1020-1040 w	Kazakhstan, Radio Almaty	9620eu	11720eu		
1030-1100 mtwhf	Ethiopia, Radio	5990do	7110do	9705do	
1030-1100	Georgia, Radio	11910me			
1030-1100	Guam, AWR/KSDA	15170as			
1030-1100	South Korea, R Korea Intl	11715am			
1030-1100	Sri Lanka, Sri Lanka BC	11835as	15120as	17850as	
1030-1055	UAE, Radio Dubai	13675eu	15395eu	21605eu	

MT MONITORING TEAM

Next Reporting Deadline: December 10, 1997

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THANK YOU...

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GROVE

December 1997

Our Complete Buyer's Guide

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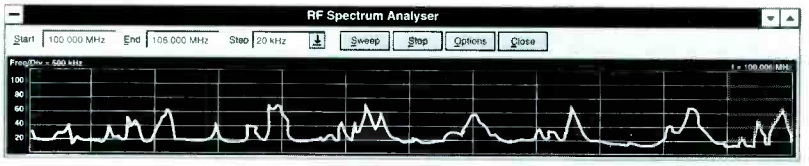
This computer-controlled, simulated receiver and spectrum display (bottom) appear on your computer screen!

Imagine—plug a small PC card into your computer, load the simple software, and turn your PC into a potent, wide-coverage monitoring station! User-friendly software allows all the usual receiver controls, plus much more. Rugged shielding resists interference from the host computer. Enjoy continuous 500 kHz through 1300 MHz (less cellular) frequency coverage; multimode reception of AM, wide and narrow FM, and SSB/CW; up to 16 memory banks with a virtually limitless number of channels; display records in memory by frequency, callsign, or comments field; scan by bank, grouping, or mode; and automatically search for activity by entering your choice of frequency limits.

Call up a full-fledged spectrum display and see signal presence on any span between 500 kHz and 1.3 GHz! Double-click the mouse on any signal spike and the receiver immediately tunes to that frequency! Storage feature allows recall of signal traces.

BNC connector allows attachment of your antenna system, while a mini-jack permits connection of speaker or earphones. One-microvolt nominal sensitivity assures weak-signal pickup.

Easy installation, full instruction manual included. This unique receiving laboratory unleashes its power with Windows 3.1, requiring 386 or higher, 1 Meg RAM, 1 Meg hard disk space, VGA monitor; or Windows 95, requiring 486 or Pentium, 4 Megs RAM, and an SVGA monitor. See specifications on page "l" in this Buyer's Guide.



Save $20.00!*

ORDER RCV16

$479.95

****This special holiday offer expires Dec. 31, 1997, at which time price will return to $499.95. See September and October, 1996,* Monitoring Times *for full WiNRADiO review. Reprint $4.***

RECOMMENDED ACCESSORIES: TUN 4A, ANT 1, ANT 2, ANT 3, ANT 7, ANT 9, ANT 15, CBL 50 and CBL 100 beginning on page "m".

NOTE: Shipping charges for all products in this Guide are shown in the chart on page "o".

SPECIAL: Get a FREE Grove FCC Database CD ($49.95 value) with the purchase of any scanner or shortwave receiver in this Buyer's Guide. See page "f" for details.

***UPS Second Day Air at Ground Rates on ALL PRODUCTS! Order Line and Product Support Info.:* 1-800-438-8155**

New TrunkTracker BC895XLT

The Exciting New TrunkTracker Desktop/Mobile BC-895XLT Now Available—with FREE Antenna for a Limited Time!

The new BC895XLT TrunkTracker is the most powerful monitoring tool available to the scanning enthusiast. Designed not only for serious scanning of conventional VHF/UHF land, sea, and air communications, but for automatically tracking Motorola 800 MHz trunking systems! Triple conversion design.

Featuring 29-54, 108-174, 216-512, and 806-956 MHz frequency coverage (less cellular), 300 memory channelss, trunk search and scan, selective lockout and delay, instant weather access with storm alert, 300 channels per second scanning, built-in subaudible tone squelch (CTCSS/"PL"), computer control port, rotary tuning dial, 10 priority channels, bargraph S meter, search autostore, data skip, and even a real-time trunking activity indicator.

Powerful 2.7 watt audio with external speaker and tape recorder jacks. Ruggedly built and compact, the 3-1/2 pound scanner measures 10-7/8"W x 3-3/8"H x 7-1/2"D and is powered by an AC adaptor (provided) or your optional mobile DC. Telescoping whip, manual are included. See detailed specifications on page "g". **Accessories: see BRK 2 and DCC 3 beginning on page "m".**

ORDER SCN 09 only **$369.95**

NOTE: Shipping charges for all products are shown in the chart on page "o".

SPECIAL: Order your TrunkTracker BC895XLT from Grove and choose one of the following antennas FREE for a limited time: Grove Omni, ANT 5, $19.95 value (add $11 UPS shipping); Scantenna, ANT 7, $39.95 value (add $11 UPS shipping); Austin Condor, ANT 14B, $29.95 value, free shipping.

Uniden BC3000XLT

Featuring continuous 25-550, 760-1300 MHz (less cellular) frequency range, 400 memory channels, 10 priority channels, 100-channel-per-second TurboScan, automatic storage of search-discovered frequencies, selectable-channel overload attenuator, mode and step selection, data skip, and reduced-intermod design.

Strong audio guarantees crisp reception in noisy environments; up to 50 frequencies may be locked out of the search function to eliminate unwanted interruptions; battery save circuit extends charge life during inactive reception periods; handsome, rugged styling makes this handheld scanner an outstanding choice. See specifications on page "g". **Accessories: see BAT 15, CAS 6, DCC 7, and PWR 2 beginning on page "m".**

ORDER SCN 29 only **$369.95**

Wow—Lowest Price on TrunkTracker BC235XLT

Uniden's new BC-235 XLT will follow elusive conversations on your local 800 MHz Motorola trunking system from law enforcement dispatch and tactical channels, fire and rescue calls, ambulances, government agencies, and many other services. You can also listen to conventional scanner communications in the 29-54, 108-174, 406-512, and 806-956 MHz bands (less cellular).

The BC-235XLT is designed to track the Motorola Type I, II, IIi, Hybrid, Smartnet, and Privacy Plus analog trunking, which are extensively used in 800 MHz communications systems. (Note: trunking frequencies must be entered before they can be monitored.) Conventional scanner mode operation is similiar to the BC-230XLT. See specifications on page "g". **Accessories: ANT 8, ANT 14, ANT 22, BAT 5, CAS-3 and DCC-7 beginning on page "m".**

ORDER SCN 10 only **$249.95**

For superb reception, combine the TrunkTracker with the Austin Condor high gain flex antenna (ANT 14) shown elsewhere in this Buyers Guide.

Uniden BC9000XLT

This superb desktop scanner is for serious monitors of the 25-550, 760-1300 MHz (less cellular) spectrum. The BC9000XLT features 500 memory channels, tuning knob, 16-digit alphanumeric display with adjustable brightness, powerful 2.2 watts of audio, tone control, and CTCSS tone squelch option.

Rubber-padded tilt feet combine with the large tuning knob for additional comfort during periods of serious signal searching. Search lockout of up to 50 frequencies prevent unwanted interruptions. This scanner means business. See detailed specifications on page "g". **Accessories: see ACC 130, BRK 2, and DCC 3 beginning on page "m".**

ORDER SCN 30 only **$399.95**

Other Grove Scanners, Satellite Receivers

NOTE: All scanners sold by Grove have cellular frequencies deleted—825-849, 869-894 MHz. Complete specifications for many scanners may be found on page "g" in this Buyer's Guide.

Model	Order Code	Description	Price	Recommended Accessories
AOR				
AR-3000	SCN-26	Mobile/base 100 kHz-2036 MHz 400 channel	$1062.95	ANT-2, ANT-1, SPK-13, SFT-2W
Radio Shack				
PRO-2046	SCN-7	Mobile 29-54, 108-174, 406-512, 806-956MHz 100 channel	$239.95	ANT-20, ANT-30, ANT-13, SPK-15
Uniden				
BC-890XLT	SCN-19	Mobile/base 29-54, 108-174, 216-512,806-956 MHz 200 channel	$269.95	ACC-96, BRK-2, DCC-3
BCT-7	SCN-21	Mobile 26.9-27.4 (CB),29.7-54, 108-174, 406-512, 806-956 MHz factory-programmed plus 100 ch.	$179.95	ANT-20, ANT-30, SPK-15
BC-230 XLT	SCN-24	Handheld 29-54, 108-174, 406-512, 806-956 MHz 200 channel	$239.95	BAT-5, CAS-3, DCC-7
Universal				
SCPC-200	RCV-28	SCPC audio receiver for home TVRO satellite dishes	$399.95	SPL-2

UPS Second Day Air at Ground Rates on ALL PRODUCTS!

GROVE

ICOM R8500

$150 Discount extended until 12/31/97!

Here is one of the world's best tabletop receivers with continuous 100 kHz-1999.99 MHz frequency coverage (less cellular), tunable in precise 10 Hz steps—longwave, shortwave, VHF/UHF, all services and modes (wide and narrow FM and AM, USB, LSB, CW). Add high sensitivity, IF shift, selectable AGC timing, audio peak filter to automatically enhance modes, built-in RS232C and CI-V for direct computer control, 1000 memory channels in 20 banks, multiple scanning selections with priority function and selectable delay, S-meter settable squelch, noise blanker, and 12 VDC / 120 VAC operation.

High stability crystal oscillators combine with automatic frequency control circuitry for outstanding stability. Multiple tuning speeds optimize signal hunting. Alphanumeric display aids in identifying memorized frequencies. Automatic memorizing of search-discovered active frequencies, skipping of unwanted channels, three antenna connectors for optimal choices for frequency ranges, even voice scan to ignore noisy channels, and even optional voice synthesizer--an incredible array of advanced features! See specifications on page "g". **Accessories: ACC 6, ACC 7, ACC 8, ACC 72, ACC 74, ANT 2, BRK 4, BRK 5, MAN 1 beginning on page "m".**

ORDER SCN 01 only **$1849.95** Through 12/31/97. After that, price returns to $1,999.95

ICOM R-10!

This incredible scanning receiver features continuous 500 kHz-1300 MHz (less cellular) frequency coverage, multimode (AM/WFM/NFM/SSB) reception, rotary tuning control, programmable tuning steps from 100 Hz-1 MHz, on-screen spectrum display (200 kHz span), 1000 channel non-volatile memory, computer control, and second-radio cloning--and these are just the beginning!

The sleek, compact, lightweight R-10 has large, easy-to-read—and touch—keys. Its revolutionary zero-wait-state scanning seeks and holds in readiness the next active frequency while you are listening to another signal! Wide-dynamic-range triple conversion, and sharp selectivity assure dramatic improvement in interference-free reception.

Eight alphanumeric characters can be entered to identify any channel, and ten characters can be used to identify banks. Voice scan control skips unmodulated carriers. Scan memory channels by bank, mode, or program. High-contrast display and powerful, dual-function keyboard provide incredible options to suit your listening requirements. Noise blanker and automatic noise limiter provide double noise reduction. Sleep timer and programmable attenuator are additional advantages. See specifications on page "g". **Accessories: ACC 3, ACC 4, ADPK 4, ANT 8, ANT 14, CAS 1, DCC 5, AND SFT 1 beginning on page "m".**

ORDER SCN 06 only **$499.95**

Coming Soon! Alinco DJ-X10!

Measuring only 2-1/4"W x 6"H x 1"D and weighing a mere 11 ounces, the DJ-X10 offers continuous 100 kHz through 2000 MHz coverage (less cellular) and all-mode reception (AM, WFM, NFM, USB, LSB, CW), high sensitivity, 1200 memory channel capacity in 30 banks, triple conversion superheterodyne design, 25 channel per second scan/search speed, 40 channel spectrum display, clock timer,

Imagine--listen to local or worldwide AM broadcasters; SSB communications, VHF/UHF dispatch and tactical radio from local police, fire, and ambulance teams; air-to-ground civilian and military comms; business, weather, trains, and taxis; even FM and TV broadcast stations--all from one handheld radio!

The feature-packed DJ-X10 also features low battery indicator, dual power (replaceable AA cells or 8-15 VDC external supply; rechargeable NiCD pack available), computer port, 100 mW audio output, overload attenuator, display contrast control, selectable on-screen help messages, alphanumeric identification of channels, automatic memorizing of search-discovered channels, illuminated dial, and up to 8 different scanning modes including linked ranges and dual VFO. See specifications on page "g".

ORDER SCN02 *Call for price and availability (available pending FCC approval)*

RELM HS200

This advanced, wide-frequency-coverage scanner covers 26-54, 118-174, 406-520, 806-960 MHz (less cellular). Stores 200 memory channels in 10 banks and scans and searches at a lightning-fast 100 channels per second! All channels may be keyboard-programmed for PL/CTCSS (subaudible tone) or DPL/DCS (digital) squelch.

Ten priority channels with hierarchy, instant weather scan, undesired frequency lockout, replaceable or rechargeable battery operation (batteries not included), backlit keyboard and display, and even a signal strength bargraph. See specifications on page "g". **Accessories: ANT 8, ANT 14, BAT 1, BAT 13, CAS 11, and DCC 3 beginning on page "m".**

ORDER SCN 08 only **$249.95**

AOR

AR-5000

Super-wide-coverage receiver

AOR has scooped the market with their new AR5000 extended-frequency coverage receiver, tunable from 10 kHz through 2600 MHz (less cellular) and offering 650 memory channels. For the first time, you can hear VLF time signals and naval communications, international shortwave broadcasting, worldwide single-sideband communications, civilian and military aeronautical transmissions, VHF/UHF public safety radio, ham repeaters, microwave earth satellites, and much, much more all on one unit!

This triple-conversion luxury receiver offers outstanding sensitivity (0.15 microvolt SSB, 0.3 microvolt VHF/UHF FM, 0.6 microvolt AM), rapid 50-channel-per-second scan/search speed, 1 Hz to 1 MHz programmable tuning steps, all mode reception (AM/FM/LSB/USB/CW), selectable IF bandwidths (3/6/15/40/110/220 kHz), superb frequency stability (+/-1 ppm,0-50 deg. C.), mobile or fixed power (12 VDC / 120 VAC), and much, much more. See specifications on page "l". **Accessories: ANT 2, ANT 7, SDU 5000 and SFT 2 beginning on page "m".**

ORDER RCV 12 only **$1895.95**

AR 5000 PLUS 3 model also available. Order RCV 12-P, only $2095.95. See more details on p. "h".

See SDU 5000 Spectrum Display and Computer control software on the following pages.

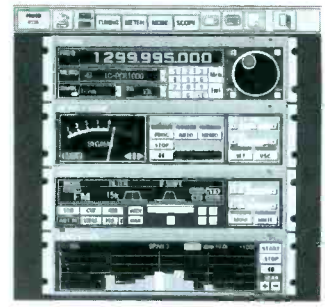
Order Line and Product Support Info.: **1-800-438-8155**

New: RCA Scanner

One of the most respected names in consumer electronics now offers their first programmable scanner. Covering 30-54, 118-174, 380-512, and 806-960 MHz (less cellular), the RCA RP-6150 is a triple-conversion scanner with 200 memory channels and 25-channel-per-second scan/search speed. Channels may be individually locked out and scan-delayed, and up to 10 search-discovered frequencies may be temporarily stored in monitor memory.

ORDER SCN 12 only **$199.95**

The New ICOM PCR1000 Wide-Coverage Receiver Computer Card

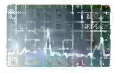


Adapt your desktop or laptop computer for superb, all-mode reception, 500 kHz-1300 MHz (less cellular; usable with reduced performance as low as 10 kHz)! Display up to 400 kHz of spectrum in real time; select mode, tuning step, filter setting. IF shift enhances selectivity; noise blanker resists pulse noise interference Other features include skip of unmodulated channels, CTCSS (subaudible tone "PL") squelch decoder, and 1 Hz tuning resolution.

Requires Windows 3.1 or 95, 486 or better, 10 MB hard disk, 16 MB RAM, serial interface, 640 x 480 pixel resolution or better. Accessories provided include program disk, telescopic antenna, RS232 interface cable, AC adaptor, and full instructions. See specifications on page "l".

ORDER RCV 21 only **$499.95**

SDU5000 Spectrum Display



An ideal companion for your AOR AR5000 or ICOM R7100, R7000, or R9000, this colorful 3.1" spectrum display unit plugs into any receiver with a 10.7 MHz IF output jack. Imagine seeing a visual panorama of real-time signals up to 10 megahertz wide! Tune in those signals immediately as they appear--don't wait for chance during scanning, searching, or manual dialing. Provides NTSC, PAL, and composite video to an optional monitor.

ORDER SDU 5000 only **$934.00**

Radio Shack PRO-90 Trunk Tracking Scanner

Virtually every two-way VHF or UHF communications is at your fingertips with the new triple-conversion PRO-90, even the elusive Motorola trunking systems! 29-54, 108-174, 406-512, 806-956 MHz (less cellular) frequency coverage, 300 memory channels plus 10 priority channels. Includes NiCd battery pack, AC charger/adaptor, flex whip, trunking frequency guide. Specifications are similar to Uniden BC235XLT shown on page "g". **Accessories: ANT 14, ANT 8, ANT 22, BAT 5 replacement battery pack and and CAS 3 leather case beginning on page "m".**

ORDER SCN 11 only **$269.95**

REACH OUT TO THE WORLD WITH GROVE SCANNER ANTENNAS

Grove OMNI II

Designed by Bob Grove, this exclusive Grove product offers 25-1300 MHz coverage; lightweight, compact design, high performance, and low cost! Designed especially for wide-area metropolitan listeners, the 68" Omni can be mounted on a mast, in an attic crawl space, against a wall...just about anywhere convenient.

Comes with balun transformer, F connector, offset pipe, mounting hardware and instructions. **Accessory: CBL50 or CBL100.**

ORDER ANT 05 only **$19.95**

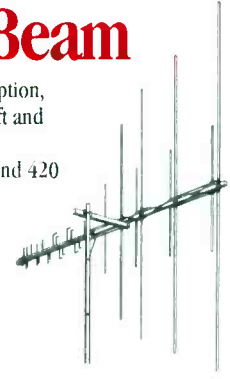
Note: Shipping charges for some full-sized outdoor antennas are different than for other items in this Buyer's Guide. Please add $11 shipping for ANT 01 and ANT 07.

Professional Wideband Discone

The discone antenna is used by government and military agencies worldwide because of its wide bandwidth characteristics and non-directional coverage. The Diamond D130J discone consists of 16 rugged, stainless steel elements and is capable of transmitting up to 200 watts above 50 MHz, and provides continuous 25-1000 MHz (and above) reception. Accomodate any standard mast-pipe (1" to 2-1/8" diameter). **Accessory: CBL50 or CBL100.**

ORDER ANT 09 only **$87.95**

Famous Grove Scanner Beam



Our world-renowned Scanner Beam enhances 30-50 MHz low band reception, 108-137 MHz aircraft, 137-174 MHz high band, 225-400 MHz military aircraft and satellites, 406-512 MHz UHF, and 806-960 MHz microwave mobile.

HAMS NOTE—can be used for transmitting up to 25 watts on 144, 220, and 420 MHz bands. 50/75 ohms nominal impedance.

May be used with inexpensive TV antenna rotator or fixed in favored direction. Local signals still come in loud and clear from all directions.

All mounting hardware included (requires TV type F connector). Approximate size 8'H x 5'W. **Accessory: CBL50 or CBL100.**

ORDER ANT 01 only **$59.95**

UPS Second Day Air at Ground Rates on ALL PRODUCTS!

GROVE

THE SCANTENNA

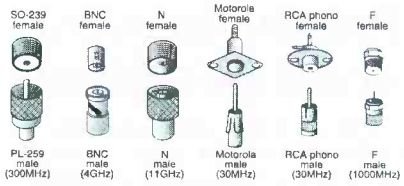
This omnidirectional scanner antenna will equal or outperform any competitor on the market, providing continuous frequency coverage from 25-1300 MHz. Public safety, civilian and military aircraft, hams, maritime, CB — anything in its frequency range! Requires TV type F connector. Approximate size 7-1/2'H x 4-1/2'W. **Accessory: CBL 50 or CBL 100.**

ORDER ANT 07 only **$39.95**

Premium Low-Loss RG6-U Cable/Adaptors

Have you had trouble finding the right coaxial adaptors for linking your antenna and receiver? We can help! Simply tell us what adaptors you need, or what antenna and radio you will be using. We will provide you with a cable which is ready to attach between your antenna and receiver!

CBL 25	**25' RG 59U**	**$9.95**
CBL 50	**50'RG-6U**	**$14.95**
CBL 100	**100'RG-6U**	**$19.95**



ADAPTORS AVAILABLE

ADP 1	SO-239 Female to F male
ADP 2	F Female to PL259 Male
ADP 3	F Female to N Male
ADP 4	F Female to Male 1/8" Mini-Plug
ADP 5	N Female to BNC Male
ADP 6	SO-239 Female to Male 1/8" Mini-Plug
ADP 7	SO-239 Female to N Male
ADP 9	F Female to BNC Male
ADP 10	SO-239 female to BNC Male
ADP 11	SO-239 female to RCA male
ADP 12	BNC female to N male
ADP 13	BNC/BNC (right angle elbow)
ADP 14	F female to RCA male
ADP 15	N female to F male
ADP 17	BNC female to F male
ADP 18	F female to 2 wires
ADP 19	SO-239 female to 2 wires
ADP 22	Motorola female to BNC male
ADP 23	SO-239 female to SO-239 female barrell–$1.50
ADP 24	BNC female to PL259 male
ADP 26	F female to F female barrel—$2.00
ADP 27	Banana Plug—$2.00
ADP 28	F female to PAL fem. Satellite700
ADP 29	3.5mm female to 2.5mm male min. plug—$1.50
ADP 30	Dual BNC female to BNC male T-adaptor—$1.50
ADP 31	BNC female to Motorola male—$3.95
ADPK 10	F female to Motorola male
ADPK 13	F male to F male 3ft.cable—$2.50
ADPK 14	F/Motorola cable, 3ft.—$2.50
ADPK 15	PL259 male to PL259 male 3ft.—$2.50
ADPK 16	BNC male/ BNC male 3ft cable

Unless otherwise specified, adaptors may be ordered separately for $5.95 each. Free shipping if ordered with other products; $2.50 for one or more shipped alone. If you are unsure which adaptor is needed, call Chanel or Sue at 1-800-438-8155 or e-mail them at **tech@grove.net** for assistance.

Grove PRE-5A VHF/UHF Signal Booster

Now Grove has integrated its high-performance preamplifier and control box into one convenient unit, offering improved performance. The new PRE-5A offers wide dynamic range and low noise for weak signal boosting, and improved overload (intermod) reduction unmatched in other 30-1000 MHz preamplifiers. Single knob operation offers continuous gain control from -10 dB attenuation to +18 dB amplification. Switched off, signals are automatically routed from the antenna directly to the receiver, bypassing the preamplifier.

Use the new PRE-5A with up to 100 feet of Grove low-loss coax to your antenna and enjoy improved VHF/UHF reception on scanners, TVs, FM stereos, and other receiving equipment (not to be used for transmitting). Powered by 12 VDC @500 mA; AC adaptor not included. Accessories: PWR-21, ADPK-3, ADPK-6 and ADPK-9.

ORDER PRE 5A only **$89.95**

NEW Universal Whip!

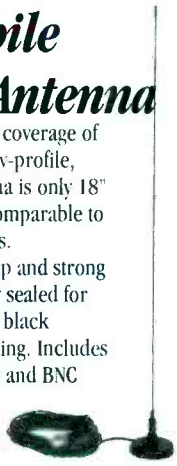
The ANT 8 now features a spring-supported base for greater flexibility—and no increase in price! Extendable from 7 to 47-1/2 inches, the ANT-8 is made of chrome-plated brass and equipped with a standard BNC base. Transmits on 45-960 MHz; receives 25-1300 MHz. Spring-base ANT-19 adjusts from 4"-21" (transmits and receives from 144-960 MHz). ANT-8B has right-angle BNC adaptor. ANT-8N has right-angle N adaptor.

Order ANT 8 (7"-47-1/2")	**$16.95**
ANT 19 (4"-21")	**$14.95**
ANT 8B	**$21.95**
ANT-8N	**$23.95**

STEALTH Mobile Monitoring Antenna

A unique design optimizes coverage of the 30-960 MHz bands; this low-profile, magnetic-mount mobile antenna is only 18" high, yet offers performance comparable to much bulkier scanner antennas.

Rugged, stainless-steel whip and strong magnetic base are hermetically sealed for waterproof construction, sleek black finished for unobtrusive mounting. Includes 14 feet of small-diameter cable and BNC connector.



ORDER ANT 30 only **$29.95**

High Gain Flex Antenna

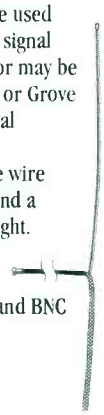
This "rubber duckie" really makes a difference on handheld scanners. The 12" Austin Condor is guaranteed to improve weak signal scanner reception—on all frequency ranges—over the original scanner antenna.

ORDER ANT 14	**$29.95**
ORDER ANT 14B (BNC right-angle conn.)	**$34.95**
ORDER ANT 14N (N right-angle conn.)	**$36.95**

HIDDEN ANTENNA

The Grove Hidden Antenna may be used alone with your scanner for improved signal reception over your attachable whip, or may be connected to the powerful GRE PRE-1 or Grove PRE-5 for considerably increased signal strengths.

This five-foot, thin-profile, flexible wire antenna can be hung in a corner, behind a drape— just about anywhere out of sight. Comes fully assembled with 20 feet of coax and F male connector, with 3 adaptors for PL259 (UHF), Motorola and BNC connections.



ORDER ANT 06 only **$19.95**

High Gain 800 MHz Portable Antenna

The Max Systems antenna will make a tremendous improvement in 806-960 MHz reception over the whip provided with your hand-held or desktop scanner! (Not usable in other frequency ranges.)

Equipped with standard BNC connector; rugged ground-plane construction for optimum performance. Only 7-1/2" tall.

ORDER ANT 22 only **$29.95**

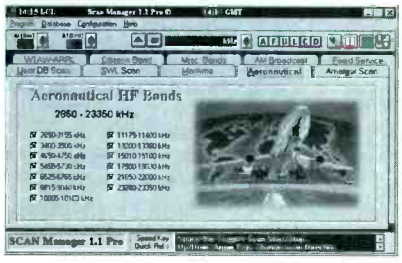
With straight connector for handhelds

ORDER ANT 23 only **$34.95**

With right-angle connector for desktop use (right)

SOFTWARE FOR SCANNERS/SHORTWAVE RECEIVERS

Scan Manager Pro v.1.1



Powerful software for hams and SWLs from KC4ZGL. If you have a modern IBM compatible computer equipped with Windows 3.1 or higher, you can edit databases and control all Kenwood, Icom, Drake R8A (R8 not supported) and Yaesu (except FT-767) transceivers and receivers! Display your data in powerful spreadsheet style, controlled and edited by keyboard or mouse. Scan Manager 1.1 Pro includes SWL Manager 2.0. When ordering, specify radio, computer and call sign.

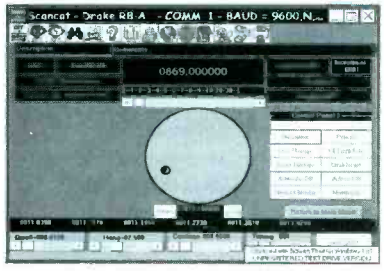
Order SFT 13, only $68.95 plus $6 UPS shipping.

Scancat-Gold for DOS

Use your 640k (or better) computer to control your AOR, Drake, Kenwood, ICOM, Yaesu, JRC, Lowe, WJ, and Radio Shack PRO-2005/6/35/42 with this fast, all-new software program! Operates from the RS-232 port. Works with any IBM compatible system. See complete list of features in our HighTech guide.

Order SFT02, only $94.95 plus $4.50 UPS shpg.

Scancat-Gold for Windows®



Offers all the Scancat-Gold features plus graphic receiver tuning by mouse, slide rule or on-screen knob, no-conversion direct scanning of DBASE, FOXPRO, ACCESS, BTRIEVE files, interactive database, map and scanning functions, and much more. See complete list of features in our HighTech buyer's guide.

Order SFT 02W, only $99.95 plus $4.50 UPS shpg.

The Windows® version of ScanCat-Gold places a controllable scanner/receiver on your computer screen!

NEW: Scancat-Gold for Windows® SE Upgrade

The SE upgrade to Scancat-Gold for Windows features permits unlimited graphical capabilities for spectrum analysis. Will examine your database, plot each frequency and "paint" the entire analysis on your screen, displaying it from the lowest to the highest frequency. Shows any point by frequency and tunes your radio with the click of the mouse. Four different analysis modes. "SE" supports Master Slave with us to six CI-VB addressable radios.

Order SFT 02WSE, only $59.95 plus $4.50 UPS shpg.

Scan*Star® for Windows Plus

This powerful new software package, ready for Windows 95, 3.1, or WFW 3.11, will allow you to customize the band plan on theA R8000, as well as display spectrum analysis and support printing on the AOR AR3000A, Drake R8 and R8A, R7100, and the PRO-2006 and PRO-2035 or PRO-2042 when equipped with OptoElectronics OS456 or OS535. Scan-controls up to 10 radios at one time; dual-receiver priority handoff for window viewing; sub-list scanning for split channels and trunk groups; monitoring assistant with frequency following for reception logging; user-defined database files. Many more great features.*

Order SFT 09, only $159.95 plus $4.50 UPS shpg.

Also available: ScanStar for Windows SE (Basic), order SFT 10, $99.95.

Digital Audio Logger from Scan*Star®

Allows received audio from one or more radios to be recorded to your computer hard disk via your sound card. Each sound bite is recorded with complete time and channel information. As you play back recorded audio, the actual time of intercept is displayed along with the frequency, PL/DPL tone and channel identification. Fast forward and rewind buttons. Audio compression is used to minimize the amount of hard disk space used. Requires Windows 95, Scan*Star Plus version 6 or later, a sound card with wave audio recording and playback facilities, a 486 or Pentium CPU and 16 MB RAM minimum.

Order SFT 04, only $49.95 plus $4.50 UPS shpg.

Order SFT 09DA (ScanStar Plus with Audio Logger), only $199.95 plus $4.50 UPS shpg.*

Optoelectronics Frequency Scout

This advanced pocket frequency counter has a selectable, silent vibrator or audible beeper to alert you to signal presence. Continuous 10-2800 MHz frequency coverage, displayed on a 10-digit, backlit LCD. High sensitivity captures weak signals up to hundreds of feet.

Connected to any scanner with a CI-V interface, allows automatic reception of any intercepted signal within the scanner's frequency range. For use with the AR8000, order SAC-8000; for the R10 order ADPK-4; for R7000, R7100, R8500, R9000, use ACC-74 or ACC-157.

Relative signal strengths are displayed on a 16-segment bargraph, and up to 400 different intercepted signal frequencies may be automatically stored in memory for later recall. Continuous operation for at least 8 hours on a fast two-hour-rechargeable battery. Antennas sold separately.

ORDER CRT 8 only **$399.95**

Computer Control your AR5000 and SDU5000!

AOR's Hawk 5000 software allows total system control of your SDU5000 and host receiver. On screen spectrum imaging, mouse-constrolled cursor selection of signals and functions. Automate your receiving laboratory! Minimum computer requirements: 486 or above, Windows 3.1 or 95, 8MB RAM, serial port with lead COM1, 2, 3, or 4 (two ports recommended for serial mouse), VGA color monitor, 3-1/4" floppy drive, hard drive with 1MB space free.

Order SFT 08, only $169.95 plus $4.50 UPS shpg.

REDUCED! The Enhanced Grove FCC Database v6.0

The Grove FCC Database lists all the licensees in the FCC Master Frequency Database (current mid-1996) 0-300,000 MHz. Fields include state, city, county, licensee name, callsign, latitude/longitude, service, class, power, antenna height and emission type! Locate public safety, railroad, business, broadcast, paging, maritime frequencies and more. Fast, menu-driven program. **SPECIAL: Get the FCC Database CD FREE with the purchase of any scanner or receiver in this Guide.**

FCC-96CD $49.95

UPS Secona Day Air at Ground Rates on ALL PRODUCTS!

Grove's Scanner Specification Guide

Prices and specifications subject to change without notice

Scanner	Alinco DJ-X10	AR 3000A	AR 8000	ICOM R10	ICOM R8500	Radio Shack Pro 2046	Relm HS-200	Uniden BC-230XLT	Uniden BC-235XLT	Uniden BC-890XLT	Uniden BC-895XLT	Uniden BC-3000XLT	Uniden BC-9000XLT	Uniden BCT-7
Grove Order #	SCN 02	SCN 26	SCN 27	SCN 6	SCN 1	SCN 7	SCN 8	SCN 24	SCN 10	SCN 19	SCN 9	SCN 29	SCN 30	SCN 21
Grove Price	Call	$1,062.95	$599.95	$499.95	$1999.95	$239.95	$249.95	$239.95	$249.95	$269.95	$369.95	$369.95	$389.95	$179.95
Frequency Range	100 kHz-2000 MHz (less cellular)	100kHz-824 MHz, 849-869 MHz, 894-2036 MHz	500kHz-1900 MHz (less cellular)	500 kHz-1300 MHz, (less cellular)	100 kHz-1999.99999 MHz (less cellular)	29-54, 108-174, 406-512, 806-956 MHz (less cellular)	26-54, 118-174, 406-520, 806-960 MHz (less cellular)	29-54, 108-174, 406-512, 806-956 MHz (less cellular)	29-54, 108-174, 406-512, 806-956 MHz (less cellular)	29-54, 108-174, 216-512, 806-956 MHz (less cellular)	29-54, 108-174, 216-512, 806-956 MHz less cellular	25-550, 760-1300 MHz (less cellular)	25-550, 760-1300 MHz (less cellular)	26.9-27.4/29.7-54/10-8-174/406-512/806-9-56 MHz (less cellular)
Keypad Entry?	Yes	Yes, plus tuning dial	Yes	Alphanumeric	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Alphanumeric	No
Tuning Steps	10/100 Hz/1/2/5/6.25/9/10/12.5/15/20/-25/30/50/100/125/15-0/200/250/500 kHz	Programmable 50 Hz-999 kHz	50 Hz-999.995 kHz	100 kHz-999.99 kHz	10/50/100 Hz, 1/2.5/5/8.33/9/10/12.5/20/25/-100/1000 kHz; custom	5/12.5 kHz	5/12.5/25 kHz	5/12.5 kHz	5/12.5 kHz	5/12.5/25 kHz	5/12.5/25 KHz	5/12.5/25/50 kHz	5/12.5/25/50 kHz	5/12.5 kHz
RIT, Fine Tuning	Not necessary	Tuning dial	Tuning dial	Yes	No	No	No	No	No	Cont. tuning dial	No	No	Tuning knob	No
Display	Backlit LCD	Backlit LCD	Backlit LCD	Backlit LCD	Backlit LCD, alphanumeric display	Backlit LCD	Backlit LCD	Backlit LCD	Backlit LCD	Backlit LCD	Backlit LCD	Edgelit LCD alphanumeric	16-character	Backlit LCD
Dimmer	Yes	On/off	On/Off	On/Off	Yes	No	No	On/off	On/off	No	No	On/off	High/low/off	No
Recommended Use	General purpose, full spectrum	Serious wide-spect. mon.	Wide spectrum monitoring	Wide spectrum monitoring	Serious wide-spectrum monitoring	General purpose mobile	Utility scanning	VHF/UHF utilities	VHF/UHF utilities, trunking	General purpose	VHF/UHF utilities, trunking	Gen. purpose scanning	Serious scanning	Casual Public Service Monitoring
Receiving Modes	AM/NFM/WFM/LSB/USB/CW	AM/NFM/WFM/LSB/USB/CW	AM/NFM/WFM/USB/LSB/CW	AM/NFM/WFM/USB/LSB/CW	AM/FM (w/ AFC)/USB/LSB/CW/RTTY	AM, NFM	AM/NFM	NFM, AM (aero) det. by freq. range	AM/NFM	AM, NFM	AM, NFM	WFM, NFM, AM (selectable)	WFM, NFM, AM	AM (air), NFM
Memory	1200 channels	400 chan. w/ backup	1000 channels	1000 channels	1000 channels	100 channels	200 channels	200 channels	300 channels	200 channels	300 channels	400 channels	500 channels	Pre-programmed by service plus user-selected frequencies
Scan	25 channels/sec.	50 channels/sec.	30 channels/sec.	6 ch./sec. (plus zero wait state)	40 chan./sec., multifunction	34 channels/sec	100 channels/sec.	100 channels/sec.	100 channels/sec.	100/20 channels/sec.	100-300 channels/sec.	100 channels/sec.	100 channels/sec.	100 channels/sec.
Banks	30	4	20 (50 channels ea.)	18	20	10	10	10	10	10	10	20	20	12 service bands
Channel Lockout	1000	Scan & search chan.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Priority	1 channel	4 channels	Any channel	Yes	Yes	Yes	10 channels	10 channels	10 channels	10 channels	10 channels	10 channels	10 channels	No
Search	Yes	50 channels/sec.	30 channels/sec.	17 steps/sec	Yes, with automemory write	300 channels/sec.	Yes, with lockouts	300 channels/sec.	Yes	w/ autostore	Yes	300 steps/sec	300 steps/sec	Yes
Delay	Selectable	Yes, variable	Programmable	Programmable time, channel	Yes	2 sec. any chan.	2 sec. any chan.	2 sec. any chan.	2 sec. any chan.	2 sec. all chan.	2.5 sec., selectable channel	2/4 sec., chan.-selectable	2 sec., chan.-selectable	2 sec., all channels
Squelch	Yes	Yes	Audio/carrier activ.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clock	Clock timer	Yes	No	No	No, sleep timer	No	No	No	No	No	No	No	No	No
Audio Output Power	100 mW	1.2 W @ 4 ohms	180 mW	120 mW @ 8 ohms	2W @ 8 ohms	2 W	400 mW nom.	180 mW	180 mW	2.7 W	2.7 W	320 mW	2.2 W	3 W
Record Audio Output	Yes	Yes	No	No	Yes	No	No	No	No	Yes	Yes	Spkr. & earph. jacks	Yes	No
Recorder Activator	No	Yes	No	No	Yes	No	No	No	No	No	3.5 mm (1/8") earphone jack	No	Yes	No
Signal Strength Ind.	LCD bargraph	Yes	LCD bargraph		S meter with center tuning indicator	No	LCD bargraph	No	No	No	LCD bargraph	No	No	No
Computer Interface	No	RS232C	RS232	Yes	RS232C and CI-V	No	No	No	No	No	RS232C	No	No	No
Conversion Scheme	Triple up (736.25/275.45, 45.05, 10.7/0.455 MHz)	Triple conv.	Triple up/quad. on WFM	Triple up-conversion (429/266, 10.7 MHz, 455 kHz)	Triple conv.	Dual conv.	Double conv.	Double conv.	Triple conv.	Dual conv.	Triple up-conversion	Triple-up conv.	Triple-up conv.	Double conversion
Sensitivity	1 uV AM, 0.25 uV SSB, 0.35 uV NFM	0.25-0.35uV	.025-3 uV	1 uV AM, 0.45 uV NFM, 0.35 uV SSB	0.2 uV SSB, 0.5 uV NFM	0.7 uV ave.	0.5 uV nom.	0.5 uV nom NFM	0.3 uV nom. NFM	0.75-1.1 uV	Unspecified			0.5-0.7 uV
Selectable Preamp.	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Selectable Atten.	Yes	Yes	Yes, chan. selectable	Programmable, 20 dB	-10/-20 dB	No	No	No	No	No	No	No	Yes, chan. selectable	No
IF Selectivity	(-6 dB) 4 kHz SSB/CW, 15 kHz AM/NFM, 150 kHz WFM	(-6/-60 dB) SSB 2.4/4.5 kHz; AM/NFM 12/25 kHz	SSB (-6/-50 dB) 4/15 kHz; AM/NFM: 12/25 kHz; WFM 180/800 kHz	(-6 dB) SSB 4 kHz, AM/NFM 15 kHz, WFM 150 kHz	5.5/12/150 kHz FM, 2.2/5.5/12 kHz AM, 2.2 kHz SSB/CW	22/30 kHz, -6/-50 dB	-50 dB adjacent channel				Unspecified			
Noise Blanker/Limiter	No	No	No	Both	Yes	No		No	No	No	No	No	No	No
Antenna Connector	BNC	BNC Integral whip	BNC	BNC	SO-239 (UHF)(0.1-30 MHz), N (30-2000 MHz)	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC
Dimensions	2-1/4"W/6"H/1"D	5.5"W/3"H/7.875"D	6"H/2.75"W/1.5"D	2.25"W/5"H/1.25"D	11.25"W/4.5"H/8.25"D	7"W/2"H/7.5"D	2.5"W/6"H/1.5"D	6"H/2.5"W/1.7"D	2.5"W/6.5"H/1.75"D	10.5"W/3.5"H/7.5"D	10.875"W/3.375"H/7.-5"D	7.4"H/2.7"W/1.5"D	10.5"H/3.38"W/7.5"D	5.25"Wx1.62"Hx7"D
Weight	11 oz.	2.5 lbs.	13 oz.	11 oz.	18 lbs.	2 lbs. 3 oz.	15 oz.	12.5 oz.	12.6 oz.	3 lbs. 14 oz.	3lbs. 8 oz.	13 oz.	4lbs.	1lb. 11 oz
Power Requirement(s)	4 AA cells or 8-15 VDC external	9-16 VDC	4AA cells (NiCds supplied)	4.8-16 VDC; AC adaptor included	12 VDC/120 VAC @ 60 Hz	12 VDC 13.6 VDC	4 AA cells or 12 VDC (adaptor/charger incl.)	Battery	Battery	120VAC/12 VDC	12 VDC (AC adaptor included)	6.5 VDC	12 VDC (AC adapt. incl.)	12 VDC
Warranty	One year	One year	One year	One year	One year	One year[2]	One year	One year	One year	One year	One year	One year	One year	One year
Accessories Incl.	Telescopic whip, manual	Tele. whip/AC adapt./DC adaptor/Manual	AC adaptor/flex antenna/DC cord/manual/carrying strap/belt clip	AC adaptor, flex whip, rechargeable batteries, manual	Manual	DC cord/Mobile mounting bracket	Flex antenna/AC charger-adaptor/belt clip/earphone/carrying strap/full instructions	Flex antenna/belt clip/manual/earphone, extra battery/AC charger-adaptor	Flex antenna/belt clip/manual/earphone, extra battery/AC charger-adaptor	AC adaptor/tele whip/instructions	Telescopic whip, manual	Rechargeable bat. pack/AC wall adaptor-charger/belt clip/flex antenna/earphone/manual	AC adaptor/tele whip/owner's manual	Mobile bracket, DC cord, cigarette lighter cord, AC adaptor, telescopic whip, mobile whip

New, Improved Drake R8-B

IMPROVEMENTS TO THE WORLD'S MOST POPULAR RECEIVER INCLUDE SELECTABLE-SIDEBAND SYNCHRONOUS DETECTION!

New "B" model also features:
- *Increased scanning speed*
- *1000 memory channels*

Drake has done it again: The shortwave industry's most popular receiver has been upgraded to include selectable-sideband synchronous detection, increased scanning speed, and 1000 memory channels! The Drake R8B additionally offers excellent audio, frequency agility (100 kHz-30 MHz, expandable to 33-55 and 108-174 MHz with optional converter), friendly control panel, noise blanker, passband tuning, preamp/attenuator selection, universal power supply, dual clock timers, giant display, five filter bandwidths, six receiving modes, single-keypress mode and bandwidth selection, alpha-numeric display of station identification, overload immunity, tone control, tight frequency stability, RS232 computer control, and more! See complete specifications on page "l". **Accessories: ACC 43, ANT 2, ANT 24, MAN 2, SPK 2, and SPK 13 beginning on page "m".**

ORDER RCV 3 only **$1159.95**

Drake SW8

Versatile desktop/ portable receiver

This combination desktop/portable world band receiver from R.L. Drake—with improved sensitivity, selectivity, noise reduction—offers continuous coverage 500 kHz-30 MHz, 87-108 MHz FM broadcast (stereo at headphone jack), and 116-136 MHz aircraft as well! Standard and synchronous detection AM, upper and lower sideband on medium and shortwave, direct frequency entry keypad, 0.5 microvolt sensitivity, dual 6/4 kHz selectivity on AM, sharp 2.3 kHz selectivity on SSB. Up-conversion eliminates images, while +10 dB intercept point suppresses intermod. Includes an amplified whip antenna on all frequencies. See complete specifications on page "l". **Accessories: ANT 2, ANT 24, CAS 10, SPK 13, and TUN 4A beginning on page "m".**

ORDER RCV 19 only **$779.95**

Bargain-Priced JRC NRD-345

Compares with receivers costing over $1,000!

Known for their luxury, high-performance receivers, Japan Radio company (JRC) has released a high quality, double conversion receiver at a low, competitive price! The new NRD-345 offers wide frequency coverage (100 kHz-30 MHz), multimode reception (AM, synch. AM, SSB), sharp selectivity (2/4 kHz), high sensitivity (0.3 microvolts), wide dynamic range (100 dB), strong audio (1 watt), dual VFOs, scannable memory (100 channels) with channel lockout, computer control (RS232C), dual clock timer (12/24 hour), precision tuning (5/100 Hz;, 1/10 kHz steps), and adjustable noise blanker.

Additional features include selectable AGC timing, 20 dB attenuator, adjustable tone control, backlit S meter, large backlit LCD display, and dual-voltage (12 VDC / 120 VAC) power supply. See complete specifications on page "l".

ORDER RCV 20 only **$799.95**

NOTE: Shipping charges for all products are shown in the chart on page "o".

Now available:
AR-5000 PLUS 3!

PLUS PERFORMANCE

The brand new AR-5000 Plus 3 includes the capabilities of the great AR-5000 on page "c" with these improvements:
- Double and single sideband synchronous detection!
- 2000 memory channels!
- AM & FM automatic frequency control (AFC)!
- 10 VFOs!
- 40 search banks!
- Improved noise blanker!

ORDER RCV 12-P only **$2095.95**

Other shortwave-capable wide-coverage receivers shown in this Guide:

ICOM R8500, *see page "c"*
ICOM R-10, *see page "c"*
WiNRADiO, *see cover*

SP-200B Sound Enhancer

Perfect for boosting the sound quality of any shortwave receiver or scanner!

Grove's **SP-200B Sound Enhancer** (shown with the ICOM R8500)is an effective, multi-functional accessory to increase the intelligibility and sound quality of voice, music, and data.

Using all-analog circuitry to avoid the distortion contributed by many digital signal processors (DSP), the SP-200B combines a powerful audio amplifier and four inch speaker along with separate bass and treble equalizers, a variable passband notch/peak filter to reject interfering tones or boost desirable audio, an adjustable noise limiter to reduce irritating pulse interference, a variable-hang 0-45 second squelch control to remove background noise between sound transmissions, and a tape recorder activator. Powered by 12 VDC, the SP-200B may be operated in a mobile environment or from an optional 12 VDC supply.

Housed in a stylish, hand crafted, oak cabinet, and constructed of sturdy, black finished aluminum with white legends. **Accessory: PWR 4 beginning on page "m".**

ORDER SPK 13 only **$199.95**

UPS Second Day Air at Ground Rates on ALL PRODUCTS!

GROVE

New AR7030 PLUS High-Performance Shortwave Receiver

PLUS PERFORMANCE

The new AR7030 "PLUS" offers superior performance. Its 105 dB dynamic range, +35 dBm third-order intermod rating, and razor-sharp selectivity guarantee signal overload immunity under conditions that would stagger other high-end receivers, yet its 0.3 microvolt SSB sensitivity snags even the weakest signals. Improved intermod rejection is assured with new balanced mixer and enhanced attenuator, while high sensitivity is provided with tight tolerance (0.1%), low noise, synthesizer components. Choose selectivity from 2.2, 4.0, 5.3, or 9.5 kHz, and enter your favorite frequencies into 400 memory slots complete with alphanumeric tags and clock/timer.

Continuous 0-32 MHz frequency coverage, high-stability TCXO oscillator, all-mode reception, synchronous detection, superb audio quality, compact portability, 2.6 Hz tuning increments, interference-resistant shielding, passband tuning, noise compressor, dual VFOs, enhanced AGC, programmable attenuator, and numerous other features combine to make this one incredible, affordable receiver. See complete specifications on page "l".

ORDER RCV 17 only **$1269.95**

SONY ICF-SW7600G

This compact marvel has synchronous AM detection, SSB, and even FM stereo coverage! DX/local switch reduces "pumping" on strong SSB signals.

Continuous 150 kHz-29.995 MHz frequency coverage plus 87.6-108 MHz FM headphone stereo, pushbutton tuning, tone control, external antenna jack, clock timer with sleep function, tilt bracket, direct-entry keypad and 22 scannable memory channels keynote the high-tech features of this potent portable! See specifications on page "l". Requires 4 AA cell batteries. **Accessories: ANT 3, ANT 22, ANT 32, BAT 1, PWR 9, SPK 11, and TUN 4A, beginning on page "m."**

ORDER RCV 11 only **$189.95**

SONY ICF-SW100

Imagine compressing the popular functions of the mighty Sony ICF2010 into a shirt-pocket radio! This tiny titan offers continuous 150 kHz-30 MHz and 76-108 MHz FM frequency ranges, Sony's famous synchronous detection, USB/LSB reception, 100 Hz tuning steps, 50 memory presets, 24 hour clock/timer, world time computer, station name display, and much, much more. See specifications on page "l".

AC adaptor, stereo earphones, active antenna, soft carrying case, and full instruction manual included.Two AA batteries required. **Accessories: ANT 21, BAT 1, SPK 11, SPK 13, and TUN 4A beginning on page "m."**

ORDER RCV 24 only **$359.95**

SONY ICF-2010

Still reigns as the world's most popular shortwave radio!

This is a full-featured radio for the serious shortwave listener—with a reputation of distinction among the "powerful portables." Synchronous detection allows interference-free reception on many stations difficult to hear on other radios. Narrow/wide selectivity switching; clock/timer allows up to 4 automatic on/off cycles per day for frequencies and times of your choice; 10-step LED signal strength meter, audio tone selection for speech or music; and 32 station direct-access keyboard combine to make this Sony product a remarkable value for beginners or seasoned SWL's.

Frequency range includes150 kHz-30MHz, 76-108, and 116-136 MHz. Requires 3D/2AA cells. See specificationson page "l". **Accessories: ANT 3, ANT 21, ANT 32, BAT 1, BAT 2, SPK 13, WPO4, and TUN 4A beginning on page "m."**

ORDER RCV 2 only **$349.95**

Tiny Sangean SR-77

This tiny FM/AM radio literally could get lost in your shirt pocket. Not only is it cute, but it pulls in distant stations and delivers high quality FM stereo reception to its tiny earphones (included). This little dynamo even has Deep Bass Boost which kicks in at the flick of a switch.

Measuring only 3"x1.5"x0.5", it's the perfect answer for recreational listening, emergencies. Runs on one AAA battery (included).

ORDER RCV 15 only **$29.95**

Other Grove Shortwave Receivers

Drake				
Drake SW2	RCV-18	Tabletop 100 kHz-30 MHz, AM, synch AM, USB/LSB 50 Hz tuning, 100 memory channels	$489.95	BRK-12, ACC9, BRK-13, ANT-3, ANT-15, SPK-13, TUN-4A
Grundig				
Yacht Boy 400	RCV-22	Portable, 160 kHz-30 MHz, 87.5-108 MHz, AM, FM, USB/LSB 5/1 kHz tuning 40 memory channels	$199.95	ANT-3, ANT-21, ANT-32, BAT-1, PWR-8, SPK-11, TUN-4A
Sangean				
Sangean ATS808	RCV-13	Portable 150 kHz-30 MHz, 87.5-108 MHz, AM, FM, 5/1 kHz tuning AM, 45 memory channels	$129.95	ANT-3, ANT-21, ANT-32, BAT-1, PWR-10, TUN-4A
Sony				
Sony ICF-SW77	RCV-11	Portable 150 kHz-30 MHz, 76-108 MHz, AM sync AM, FM, USB/LSB 50 Hz/1 kHz tuning, 162 memory channels	$469.95	ANT-3, ANT21, ANT32, BAT-1, BAT-2, SPK13, TUN-4A, WP-4

GE Superadio III for AM/FM DXing

This receiver for AM/FM DXers features smooth vernier dial and tuned RF on both AM and FM, while a ceramic IF filter and 7 tuned IF circuits provide outstanding selectivity. The two-way speaker system with separate bass, treble, and loudness controls assure solid, clean sound, and the drift-cancelling, automatic frequency control (AFC) circuit can be switched out for weak-signal hunting. The internal AM loop and FM whip antennas provide convenient portability, while external antenna jacks accomodate your long-distance antennas.

Powered by 120 VAC or six internal D cells (optional). **Accessories: ANT 3, ANT 21, ANT 31, ANT 32, BAT 2, SPK 13, and TUN 4A beginning on page "m."**

ORDER RCV 5 only **$59.95**

Top-of-the-Line Sangeans

ATS-818
ORDER RCV 7 only **$149.95**

ATS-818CS
w/cassette recorder
ORDER RCV 9 only **$219.95**
~~List Price $399~~

Imagine—record your favorite programs automatically with the dual-zone clock timer on any frequency from 150 kHz through 30 MHz, 87.5-108 MHz FM as well! This impressive portable has SSB and CW reception, 45 memory channels, wide/narrow filter selectivity, signal strength indicator, AC wall adaptor, and more! Requires 4 D cells. See specifications on page "l".

Receivers are the same, excluding the tape recorder specifications. **Accessories: ANT 3, ANT 21, ANT 32, BAT 2, SPK 11, and TUN 4A beginning on page "m."**

Sangean ATS909 Multiband Radio

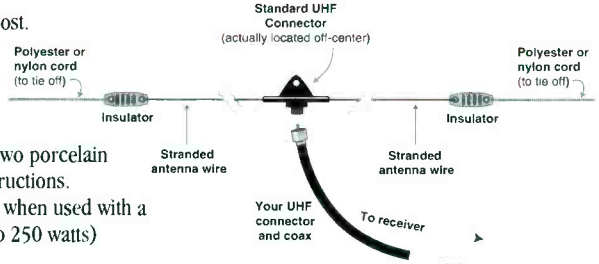
This portable receiver sets a new standard with continuous coverage longwave, mediumwave, and shortwave reception plus FM (stereo with earphones), alphanumeric display for station identification, 306 channel memory, USB/LSB mode with 40 Hz step tuning, 29 memory banks with automatic search, world time for 42 cities, three independent timers, signal strength indicator, wide/narrow filter selection, RF gain, and tone control. See specifications on page "l". **Accessories: ANT 3, ANT 21, ANT 32, BAT 1 (4 required), SPK 11, and TUN 4A. beginning on page "m."**

ORDER RCV 8 only **$259.95**

THE FAMOUS GROVE SKYWIRE

High performance and low cost. Comes fully assembled with Budwig center connector ready for your PL-259 (UHF male) equipped coaxial cable (50 or 75 ohm, see page 11); includes two porcelain end insulators and complete instructions.

HAMS! Ideal for transmitting when used with a transmatch. (1.8-30 MHz at up to 250 watts)



ORDER ANT 2 only **$39.95**

SPECIFICATIONS:
Length: 66 feet
Feedpoint impedance: 50 or 75 ohm (nominal)
Feedpoint location: 22 feet from end
Elements: 18 AWG (16 x 30) bare stranded copper
Connector housing: Heavy duty black phenolic

Limited Space? Try Grove's new *Mini-Skywire*

Similar to above, but 40-foot dual-dipole.

ORDER ANT 3 only **$29.95**

GROVE TUN-4A MINITUNER PLUS

Get Ready for Winter DXing with the TUN4A and the Grove Skywire Antenna!

Here's the shortwave listener's dream—a high performance, amplified, frequency-tunable antenna system for general coverage shortwave and medium wave monitoring. For indoor use, connect a short length of wire or the popular Grove ANT-6 Hidden Antenna. Connected to an outdoor antenna like the Grove ANT-2 Skywire or ANT-3 Mini Skywire, the TUN-4A MiniTuner Plus provides knockout signal strength and allows frequency preselection as well.

Continuous 400 kHz-30 MHz coverage, -20 to +20 dB gain/attenuation control, dual antenna switch, dual receiver output, amplified/unamplified preselection, band switch, fine tuning, and built-in lightning protection. Full instructions included. Requires 12VDC power (sold separately). **Accessories: ADP 6, ADP 11, ADP 27, ADPK 15, ANT 2, ANT 3, ANT 25, and PWR 19 beginning on page "m."**

ORDER TUN 4A only **$99.95**

UPS Second Day Air at Ground Rates on ALL PRODUCTS!

GROVE

STONER-DYMEK

Shortwave/ Longwave Active Antenna

If a large, outside dipole is out of the question, choose the professional Dymek DA-100E, 50 kHz-30 MHz active receiving antenna! High sensitivity, low noise, wide dynamic range, step-selectable attenuator, static-discharge-protected, weather-proof remote amplifier/whip assembly. Includes AC power supply, 50 feet RG-58/U coax, remote amplifier, 4' stainless-steel whip, receiver-interconnect cable (RCA), and full instructions. **May require adaptor kit ADP 32 or ADP 25, see p. "m".**

ORDER ANT 24 only **$179.95**

Select-A-Tenna

Apartment dwellers and mobile home owners, boost your 530-1700 kHz AM broadcast reception up to 30 dB with the famous Select-A-Tenna! Improves adjacent channel rejection, reduces signal fading. Tuning knob selects your listening frequency.

No batteries, power, or connection required; simply set the Select-A-Tenna next to your radio, peak the tuning knob, and listen to AM broadcast signals soar out of the background noise!

This 11", high-Q loop antenna focuses its captive signals to your radio's internal ferrite loop. If your receiver requires an external antenna, a convenient 3.5 mm (1/8") jack and plug are provided.

ORDER ANT 21 only **$59.95**

Cable and Connectors
See page "e"

Shortwave Software
See page "f"

KIWA Medium Wave Air-Core Loop Antenna

Are you looking for an antenna that will improve medium wave reception on your communications receiver? Then look no more—this unique 12-inch, circular air-core antenna provides improved weak signal reception of medium wave broadcast signals and its electronically balanced circuitry minimizes pickup of electrical interference. Some of the other high performance features of the Kiwa loop include:

- Full 530-1705 kHz MW frequency coverage
- May be precisely rotated and tilted for maximum signal pickup and nulling of interfering stations.
- Equipped with local/DX pre-amp switch, variable output attenuator, and dual output amplifiers.
- May be powered by a low-noise AC supply, included, or by battery.
- Stands 17 inches (43 cm) high and weighs 16 pounds (7.25 kg).

ORDER ANT 31 only **$349.95**

JPS Noise Canceller/Active Antenna

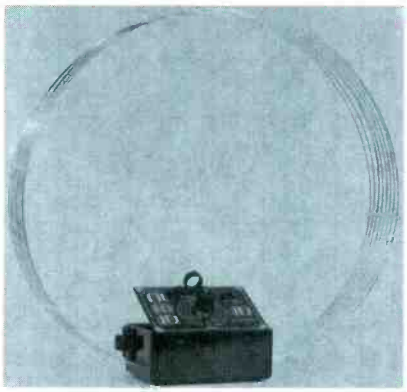
Enjoy Crystal Clear Sound!

Imagine, just connect this simple device between your receiving antenna and shortwave receiver or transceiver, and null out locally-generated interference of virtually *any* kind! Computer hash, line noise, TV synch buzz—they all go away when the ANC-4 is adjusted to your receiver to receive 100 kHz-80 MHz!

Use the attachable whip (provided) or, even better, a second external antenna to sample local noise. A simple adjustment from the front panel reduces or even eliminates virtually any electrical noise interference you are likely to encounter! The new ANC-4 can even be used as a frequency-selective active antenna/signal booster! Whip, random wire antenna, DC plug and full instructions provided. Requires 12 VDC @ 300 mA power. **Accessory: PWR 13 on page "m".**

ORDER ACC-21 only **$174.95**

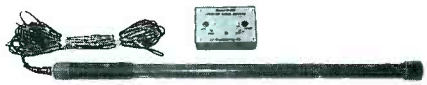
Exciting New KIWA Pocket-Loop Antenna



This highly efficient signal grabber is 12" across when deployed, yet collapses to a tiny pocket size for transport! Designed to receive and amplify signals from 530 kHz through 20 MHz in four bands, no antenna jack on your portable radio is needed; it space-couples to your radio's existing whip and internal ferrite rod!

ORDER ANT 32 only **$119.95**

H800 Skymatch



Compact Active Antenna

Imagine a two-foot antenna that performs like a 100 foot antenna; and what if that compact powerhouse could receive signals from 10 kHz through 50 MHz? That's VLF, medium wave, shortwave, and even VHF low band all rolled into one! Operates either from 120 VAC or optional 9 volt batteries for portable or emergency use.

Wide dynamic range resists strong-signal-overload problems, while high sensitivity enhances weak signals. Mounts inconspicuously on a porch, outside a window, on a roof, in a tree, or even in the radio room (not recommended because of electrical noise pickup).

Includes integrated active antenna, 50 feet of coax lead-in, control box, and AC adaptor. Equipped with RCA jack. **May require adaptor kit ADP 32 or ADP 25, see p. "m".**

ORDER ANT 15 only **$99.95**

Grove's Shortwave Receiver Specification Guide

Prices and specifications subject to change without notice

Receiver	AR 5000	AR 7030 "Plus"	Drake R8B	Drake SW2	Drake SW8	Grundig Yt. By. 400	ICOM PCR1000	JRC NRD-345	Sangean ATS-803	Sangean ATS-818CS	Sangean ATS-909	Sony ICF-SW77	Sony ICF-SW100	Sony ICF-SW2010	Sony ICF-SW7600G	WiNRADiO
Grove Order #	RCV 12	RCV 17	RCV 3	RCV 18	RCV 19	RCV 22	RCV 21	RCV 20	RCV 13	RCV 9	RCV 8	RCV 10	RCV 24	RCV 2	RCV 11	RCV 16
Grove Price	$1895.95	$1269.95	$1159.95	$489.95	$779.95	$199.95	Call	$799.95	$129.95	$219.95	$259.95	$469.95	$359.95	$349.95	$189.95	$499.95
Frequency Range	10 KHz-2600 MHz (less cellular)	0-32 MHz	100kHz-30MHz (35-55/108-174MHz with optional converter)	100 Hz-30 MHz	500 kHz-30 MHz, 87-108,118-137MHz	160kHz-30MHz 87.5-108MHz	500 kHz 13000 MHz (less cellular)	100 kHz-30 MHz	150kHz-30 MHz, 87.5-108 MHz	150kHz-30MHz 87.5-108MHz	150kHz-30MHz 87.5-108 MHz	150kHz-29.99MHz 87.5-108 MHz	150kHz-30MHz 76-108 MHz	150kHz-30MHz 76-108, 116-136MHz	150kHz-29.995MHz, 87.6-108MHz	500 kHz-1300 MHz (less cellular)
Keypad Entry?	Yes, plus tuning dial	Remote control (incl.)	Yes, plus tuning dial	Yes	Yes, plus tuning dial	Yes	Yes	Yes	Yes	Yes	Yes	Yes, plus tuning dial	Yes, plus tuning dial	Yes, plus tuning dial	Yes	Yes
Tuning Steps	Programmable, 1 Hz-1 MHz	2.665 Hz SSB, 20.62 Hz AM/FM	10/100Hz 1 kHz	50 Hz-5 kHz	50 kHz FM 100 Hz AM	1/5 kHz	1 Hz minimum, user programmable	5/100 Hz;1/10 kHz	50/100 kHz FM, 10/9/5/1 kHz AM	1kHz	40 Hz USB/LSB	50Hz/1kHz	100Hz/1/5kHz; 9/10kHz MW, 50kHz FM	100Hz/1kHz	1kHz	50 Hz-1 MHz
RIT/Fine Tuning	Tuning dial	Tuning dial	Not required	Not required	No	Yes	Not required	Not required	No		No	No		No	Yes	Yes
Display	Backlit LCD	Backlit LCD	Backlit LCD	Backlit LCD	Backlit LCD	Backlit LCD	Your monitor, 640 x 480 pixels or better	Backlit LCD	LCD	Backlit LCD	Backlit LCD	Backlit LCD	Backlit LCD	Backlit LCD	Backlit LCD	On screen (PC)
Dimmer	Yes		Yes	Yes	On/Off	On/Off	Your monitor	No	No	Yes		On/off	On/Off	On/off	No	N/A
Recommended Use	Wide spectrum monitoring	Serious DXing and monitoring	Serious DXing and Monitoring	Casual SW and Utilities	AM/SSB, aircraft/FM	Casual SW and FM	Wide frequency, general purpose	General Purpose SW and Utilities	Casual Broadcast	Casual SW	Casual SW and Utilities	Casual SW	Casual SW	SW /Air/Util./FM	Casual SW	Custom listening requirements
Receiving Modes	AM/NFM/WFM/LSB/USB/CW	AM/synchronous AM, USB/LSB/CW, data, NFM	AM, NFM, USB, LSB CW, RTTY	AM, AM Synch, USB, LSB	AM, AM synch., WFM LSB, USB	AM, LSB, FM, CW, USB	AM, WFM, NFM, SSB CW	AM, AM synch, USB, LSB	AM, FM	AM, LSB, WFM, USB	AM, FM broadcast, USB LSB	AM, AM synch., LSB, WFM, USB	AM, AM synch., USB, LSB, CW, WFM	AM, USB, LSB, WFM, synch det.	AM, WFM, USB, LSB, synch det.	AM, wide/narrow FM SSB
Memory	650 Channels	100 channels	400 channels	100 channels	70 channels	40 channels	Unlimited, determined by computer	100 channels	45 channels	45 presets	307 channels	162 channels	50 channels	32 channels	22 channels	Virtually unlimited
Scan	50 chan./sec. w. priority	Yes	Yes	No	Yes	Yes	Yes, 6 different modes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	50 ch./sec. (FM mode)
Banks	65		10	No	7	No		No	No	No	29	20	10	No	No	16
Search	50 channels/sec		No	No	No	Yes		No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Delay	Yes		Yes	No	5 sec. per step	Yes		No	Yes	Yes	Yes	Yes	Yes	Yes	No	Programmable
Squelch	Yes	Yes	Yes	No	No	No	Yes	No	No	No	No	No		No	No	Yes
Clock	Yes	Clock timer	Dual time zone	No	Dual mode	12/24 hr./sleep		12/24 hour clock/timer	24 hour UTC/local, alarm/timer	Dual time with record	3 separate timers with alarm	12/24 hr.	24 hr./sleep	12/24 hr./alarm/sleep	w/ timer and sleep	Yes
Audio Output Power	1 W	2 W @ 8 ohms	2.5 W @ 4 ohms		2 W @ 4 ohms	700 mW	200 mW @ 10% THD into 8 ohms	1 Watt	440 mW @ 10 @ THD	800 mW		400 mW	250 mW	380 mW		200 mW
Record Audio Output	Yes	Yes	Yes	No	Yes	No		Yes	No	No	Yes	138 mV	245 mV	.775 mV @ 1000 ohms	Yes	8 ohm minijack
Recorder Activator	No	Yes	No	No	No	No		No	No	Internal prog. cassette	No	Yes	No	No	No	No
Signal Strength Ind.	Analog S-meter		Analog S-meter	Analog S-meter	Analog S-meter	LCD bargraph	Yes	LCD bargraph	No	Yes	LCD bargraph	LCD bargraph	No	LED bargraph	Single "tune" LED	On PC screen
Computer Interface	RS232	RS232	RS232C	No	No	No	RS232C	RS-232C	No	No	No	No	No	No	No	Expansion slot
Conversion Scheme	Triple up-conversion (622.2/10.7 MHz, 455 kHz)	Double up-conversion (45 MHz/455 kHz)	Double up-conversion	Double up-conversion (55 MHz/455 kHz	Double up-conversion	Double up-conversion	Triple up-conversion (266.7/10.7 MHz, 450 kHz)	Double up-conversion	Double up-conversion	Double up-conversion	Double up-conversion	Double up-conversion	Double up-conversion	Double up-conversion	Double up-conversion	Triple up-conversion
Sensitivity	0.6 uV or better	0.3 uV SSB, 0.5 uV AM	0.5 uV 1.5-30 MHz	0.5 uV	0.5 uV or better (SSB)		0.3 uV or better	0.3 uV								0.35 uV or better
Selectable Preamp.	Yes	Yes	Yes	No	No	No		No	No	No	No	No	No	No	No	No
Selectable Atten.	Yes	5 level	Yes	No	Yes	Yes	20 dB	20 dB	Yes	RF gain control	RF gain control	Yes	Yes	Yes	Yes	Yes
IF Selectivity	3/6/15/40/110/220 kHz	2.2/4/5.3/9.5 kHz	(-6/-60 dB); 6/4/2.3/1.8 kHz, 500 Hz	(-6/-60 dB): 6/12 kHz AM, 2.3/5 kHz SSB	(-6/-50 dB): AM Narrow 4/6 kHz SSB 2.3/4.5 kHz		2.8, 6, 15, 50, 230 kHz	(-6/-60dB) 4/10 kHz wide, 2/6 kHz narrow	Wide/narrow AM	Wide/narrow switch 6.5 kHz AM	Wide/narrow AM			(-6/-50 dB) Wide 9/18 kHz Narrow 4/18 kHz		(-6 dB) AM/SSB 6 kHz; NFM 17 kHz; WFM 280 kHz
Image Rejection			80 dB or better 1.5-30 MHz		70 dB or better			-70 dB								
Selectable AGC			Yes	No	Yes	No		Off/fast/slow	No	No	No	No	No	No	No	
Dynamic Range		105 dB	100 dB @ 20 kHz spacing		95 dB or better			100 dB								
Passband Tuning	No	±4.2 kHz, all modes	+/-3 kHz	No	No	No	IF shift, ±1.2 kHz	No	No	No	No	No	No	No	No	
Noise Blanker/Limiter	Yes	Yes	Yes	No	No	No	Yes	Adjustable	No	No	No	No	No	No	No	No
Adjustable Notch Filter	No	No	500-5000 Hz, 40 dB	No	No	No		No	No	No	No		No	No	No	
Tone Control	Yes	CW and data only	Yes	No	Yes	Yes		Yes	Yes	Yes	Yes	Sep. bass/treble	Yes	Yes	Music/news switch	
Antenna Connector	BNC & N, programmable frequency ranges	SO-239 and 600 ohm	Dual, switched SO 239	SO-239 and screw terminal	SO-239, Push terminals, integral whip	1/8" mini whip	BNC	SO-239 and 600 ohm	1/8" miniplug	1/8" miniplug	1/8" miniplug	1/8" miniplug	1/8" miniplug	1/8" miniplug	1/8" miniplug	BNC
Dimensions	8.5"W/x3.5"Hx10"D	9.5"Wx3.5"Hx9"D	13.5"W/5.25"H/13"D	11"W/4.5"H/7.5"D	11.5"W/5.25"H/13"D	7.75"H/4.62"W/1.75"D	5"W/1.25"H/7.75"D	10"W/4"H/9"D	7.5"W/5"H/1.5"D	11.25"W/7.37"H/2.75"D	8.5"W/5"H/1.5"D	10.87"W/6.87"H/1.87"D	4.37"W/2.87"H/.93" D	11.37"W/6.25"H/2.16D	7.27"W/4.72"H/1.25"D	PC expansion card
Weight	7 lb. 10.5 oz.	4 lbs. 13 oz.	13 lbs	5.8 lbs.	10 lbs.	1 lb. 5 oz.	2.2 lbs.	7.7 lbs.	1 lb. 5 oz.	3 lbs. 13 oz.	1 lb. 12 oz.	3.25 lbs	8 oz.	3.75 lbs	1.25 lbs	N/A
Power Requirement(s)	13.8 VDC @ 1 A or 120 VAC @ 60 Hz	120 VAC (supply included) or 15 VDC @ 1 A (12 VDC w/ less perf.)	100/120/200/240VAC 11.16VDC @ 2A	12 VDC/120 VAC	6-9VDC/6 cells	6AA cells/9VDC	12 VDC @ 700 mA, AC adaptor included	12 VDC/120 VAC	6 VDC @ 300 mA or 6 AA cells	120VAC/int cells 4D cells	4AA batteries or optional AC adaptor: 6 VDC	6VDC or 4C cells	120VAC or 2AA cells	120VAC or 3D/2AA cells	120VAC or 4AA cells	PC bus powered
Warranty	One year	One year	One year	One year	One year	One year	One year	One year	One year	One year	One Year	One year	One year	One year	One year	One year
Accessories Incl.	Manual/AC adaptor		Manual	AC adaptor	Tele. whip/AC adaptor	Reel ant./case/ earphone/SW Guide/ 6AA batteries	Whip antenna, computer cable, program disk, AC adaptor, manual	Ac acaptor	Soft pouch/stereo earphones/external antenna adaptor	AC adapt./ ext. ant adaptor/ SW Guide	AC adapt./manual carrying pouch, earphones, external antenna connection	Stereo earphones/ AC adapt./tele. ant/ SW Guide	Stereo earphones/AC adapt./tele. ant/soft pouch/SW Guide	Earphone/ AC adapt./wire ant./tele ant/strap/ext. ant. adapt./SW Gd	Carrying case/ Reel Ant.	3-1/2" disk, manual

Grove Accessories, Books and Items not Otherwise Pictured in this Guide

Listed by Grove order code, many of these items are cited in the product descriptions of items sold on previous pages of this Guide

ACCESSORIES		
ACC-2	NIGHTLOGGER II TAPE RECORDER ACTIVATOR	$69.95
ACC-3	OPC-478 COMPUTER INTERFACE CABLE, ICOM R10	$44.95
ACC-4	OPC-474 CLONING CABLE, ICOM R10	$17.95
ACC-5	METAL TILT REPLACEMENT LEGS, DRAKE R8	$34.95
ACC-6	CR-293 HIGH STABILITY CRYSTAL, ICOM R8500	$295.95
ACC-7	FL-52A CW NARROW FILTER, ICOM R8500	$189.95
ACC-8	UT-102 VOICE SYNTHESIZER, ICOM R8500	$57.95
ACC-9	DRAKE SW-2 REMOTE CONTROL	$48.95
ACC-11	MAGELLAN GPS 3000/4000 DATA MODULE/ANTENNA KIT	$149.95
ACC-12	SWIVEL MOUNTING BRACKET, MAGELLAN GPS 2000/3000/4000	$19.95
ACC-13	INSTRUCTIONAL VIDEO, MAGELLAN GPS-2000	$14.95
ACC-14	INSTRUCTIONAL VIDEO, MAGELLAN GPS-3000	$14.95
ACC-21	JPS ANC-4 NOISE CANCELLER 100 kHz-80 MHz	$174.95
ACC-43	VHF CONVERTER, DRAKE R8A/B (33-55, 108-174 MHZ)	$219.95
ACC-50	FAX INTERFACE, O'GARA PHN-5	$95.00
ACC-51	DATA INTERFACE, O'GARA PHN-5	$295.00
ACC-53	RECHARGEABLE NIMH BATTERY, O'GARA PHN-6	$335.00
ACC-54	AC-DC CONVERTER, O'GARA PHN-6	$175.00
ACC-55	12 VDC MINI CHARGER, O'GARA PHN-6	$160.00
ACC-56	SOFT CARRYING CASE, O'GARA PHN-6	&95.00
ACC-57	HARD CARRYING CASE, O'GARA PHN-6	$325.00
ACC-58	REMOTE ANTENNA, O'GARA PHN-5A	$1395.00
ACC-59	ADDITIONAL ACCESS CARDS, O'GARA COMPACT-M, PHN-5	$85.00
ACC-60	ANTENNA WALL MOUNTING BRACKET, O'GARA PHN-6	$400.00
ACC-61	ANTENNA CABLE (10 METERS), O'GARA PHN-6	$320.00
ACC-62	ANTENNA CABLE, (20 METERS), O'GARA PHN-6	$480.00
ACC-63	INTERNAL RECHARGEABLE BAT PACK O'GARA PHN-6	$128.00
ACC-64	UNIVERSAL AC/DC CONVERTER, O'GARA PHN-6	$335.00
ACC-72	TV-R7100 TV/FM ADAPTER, ICOM R7100/8500	$339.95
ACC-74	CT-17 LEVEL CONVERTER, ICOM R7000/7100/8500	$134.95
ACC-79	AUDIO CASSETTE ADAPTER, SCANNERS/SW RECEIVERS	$9.95
ACC-94	ADHESIVE REPLACEMENT KIT, ANT-13	$4.95
ACC-96	CTCSS SQUELCH DECODER, BC-890	$59.95
ACC-101	BUDWIG CH-239 SW DIPOLE CONNECTOR	$9.95
ACC-130	CTCSS TONE BOARD, UNIDEN BC-9000&PRO-2045	$46.95
ACC-156	SAC-8000 INTERFACE CABLE, AR-8000/OPTO SCOUT	$34.95
ACC-157	OPTO'S LYNX COMPUTER INTERFACE, AR-8000	$129.95
ACC-168	WEATHER-PROOF FLEX TAPE, 22 FT ROLL	$1.95

ADAPTORS & ADAPTOR KITS		
ADP-25	RCA FEMALE TO MALE MINIPLUG, ANT-15/24	$5.95
ADP-32	RCA FEMALE TO MALE PL-259, ANT-15/24	$5.95
ADPK-1	ADAPTER KIT UHF/F, FTR-6/7/8/9 PRE-5A, ATT-1	$9.95
ADPK-3	ADAPTER KIT BNC/F, FTR6/7/8/9 PRE-5A, ATT-1	$9.95
ADPK-4	OPTO SCOUT TO R-10 INTERFACE KIT	$8.95
ADPK-6	ADAPTOR KIT MOT/BNC, FTR6/7/8/9 PRE-5A, ATT-1	$9.95
ADPK-9	ADAPTOR KIT N/F, FTR6/7/8/9 PRE-5A, ATT-1	$12.95

ANTENNAS VHF/UHF		
ANT-10DS	AUSTIN FERRET VHF/UHF RECEIVE/TRANSMIT	$249.95
ANT-13	22" VALOR GLAS-MASTER, 30-1200 MHZ	$29.95
ANT-18	300-512 MHz, 2 1/2' FLEX CLOSE RANGE ANTENNA	$19.95
ANT-20	GROVE NO-TENNA, 1-1000 MHZ BASE/MOBILE	$19.95

ANTENNAS SHORTWAVE		
ANT-12	ALPHA DELTA ANT KIT, SO-239 CONNECTOR, INSULATORS	$29.95
ANT-16	23' REEL FOR SW PORTABLES	$14.95
ANT-25	25' RANDOM WIRE W/RCA & PL-259 ADAPTORS	$7.95
ANT-32	KIWA POCKET LOOP 530 kHz - 30 MHz	$119.95

BATTERIES		
BAT-1	ENERGIZER INDUSTRIAL "AA"	$.79
BAT-2	ENERGIZER INDUSTRIAL "D"	$1.19
BAT-3	ENERGIZER INDUSTRIAL "C"	$1.09
BAT-4	ENERGIZER INDUSTRIAL "9V"	$2.25
BAT-5	BP-180 800 mAH CHARGEABLE, UNIDEN BC-230/235, PRO-90	$29.95
BAT-9	METROWEST LONG LIFE PACK, UNIDEN BC-200/205	$79.95
BAT-13	RECHARGEABLE "AA"NICAD BATTERIES	$2.75
BAT-14	RECHARGEABLE PACK, UNIDEN BC-200/205	$39.95
BAT-15	RECHARGEABLE PACK, UNIDEN BC-2500/3000	$31.95
BAT-16	POWER POCKET RECHARGEABLE LEAD/ACID 12 V, 2 AH	$59.95

BOOKS (See listings and displays on following pages)

BRACKETS		
BRK-1	HAND-HELD RADIO MOBILE MOUNT, SINGLE	$9.95
BRK-2	MOBILE MOUNTING BRACKET FOR BC-890/9000XLT, PRO2045	$15.95
BRK-3	UNIVERSAL BELT CLIP CAN BE USED WITH BRK-6	$4.95
BRK-4	MB12 MOBILE MOUNTING BRACKET, ICOM R8500	$35.95
BRK-5	MB-23 CARRYING HANDLE, ICOM R7100/8500	$12.95
BRK-6	THE CLIP MOUNT FITS 1" OR SMALLER BELT CLIPS & BRK-3	$4.95
BRK-7	HAND-HELD RADIO MOBILE MOUNT, DOUBLE	$12.95
BRK-9	WINDOW ANTENNA MOUNT KIT BNC CONNECTOR	$28.95
BRK-10	DELUXE MOBILE HAND HELD SCANNER MOUNT/ORGANIZER	$14.95
BRK-11	HAND-HELD SCANNER CAR WINDOW MOUNT	$7.95
BRK-12	DRAKE SW-1,2 CARRYING/TILT HANDLE	$4.50
BRK-13	DRAKE SW-1,2 MOBILE MOUNTING BRACKET	$14.95
BRK-14	AOR-5000 DOUBLE RACK MOUNT	$149.95
BRK-15	AOR-3000 RACK MOUNT	$89.95

CARRYING CASES		
CAS-1	ICOM R10 LC-140 CARRYING CASE	$29.95
CAS-2	LEATHER CASE FOR AR-8000	$29.95
CAS-3	LEATHER CASE FOR UNIDEN BC-230/235, PRO-90	$29.95
CAS-6	LEATHER CASE FOR UNIDEN BC-3000XLT	$19.95
CAS-7	MAGELLAN GPS-2000 CARRYING CASE	$9.95
CAS-8	OPTOELECTRONICS SCOUT	$15.10
CAS-10	DRAKE SW-8 CARRYING CASE	$49.95
CAS-11	RELM HS-200	$22.95

CABLE		
CBL-2	50 FT 3-CONDUCTOR CABLE FOR ROT-01 ROTATOR	$5.95
CBL-3	100 FT 3 CONDUCTOR CABLE FOR ROT-01 ROTATOR	$8.95

CHARTS		
CHT-1	RADIO SPECTRUM COLOR WALL CHART, 1996	$9.95

CLOCKS		
CLK-1	24 HOUR SETH THOMAS 13" WALL CLOCK	24.95
CLK-2	MFJ-108B LOCAL/UTC DUAL DIGITAL CLOCK	$19.95
CLK-4	MFJ-112 WORLD MAP DESK CLOCK	$24.95

COLLECTIBLES		
COL-1	SPINNING VANE RADIOMETER	$6.95
COL-3	EDISON WALL PLAQUE	$6.95
COL-5	RADIACMETER (1960 PERSONAL RADIATION DETECTOR)	$9.95
COL-6DS	TWIN CYLINDER STEAM ENGINE, BUILT ($20.00 UPS)	$449.95
COL-7	JENSEN HOBBY STEAM ENGINE KIT	$99.95
COL-8	VICTORIAN STYLE CARBON FILAMENT BULB	$6.95
COL-9DS	TWIN CYLINDER, STEAM POWER PLANT ($25.00 UPS)	$574.95
COL-10	POST OFFICE BANK SMALL	$39.95
COL-11	POST OFFICE BANK LARGE	$79.95
COL-12	POST OFFICE BOX DOORS, SMALL	$19.95
COL-13	POST OFFICE BOX DOORS, LARGE	$24.95

COUPLERS		
CPL-63B	AUTO ANTENNA MULTICOUPLER, AM/FM SCANNER (BNC)	$16.95
CPL-63M	AUTO ANTENNA MULTICOUPLER, AM/FM SCANNER (MOT)	$14.95
CPL-SC	DUAL SCANNER MULTICOUPLER KIT (BNC, PL-250, MOT, F)	$29.95

FREQUENCY COUNTERS		
CTR-8	OPTOELECTRONICS SCOUT-40 (10 MHz - 2.8 GHz)	$399.95
CTR-9	OPTOELECTRONICS CUB (1 MHz - 2.8 GHz)	$144.95

CONVERTERS		
DCC-3	MOBILE DC ADAPTOR (1.5,3,4.5,6,7.5,9.12 V, 800 mA)	$12.95
DCC5	CP-12 DC ADAPTOR W/ NOISE FILTER FOR ICOM R10	$29.95
DCC7	MOBILE DC ADAPTOR FOR UNIDEN BC-9000/300/230/235	$15.95

FILTERS		
FTR-6	30-2000 MHZ BANDPASS FOR SCANNERS	$29.95
FTR-7	540-1700 KHZ BAND REJECT FOR SHORTWAVE RECEIVERS	$29.95
FTR-8	118-137 MHZ BAND REJECT FOR SCANNERS	$29.95
FTR-9	30 MHZ LOW PASS FOR SHORTWAVE RECEIVERS	$29.95

GPS SATELLITE EQUIPMENT		
GPS-100	MAGELLAN GCS-100 GLOBAL E-MAIL/GPS RECEIVER	$1499.95
GPS-2000	MAGELLAN GPS 2000, OUTDOOR (BASIC)	$149.95
GPS-3000	MAGELLAN GPS 3000, MARINE	$249.95
GPS-4000	MAGELLAN GPS-4000 XL, OUTDOOR (EXTRA FEATURES)	$249.95

HEADPHONES		
HDP-3	ICOM HP-4 LIGHTWEIGHT	$22.95
HDP-4	RACETRAC CLASSIC PROFESSIONAL	$59.95
HDP-5	RACETRAC PLATINUM PROFESSIONAL W/DOUBLE HEADBAND	$88.95

LIGHTNING PROTECTORS		
LAR-1B	GAS DISCHARGE LIGHTNING/SURGE PROTECTOR (BNC)	24.95
LAR-1F	GAS DISCHARGE LIGHTNING/SURGE PROTECTOR (F)	$19.95
LAR-1M	GAS DISCHARGE LIGHTNING/SURGE PROTECTOR (MOTO)	$29.95
LAR-1P	GAS DISCHARGE LIGHTNING/SURGE PROTECTOR (PL-259)	$24.95
LAR-2	SINGLE OUTLET-SURGE PROTECTOR (120 VAC)	$3.95
LAR-03	SIX OUTLET SURGE PROTECTOR (120 VAC)	$4.95
MANUALS		
MAN-1	SERVICE MANUAL, ICOM R-8500	$57.95
MAN-2	SERVICE MANUAL, DRAKE R8A	$39.95
MAN-5	OWNERS MANUAL, ICOM-R1	$25.00
MAN-6	SERVICE MANUAL, AR-5000	$29.95
MICROPHONES		
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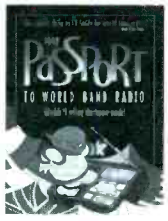

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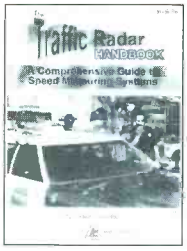

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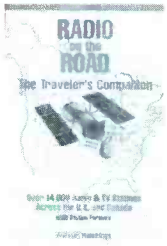

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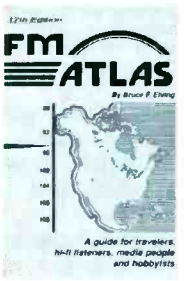

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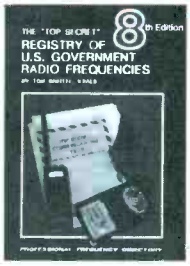

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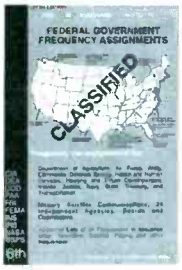

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1100-1200	Anguilla,Caribbean Beacon	11775am			
1100-1200	Australia, Radio	6080as	9580pa		
1100-1200 vl	Australia, VL8A Alice Spg	2310do			
1100-1200 vl	Australia, VL8K Katherine	2485do			
1100-1200 vl	Australia, VL8T Tent Crk	2325do			
1100-1200	Canada, 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, Adv World R	5030am	6150am	7375am	9725am
		13750am			
1100-1200	Costa Rica,RF Peace Intl	7385am	7585am		
1100-1200	Ecuador, HCJB	12005am	15115am	21455au	
1100-1200 as	Eqt Guinea, R East Africa	15186af			
1100-1200	Eqt Guinea, Radio Africa	9530as			
1100-1150	Germany, Deutsche Welle	15370af	15410af	17780af	17800af
1100-1200 fas/vl	Italy, IRRS	7120va			
1100-1200	Japan, R Japan/NHK World	6120na	7125na	11815as	
1100-1200	Jordan, Radio	11690eu			
1100-1200	Lebanon, Voice of Hope	9960va			
1100-1110	Liberia,LCN/R Liberia Int	5100do			
1100-1200	Malaysia, Radio	7295do			
1100-1200 vl	Malaysia, RTM Kuching	7160do			
1100-1200 vl	Malaysia,RTM KotaKinabalu	5980do			
1100-1129	Mozambique, Radio	11812do			
1100-1125	Netherlands, Radio	6045eu	7190eu		
1100-1200	New Zealand, R NZ Intl	9700pa			
1100-1157	North Korea, R Pyongyang	3560af	9640af	9975af	11335af
		13650af	15230af		
1100-1120	Pakistan, Radio	15520eu	17835eu		
1100-1130 as	Palau, KHBN/Voice of Hope	9730as			
1100-1200 vl	Papua New Guinea, NBC	4890do			
1100-1200	Russia,Voice of Russia WS	4730as	11655as	11820as	11880as
		12065as	15120as	15460as	15535as
		15560as	17755as	17860as	
1100-1200	Singapore,R Singapore Int	6015as	6155as		
1100-1130 vl	Solomon Islands, SIBC	5020do			
1100-1130	Sri Lanka, Sri Lanka BC	11835as	15120as	17850as	
1100-1130	Switzerland, Swiss R Intl	9885as	12075as	13635as	
1100-1200	Taiwan, Voice of Asia	7445as			
1100-1200	United Kingdom, BBC WS	5965am	6190af	6195va	9410eu
		9580as	11750as	11760as	11940af
		11955as	12095eu	15220am	15310as
		15485va	15565as	15575va	17640na
		17705eu	17830af	17885af	21660af
1100-1130 as	United Kingdom, BBC WS	15190am			
1100-1130	United Kingdom, BBC WS	9700as	11765va	15310as	17785as
1100-1145	United Kingdom, BBC WS	15400af	17790as		
1100-1200	United Kingdom, UCB	6200eu			
1100-1200	USA, KAIJ Dallas TX	5810am			
1100-1200	USA, KTBN Salt Lk City UT	7510am			
1100-1200	USA, KWHR Naalehu HI	11565pa			
1100-1200	USA, Monitor Radio Intl	6095am	7395am	9355as	9385au
1100-1200	USA, Voice of America	5985as	6160as	9645as	9760as
		11705as	11720as	15425as	
1100-1200	USA, WEWN Birmingham AL	5825na	7465eu		
1100-1200	USA, WGTG McCaysville GA	9400am			
1100-1200	USA, WHRI Noblesville IN	6040am	9495am	9930am	
1100-1200	USA, WJCR Upton KY	7490na			
1100-1200	USA, WRMI/R Miami Intl	9955am			
1100-1200	USA, WRNO New Orleans LA	15420am			
1100-1200	USA, WWCR Nashville TN	2390am	5070am	5935am	15685am
1100-1200	USA, WYFR Okeechobee FL	5950na	11830na		
1100-1130	Vietnam, Voice of	7285as	9730as		
1100-1200	Zambia, Christian Voice	6065af			
1100-1200 vl	Zambia, R Zambia/ZNBC 1	7220do			
1115-1145	Nepal, Radio	3230do	5005do		
1120-1140	Australia,DefenseForces R	4763as			
1130-1200 vl	China, China Radio Intl	6995as	8660as	11445as	11700as
		15480as			
1130-1157	Czech Rep, Radio Prague	7345eu	9505eu		
1130-1200	Iran, VOIRI	9585as	11830as	11875as	15260as
1130-1135	Israel, Kol Israel	15640eu			
1130-1140	Lesotho, Radio Lesotho	4800do			
1130-1200	Myanmar, Voice of	5990do			
1130-1200	Netherlands, Radio	6045eu	7190eu		
1130-1200	United Kingdom, BBC WS	6195am	17705va		

SELECTED PROGRAMS

Sundays

1100 Ecuador, HCJB Quito (am): Morning Song. Music and thoughts to start the day.
1100 UK, BBC London (am/eu): Newsdesk. See S 0000.
1130 Ecuador, HCJB Quito (am): The Christian's Hour. Christian messages of inspiration by Gary York.
1130 UK, BBC London (am/eu): Anything Goes. A variety of music and much more with Bob Holness.

Mondays

1100 Ecuador, HCJB Quito (am): Insight for Living. Chuck Swindoll applies the Bible to life today. (www.insight.org)
1100 UK, BBC London (am/eu): Newsdesk. See S 0000.
1100 UK, BBC London (am/eu): World News (Carib). A five minute news summary for listeners in the Caribbean.
1105 UK, BBC London (am/eu): Caribbean Report (Carib). Weekday coverage of current affairs in the Caribbean region with emphasis on political and economic analysis.
1110 UK, BBC London (am/eu): Sports for the Caribbean (Carib). A round-up of the latest scores and sports news.
1115 UK, BBC London (am/eu): Caribbean Magazine (Carib). General news and features from around the islands.
1130 Ecuador, HCJB Quito (am): Morning in the Mountains. A light-hearted mix of music, conversation, news, and Len Kinzel helps you start your morning with a live program of music, news, scripture reading, and sports.
1130 UK, BBC London (am/eu): Jazzmatazz. See S 0530.
1134 Ecuador, HCJB Quito (am): News. A summary of world and regional news.

Tuesdays

1100 Ecuador, HCJB Quito (am): Insight for Living. See M 1100.
1100 UK, BBC London (am/eu): Newsdesk. See S 0000.
1100 UK, BBC London (am/eu): World News (Carib). See M 1100.
1105 UK, BBC London (am/eu): Caribbean Report (Carib). See M 1105.
1110 UK, BBC London (am/eu): Sports for the Caribbean (Carib). See M 1110.
1115 UK, BBC London (am/eu): Caribbean Magazine (Carib). See M 1115.
1130 Ecuador, HCJB Quito (am): Morning in the Mountains. See M 1130.
1130 UK, BBC London (am/eu): Variable Feature. See S 0130.
1134 Ecuador, HCJB Quito (am): News. See M 1134.

Wednesdays

1100 Ecuador, HCJB Quito (am): Insight for Living. See M 1100.
1100 UK, BBC London (am/eu): Newsdesk. See S 0000.
1100 UK, BBC London (am/eu): World News (Carib). See M 1100.
1105 UK, BBC London (am/eu): Caribbean Report (Carib). See M 1105.
1110 UK, BBC London (am/eu): Sports for the Caribbean (Carib). See M 1110.
1115 UK, BBC London (am/eu): Caribbean Magazine (Carib). See M 1115.
1130 Ecuador, HCJB Quito (am): Morning in the Mountains. See M 1130.
1130 UK, BBC London (am/eu): Sports International. See W 0630.
1134 Ecuador, HCJB Quito (am): News. See M 1134.

Thursdays

1100 Ecuador, HCJB Quito (am): Insight for Living. See M 1100.
1100 UK, BBC London (am/eu): Newsdesk. See S 0000.
1100 UK, BBC London (am/eu): World News (Carib). See M 1100.
1105 UK, BBC London (am/eu): Caribbean Report (Carib). See M 1105.
1110 UK, BBC London (am/eu): Sports for the Caribbean (Carib). See M 1110.
1115 UK, BBC London (am/eu): Caribbean Magazine (Carib). See M 1115.
1130 Ecuador, HCJB Quito (am): Morning in the Mountains. See M 1130.
1130 UK, BBC London (am/eu): Variable Feature. See S 0130.
1134 Ecuador, HCJB Quito (am): News. See M 1134.

Fridays

1100 Ecuador, HCJB Quito (am): Insight for Living. See M 1100.
1100 UK, BBC London (am/eu): Newsdesk. See S 0000.
1100 UK, BBC London (am/eu): World News (Carib). See M 1100.
1105 UK, BBC London (am/eu): Caribbean Report (Carib). See M 1105.
1110 UK, BBC London (am/eu): Sports for the Caribbean (Carib). See M 1110.
1115 UK, BBC London (am/eu): Caribbean Magazine (Carib). See M 1115.
1130 Ecuador, HCJB Quito (am): Morning in the Mountains. See M 1130.
1130 UK, BBC London (am/eu): Focus on Faith. See F 0230.
1134 Ecuador, HCJB Quito (am): News. See M 1134.
1154 Radio Netherlands: Documentary. 50th Anniversary Celebrations: From the Wireless to the World Wide Web (5th). See W 1254.
1154 Radio Netherlands: Documentary. The High "C's" (26th). See F 2354.
1154 Radio Netherlands: Documentary. The Netherlands is Full (19th). See F 1454.
1154 Radio Netherlands: Documentary. The Social Cost of Transformation (12th). See A 2354.

Saturdays

1100 Ecuador, HCJB Quito (am): Your Story Hour. Dramatized children's stories.
1100 UK, BBC London (am/eu): Newsdesk. See S 0000.
1130 Ecuador, HCJB Quito (am): We Kids. A fast-moving program for children.
1130 UK, BBC London (am/eu): People and Politics. See F 2130.

1200 UTC SHORTWAVE GUIDE 7:00 AM EST 4:00 AM PST

Frequencies

1200-1300	Anguilla,Caribbean Beacon	11775am			
1200-1300	Australia, Radio	5870pa	6080as	9415pa	9580pa
1200-1300 vl	Australia, VL8A Alice Spg	2310do			
1200-1300 vl	Australia, VL8K Katherine	2485do			
1200-1300 vl	Australia, VL8T Tent Crk	2325do			
1200-1300	Brazil, Radio Bras	15445na			
1200-1300	Bulgaria, Radio	15130eu	15290eu		
1200-1215	Cambodia, Natl Voice of	11940as			
1200-1300 vl	Canada, CBC N Quebec Svc	9625do			
1200-1300	Canada, CFRX Toronto	6070do			
1200-1300	Canada, CFVP Calgary	6030do			
1200-1300	Canada, CHNX Halifax	6130do			
1200-1300	Canada, CKZN St John's	6160do			
1200-1300	Canada, CKZU Vancouver	6160do			
1200-1229	Canada, R Canada Intl	6150as	11730as		
1200-1300	China, China Radio Intl	7385pa	9565pa	9715as	11660as
		11795pa	15440as		
1200-1230 vl	China, China Radio Intl	6995as	8660as	11445as	11700as
		12110as			
1200-1300	Costa Rica,RF Peace Intl	7385am			
1200-1300	Ecuador, HCJB	12005am	15115am	21455am	
1200-1300 as	Eqt Guinea, R East Africa	15186af			
1200-1300	Eqt Guinea, Radio Africa	9530as			
1200-1257	France, Radio France Intl	9805af	11600as	13625eu	15155eu
		15195eu	15540af	17575af	
1200-1230 s	Germany, Universal Life	9710eu			
1200-1230 s	Germany, Universal Life	9710eu			
1200-1230	Iran, VOIRI	9585as	11830as	11875as	15260as
1200-1300 fas/vl	Italy, IRRS	7120va			
1200-1300	Japan, R Japan/NHK World	6120na	7125as	11815as	
1200-1300	Jordan, Radio	11690eu			
1200-1300	Lebanon, Voice of Hope	9960va			
1200-1300	Malaysia, Radio	7295do			
1200-1300 vl	Malaysia,RTM KotaKinabalu	5980do			
1200-1230	Mongolia, Voice of	12085au			
1200-1250	Myanmar, Voice of	5990do			
1200-1230	Netherlands, Radio	6045eu	7190eu		
1200-1206	New Zealand, R NZ Intl	9700pa			
1200-1300 vl	Papua New Guinea, NBC	4890do			
1200-1300	Russia,Voice of Russia WS	4730as	11655as	11820as	11880as
		12065as	15120as	15460as	15490as
		15535as	15560as	17755as	17795as
		17860as			
1200-1300	Singapore,R Singapore Int	6015as	6155as		
1200-1300	South Korea, R Korea Intl	7285af			
1200-1300	Taiwan, Taipei Radio Intl	7130au	9610as		
1200-1300	Ukraine, R Ukraine Intl	9870na	17725au		
1200-1300	United Kingdom, BBC WS	6190af	6195va	9410eu	9515am
		9580as	9740as	11750as	11760as
		11940af	11955as	15220am	15310as
		15485va	15565va	15575va	17640va
		17705af	17830af	17885af	21660af
1200-1300	United Kingdom, UCB	6200eu			
1200-1300	USA, KAIJ Dallas TX	5810am			
1200-1300	USA, KTBN Salt Lk City UT	7510am			
1200-1300	USA, KWHR Naalehu HI	11565pa			
1200-1300	USA, Monitor Radio Intl	6095am	9355as	9385au	9455am
1200-1300	USA, Voice of America	6160as	9645as	9760as	11705as
		11715as	15160as	15425as	
1200-1300	USA, WEWN Birmingham AL	5825na	15745eu		
1200-1300	USA, WHRI Noblesville IN	6040am	9495am	9930am	
1200-1300	USA, WJCR Upton KY	7490na			
1200-1300	USA, WRMI/R Miami Intl	9955am			
1200-1300	USA, WRNO New Orleans LA	15420am			
1200-1300	USA, WWCR Nashville TN	2390am	5070am	5935am	15685am
1200-1300	USA, WYFR Okeechobee FL	5950na	6015na	11830na	17750na
1200-1230	Uzbekistan, R Tashkent	7190as	7285as	9715as	15295as
1200-1300	Zambia, Christian Voice	6065af			
1200-1300 vl	Zambia, R Zambia/ZNBC 1	7220do			
1206-1300 occsnal	New Zealand, R NZ Intl	6105pa			
1215-1300	Egypt, Radio Cairo	17595as			
1215-1300	United Kingdom, BBC WS	15220am			
1230-1300	Bangladesh, Bangla Betar	7185as	9550as		
1230-1300	Guam, AWR/KSDA	13720as			
1230-1300 w	Indonesia, RRI Sorong	4875do			
1230-1300	Netherlands, Radio	5975eu	6045eu		
1230-1300	Romania, R Romania Intl	9690eu	11885eu	15365eu	17720eu
1230-1300	South Korea, R Korea Intl	9570as	9640as	13670as	
1230-1300	Sri Lanka, Sri Lanka BC	9730as	15425as		
1230-1300	Sweden, Radio	11650na	15240na		
1230-1300	Thailand, Radio	9505as	9655as	9885as	11905as
1230-1300 a	USA, Voice of America	7768eu			
1230-1300	Vietnam, Voice of	5940as	7270as	7400as	9840as
		12020as	15010as		
1240-1250	Greece, Voice of	11645af			

Selected Programs

Sundays

1200 Ecuador, HCJB (am): Hour of Decision. Evangelist Billy Graham's radio program. (www.graham-assn.org/bgea/bgeamin.htm)
1200 UK, BBC (am/eu): World News. S 0300.
1205 UK, BBC (am/eu): Write On. S 0905.
1215 UK, BBC (am/eu): In Praise of God. S 0630.
1230 Ecuador, HCJB (am): Radio Bible Class. Bible teaching and the Men of Praise providing the music. (www.gospelcom.net/rbc/)
1245 UK, BBC (am/eu): Sports Roundup. S 0145.

Mondays

1200 Ecuador, HCJB (am): Morning in the Mountains. M 1130.
1200 UK, BBC (am/eu): World News (Carib). M 1100.
1200 UK, BBC (am/eu): World News. S 0300.
1201 Ecuador, HCJB (am): News. M 1134.
1205 UK, BBC (am/eu): World Business Report (Carib). M 0905.
1205 UK, BBC (am/eu): World Business Report. M 0905.
1210 UK, BBC (am/eu): Caribbean Report (Carib). M 1105.
1215 UK, BBC (am/eu): Britain Today. S 0045.
1230 Ecuador, HCJB (am): Guidelines. A five-minute commentary on living from Harold Sala. (www.guidelines.org)
1230 UK, BBC (am/eu): Seven Days. Roundup of the week's news, plus sports highlights, finance and the weather.
1238 Ecuador, HCJB (am): A Reading from God's Word. A short break for bible reading.
1245 UK, BBC (am/eu): Sports Roundup. S 0145.
1249 Ecuador, HCJB (am): The Church Doctor. Helping Christians one at a time.

Tuesdays

1200 Ecuador, HCJB (am): Morning in the Mountains. M 1130.
1200 UK, BBC (am/eu): World News (Carib). M 1100.
1200 UK, BBC (am/eu): World News. S 0300.
1201 Ecuador, HCJB (am): News. M 1134.
1205 UK, BBC (am/eu): World Business Report (Carib). M 0905.
1205 UK, BBC (am/eu): World Business Report. M 0905.
1210 UK, BBC (am/eu): Caribbean Report (Carib). M 1105.
1215 UK, BBC (am/eu): Britain Today. S 0045.
1230 Ecuador, HCJB (am): Guidelines. M 1230.
1230 UK, BBC (am/eu): Health Matters. S 2230.
1238 Ecuador, HCJB (am): A Reading from God's Word. M 1238.
1245 UK, BBC (am/eu): Sports Roundup. S 0145.
1249 Ecuador, HCJB (am): The Church Doctor. M 1249.

Wednesdays

1200 Ecuador, HCJB (am): Morning in the Mountains. M 1130.
1200 UK, BBC (am/eu): World News. S 0300.
1201 Ecuador, HCJB (am): News. M 1134.
1205 UK, BBC (am/eu): World Business Report. M 0905.
1215 UK, BBC (am/eu): Britain Today. S 0045.
1230 Ecuador, HCJB (am): Guidelines. M 1230.
1230 UK, BBC (am/eu): Science Feedback (5). T 1615.
1230 UK, BBC (am/eu): Seeing Stars (1). T 1615.
1230 UK, BBC (am/eu): Soundbyte (2). T 1615.
1230 UK, BBC (am/eu): Waveguide (4). T 1615.
1230 UK, BBC (am/eu): Wildtrack (3). T 1615.
1238 Ecuador, HCJB (am): A Reading from God's Word. M 1238.
1245 UK, BBC (am/eu): Sports Roundup. S 0145.
1249 Ecuador, HCJB (am): The Church Doctor. M 1249.
1254 Radio Netherlands: Documentary. 50th Anniversary Celebrations: From the Wireless to the World Wide Web (3rd). In the final anniversary program, Pete Myers looks back to RN's recent past, with the 1980s and 90s respectively.
1254 Radio Netherlands: Documentary. The High "C's" (24th). F 2354.
1254 Radio Netherlands: Documentary. The Netherlands is Full (17th). F 1454.
1254 Radio Netherlands: Documentary. The Social Cost of Transformation (10th). A 2354.

Thursdays

1200 Ecuador, HCJB (am): Morning in the Mountains. M 1130.
1200 UK, BBC (am/eu): World News (Carib). M 1100.
1200 UK, BBC (am/eu): World News. S 0300.
1201 Ecuador, HCJB (am): News. M 1134.
1205 UK, BBC (am/eu): World Business Report (Carib). M 0905.
1205 UK, BBC (am/eu): World Business Report. M 0905.
1210 UK, BBC (am/eu): Caribbean Report (Carib). M 1105.
1215 UK, BBC (am/eu): Britain Today. S 0045.
1230 Ecuador, HCJB (am): Guidelines. M 1230.
1230 UK, BBC (am/eu): Record News. Focus on the most interesting new releases of classical recordings.
1238 Ecuador, HCJB (am): A Reading from God's Word. M 1238.
1245 UK, BBC (am/eu): Sports Roundup. S 0145.
1249 Ecuador, HCJB (am): The Church Doctor. M 1249.

Fridays

1200 Ecuador, HCJB (am): Morning in the Mountains. M 1130.
1200 UK, BBC (am/eu): World News (Carib). M 1100.
1200 UK, BBC (am/eu): World News. S 0300.
1201 Ecuador, HCJB (am): News. M 1134.
1205 UK, BBC (am/eu): World Business Report (Carib). M 0905.
1205 UK, BBC (am/eu): World Business Report. M 0905.
1210 UK, BBC (am/eu): Caribbean Report (Carib). M 1105.
1215 UK, BBC (am/eu): Variable Feature. S 0130.
1230 Ecuador, HCJB (am): Guidelines. M 1230.
1238 Ecuador, HCJB (am): A Reading from God's Word. M 1238.
1245 UK, BBC (am/eu): Sports Roundup. S 0145.
1249 Ecuador, HCJB (am): The Church Doctor. M 1249.

Saturdays

1200 Ecuador, HCJB (am): A Visit With Mrs. G. Bible stories for children.
1200 UK, BBC (am/eu): World News. S 0300.
1205 UK, BBC (am/eu): World Business Review. S 0305.
1215 Ecuador, HCJB (am): Adventure Pals. A weekly adventure program on Christianity for children.
1215 UK, BBC (am/eu): A Jolly Good Show. S 0730.
1230 Ecuador, HCJB (am): Adventures in Odyssey. S 0000.
1245 UK, BBC (am/eu): Good Books. S 0815.

Frequencies

1300-1400	Anguilla,Caribbean Beacon	11775am			
1300-1400	Australia, Radio	5870pa	5995pa	6080as	9415pa
1300-1400 vl	Australia, VL8A Alice Spg	2310do			
1300-1400 vl	Australia, VL8K Katherine	2485do			
1300-1400 vl	Australia, VI8T Tent Crk	2325do			
1300-1325 s	Belgium, R Vlaanderen Int	13680na			
1300-1320	Brazil, Radio Bras	15445na			
1300-1400 vl	Canada, CBC N Quebec Svc	9625do			
1300-1400	Canada, CFRX Toronto	6070do			
1300-1400	Canada, CFVP Calgary	6030do			
1300-1400	Canada, CHNX Halifax	6130do			
1300-1400	Canada, CKZN St John's	6160do			
1300-1400	Canada, CKZU Vancouver	6160do			
1300-1330	Canada, R Canada Intl	9640na	11855na		
1300-1400	China, China Radio Intl	6140as	7230eu	7385pa	7405as
		9715as	11660pa	11980as	
1300-1400	Costa Rica,RF Peace Intl	7385am			
1300-1400 vl	Cyprus, BRT International	6150do			
1300-1400	Ecuador, HCJB	12005am	15115am	21455am	
1300-1330	Egypt, Radio Cairo	17595as			
1300-1400 as	Eqt Guinea, R East Africa	15186af			
1300-1400	Eqt Guinea, Radio Africa	9530as			
1300-1400 fas/vl	Italy, IRRS	7120va			
1300-1400	Jordan, Radio	11690eu			
1300-1310	Liberia,LCN/R Liberia Int	5100do			
1300-1400	Malaysia, Radio	7295do			
1300-1400 vl	Malaysia, RTM Kuching	7160do			
1300-1400 vl	Malaysia,RTM KotaKinabalu	5980do			
1300-1325	Netherlands, Radio	5975eu	6045eu		
1300-1400 occsnal	New Zealand, R NZ Intl	6105pa			
1300-1330 s	Norway, Radio Norway Intl	9590eu	9905as	13800va	13805am
1300-1400 vl	Papua New Guinea, NBC	4890do			
1300-1400	Philippines, FEBC/R Intl	11995as			
1300-1355	Poland, Polish R Warsaw	6095eu	7145eu	7270eu	9525eu
		11815eu			
1300-1356	Romania, R Romania Intl	9690eu	11885eu	15365eu	17720eu
1300-1400	Russia,Voice of Russia WS	4730as	4975as	15460as	15490as
		17860as			
1300-1400 as	S Africa, Channel Africa	9440af	17675af	17870af	
1300-1400	Singapore,R Singapore Int	6015as	6155as		
1300-1400	Sri Lanka, Sri Lanka BC	9730as	15425as		
1300-1330	Switzerland, Swiss R Intl	7230as	7480as		
1300-1400	United Kingdom, BBC WS	5990as	6190af	6195va	9410eu
		9515am	9740va	11750as	11760as
		11865am	11940af	12095eu	15220am
		15310as	15420af	15485va	15565as
		15575va	17640va	17705af	17830af
	17885af	21470af	21660af		
1300-1400	United Kingdom, UCB	6200eu			
1300-1400	USA, KAIJ Dallas TX	5810am			
1300-1400	USA, KNLS Anchor Point AK	7365as			
1300-1400	USA, KTBN Salt Lk City UT	7510am			
1300-1400	USA, KWHR Naalehu HI	7560pa			
1300-1400	USA, Monitor Radio Intl	6095na	9355as	9385as	9455na
1300-1400	USA, Voice of America	6160as	9645as	9760as	11705as
		11715as	15425as		
1300-1400	USA, WEWN Birmingham AL	5825na	15745eu		
1300-1400	USA, WGTG McCaysville GA	9400am			
1300-1400	USA, WHRI Noblesville IN	6040am	9930am	15105am	
1300-1400	USA, WJCR Upton KY	7490na			
1300-1400	USA, WRMI/R Miami Intl	9955am			
1300-1400	USA, WRNO New Orleans LA	15420am			
1300-1400	USA, WWCR Nashville TN	5070am	12160am	13845am	15685am
1300-1400	USA, WYFR Okeechobee FL	5950na	11830na	13695na	17750na
1300-1400	Zambia, Christian Voice	6065af			
1300-1400 vl	Zambia, R Zambia/ZNBC 1	7220do			
1302-1400	USA, WYFR Okeechobee FL	11550as			
1330-1355	Austria, R Austria Intl	6155eu	13730na		
1330-1359	Canada, R Canada Intl	6150as	9535as	9640na	11855na
1330-1400	China, Heilongjiang PBS	4840do			
1330-1400	Finland, YLE/R Finland	11735na	15400na		
1330-1400	Guam, AWR/KSDA	9650as	13720as		
1330-1400	India, All India Radio	9545as	11620as	13710as	
1330-1400	Netherlands, Radio	9895as	13700as	15585as	
1330-1400 mtwhf	Portugal, R Portugal Intl	21515as			
1330-1400	Serbia, Radio Yugoslavia	11835au			
1330-1400	Sweden, Radio	9705as	13740au		
1330-1400	Turkey, Voice of	9630as	15290as		
1330-1355	UAE, Radio Dubai	13630eu	13675eu	15395eu	17825eu
		21605eu			
1330-1400	Uzbekistan, R Tashkent	7190as	7285as	9715as	15295as
1330-1400	Vietnam, Voice of	5940eu	7270eu	7400eu	9840as
		12020eu	15010as		
1335-1345	Greece, Voice of	11645eu	12105eu	15175na	15630na
1345-1400	Vatican State, Vatican R	11625au	13765au		
1350-1400	South Korea, KBS-1	3930do			

Selected Programs

Sundays

1300 Ecuador, HCJB Quito (am): Simply Worship. A Northern Ireland program of music, readings and meditation.
1300 UK, BBC London (am/eu): Newshour. A comprehensive look at the major topics of the day, plus up-to-the-minute international and British news.
1330 Ecuador, HCJB Quito (am): Mountain Meditations. A mixture of music and devotional thoughts in an Andean setting.
1330 Sweden, Radio: In Touch with Stockholm (1). See S 1230.
1330 Sweden, Radio: Sounds Nordic (2/4). See S 1230.
1330 Sweden, Radio: Weekend (3). See S 1230.
1330 Turkey, Voice of: News. See S 0400.
1337 Turkey, Voice of: Review of the Turkish Press. See S 0408.

Mondays

1300 Ecuador, HCJB Quito (am): Precepts. Kay arthur offers a fresh approach to daily Bible study.
1300 UK, BBC London (am/eu): Newshour. See S 1300.
1315 Ecuador, HCJB Quito (am): Proclaim!. Daily encouragement for godly living with Dr. Joseph Stowell, President of the Moody Bible Institute.
1330 Ecuador, HCJB Quito (am): Focus on the Family. Psychologist James Dobson on everyday family matters. (www.cs.albany.edu/~ault/fof/fof.html (unofficial))
1330 Sweden, Radio: Sixty Degrees North. See M 1230.
1330 Turkey, Voice of: News. See S 0400.
1337 Turkey, Voice of: Review of the Turkish Press. See S 0408.
1348 Sweden, Radio: SportScan. See M 1242.
1356 Ecuador, HCJB Quito (am): Beyond the Call. Real questions and real answers on Christian living with Dr. Ron Cline, HCJB World Radio President.

Tuesdays

1300 Ecuador, HCJB Quito (am): Precepts. See M 1300.
1300 UK, BBC London (am/eu): Newshour. See S 1300.
1315 Ecuador, HCJB Quito (am): Proclaim!. See M 1315.
1330 Ecuador, HCJB Quito (am): Focus on the Family. See M 1330.
1330 Sweden, Radio: Sixty Degrees North. See M 1230.
1330 Turkey, Voice of: News. See S 0400.
1337 Turkey, Voice of: Review of the Turkish Press. See S 0408.
1346 Sweden, Radio: MediaScan (1/3). See T 1246.
1356 Ecuador, HCJB Quito (am): Beyond the Call. See M 1356.

Wednesdays

1300 Ecuador, HCJB Quito (am): Precepts. See M 1300.
1300 UK, BBC London (am/eu): Newshour. See S 1300.
1315 Ecuador, HCJB Quito (am): Proclaim!. See M 1315.
1330 Ecuador, HCJB Quito (am): Focus on the Family. See M 1330.
1330 Sweden, Radio: Sixty Degrees North. See M 1230.
1330 Turkey, Voice of: News. See S 0400.
1337 Turkey, Voice of: Review of the Turkish Press. See S 0408.
1346 Sweden, Radio: Money Matters. See W 1246.
1354 Radio Netherlands: Documentary. 50th Anniversary Celebrations: From the Wireless to the World Wide Web (3rd). See W 1254.
1354 Radio Netherlands: Documentary. The High "C's" (24th). See F 2354.
1354 Radio Netherlands: Documentary. The Netherlands is Full (17th). See F 1454.
1354 Radio Netherlands: Documentary. The Social Cost of Transformation (10th). See A 2354.
1356 Ecuador, HCJB Quito (am): Beyond the Call. See M 1356.

Thursdays

1300 Ecuador, HCJB Quito (am): Precepts. See M 1300.
1300 UK, BBC London (am/eu): Newshour. See S 1300.
1315 Ecuador, HCJB Quito (am): Proclaim!. See M 1315.
1330 Ecuador, HCJB Quito (am): Focus on the Family. See M 1330.
1330 Sweden, Radio: Sixty Degrees North. See M 1230.
1330 Turkey, Voice of: News. See S 0400.
1337 Turkey, Voice of: Review of the Turkish Press. See S 0408.
1346 Sweden, Radio: Horizon (4/5). See H 1246.
1347 Sweden, Radio: HeartBeat (3). See H 1247.
1356 Ecuador, HCJB Quito (am): Beyond the Call. See M 1356.

Fridays

1300 Ecuador, HCJB Quito (am): Precepts. See M 1300.
1300 UK, BBC London (am/eu): Newshour. See S 1300.
1315 Ecuador, HCJB Quito (am): Proclaim!. See M 1315.
1330 Ecuador, HCJB Quito (am): Focus on the Family. See M 1330.
1330 Sweden, Radio: Sixty Degrees North. See M 1230.
1330 Turkey, Voice of: News. See S 0400.
1335 Sweden, Radio: Newsweek. See F 1235.
1337 Turkey, Voice of: Review of the Turkish Press. See S 0408.
1356 Ecuador, HCJB Quito (am): Beyond the Call. See M 1356.

Saturdays

1300 Ecuador, HCJB Quito (am): Children's Bible Hour. Songs and stories for children. (www.gospelcom.net/cbh/)
1300 UK, BBC London (am/eu): Newshour. See S 1300.
1330 Ecuador, HCJB Quito (am): Jungle Jam and Friends. A program for children.
1330 Sweden, Radio: Spectrum (1). See S 0130.
1330 Sweden, Radio: Sweden Today (3). See S 0130.
1330 Turkey, Voice of: News. See S 0400.
1337 Turkey, Voice of: Review of the Turkish Press. See S 0408.
1345 Turkey, Voice of: VOT DX Corner (biweekly). See S 0415.

Frequencies

1400-1500	Anguilla,Caribbean Beacon	11775am			
1400-1500	Australia, Radio	5870pa	5995pa	6080as	9415pa
		9435as	11660as		
1400-1500 vl	Australia, VL8A Alice Spg	2310do			
1400-1500 vl	Australia, VL8K Katherine	2485do			
1400-1500 vl	Australia, VI8T Tent Crk	2325do			
1400-1500 vl	Canada, CBC N Quebec Svc	9625do			
1400-1500	Canada, CFRX Toronto	6070do			
1400-1500	Canada, CFVP Calgary	6030do			
1400-1500	Canada, CHNX Halifax	6130do			
1400-1500	Canada, CKZN St John's	6160do			
1400-1500	Canada, CKZU Vancouver	6160do			
1400-1430 smtwhf	Canada, R Canada Intl	9640na	11855na		
1400-1500	China, China Radio Intl	7160as	7405na	9535as	11825as
1400-1430	Czech Rep, Radio Prague	13580na	21700af		
1400-1500	Ecuador, HCJB	12005am	15115am	21455am	
1400-1500 as	Eqt Guinea, R East Africa	15186af			
1400-1457	France, Radio France Intl	11910as	15405me	17560me	
1400-1500	India, All India Radio	9545as	11620as	13710as	
1400-1500 fas/vl	Italy, IRRS	7120va			
1400-1500	Japan, R Japan/NHK World	7200as			
1400-1500	Jordan, Radio	11690eu			
1400-1500	Malaysia, Radio	7295do			
1400-1500	Malaysia, RTM Kuching	7160do			
1400-1500 vl	Malaysia,RTM KotaKinabalu	5980do			
1400-1500	Netherlands, Radio	9895as	13700as	15585as	
1400-1500 occsnal	New Zealand, R NZ Intl	6105pa			
1400-1430 s	Norway, Radio Norway Intl	13800as			
1400-1500 vl	Papua New Guinea, NBC	4890do			
1400-1500	Philippines, FEBC/R Intl	11995as			
1400-1500	Russia,Voice of Russia WS	7130me	9470me	9840me	
1400-1455 as	S Africa, Channel Africa	9440af	17675af	17870af	
1400-1500	Singapore,R Corp of Sing	6155do			
1400-1500	Sri Lanka, Sri Lanka BC	9730as	15425as		
1400-1430	Switzerland, Swiss R Intl	6165eu	9535eu	9885as	12075as
		13635as			
1400-1430	Thailand, Radio	9655as	9830as	11905as	
1400-1430	Turkey, Voice of	9630as	15290as		
1400-1410 thfs	Turkmenistan, Turkmen R	5015eu			
1400-1500	United Kingdom, BBC WS	5990as	6190af	6195as	9410eu
		9515am	9740as	11750as	11865am
		11940af	12095eu	15485va	15565as
		15575va	17640va	17830af	17840am
		21470af	21660af		
1400-1500	United Kingdom, UCB	6200eu			
1400-1500	USA, KAIJ Dallas TX	13815am			
1400-1500	USA, KTBN Salt Lk City UT	7510am			
1400-1500	USA, KWHR Naalehu HI	7560pa			
1400-1500	USA, Monitor Radio Intl	9355as			
1400-1500	USA, Voice of America	6160as	7125as	7215as	9645as
		9760as	11705as	15205as	15395as
		15425as			
1400-1500	USA, WEWN Birmingham AL	5825na	9455na	11875na	15745eu
1400-1500	USA, WGTG McCaysville GA	9400am			
1400-1500	USA, WHRI Noblesville IN	6040am	9930am	15105am	
1400-1500	USA, WJCR Upton KY	7490na			
1400-1500	USA, WRMI/R Miami Intl	9955am			
1400-1500	USA, WRNO New Orleans LA	15420am			
1400-1500	USA, WWCR Nashville TN	9475am	12160am	13845am	15685am
1400-1500	USA, WYFR Okeechobee FL	5950na	11830na	17750ca	
1400-1405	Vatican State, Vatican R	11625au	13765au		
1400-1500	Zambia, Christian Voice	6065af			
1400-1500 vl	Zambia, R Zambia/ZNBC 1	4910do			
1415-1420	Nepal, Radio	3230do	5005do		
1420-1500 as	Palau, KHBN/Voice of Hope	9985as			
1430-1500	Canada, R Canada Intl	9555va	11915eu	11935va	15325va
1430-1500 smtwhf	Canada, R Canada Intl	9640na	11855na		
1430-1500 vl	China, China Radio Intl	6995as	8660as	9880as	11445as
1430-1500	Guam, AWR/KSDA	7400as			
1430-1440 mtwhf	Indonesia, RRI Uj Pandang	4753do			
1430-1500	Romania, R Romania Intl	15335as	17720as		
1430-1500	Sweden, Radio	11650au	11880as	15240au	
1430-1500 vl	Zambia, R Zambia/ZNBC 2	6165do			
1440-1500	Myanmar, Voice of	5990do			
1450-1500	Vatican State, Vatican R	11635au	13765au		
1455-1500	Georgia, Voice of Hope	12120as			

Selected Programs

Sundays

1400 Ecuador, HCJB Quito (am): The Urban Alternative. A program produced in Dallas for inner-city America.
1400 UK, BBC London (am/eu): News Summary. One minute news update.
1401 UK, BBC London (am/eu): Variable Music Feature. Different features of 15, 30, and 45 minutes length with a musical theme.
1430 Ecuador, HCJB Quito (am): Moody Presents. Christian messages from the Moody Bible Institute. (www.moody.edu)
1430 Sweden, Radio: In Touch with Stockholm (1). See S 1230.
1430 Sweden, Radio: Sounds Nordic (2/4). See S 1230.
1430 Sweden, Radio: Weekend (3). See S 1230.

Mondays

1400 Ecuador, HCJB Quito (am): Gateway to Joy. Elizabeth Elliot with contemporary women's issues from a Biblical perspective. (www.gospelcom.net/bttb/fob-gtj.html)
1400 UK, BBC London (am/eu): World News. See S 0300.
1405 UK, BBC London (am/eu): Outlook. An up-to-the-minute mix of conversation, controversy and color from around the world.
1415 Ecuador, HCJB Quito (am): Key Life. Steve Brown presents truthful teachings.
1430 Ecuador, HCJB Quito (am): Let My People Think. See S 1530.
1430 Sweden, Radio: Sixty Degrees North. See M 1230.
1430 UK, BBC London (am/eu): Variable Feature. See S 0130.
1446 Sweden, Radio: SportScan. See M 1242.

Tuesdays

1400 Ecuador, HCJB Quito (am): Gateway to Joy. See M 1400.
1400 UK, BBC London (am/eu): World News. See S 0300.
1405 UK, BBC London (am/eu): Outlook. See M 1405.
1415 Ecuador, HCJB Quito (am): Key Life. See M 1415.
1430 Ecuador, HCJB Quito (am): The Living Word. Brother Bob Russell of Southeast Christian Church of Louisville, Kentucky conducts the sermon.
1430 Sweden, Radio: Sixty Degrees North. See M 1230.
1430 UK, BBC London (am/eu): Multitrack Hit-List. See M 1930.
1446 Sweden, Radio: MediaScan (1/3). See T 1246.

Wednesdays

1400 Ecuador, HCJB Quito (am): Gateway to Joy. See M 1400.
1400 UK, BBC London (am/eu): World News. See S 0300.
1405 UK, BBC London (am/eu): Outlook. See M 1405.
1415 Ecuador, HCJB Quito (am): Key Life. See M 1415.
1430 Ecuador, HCJB Quito (am): Back to God Hour. The Christian Reformed Church looks at life in light of the historic Christian faith.
1430 Sweden, Radio: Sixty Degrees North. See M 1230.
1430 UK, BBC London (am/eu): Megamix. See T 1930.
1446 Sweden, Radio: Money Matters. See W 1246.

Thursdays

1400 Ecuador, HCJB Quito (am): Gateway to Joy. See M 1400.
1400 UK, BBC London (am/eu): World News. See S 0300.
1405 UK, BBC London (am/eu): Outlook. See M 1405.
1415 Ecuador, HCJB Quito (am): Key Life. See M 1415.
1430 Ecuador, HCJB Quito (am): Christians Broadcasting Hope. No information available.
1430 Sweden, Radio: Sixty Degrees North. See M 1230.
1430 UK, BBC London (am/eu): Multitrack X-Press. See W 1930.
1446 Sweden, Radio: Horizon (4/5). See H 1246.
1447 Sweden, Radio: HeartBeat (3). See H 1247.

Fridays

1400 Ecuador, HCJB Quito (am): Gateway to Joy. See M 1400.
1400 UK, BBC London (am/eu): World News. See S 0300.
1405 UK, BBC London (am/eu): Outlook. See M 1405.
1415 Ecuador, HCJB Quito (am): Key Life. See M 1415.
1430 Ecuador, HCJB Quito (am): Haven. Evangelizing and The Haven Quartet.
1430 Sweden, Radio: Sixty Degrees North. See M 1230.
1430 UK, BBC London (am/eu): Multitrack Alternative. Latest developments on the British music scene.
1435 Sweden, Radio: Newsweek. See F 1235.
1454 Radio Netherlands: Documentary. 50th Anniversary Celebrations: From the Wireless to the World Wide Web (5th). See W 1254.
1454 Radio Netherlands: Documentary. The High "C's" (26th). See F 2354.
1454 Radio Netherlands: Documentary. The Netherlands is Full (19th). Theo Tamis looks at how the Dutch are managing their limited living space.
1454 Radio Netherlands: Documentary. The Social Cost of Transformation (12th). See A 2354.

Saturdays

1400 Ecuador, HCJB Quito (am): Rock Solid!. See H 0200.
1400 UK, BBC London (am/eu): World News. See S 0300.
1405 UK, BBC London (am/eu): Sportsworld. The weekly sports magazine.
1430 Sweden, Radio: Spectrum (1). See S 0130.
1430 Sweden, Radio: Sweden Today (3). See S 0130.

SRI LANKA: SLBC

External English:

0025-0430		9730 15425
1030-1130		11835
		17850
	(inactive)	15120
1230-1600		9730 15425
1600-1700	daily	15425
	Sat/Sun	9730
1900-2000	Sat	5975

via BBC Skelton, England (Victor Goonetilleke, UADX via Marie Lamb, *Cumbre DX*)

Frequencies

1500-1600	Anguilla,Caribbean Beacon	11775am			
1500-1600	Australia, Radio	5870pa	5995pa	6080as	9415as
		9435pa	11660as		
1500-1600 vl	Australia, VL8A Alice Spg	2310do			
1500-1600 vl	Australia, VL8K Katherine	2485do			
1500-1600 vl	Australia, VL8T Tent Crk	2325do			
1500-1600 vl	Canada, CBC N Quebec Svc	9625do			
1500-1600	Canada, CFRX Toronto	6070do			
1500-1600	Canada, CFVP Calgary	6030do			
1500-1600	Canada, CHNX Halifax	6130do			
1500-1600	Canada, CKZN St John's	6160do			
1500-1600	Canada, CKZU Vancouver	6160do			
1500-1600 s	Canada, R Canada Intl	9640na	11855na		
1500-1600	China, China Radio Intl	7160as	9785as		
1500-1600	Costa Rica,RF Peace Intl	7385am	15050am		
1500-1600	Ecuador, HCJB	12005am	15115am	21455am	
1500-1600 as	Eqt Guinea, R East Africa	15186af			
1500-1600	Georgia, Voice of Hope	12120as			
1500-1600	Guam, TWR/KTWR	11580as			
1500-1600 a	Ireland,W Coast R Ireland	6175eu			
1500-1530	Israel, Kol Israel	12080na			
1500-1600 fas/vl	Italy, IRRS	7120va			
1500-1600	Japan, R Japan/NHK World	7200as	7240as	9535na	9750as
		1173012	15355af		
1500-1600	Jordan, Radio	11690eu			
1500-1510	Liberia,LCN/R Liberia Int	5100do			
1500-1600	Malaysia, Radio	7295do			
1500-1600 vl	Malaysia, RTM Kuching	7160do			
1500-1600 vl	Malaysia,RTM KotaKinabalu	5980do			
1500-1530	Mexico, Radio Mexico Intl	9705na			
1500-1530	Mongolia, Voice of	9720as	12085as		
1500-1515 s	Myanmar, Voice of	5990do			
1500-1525	Netherlands, Radio	9895as	13700as	15585as	
1500-1600 occsnal	New Zealand, R NZ Intl	6105pa			
1500-1600	Nigeria, Voice of	7255af			
1500-1557	North Korea, R Pyongyang	3560eu	9640af	9975eu	11335eu
		11735eu	13650me		
1500-1530 as	Palau, KHBN/Voice of Hope	9985as			
1500-1600 vl	Papua New Guinea, NBC	4890do			
1500-1600	Philippines, FEBC/R Intl	11995as			
1500-1526	Romania, R Romania Intl	15335as	17720as		
1500-1600	Russia,Voice of Russia WS	4730eu	4940eu	4975eu	5925eu
		7115eu	7130eu	7235eu	9400eu
		9470eu	9635eu	9840eu	9905eu
1500-1530	S Africa, Channel Africa	9440af			
1500-1530	Seychelles, FEBA Radio	11600as			
1500-1600 mtwhfa	Seychelles, FEBA Radio	9810as			
1500-1600	Singapore,R Corp of Sing	6155do			
1500-1600	Sri Lanka, Sri Lanka BC	9730as	15425as		
1500-1600	United Kingdom, BBC WS	5975as	5990as	6190af	6195as
		9410eu	9515am	9740as	11750as
		11865am	11940af	12095as	15220am
		15400af	15485af	15565va	15575va
		17705af	17830af	17840am	21470af
		21660af			
1500-1530	United Kingdom, BBC WS	11860af	15420af	17880af	21490af
1500-1600	United Kingdom, UCB	6200eu			
1500-1600	USA, KAIJ Dallas TX	13815am			
1500-1600	USA, KJES Mesquite NM	11715na			
1500-1600	USA, KTBN Salt Lk City UT	7510am			
1500-1600	USA, KWHR Naalehu HI	7560as			
1500-1600	USA, Voice of America	6110as	6160as	7125as	7215as
		9575as	9645as	9760as	15205as
		15395as			
1500-1600	USA, WEWN Birmingham AL	5825na	9455na	11875na	15745eu
1500-1600	USA, WGTG McCaysville GA	9400am			
1500-1600	USA, WHRI Noblesville IN	9930am	13760am	15105am	
1500-1600	USA, WJCR Upton KY	7490na			
1500-1600	USA, WRMI/R Miami Intl	9955am			
1500-1600	USA, WRNO New Orleans LA	15420am			
1500-1600	USA, WWCR Nashville TN	9475am	12160am	13845am	15685am
1500-1600	USA, WYFR Okeechobee FL	11830na	17750ca		
1500-1530	Vatican State, Vatican R	11635au	13765au		
1500-1600	Zambia, Christian Voice	6065af			
1500-1600 vl	Zambia, R Zambia/ZNBC 1	4910do			
1500-1600 vl	Zambia, R Zambia/ZNBC 2	6165do			
1515-1530 vl	Cyprus, BRT International	6150do			
1530-1600	Iran, VOIRI	7215as	11790as	13605as	
1530-1545 sm	Seychelles, FEBA Radio	11600as			
1545-1600 sh	Bangladesh, Bangla Betar	4880do			

Selected Programs

Sundays

1500 Ecuador, HCJB Quito (am): Encounter. Expository biblical preaching by Stephen Olford.
1500 UK, BBC London (am/eu): World News. See S 0300.
1505 UK, BBC London (am/eu): Sports Roundup. See S 0145.
1515 UK, BBC London (am/eu): Concert Hall. Classical music concerts.
1530 Ecuador, HCJB Quito (am): Let My People Think. Addressing questions of today's thinking Christians.

Mondays

1500 Ecuador, HCJB Quito (am): Back to the Bible. A mix of music and daily Bible study. (www.gospelcom.net/bttb/)
1500 UK, BBC London (am/eu): World News. See S 0300.
1505 UK, BBC London (am/eu): Sports Roundup. See S 0145.
1515 UK, BBC London (am/eu): BBC English. See M 0930.
1525 Ecuador, HCJB Quito (am): Joni and Friends. See M 0000.
1530 Ecuador, HCJB Quito (am): Thru the Bible. J. Vernon McGee presents a book-by-book study of the Bible.
1530 UK, BBC London (am/eu): The Ed Stewart Show. Ed plays the music of internationally known vocalists.

Tuesdays

1500 Ecuador, HCJB Quito (am): Back to the Bible. See M 1500.
1500 UK, BBC London (am/eu): World News. See S 0300.
1505 UK, BBC London (am/eu): Sports Roundup. See S 0145.
1515 UK, BBC London (am/eu): Westway. See T 0030.
1525 Ecuador, HCJB Quito (am): Joni and Friends. See M 0000.
1530 Ecuador, HCJB Quito (am): Thru the Bible. See M 1530.
1530 UK, BBC London (am/eu): The Greenfield Collection. See S 0830.

Wednesdays

1500 Ecuador, HCJB Quito (am): Back to the Bible. See M 1500.
1500 UK, BBC London (am/eu): World News. See S 0300.
1505 UK, BBC London (am/eu): Sports Roundup. See S 0145.
1515 UK, BBC London (am/eu): Classical Music Feature. A variable program featuring the world of classical music.
1525 Ecuador, HCJB Quito (am): Joni and Friends, See M 0000.
1530 Ecuador, HCJB Quito (am): Thru the Bible. See M 1530.
1530 UK, BBC London (am/eu): Everywoman. See T 0830.
1554 Radio Netherlands: Documentary. 50th Anniversary Celebrations: From the Wireless to the World Wide Web (3rd). See W 1254.
1554 Radio Netherlands: Documentary. The High "C's" (24th). See F 2354.
1554 Radio Netherlands: Documentary. The Netherlands is Full (17th). See F 1454.
1554 Radio Netherlands: Documentary. The Social Cost of Transformation (10th). See A 2354.

Thursdays

1500 Ecuador, HCJB Quito (am): Back to the Bible. See M 1500.
1500 UK, BBC London (am/eu): World News. See S 0300.
1505 UK, BBC London (am/eu): Sports Roundup. See S 0145.
1515 UK, BBC London (am/eu): Westway. See T 0030.
1525 Ecuador, HCJB Quito (am): Joni and Friends. See M 0000.
1530 Ecuador, HCJB Quito (am): Thru the Bible. See M 1530.
1530 UK, BBC London (am/eu): The Vintage Chart Show. See M 0730.

Fridays

1500 Ecuador, HCJB Quito (am): Back to the Bible. See M 1500.
1500 UK, BBC London (am/eu): World News. See S 0300.
1505 UK, BBC London (am/eu): Football Extra. A review of the week's action and the upcoming weekend matches.
1515 UK, BBC London (am/eu): Variable Feature. See S 0130.
1525 Ecuador, HCJB Quito (am): Joni and Friends. See M 0000.
1530 Ecuador, HCJB Quito (am): Thru the Bible. See M 1530.
1530 UK, BBC London (am/eu): Science in Action. The latest in science and technology.

Saturdays

1500 Ecuador, HCJB Quito (am): Words of Hope. David Bass provides the message.
1500 UK, BBC London (am/eu): World News. See S 0300.
1505 UK, BBC London (am/eu): Sportsworld. See A 1405.
1530 Ecuador, HCJB Quito (am): Songtime Weekend. Evangelical teachings and music from Boston.

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.

1600 UTC SHORTWAVE GUIDE 11:00 AM EST 8:00 AM PST

Frequencies

1600-1700	Algeria, R Algiers Intl	15160me			
1600-1700	Anguilla,Caribbean Beacon	11775am			
1600-1700	Australia, Radio	5870pa	5995pa	6080as	9415as
		9435as	11660as		
1600-1700 vl	Australia, VL8A Alice Spg	2310do			
1600-1700 vl	Australia, VL8K Katherine	2485do			
1600-1700 vl	Australia, VL8T Tent Crk	2325do			
1600-1610	Bangladesh, Bangla Betar	4880do	15520do		
1600-1700 vl	Canada, CBC N Quebec Svc	9625do			
1600-1700	Canada, CFRX Toronto	6070do			
1600-1700	Canada, CFVP Calgary	6030do			
1600-1700	Canada, CHNX Halifax	6130do			
1600-1700	Canada, CKZN St John's	6160do			
1600-1700	Canada, CKZU Vancouver	6160do			
1600-1630 s	Canada, R Canada Intl	9640na	11855na		
1600-1659	Canada, R Canada Intl	6140as	7150as		
1600-1700	China, China Radio Intl	9565as	9620as		
1600-1700 as	Costa Rica, Adv World R	9725am	11870am	13750am	
1600-1700	Costa Rica, RF Peace Intl	7385am	15050am		
1600-1700	Ethiopia, Radio	7165af	9560af		
1600-1654	France, Radio France Intl	11615me	11700af	12015af	15210af
		15460af	15530af		
1600-1700	Georgia, Voice of Hope	12120as			
1600-1650	Germany, Deutsche Welle	6170as	7120af	7225as	7305as
	9585as 9735af	11810af	13790as	15145af	
1600-1700	Germany,Overcomer Ministr	6175eu	11985eu		
1600-1700	Guam, AWR/KSDA	7455as			
1600-1630	Guam, TWR/KTWR	11580as			
1600-1630	Iran, VOIRI	7215as	11790as	13605as	
1600-1700 fas/vl	Italy, IRRS	3985va			
1600-1700	Jordan, Radio	11690eu			
1600-1610	Lesotho, Radio Lesotho	4800do			
1600-1700	Malaysia, Radio	7295do			
1600-1630	Mexico, Radio Mexico Intl	9705na			
1600-1650 occsnal	New Zealand, R NZ Intl	6105pa			
1600-1700	Nigeria, Voice of	7255af			
1600-1630 s	Norway, Radio Norway Intl	13800va	13805na		
1600-1630	Pakistan, Radio	3664va	4790va	5027va	6070va
		9515me	9600va	11655me	
1600-1700 vl	Papua New Guinea, NBC	4890do			
1600-1700	Russia,Voice of Russia WS	4730af	4940af	4975af	7115af
	7175af 9470af	9505af	9585af	9635af	9895af
	9905af 11895af	12065af	13670af		
1600-1625	S Africa, Channel Africa	5955af			
1600-1700	Singapore,R Corp of Sing	6155do			
1600-1700	South Korea, R Korea Intl	5975eu	9515af	9870af	
1600-1700 as	Sri Lanka, Sri Lanka BC	9730as	15425as		
1600-1700	Swaziland, Trans World R	9500af			
1600-1630	Switzerland, Swiss R Intl	9885as	12075as	13635as	
1600-1638	UAE, Radio Dubai	13630au	13675eu	15395eu	21605eu
1600-1700	United Kingdom, BBC WS	3255af	3915as	5975as	6190af
	7160as 7275as	9410eu	11750as	12095eu	15400af
	15485eu 15565me	15575va	17830af	17840am	21470af
	21660af				
1600-1615	United Kingdom, BBC WS	5990as	6195as	9515am	9740as
1600-1700	United Kingdom, UCB	6200eu			
1600-1700	USA, KAIJ Dallas TX	13815am			
1600-1700	USA, KTBN Salt Lk City UT	15590am			
1600-1700	USA, KWHR Naalehu HI	7560pa			
1600-1700	USA, Monitor Radio Intl	18930af			
1600-1700	USA, Voice of America	6035af	6110as	7125as	7215as
	9575as 9645as	9645as	9760as	11920af	12040af
	13600af 13710af	15205as	15225af	15395as	15410af
	15445af 17895af				
1600-1700	USA, WEWN Birmingham AL	5825na	11875na	13615na	15745eu
1600-1700	USA, WGTG McCaysville GA	9400am			
1600-1700	USA, WHRI Noblesville IN	9930am	13760am	15105am	
1600-1700	USA, WJCR Upton KY	7490na			
1600-1700	USA, WRMI/R Miami Intl	9955am			
1600-1700	USA, WRNO New Orleans LA	15420am			
1600-1700	USA, WWCR Nashville TN	9475am	12160am	13845am	15685am
1600-1700	USA, WYFR Okeechobee FL	11550as	11705na	11830na	15695eu
		17750eu	21525af	21745eu	
1600-1630	Vatican State, Vatican R	5885eu	7250eu	9645eu	11810va
1600-1630	Vietnam, Voice of	9840af	15010af		
1600-1700	Zambia, Christian Voice	3330af	4965af		
1600-1700 vl	Zambia, R Zambia/ZNBC 1	4910do			
1600-1700 vl	Zambia, R Zambia/ZNBC 2	6165do			
1610-1615	Bangladesh, Bangla Betar	4880do			
1615-1630 mtwhf	Estonia, Radio	5925eu			
1615-1700 as	United Kingdom, BBC WS	9515am	11860af	15420af	
1630-1659 s	Canada, R Canada Intl	9640na	11855na		
1630-1700	Egypt, Radio Cairo	15255af			
1630-1700	Slovakia, R Slovakia Intl	5915eu	6055eu	7345eu	
1645-1700 irreg	Afghanistan, Radio	7200as			
1645-1700	Israel, Kol Israel	7465eu	9395eu	9435eu	15640eu
1645-1700	Tajikistan,Radio Dushanbe	7245as	9905as		
1650-1700	Eqt Guinea, Radio Africa	15186af			
1650-1700 mtwhf	New Zealand, R NZ Intl	9810pa			

Selected Programs

Sundays

1600 UK, BBC (am/eu): World News. See S 0300.
1600 USA, VOA (af): Nightline Africa. News, correspondent reports, backgrounders, and features on world and African issues.
1600 USA, VOA (as/eu): VOA News. See S 0600.
1610 USA, VOA (as/eu): Encounter. Two experts debate their contrasting views on a subject of current importance.
1615 UK, BBC (am/eu): Variable Feature. See S 0130.
1630 USA, VOA (af): News Summary. A five-minute wrap-up.
1630 USA, VOA (as/eu): Studio 38. A bright, fast-paced show highlighting American lifestyles and culture.
1645 UK, BBC (am/eu): Britain Today. See S 0045.
1657 USA, VOA (af): VOA Editorial. Comments expressing the official position of the U.S. Government on various subjects.

Mondays

1600 UK, BBC (am/eu): World News. See S 0300.
1600 USA, VOA (af): News (Special English). Ten minutes of news.
1600 USA, VOA (as/eu): VOA News. See S 0600.
1610 USA, VOA (af): Development Report (Special English). Helpful information for developing nations.
1610 USA, VOA (as/eu): Mideast Edition. News events, issues, people, and culture for listeners in the Middle East and south Asia, featuring on-the-scene reports and interviews.
1615 UK, BBC (am/eu): Seven Days. See M 1230.
1615 USA, VOA (af): This is America (Special English). Informative reports on life in the United States.
1630 UK, BBC (am/eu): The World Today. Examines thoroughly a topical aspect of the international scene.
1630 USA, VOA (af): Africa World Tonight. News, sports, correspondent reports, backgrounders, and features on world and African issues.
1630 USA, VOA (as): Now Music USA. Rock and soul hits.
1630 USA, VOA (eu): American Gold. Fifty minutes of classic pop music hosted by Ray Freeman.
1645 UK, BBC (am/eu): Britain Today. See S 0045.

Tuesdays

1600 UK, BBC (am/eu): World News. See S 0300.
1600 USA, VOA (af): News (Special English). See M 1600.
1600 USA, VOA (as/eu): VOA News. See S 0600.
1610 USA, VOA (af): Agriculture Report (Special English). Developments and reports on farming and agriculture.
1610 USA, VOA (as/eu): Mideast Edition. See M 1610.
1615 UK, BBC (am/eu): Science Feedback (5). Listeners' questions, comments and queries about World Service science programs.
1615 UK, BBC (am/eu): Seeing Stars (1). A discussion of astronomical observations and upcoming special events.
1615 UK, BBC (am/eu): Soundbyte (2). Presenter Violet Berlin plays with virtual games and more on the information superhighway.
1615 UK, BBC (am/eu): Waveguide (4). The latest information on international broadcasting with reviews of receivers and news about reception.
1615 UK, BBC (am/eu): Wildtrack (3). The natural world, with emphasis on what people can see, hear, photograph or collect.
1615 USA, VOA (af): Science in the News (Special English). Recent scientific developments.
1630 UK, BBC (am/eu): The World Today. See M 1630.
1630 USA, VOA (af): Africa World Tonight. See M 1630.
1630 USA, VOA (as/eu): Now Music USA. See M 1630.
1645 UK, BBC (am/eu): Britain Today. See S 0045.

Wednesdays

1600 UK, BBC (am/eu): World News. See S 0300.
1600 USA, VOA (af): News (Special English). See M 1600.
1600 USA, VOA (as/eu): VOA News. See S 0600.
1610 USA, VOA (af): Science Report (Special English). Developments in the world of science and technology.
1610 USA, VOA (as/eu): Mideast Edition. See M 1610.
1615 UK, BBC (am/eu): From Our Own Correspondent. See S 0330.
1615 USA, VOA (af): Exploration (Special English). NEW! Steve Ember and Shirley Griffith report on space news.
1630 UK, BBC (am/eu): The World Today. See M 1630.
1630 USA, VOA (af): Africa World Tonight. See M 1630.
1630 USA, VOA (as/eu): Now Music USA. See M 1630.
1645 UK, BBC (am/eu): Britain Today. See S 0045.

Thursdays

1600 UK, BBC (am/eu): World News. See S 0300.
1600 USA, VOA (af): News (Special English). See M 1600.
1600 USA, VOA (as/eu): VOA News. See S 0600.
1610 USA, VOA (af): Science Report (Special English). See W 1610.
1610 USA, VOA (as/eu): Mideast Edition. See M 1610.
1615 UK, BBC (am/eu): Record News. See H 1230.
1615 USA, VOA (af): The Making of a Nation (Special English). Chapters from U.S. history in special English.
1630 UK, BBC (am/eu): The World Today. See M 1630.
1630 USA, VOA (af): Africa World Tonight. See M 1630.
1630 USA, VOA (eu): Now Music USA (Top 20 Countdown). News and the top hits of the week in the USA.
1645 UK, BBC (am/eu): Britain Today. See S 0045.

Fridays

1600 UK, BBC (am/eu): World News. See S 0300.
1600 USA, VOA (af): News (Special English). See M 1600.
1600 USA, VOA (as/eu): VOA News. See S 0600.
1610 USA, VOA (af): Environment Report (Special English). A five-minute report on a specific environmental subject.
1610 USA, VOA (as/eu): Mideast Edition. See M 1610.
1615 UK, BBC (am/eu): Variable Feature. See S 0130.
1615 USA, VOA (af): American Mosaic (Special English). Reports about music, books, movies, and student life in the USA.
1630 UK, BBC (am/eu): The World Today. See M 1630.
1630 USA, VOA (af): Africa World Tonight. See M 1630.
1630 USA, VOA (as): Country Music USA. Country, bluegrass, and western swing, plus conversations with country performers.
1630 USA, VOA (eu): Now Music USA (Top 20 Countdown). See H 1630.
1645 UK, BBC (am/eu): Britain Today. See S 0045.

Saturdays

1600 UK, BBC (am/eu): World News. See S 0300.
1600 USA, VOA (af): Nightline Africa. See S 1600.
1600 USA, VOA (as/eu): VOA News. See S 0600.
1610 USA, VOA (as/eu): On the Line. A discussion of U.S. policies and contemporary issues.
1615 UK, BBC (am/eu): Sportsworld. See A 1405.
1630 USA, VOA (af): News Summary. See S 1630.
1630 USA, VOA (as/eu): Press Conference USA. Newsmakers are questioned by Washington journalists in the VOA studios.
1655 USA, VOA (af): VOA Editorial. See S 1657.

FREQUENCIES

1700-1800	Anguilla,Caribbean Beacon	11775am			
1700-1800	Australia, Radio	5870pa	5995pa	6080pa	9415va
		11880pa			
1700-1800 vl	Australia, VL8A Alice Spg	2310do			
1700-1800 vl	Australia, VL8K Katherine	2485do			
1700-1800 vl	Australia, VL8T Tent Crk	2325do			
1700-1800 vl	Canada, CBC N Quebec Svc	9625do			
1700-1800	Canada, CFRX Toronto	6070do			
1700-1800	Canada, CFVP Calgary	6030do			
1700-1800	Canada, CHNX Halifax	6130do			
1700-1800	Canada, CKZN St John's	6160do			
1700-1800	Canada, CKZU Vancouver	6160do			
1700-1800	China, China Radio Intl	5220af	7150af	7160af	7200af
		7405af	9570af	11910af	
1700-1800	Costa Rica,RF Peace Intl	15050am			
1700-1727	Czech Rep, Radio Prague	5930eu	9430af		
1700-1800	Egypt, Radio Cairo	15255af			
1700-1800	Eqt Guinea, Radio Africa	15186af			
1700-1730	France, Radio France Intl	15210af	15460me		
1700-1800	Germany,Overcomer Ministr	6175eu	11985eu		
1700-1800 vl	Italy, IRRS	3985va			
1700-1800	Japan, R Japan/NHK World	6035as	6190va	7110eu	7200as
		7225as	9535na	11730as	11880af
1700-1730	Jordan, Radio	11690eu			
1700-1800 mtwhf	New Zealand, R NZ Intl	9810pa			
1700-1730 s	Norway, Radio Norway Intl	7560va			
1700-1800 vl	Papua New Guinea, NBC	4890do			
1700-1800	Russia,Voice of Russia WS	4920af	5940af	5965af	7115af
	7125af 7175af	7180af	7185af	7255af	7305af
	7325af 7355af	7440af	9450af	9505af	9560af
	9585af 9745af	9890af	9895af	12065af	13670af
	15470af				
1700-1730	S Africa, Channel Africa	15240af			
1700-1730	Slovakia, AWR Europe	7325as	9450af		
1700-1800	Swaziland, Trans World R	9500af			
1700-1800	United Kingdom, BBC WS	3255af	5975as	6090va	6190af
		6195eu	7160as	9410eu	9510as
		11750as	12095eu	15400af	15420af
		15485eu	15575va	17830af	17840af
1700-1745	United Kingdom, BBC WS	3915as	9630af	11860af	
1700-1800	United Kingdom, UCB	6200eu			
1700-1800	USA, KAIJ Dallas TX	13815am			
1700-1800	USA, KTBN Salt Lk City UT	15590am			
1700-1800	USA, KWHR Naalehu HI	7560pa			
1700-1800	USA, Monitor Radio Intl	18930af			
1700-1800	USA, Voice of America	6040af	6110as	7125as	7215as
	9645as 9760as	11920af	12040af	15205as	15395as
	15410af 15445af	17895af			
1700-1800 mtwhf	USA, Voice of America	5990as	6045as	9525as	9670as
		9795as	12050as	15255as	
1700-1800	USA, WEWN Birmingham AL	5825na	11875na	13615na	15745eu
1700-1800	USA, WGTG McCaysville GA	9400am			
1700-1800	USA, WHRI Noblesville IN	9930am	13760am	15105am	
1700-1800	USA, WJCR Upton KY	7490na			
1700-1800	USA, WRMI/R Miami Intl	9955am			
1700-1800	USA, WRNO New Orleans LA	15420am			
1700-1800	USA, WWCR Nashville TN	9475am	12160am	13845am	15685am
1700-1800	USA, WYFR Okeechobee FL	11550as	15695eu	21745eu	
1700-1800	Zambia, Christian Voice	3330af	4965af		
1700-1800 vl	Zambia, R Zambia/ZNBC 1	4910do			
1700-1800 vl	Zambia, R Zambia/ZNBC 2	6165do			
1700-1800 vl	Zimbabwe, Zimbabwe BC	4828do			
1730-1755	Austria, R Austria Intl	6155eu	9655me	13710as	13730af
1730-1755	Belgium, R Vlaanderen Int	5910eu	9925eu	11680me	
1730-1800	Georgia, Radio	6180eu			
1730-1800	Guam, AWR/KSDA	9370as			
1730-1800	Netherlands, Radio	6020af	9605af	11655af	
1730-1800	Philippines, R Pilipinas	11720me	11890me	15190me	
1730-1756	Romania, R Romania Intl	9550af	11940af	15340af	
1730-1745 mtwh	Swaziland, Trans World R	3200af			
1730-1759	Vatican State, Vatican R	11625af	15570af	17550af	
1745-1800	Armenia, Voice of	4810eu	4990me		
1745-1800	Bangladesh, Bangla Betar	7190as	9570eu	15520do	
1745-1800	India, All India Radio	7410eu	9650af	9950eu	11620eu
		11935af	13780af	15075af	
1745-1800	Swaziland, Trans World R	3200af			
1755-1800	Georgia, Voice of Hope	9310eu			

1800 UTC

1800-1900	Anguilla,Caribbean Beacon	11775am			
1800-1900 mtwhf	Argentina, RAE	15345eu			
1800-1900	Australia, Radio	5995pa	6080as	7240pa	9415pa
		9435as	11880pa		
1800-1900 vl	Australia, VL8A Alice Spg	2310do			
1800-1900 vl	Australia, VL8K Katherine	2485do			
1800-1900 vl	Australia, VL8T Tent Crk	2325do			
1800-1900	Bangladesh, Bangla Betar	7190eu	9570as	15520do	
1800-1900	Brazil, Radio Bras	15265eu			
1800-1900	Canada, CFRX Toronto	6070do			
1800-1900	Canada, CFVP Calgary	6030do			
1800-1900	Canada, CHNX Halifax	6130do			
1800-1900	Canada, CKZN St John's	6160do			
1800-1900	Canada, CKZU Vancouver	6160do			
1800-1900	Costa Rica,RF Peace Intl	15050am			
1800-1827	Czech Rep, Radio Prague	5930eu	9430as		
1800-1830	Egypt, Radio Cairo	15255af			
1800-1900	Eqt Guinea, Radio Africa	15186af			
1800-1900	Georgia, Voice of Hope	9310eu			
1800-1815	India, All India Radio	7410eu	9650af	9950eu	11620eu
		11935af	13770af	15075af	
1800-1900 vl	Italy, IRRS	3985va			
1800-1900 vl	Kenya, Kenya Broadc Corp	4885do	4935do	6150do	
1800-1900	Kuwait, Radio	11990na			
1800-1900 s	Morocco, RTVM Marocaine	17815af			
1800-1830	Netherlands, Radio	6020af	9605af	11655af	
1800-1852 mtwhf	New Zealand, R NZ Intl	9810pa			
1800-1857	North Korea, R Pyongyang	4405eu	6575eu	9345eu	11700am
		13760am			
1800-1900 vl	Papua New Guinea, NBC	4890do			
1800-1900 vl	Philippines, R Pilipinas	11720me	11890me	15190me	
1800-1855	Poland, Polish R Warsaw	6000eu	6095eu	7285eu	
1800-1900	Russia,Voice of Russia WS	4920af	5940af	5965af	7175af
		7180af	7305af	7440af	9450af
		9505af	9890af	9895af	12065af
		13670af			
1800-1830	S Africa, Channel Africa	15240af			
1800-1900	Sudan, Radio Omdurman	9200af			
1800-1900	Swaziland, Trans World R	3200af			
1800-1830	Swaziland, Trans World R	9500af			
1800-1900	United Kingdom, BBC WS	3255af	6180eu	6190af	6195eu
		9410va	12095eu	15400af	15420af
		15485va	15575va	17830af	
1800-1830	United Kingdom, BBC WS	5975as	6090va	9510as	21490af
1800-1900	United Kingdom, UCB	6200eu			
1800-1900	USA, KAIJ Dallas TX	13815am			
1800-1900	USA, KJES Mesquite NM	15385au			
1800-1900	USA, KTBN Salt Lk City UT	15590am			
1800-1900	USA, KWHR Naalehu HI	7560pa	13625as		
1800-1900	USA, Monitor Radio Intl	9355va	9385af	13770eu	18930af
1800-1900	USA, Voice of America	6035af	6040af	9760eu	11920af
		11975af	13710af	15410af	15580af
1800-1900	USA, WEWN Birmingham AL	5825na	11875na	13615na	17695eu
1800-1900	USA, WGTG McCaysville GA	9400am			
1800-1900	USA, WHRI Noblesville IN	9495am	13760eu		
1800-1900	USA, WINB Red Lion PA	15715af			
1800-1900	USA, WJCR Upton KY	7490na			
1800-1900	USA, WRMI/R Miami Intl	9955am			
1800-1900	USA, WRNO New Orleans LA	15420am			
1800-1900	USA, WWCR Nashville TN	9475am	12160am	13845am	15685am
1800-1900	USA, WYFR Okeechobee FL	15695eu	17555eu		
1800-1827	Vietnam, Voice of	9840eu	15010eu		
1800-1900	Yemen, Radio Aden	9780do			
1800-1900	Zambia, Christian Voice	3330af	4965af		
1800-1900 vl	Zambia, R Zambia/ZNBC 1	4910do			
1800-1900 vl	Zambia, R Zambia/ZNBC 2	6165do			
1800-1900 vl	Zimbabwe, Zimbabwe BC	4828do			
1805-1830	Malawi, MBC	5993do			
1830-1855	Belgium, R Vlaanderen Int	9925af	13745af		
1830-1900 vl	Cyprus, BRT International	6150do			
1830-1900 mtwhf	Georgia, Radio	6080eu			
1830-1900	Netherlands, Radio	6020af	9605af	9895af	11655af
		15315af			
1830-1900 w	Saipan, FEBC/KFBS	9465as			
1830-1900	Slovakia, R Slovakia Intl	5915eu	6055eu	7345eu	
1830-1835	Somalia, Radio Mogadishu	6732do			
1830-1900 mtwfha	Sweden, Radio	6065eu			
1830-1900 s	Sweden, Radio	9645eu			
1830-1900	United Kingdom, BBC WS	6005af	9630af		
1830-1900 as	USA, Voice of America	7150af	9845af	15445af	
1833-1900	Cote D' Ivoire, RDTV	11920do			
1840-1850	Greece, Voice of	11645af	15150af		
1845-1900 irreg s	Mali, RDTV Malienne	4783do	4835do	5995do	
1853-1900 smtwhf	New Zealand, R NZ Intl	11735pa			

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

1900-2000	Anguilla,Caribbean Beacon	11775am			
1900-2000	Australia, Radio	5995pa	6080pa	7240pa	9415pa
		9435pa	11880pa		
1900-2000 vl	Australia, VL8A Alice Spg	2310do			
1900-2000 vl	Australia, VL8K Katherine	2485do			
1900-2000 vl	Australia, VL8T Tent Crk	2325do			
1900-1920	Brazil, Radio Bras	15265eu			
1900-2000	Canada, CFRX Toronto	6070do			
1900-2000	Canada, CFVP Calgary	6030do			
1900-2000	Canada, CHNX Halifax	6130do			
1900-2000	Canada, CKZN St John's	6160do			
1900-2000	Canada, CKZU Vancouver	6160do			
1900-2000	China, China Radio Intl	6955af	9440af	11515af	
1900-2000	Costa Rica,RF Peace Intl	15050am			
1900-1930	Cote D' Ivoire, RDTV	11920do			
1900-2000	Ecuador, HCJB	12015am	21455am		
1900-2000	Eqt Guinea, Radio Africa	15186af			
1900-1950	Germany, Deutsche Welle	9640af	9765af	11785af	11810af
		13690af	15135af	15425af	
1900-2000	Guatemala, Adv World R	5980am			
1900-1945	India, All India Radio	7410eu	9650af	9950eu	11620eu
		11935af	13780af	15075as	
1900-2000 h	Ireland,W Coast R Ireland	11665af			
1900-2000 vl	Italy, IRRS	3985va			
1900-2000 vl	Kenya, Kenya Broadc Corp	4885do	4935do	6150do	
1900-2000	Kuwait, Radio	11990eu			
1900-1915	Liberia,LCN/R Liberia Int	5100do			
1900-2000 smtwha	Malta, VO Mediterranean	9765eu	9810am	12060me	
1900-2000	Netherlands, Radio	6020af	9605af	9895af	11655af
		15315af			
1900-2000 smtwhf	New Zealand, R NZ Intl	11735pa			
1900-2000	Nigeria, Voice of	7255af			
1900-1957	North Korea, R Pyongyang	6520af	9600af	9975af	
1900-1930 s	Norway, Radio Norway Intl	7485eu	9590af	9960na	
1900-2000 vl	Papua New Guinea, NBC	4890do			
1900-1930 vl	Philippines, R Pilipinas	11720me	11890me	15190me	
1900-2000	Romania, R Romania Intl	7105af	7195eu	9550eu	9690eu
		11810eu	11940af		
1900-2000	Russia,Voice of Russia WS	4920eu	5940eu	5965eu	7180eu
		7255eu	7305eu	7325eu	7440eu
		7490eu	9440eu	9450eu	9505eu
		9585eu	9890eu	9895eu	12065eu
1900-2000 vl	Solomon Islands, SIBC	5020do			
1900-2000	South Korea, R Korea Intl	5975eu	7275as		
1900-2000 a	Sri Lanka, Sri Lanka BC	5975eu			
1900-2000	Swaziland, Trans World R	3200af			
1900-1930 s	Sweden, Radio	9645eu			
1900-2000	Thailand, Radio	7210eu	9655eu	11905eu	
1900-2000	United Kingdom, BBC WS	3255af	6005af	6180eu	6190af
		6195va	9410af	9630af	9740as
		11835af	12095eu	15400af	15485va
		15575va	17830af		
1900-2000	United Kingdom, UCB	6200eu			
1900-2000	USA, KAIJ Dallas TX	13815am			
1900-2000	USA, KTBN Salt Lk City UT	15590am			
1900-2000	USA, KWHR Naalehu HI	7560pa	13625as	17555pa	
1900-2000	USA, Monitor Radio Intl	9355va	9385af	13770eu	17510af
1900-2000	USA, Voice of America	6035af	9525pa	9760eu	11870pa
		11920af	11975af	13710af	15180pa
		15410af	15580af		
1900-1930 s	USA, Voice of America	4950af			
1900-2000	USA, WEWN Birmingham AL	5825na	11875na	13615na	17695eu
1900-2000	USA, WGTG McCaysville GA	9400am			
1900-2000	USA, WHRI Noblesville IN	9495am	13760eu		
1900-2000	USA, WINB Red Lion PA	15715af			
1900-2000	USA, WJCR Upton KY	7490na			
1900-2000 as	USA, WRMI/R Miami Intl	9955am			
1900-2000	USA, WRNO New Orleans LA	15420am			
1900-2000	USA, WWCR Nashville TN	9475am	12160am	13845am	15685am
1900-2000	USA, WYFR Okeechobee FL	17555af			
1900-1927	Vietnam, Voice of	9840eu	15010eu		
1900-2000	Zambia, Christian Voice	3330af	4965af		
1900-2000 vl	Zambia, R Zambia/ZNBC 1	4910do			
1900-2000 vl	Zambia, R Zambia/ZNBC 2	6165do			
1900-2000 vl	Zimbabwe, Zimbabwe BC	4828do			
1910-1955	Germany, VO Mediterranean	12060eu			
1925-2000 vl	Cyprus, BRT International	6150do			
1930-2000 t	Belarus, Radiosta Belarus	6010eu	7105eu	7205eu	7210eu
1930-2000	Georgia, Radio	11910eu			
1930-2000	Iran, VOIRI	7160eu	7260eu	9022eu	
1930-2000	Mongolia, Voice of	9720eu	12085eu		
1930-2000 a	Serbia, Radio Yugoslavia	6100eu	9720af		
1930-2000	Turkey, Voice of	5960eu	6175na		
1930-2000	USA, Voice of America	4950af			
1935-1955	Italy, RAI Intl	6015eu	7225eu		
1945-2000	Albania, R Tirana Intl	6025eu	7135eu		
1945-2000 t	Germany, Universal Life	5890eu			
1950-2000	Vatican State, Vatican R	4005eu	5885eu	7250eu	9645eu
1959-2000 a	New Zealand, R NZ Intl	11735pa			

2000 UTC

2000-2100	Algeria, R Algiers Intl	15160af			
2000-2100	Angola, Radio Nacional	3355do	9535do		
2000-2100	Anguilla,Caribbean Beacon	11775am			
2000-2100	Australia, Radio	5995pa	9415pa	9435pa	11880pa
2000-2100 vl	Australia, VL8A Alice Spg	2310do			
2000-2100 vl	Australia, VL8K Katherine	2485do			
2000-2100 vl	Australia, VL8T Tent Crk	2325do			
2000-2100	Bulgaria, Radio	7530eu	9700eu		
2000-2100	Canada, CFRX Toronto	6070do			
2000-2100	Canada, CFVP Calgary	6030do			
2000-2100	Canada, CHNX Halifax	6130do			
2000-2100	Canada, CKZN St John's	6160do			
2000-2100	Canada, CKZU Vancouver	6160do			
2000-2100	China, China Radio Intl	5220eu	6950eu	7180af	9440af
		9635af	9920eu	9935eu	
2000-2100	Costa Rica,RF Peace Intl	15050am			
2000-2100 vl	Cyprus, BRT International	6150do			
2000-2100	Ecuador, HCJB	12015eu	21455am		
2000-2100	Eqt Guinea, Radio Africa	15186af			
2000-2030 m	Estonia, Radio	5925eu			
2000-2100	Georgia, Voice of Hope	9310eu			
2000-2050	Germany, Deutsche Welle	7285eu			
2000-2015 t	Germany, Universal Life	5890eu			
2000-2030	Ghana, Ghana Broadc Corp	3366do	4915do		
2000-2010	Greece, Voice of	7450eu	9420eu		
2000-2100	Guatemala, Adv World R	5980am			
2000-2030	Hungary, Radio Budapest	3975eu	9840eu		
2000-2100	Indonesia, Voice of	7225as	9525as		
2000-2030	Iran, VOIRI	7160eu	7260eu	9022eu	
2000-2025	Israel, Kol Israel	7465na	9365na	15640va	
2000-2100 vl	Italy, IRRS	3985va			
2000-2100 vl	Kenya, Kenya Broadc Corp	4885do	4935do	6150do	
2000-2100	Kuwait, Radio	11990eu			
2000-2030 as	Latvia, Radio	5935eu			
2000-2030	Mexico, Radio Mexico Intl	9705na			
2000-2025	Netherlands, Radio	6020af	9605af	9895af	11655af
		15315af			
2000-2052 smtwhf	New Zealand, R NZ Intl	11735pa			
2000-2058 a	New Zealand, R NZ Intl	11735pa			
2000-2005	Nigeria, FRCN/Radio	3326do	4770do	4990do	
2000-2030 s	Norway, Radio Norway Intl	7570au			
2000-2100 vl	Papua New Guinea, NBC	4890do			
2000-2030 mtwhf	Portugal, R Portugal Intl	7110eu	9780eu	9815eu	
2000-2100	Russia,Voice of Russia WS	4920eu	5940eu	5965eu	7180eu
	7305eu 7325eu	7440eu	7490eu	9440eu	9450eu
	9585eu 9820eu	13670eu			
2000-2015	Sierra Leone, SLBS	3316do			
2000-2100 vl	Solomon Islands, SIBC	5020do			
2000-2015 irreg	Somalia, Radio Mogadishu	6870af			
2000-2100 mtwhf	Spain, R Exterior Espana	6125eu	11775af		
2000-2015	Swaziland, Trans World R	3200af			
2000-2030	Switzerland, Swiss R Intl	9620af	9885af	9905af	11725af
2000-2030	Turkey, Voice of	5960eu	6175na		
2000-2015	Uganda, Radio	4976do			
2000-2100	United Kingdom, BBC WS	3255af	5975as	6005af	6180eu
	6190af 6195va	9410eu	9630af	11750am	11835af
	12095eu 15400af	15485af	15575va	17830af	
2000-2100	United Kingdom, UCB	6200eu			
2000-2100	USA, KAIJ Dallas TX	13815am			
2000-2100	USA, KTBN Salt Lk City UT	15590am			
2000-2100	USA, KWHR Naalehu HI	7560pa	13625pa	17555pa	
2000-2100	USA, Monitor Radio Intl	7510eu	9355eu	13840pa	
2000-2100	USA, Voice of America	6035af	7415af	9760eu	11855af
		11975af	13710af	15205as	15410af
		15445af	15580af	17725af	17755af
2000-2030	USA, Voice of America	4950af			
2000-2100	USA, WEWN Birmingham AL	5825na	11875na	13615am	15745eu
2000-2100	USA, WGTG McCaysville GA	9400am			
2000-2100	USA, WHRI Noblesville IN	9495am	13760eu		
2000-2100	USA, WINB Red Lion PA	13790eu			
2000-2100	USA, WJCR Upton KY	7490na			
2000-2100	USA, WRMI/R Miami Intl	9955am			
2000-2100	USA, WRNO New Orleans LA	15420am			
2000-2100	USA, WWCR Nashville TN	9475am	12160am	13845am	15685am
2000-2100	USA, WYFR Okeechobee FL	17555eu	17845af	21525af	
2000-2010	Vatican State, Vatican R	4005eu	5885eu	7250eu	9645eu
		9660af	11625af		
2000-2100	Zambia, Christian Voice	3330af	4965af		
2000-2100 vl	Zambia, R Zambia/ZNBC 2	6165do			
2000-2100 vl	Zimbabwe, Zimbabwe BC	4828do			
2005-2100	Syria, Radio Damascus	12085eu	13610eu		
2010-2030	Vatican State, Vatican R	7365af	9660af	11625af	
2015-2030	Namibia, NBC	3270do	3290do		
2025-2045	Italy, RAI Intl	7125eu	9685af	11840as	
2030-2100	Armenia, Voice of	7480eu	9965eu		
2030-2100	Cuba, Radio Havana	13715eu	13725eu		
2030-2100	Egypt, Radio Cairo	15375af			
2030-2130	Finland, YLE/R Finland	9875af			
2030-2100	Georgia, Radio	11760eu			
2030-2100	Germany,Adventist World R	9835af			
2030-2100	Poland, Polish R Warsaw	6035eu	6095eu	7285eu	
2030-2100	Slovakia, AWR Europe	7265af			
2030-2100	Sweden, Radio	6065eu			
2030-2045	Thailand, Radio	9655eu	9680eu	11905eu	
2030-2100 as	USA, Voice of America	4950af			
2030-2100	Uzbekistan, R Tashkent	9540eu	9545eu		
2030-2057	Vietnam, Voice of	9840eu	12020eu	15010eu	
2045-2100	India, All India Radio	7150au	7410eu	9650eu	9910au
		9950eu	11620eu	11715au	
2053-2100 smtwhf	New Zealand, R NZ Intl	15115pa			
2057-2100	Iraq, Radio Iraq Intl	11785me			
2059-2100 a	New Zealand, R NZ Intl	15115pa			

FREQUENCIES

2100-2200	Anguilla,Caribbean Beacon	11775am			
2100-2130	Australia, Radio	5995pa	7240pa	9415pa	9435pa
		9660pa	11880pa	12080pa	17795pa
2100-2130 vl	Australia, VL8A Alice Spg	2310do			
2100-2130 vl	Australia, VL8K Katherine	2485do			
2100-2200 vl	Australia, VL8K Katherine	5025do			
2100-2130 vl	Australia, VL8T Tent Crk	2325do			
2100-2200 vl	Australia, VL8T Tent Crk	4910do			
2100-2115 vl	Cameroon, Radio Cameroon	4850do			
2100-2200 vl	Cameroon, Radio Garoua	5010do			
2100-2200 vl	Canada, CBC N Quebec Svc	9625do			
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	5925va	5995va	7235va	9805va
		11945va	13650va	13690va	15150va
		17820af			
2100-2130	China, China Radio Intl	3985eu	5220eu	6950eu	9920eu
		11715af	15110af		
2100-2200	Costa Rica,RF Peace Intl	15050am			
2100-2104	Croatia, Croatian Radio	9590af			
2100-2130	Cuba, Radio Havana	13715eu	13725eu		
2100-2200 vl	Cyprus, BRT International	6150do			
2100-2127	Czech Rep, Radio Prague	5930na	7345af		
2100-2200	Ecuador, HCJB	12015eu	21455am		
2100-2200	Egypt, Radio Cairo	15375af			
2100-2200	Eqt Guinea, Radio Africa	15186af			
2100-2107	Georgia, Voice of Hope	9310eu			
2100-2150	Germany, Deutsche Welle	9615af	9670as	9690af	9765as
		11785as	11865af	15275va	
2100-2130	Germany,Adventist World R	9835af			
2100-2200	India, All India Radio	7150va	7410eu	9650eu	9910au
		9950eu	11620va	11715au	
2100-2157	Iraq, Radio Iraq Intl	11785me			
2100-2200 vl	Italy, IRRS	3955va			
2100-2115	Japan, R Japan/NHK World	6035as	6090as	13630na	
2100-2107 vl	Kenya, Kenya Broadc Corp	4885do	4935do	6150do	
2100-2200	Lebanon, Voice of Hope	9960va			
2100-2115	Liberia,LCN/R Liberia Int	5100do			
2100-2130	Mexico, Radio Mexico Intl	9705na			
2100-2107	Namibia, NBC	3270do	3290do		
2100-2200	New Zealand, R NZ Intl	15115pa			
2100-2200	Nigeria, FRCN/Radio	3326do	4770do	4990do	
2100-2157	North Korea, R Pyongyang	4405eu	6575eu	9345am	11700am
		13760am			
2100-2200 vl	Papua New Guinea, NBC	4890do			
2100-2125	Poland, Polish R Warsaw	6035eu	6095eu	7285eu	
2100-2156	Romania, R Romania Intl	7105eu	7195eu	9690eu	11810eu
2100-2200	Russia,Voice of Russia WS	5940eu	5965eu	7170eu	7180eu
		7320eu	7440eu	9890eu	
2100-2130	Slovakia, AWR Europe	7265af			
2100-2200 vl	Solomon Islands, SIBC	5020do			
2100-2200	South Korea, R Korea Intl	6480eu	15575eu		
2100-2130	South Korea, R Korea Intl	3970eu			
2100-2130	Switzerland, Swiss R Intl	6165eu	7410eu		
2100-2200	Syria, Radio Damascus	12085na	13610au		
2100-2110	Uganda, Radio	4976do			
2100-2200	United Kingdom, BBC WS	3255af	3915as	3955eu	5965as
	5975as 6005af	6180eu	6190af	6195va	7325va
	9410eu 9630va	11750sa	11835af	11945as	12095eu
	15400af				
2100-2130	United Kingdom, BBC WS	9630af	15485af		
2100-2145	United Kingdom, BBC WS	11680sa			
2100-2200	United Kingdom, UCB	6200eu			
2100-2200	USA, KAIJ Dallas TX	13815am			
2100-2200	USA, KTBN Salt Lk City UT	15590am			
2100-2200	USA, KWHR Naalehu HI	7560pa	17555pa		
2100-2200	USA, Monitor Radio Intl	7510eu	9355eu		
2100-2200	USA, Voice of America	6035af	6070me	7415af	9595af
		9760eu	11870pa	11975af	13710af
		15185as	15205as	15410af	15580af
		17725af	17735as		
2100-2200	USA, WEWN Birmingham AL	5825na	11875na	13615na	17695eu
2100-2200	USA, WGTG McCaysville GA	9400am			
2100-2200	USA, WHRI Noblesville IN	9495am			
2100-2200	USA, WINB Red Lion PA	13790eu			
2100-2200	USA, WJCR Upton KY	7490na			
2100-2200	USA, WRMI/R Miami Intl	9955am			
2100-2200	USA, WRNO New Orleans LA	15420am			
2100-2200	USA, WWCR Nashville TN	9475am	12160am	13845am	15685am
2100-2200	USA, WYFR Okeechobee FL	17555eu	17845eu	21525eu	
2100-2200	Zambia, Christian Voice	3330af	4965af		
2100-2200 vl	Zambia, R Zambia/ZNBC 1	4910do			
2100-2200 vl	Zambia, R Zambia/ZNBC 2	6165do			
2100-2200 vl	Zimbabwe, Zimbabwe BC	4828do			
2115-2200	Egypt, Radio Cairo	9900eu			
2115-2130	United Kingdom, BBC WS	6175am	15390am	17715am	
2125-2135 mtwhf	Latvia, Radio	5935eu			
2130-2200	Australia, Radio	7240pa	9435as	9660pa	11695as
		12080pa	13755pa	17795pa	
2130-2200	China, China Radio Intl	5220eu	6950eu	9635eu	9920eu
2130-2200	Finland, YLE/R Finland	6135eu			
2130-2200	Ghana, Ghana Broadc Corp	3366do			
2130-2200	Guam, AWR/KSDA	15310as			
2130-2200	Iran, VOIRI	6165pa	6175pa		
2130-2200	Malawi, MBC	3380do			
2130-2200	South Korea, R Korea Intl	6480eu	15575eu		
2130-2200 as	Sweden, Radio	6065eu	9655eu		
2130-2200	Turkey, Voice of	7200eu			
2130-2200	USA, Voice of America	6035af	6070me	7415af	9595as
		9760me	11870pa	11975af	13710af
		15185pa	15205as	15410af	15580af
		17725af	17735pa		
2130-2200	Uzbekistan, R Tashkent	9540as	9545me		
2145-2200 a	Greece, Voice of	11595au	11645au		

2200 UTC

2200-2230	Albania, R Tirana Intl	6025eu	7135eu		
2200-2300	Anguilla,Caribbean Beacon	11775am			
2200-2300	Australia, Radio	9660pa	11695as	13755pa	15510as
		17795pa			
2200-2300 vl	Australia, VL8K Katherine	5025do			
2200-2300 vl	Australia, VL8T Tent Crk	4910do			
2200-2300	Bulgaria, Radio	7530eu	9700eu		
2200-2300	Canada, CBC N Quebec Svc	9625do			
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			
2200-2229	Canada, R Canada Intl	5995va	7235va	9735va	9805va
		11705as	11945va	13690va	15150va
\2200-2300	China, China Radio Intl	7175eu			
2200-2300	Costa Rica,RF Peace Intl	7385am	15050am		
2200-2300 vl	Cyprus, BRT International	6150do			
2200-2245	Egypt, Radio Cairo	9900eu			
2200-2300	Eqt Guinea, Radio Africa	15186af			
2200-2215	Ghana, Ghana Broadc Corp	4915do			
2200-2230	Hungary, Radio Budapest	3975eu	9840eu		
2200-2230	India, All India Radio	7150va	7410eu	9650eu	9910au
		9950eu	11620va	11715au	
2200-2225	Iran, VOIRI	6165pa	6175pa		
2200-2225	Italy, RAI Intl	6150pa	9675pa	11900as	
2200-2300	Lebanon, Voice of Hope	9960va			
2200-2215	Liberia,LCN/R Liberia Int	5100do			
2200-2300	Malaysia, Radio	7295do			
2200-2225	Moldova, R Moldova Intl	7520eu			
2200-2300	New Zealand, R NZ Intl	15115pa			
2200-2215	Nigeria, FRCN/Radio	3326do	4770do	4990do	
2200-2230 s	Norway, Radio Norway Intl	7570sa			
2200-2300 vl	Papua New Guinea, NBC	9675do			
2200-2300	Russia,Voice of Russia WS	5940eu	7105eu	7125eu	7180eu
		7205eu	7320eu	7360eu	7440eu
		9890eu			
2200-2230	Serbia, Radio Yugoslavia	6100eu	6185eu		
2200-2215	Sierra Leone, SLBS	3316do			
2200-2230	Slovakia, AWR Europe	6055eu			
2200-2300 vl	Solomon Islands, SIBC	5020do			
2200-2300 as	Spain, R Exterior Espana	6125eu	11775af		
2200-2205	Syria, Radio Damascus	12085na	13610au		
2200-2300	Taiwan, Taipei Radio Intl	15600eu	17750eu		
2200-2230	Turkey, Voice of	7200eu			
2200-2300	Ukraine, R Ukraine Intl	5905eu	5940eu	6010eu	6020eu
		7150na	7205eu		
2200-2300	United Kingdom, BBC WS	5965as	5975am	6175am	6180eu
	6195as 7325va	9410va	9590am	9660as	9890as
	9915am 11750am	11835af	11955as	12080as	15400af
2200-2230	United Kingdom, BBC WS	12095eu			
2200-2300	United Kingdom, UCB	6200eu			
2200-2300	USA, KAIJ Dallas TX	13815am			
2200-2300	USA, KTBN Salt Lk City UT	15590am			
2200-2300	USA, KWHR Naalehu HI	7560pa	17555pa		
2200-2300	USA, Monitor Radio Intl	7510eu	13770sa		
2200-2300	USA, Voice of America	7215as	9770as	9890as	11760as
	15185as 15290as	15305as	17735as	17820as	
2200-2230 mtwhf	USA, Voice of America	6035af	7415af	11975af	12080af
		13710af			
2200-2300	USA, WEWN Birmingham AL	5825eu	13615na		
2200-2300	USA, WGTG McCaysville GA	9400am			
2200-2300	USA, WHRI Noblesville IN	9495am			
2200-2300	USA, WINB Red Lion PA	13790eu			
2200-2300	USA, WJCR Upton KY	7490na			
2200-2300	USA, WRMI/R Miami Intl	9955am			
2200-2300	USA, WRNO New Orleans LA	15420am			
2200-2300	USA, WWCR Nashville TN	7435am	9475am	12160am	13845am
2200-2300	USA, WYFR Okeechobee FL	17845eu	21525eu		
2200-2300 vl	Zambia, R Zambia/ZNBC 1	4910do			
2230-2255	Austria, R Austria Intl	5945eu	6155eu	13730af	
2230-2300	Cuba, Radio Havana	6000na	6180na		
2230-2227	Czech Rep, Radio Prague	5930na	7345na		
2230-2300	Iraq, Radio Iraq Intl	11785me			
2230-2300	Sweden, Radio	6065eu	7325eu		
2240-2250	Greece, Voice of	11595au	11645au		
2245-2300	Ghana, Ghana Broadc Corp	3366do	4915do		
2245-2300	India, All India Radio	7410as	9705as	9950as	11620as
2245-2300	Vatican State, Vatican R	7305au	9600au	11830au	

2300 UTC SHORTWAVE GUIDE 6:00 PM EST 3:00 PM PST

Frequencies

2300-0000	Anguilla,Caribbean Beacon	6090am			
2300-0000	Australia, Radio	9660pa	12080pa	13755pa	15510pa
		17795pa			
2300-0000 vl	Australia, VL8K Katherine	5025do			
2300-0000 vl	Australia, VL8T Tent Crk	4910do			
2300-0000	Canada, CBC N Quebec Svc	9625do			
2300-0000	Canada, CFRX Toronto	6070do			
2300-0000	Canada, CFVP Calgary	6030do			
2300-0000	Canada, CHNX Halifax	6130do			
2300-0000	Canada, CKZN St John's	6160do			
2300-0000	Canada, CKZU Vancouver	6160do			
2300-2330	Canada, R Canada Intl	5960am	6040ca	9535ca	9755am
		11865ca			
2300-0000	Costa Rica, Adv World R	5030am	6150am	9725am	13750am
		15460am			
2300-0000	Costa Rica,RF Peace Intl	7385am	15050am		
2300-2330	Cuba, Radio Havana	6000na	6180na		
2300-0000	Egypt, Radio Cairo	9900na			
2300-2350	Germany, Deutsche Welle	6045as	6130as	7235as	
2300-0000	Guam, AWR/KSDA	11775as			
2300-0000	Guatemala, Adv World R	11775am			
2300-0000	India, All India Radio	7410as	9705as	9950as	11620as
2300-0000	Lebanon, Voice of Hope	9960va			
2300-2315	Liberia,LCN/R Liberia Int	5100do			
2300-0000	Malaysia, Radio	7295do			
2300-2325	Moldova, R Moldova Intl	7520eu			
2300-0000	New Zealand, R NZ Intl	15115pa			
2300-2315	Nigeria, FRCN/Radio	3326do	4770do	4990do	
2300-2357	North Korea, R Pyongyang	11335na	11700na	13760na	15130na
2300-0000 vl	Papua New Guinea, NBC	9675do			
2300-2356	Romania, R Romania Intl	5990na	6155na	9510na	9570na
		11940na			
2300-0000	Russia,Voice of Russia WS	5940na	7105na	7125na	7180na
2300-0000 vl	Solomon Islands, SIBC	5020do			
2300-0000	Turkey, Voice of	6135eu	9655eu		
2300-0000	United Kingdom, BBC WS	3915as	5965as	5975am	6175am
		9580as	9590na	9915am	11750sa
		11945as	11955as	15380as	
2300-2315	United Kingdom, BBC WS	15400af			
2300-0000	United Kingdom, UCB	6200eu			
2300-0000	USA, KAIJ Dallas TX	13815am			
2300-0000	USA, KTBN Slt Lk City UT	15590am			
2300-0000	USA, KWHR Naalehu HI	7560pa	17510as	17555pa	
2300-0000	USA, Monitor Radio Intl	7510eu	13770sa		
2300-0000	USA, Voice of America	7215as	9770as	9890as	11760as
		15185as	15290as	15305as	17735as
		17820as			
2300-0000	USA, WEWN Birmingham AL	5825na	13615na		
2300-0000	USA, WGTG McCaysville GA	9400am			
2300-0000	USA, WHRI Noblesville IN	5745am	9495am		
2300-0000	USA, WINB Red Lion PA	13790am			
2300-0000	USA, WJCR Upton KY	7490na			
2300-0000	USA, WRMI/R Miami Intl	9955am			
2300-0000	USA, WRNO New Orleans LA	7355na			
2300-0000	USA, WWCR Nashville TN	5070am	7435am	9475am	13845am
2300-2315	Vatican State, Vatican R	9600au	11830au		
2310-2315	Kyrgstan, Kyrgyz Radio	4010do	4050do		
2330-0000 as	Canada, R Canada Intl	6040am	9535am	11865am	
2330-0000 vl	Ghana, Ghana Broadc Corp	4915af			
2330-0000 mtwhf	Guam, AWR/KSDA	11775as			
2330-0000	Netherlands, Radio	6020na	6165na		
2335-2345	Greece, Voice of	9395am	9425am	11595am	11710ca
2335-2345	Sierra Leone, SLBS	3316do			

Selected Programs

Sundays

2300 Turkey, Voice of: News. See S 0400.
2300 UK, BBC London (am/eu): World News. See S 0300.
2305 UK, BBC London (am/eu): Science View. A look at complex issues and the implications of the latest research findings.
2308 Turkey, Voice of: Review of the Turkish Press. See S 0408.
2310 UK, BBC London (am/eu): Learning Zone. For people who want to learn more about subjects such as science, health, the world and work and literature while practicing English listening skills.
2311 Turkey, Voice of: Turkish Customs and Traditions. A look into time-honored ways of Turkish life.
2323 Turkey, Voice of: Turkish Songs. Currently popular vocal music.
2325 UK, BBC London (am/eu): Pop Short. A five-minute popular music program.
2326 Turkey, Voice of: Turkish Songs. See S 2323.
2330 Turkey, Voice of: Reflections of Civilization on Minerals. The history of ancient civiliations as depicted in archaelogical treasures.
2330 UK, BBC London (am/eu): In Praise of God. See S 0630.
2333 Turkey, Voice of: Reflections of Civilization on Minerals. See S 2330.

Mondays

2300 Turkey, Voice of: News. See S 0400.
2300 UK, BBC London (am/eu): World News. See S 0300.
2305 UK, BBC London (am/eu): Outlook. See M 1405.
2308 Turkey, Voice of: Review of the Turkish Press. See S 0408.
2311 Turkey, Voice of: Last Week. A recap of events affecting Turkey during the previous week.
2319 Turkey, Voice of: Old Turkish Mansions. An audio tour of an historic structure.
2325 Turkey, Voice of: Turkish Songs. See S 2323.
2330 UK, BBC London (am/eu): Multitrack Hit-List. See M 1930.
2338 Turkey, Voice of: A History of Westernization in Turkey. How Turkey evolved to its present state over the centuries and the outside influences that affected it.

Tuesdays

2300 Turkey, Voice of: News. See S 0400.
2300 UK, BBC London (am/eu): World News. See S 0300.
2305 UK, BBC London (am/eu): Outlook. See M 1405.
2308 Turkey, Voice of: Review of the Turkish Press. See S 0408.
2313 Turkey, Voice of: A Sea and an Island. Turkey's situation today from a political perspective.
2321 Turkey, Voice of: Another Spot in Turkey. A different location in Turkey is featured in each program.
2330 UK, BBC London (am/eu): Megamix. See T 1930.
2333 Turkey, Voice of: Turkish Songs. See S 2323.

Wednesdays

2300 Turkey, Voice of: News. See S 0400.
2300 UK, BBC London (am/eu): World News. See S 0300.
2305 UK, BBC London (am/eu): Outlook. See M 1405.
2307 Turkey, Voice of: Review of the Turkish Press. See S 0408.
2310 Turkey, Voice of: A Review of the Foreign Media. Items of interest to Turkey found in the media of other countries.
2319 Turkey, Voice of: Letter Box. The weekly mailbag program.
2330 UK, BBC London (am/eu): Multitrack X-Press. See W 1930.
2334 Turkey, Voice of: Turkish Music. Selections of classical Turkish music.
2338 Turkey, Voice of: Turkish Decorative Arts. A looks at woodcarving and similar crafts in Turkey.

Thursdays

2300 Turkey, Voice of: News. See S 0400.
2300 UK, BBC London (am/eu): World News. See S 0300.
2305 UK, BBC London (am/eu): Outlook. See M 1405.
2308 Turkey, Voice of: Review of the Turkish Press. See S 0408.
2314 Turkey, Voice of: Turkish Foreign Policy. How Turkey interacts with its neighbors.
2321 Turkey, Voice of: Turkish Popular Music. Selections of music being played in Turkey.
2330 UK, BBC London (am/eu): John Peel. See H 1930.
2333 Turkey, Voice of: I Am Antolia. The evolution of modern Turkey as seen from the science of archeology.
2342 Turkey, Voice of: Turkish Popular Music. See H 2321.

Fridays

2300 Turkey, Voice of: News. See S 0400.
2300 UK, BBC London (am/eu): World News. See S 0300.
2305 UK, BBC London (am/eu): Outlook. See M 1405.
2308 Turkey, Voice of: Review of the Turkish Press. See S 0408.
2311 Turkey, Voice of: Turkish Album. Music and cultural interviews.
2330 UK, BBC London (am/eu): Multitrack Alternative. See F 1430.
2344 Turkey, Voice of: The Southeastern Anatolian Project (GAP). A progress report.
2354 Radio Netherlands: Documentary. 50th Anniversary Celebrations: From the Wireless to the World Wide Web (5th). See W 1254.
2354 Radio Netherlands: Documentary. The High "C's" (26th). Marijke van der Meer reports behind the scenes of the diamond industry.
2354 Radio Netherlands: Documentary. The Netherlands is Full (19th). See F 1454.
2354 Radio Netherlands: Documentary. The Social Cost of Transformation (12th). See A 2354.

Saturdays

2300 Turkey, Voice of: News. See S 0400.
2300 UK, BBC London (am/eu): Play of the Week (from 2230). See S 1830.
2307 Turkey, Voice of: Review of the Turkish Press. See S 0408.
2310 Turkey, Voice of: Outlook. See S 0412.
2315 Turkey, Voice of: Popular Turkish Music. Turkey's music of today.
2315 Turkey, Voice of: VOT DX Corner (biweekly). See S 0415.
2320 Turkey, Voice of: Turkish Literature (biweekly). See S 0415.
2330 UK, BBC London (am/eu): Andy Kershaw's World of Music. See A 0830.
2332 Turkey, Voice of: Blue Voyage. See S 0433.

DECEMBER — A GOOD MONTH TO SEE (AND HEAR!) AURORAS

By Jacques d'Avignon
monitor@rac.ca

When I prepare the monthly table of propagation predictions, I always indicate which circuits cross the auroral zone near the North Pole (P). Why? I do so because the auroral doughnut-shaped zone in the polar region disturbs the ionosphere and causes fluttering in a signal whose great circle path between the transmitter and the receiver crosses this region.

Many *MT* readers have seen live or on TV the fantastic display of Northern Lights, Aurora Borealis, but how many have actually heard the sound produced by the aurora? I can see the raised eyebrows and hear the readers comment that I should not sip spiked Christmas eggnog while writing my December column! (Actually, this column is being written during the hottest day of July, so I am sipping on straight iced tea!)

About four years ago, I started reading a flurry of messages discussing the possibility of "really" hearing the sounds of the aurora. Hearing auroras has been something very normal for me, and it was my assumption that everyone heard them. I now know better.

From 1952 until 1969 my work had me traveling in very remote areas of Eastern Canada and the North Eastern USA. In many places I slept in isolated camps because of the distances involved in traveling back to "civilization" to get a room at the inn. It was not unusual to find myself, in the evening, as far as 200 kilometers (150 miles) from the nearest hamlet — let alone town!

You did not see an auroral display every night, but when conditions were right the spectacle was breathtaking. At most of these remote sites, the ambient noise level is also very low at night: the electricity-producing diesel was shut off around 21:00 local. Then it was "deafening" silence except for the howling of the wolves and the sound of the aurora.

When the auroras were in progress, I could always hear a sound resembling the "swishing" sound of silk textile being rubbed. It is very difficult to explain what it really sounds like. The level of the sound would change in intensity and pitch as the auroras would become more or less luminous, the intensity of the sound would also change if you had auroral "darts" flowing out of the main body of the aurora or if you had a sudden change in intensity of all or part of the "curtain."

Since these observations were not very "scientific," but more of an anecdotal report of what I have always considered a normal occurrence, I never discussed this until recently.

There is an easier way to listen to auroras; Kevin Carey, in his *MT* column "Below 500 kHz," has frequently discussed Natural Radio sounds that can be heard at the bottom end of the radio spectrum. Look back to his columns to find out on how to do it, or pick up the November/December *Satellite Times* which contains two feature articles on the subject.

I will now leave you with an interesting question: the lowest frequency that Kevin is talks about for the signals from Natural Radio is about 10 kHz (10,000 Hz). We know that the average audio range of a human is 60 Hz to about 20,000 Hz, depending on the age and how well you have protected your ears from the high ambient sounds. Here is the question for you to ponder over the holiday turkey dinner: "Is there a crossover somewhere in this range between radio transmissions heard in the ELF part of the spectrum and the audio 'noise' that some individuals are hearing when watching auroras?" I do not have an answer.

A Happy Hanukkah, a Merry Christmas and very Happy New Year to all!

OPTIMUM WORKING FREQUENCIES (MHz)

For the Period 15 December to 14 January 1998 Flux=97 SSN=43

UTC	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
TO/FROM US WEST COAST																								
SOUTH AMERICA	21	16	13	11	11	10	11	11	10	9	8	10	9	*	14	21	23	24	24	25	25	25	24	23
WESTERN EUROPE	8	8	8	8	8	8	8	8	8	8	8	8	8	8	9	13	17	19	16	14	11	9	9	8
EASTERN EUROPE (P)	7	7	7	7	7	7	9	9	9	8	8	8	8	8	9	11	10	*	*	*	*	*	*	*
MEDITERRANEAN	6	6	6	5	5	10	10	10	10	*	*	*	*	*	*	13	18	16	14	13	12	12	12	11
MIDDLE EAST (P)	10	10	10	10	9	*	*	*	*	*	*	*	*	8	9	10	11	10	*	*	*	*	10	10
CENTRAL AFRICA	16	15	12	11	10	10	10	*	*	*	*	*	*	*	*	19	22	22	20	18	18	19	19	17
SOUTH AFRICA	14	13	12	11	10	10	10	*	*	*	*	*	*	*	15	21	22	21	21	19	18	16	15	15
SOUTH EAST ASIA (P)	18	21	18	14	*	*	*	*	*	*	9	9	9	9	9	10	11	11	11	11	*	*	*	*
FAR EAST	22	20	17	13	10	9	8	9	9	9	9	9	9	9	9	9	9	9	9	*	*	12	18	21
AUSTRALIA	20	21	21	16	*	*	*	*	10	10	11	10	10	9	9	9	15	14	14	15	17	17	18	19
TO/FROM US MIDWEST																								
SOUTH AMERICA	17	13	11	10	10	10	10	10	9	8	8	9	9	12	18	21	22	22	22	22	22	22	21	20
WESTERN EUROPE	9	9	9	9	9	9	9	9	9	9	9	9	10	11	*	9	10	*	*	17	14	10	9	10
EASTERN EUROPE	7	7	7	7	7	7	8	9	9	9	9	9	9	9	12	15	12	*	*	*	*	*	7	7
MEDITERRANEAN	12	12	11	10	10	10	9	9	*	*	*	*	*	*	17	21	22	18	15	13	12	12	12	12
MIDDLE EAST (P)	10	10	10	10	9	9	*	*	*	*	*	*	*	9	11	14	12	11	*	*	*	10	11	10
CENTRAL AFRICA	16	13	11	10	10	10	10	*	*	*	*	*	*	*	20	22	22	22	20	18	18	20	20	18
SOUTH AFRICA	14	13	11	10	10	11	11	*	*	*	*	*	*	15	21	22	22	21	21	19	18	16	15	15
SOUTH EAST ASIA (P)	17	17	13	*	*	*	*	*	*	*	9	8	8	8	9	11	12	11	11	*	*	*	*	9
FAR EAST	21	18	14	11	*	9	9	9	9	9	9	9	9	9	9	10	10	10	10	*	*	12	18	22
AUSTRALIA	20	20	15	*	*	*	*	*	11	11	10	10	10	9	10	15	15	14	14	15	17	17	18	19
TO/FROM US EAST COAST																								
SOUTH AMERICA	12	10	10	9	9	10	10	9	8	7	7	8	12	18	20	20	19	19	19	19	19	18	17	14
WESTERN EUROPE	8	8	8	8	8	8	8	8	8	8	8	9	12	18	20	21	20	20	18	15	12	10	9	9
EASTERN EUROPE	8	8	8	7	8	8	8	8	8	8	8	8	10	16	18	16	13	10	*	*	8	8	8	8
MEDITERRANEAN	12	11	10	9	9	9	9	9	9	*	*	*	14	19	22	22	21	18	15	13	12	12	12	12
MIDDLE EAST (P)	11	11	10	10	10	9	9	*	*	*	*	*	12	18	18	15	13	11	11	11	11	11	11	11
CENTRAL AFRICA	13	12	11	11	11	11	11	11	*	*	*	14	17	21	22	23	23	23	21	19	19	20	19	15
SOUTH AFRICA	13	12	12	11	10	12	12	*	*	*	*	*	19	23	23	22	22	21	20	19	18	16	16	15
SOUTH EAST ASIA (P)	13	12	*	*	*	*	*	*	*	*	9	9	10	12	14	13	11	*	*	*	10	10	9	9
FAR EAST	16	13	11	*	*	10	9	9	9	9	9	9	10	10	10	10	*	*	*	*	10	11	17	19
AUSTRALIA	18	*	*	*	*	*	*	*	11	11	10	10	10	12	18	17	15	14	14	15	17	17	18	19

**Unfavorable conditions: Search around the last listed frequency for activity.*

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The Northern Light, Asgeir Brekke and Alv Engeland, published by Springer-Verlag, ISBN 3-540-12429-2, 1983.

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Choosing a Handheld Ham Radio

Every now and then I get a notion for a column that seems so obvious I wonder to myself why I hadn't thought of it before. Every day the general radio press has been throwing facts at me.

FACT ONE: The fastest growing segment of the amateur radio hobby is the Technician Class license, more specifically the "No-Code Tech" ticket.

FACT TWO: Newly licensed amateur radio operators (especially those folks with Technician Class privileges) tend to gravitate to the popular "repeater" bands of 144-148 MHz and 420-450 MHz operating in the FM mode.

FACT THREE: Because of facts one and two, the sales of handheld dual-band FM transceivers are making up a large portion of the manufacturer's profit margins these days.

Being someone with full amateur privileges and a tendency to operate on all the bands and all the modes, I was somewhat remiss in missing the point that so many folks were hanging out on 2 meters and 70 centimeters. This occurred in spite of the fact that a week doesn't go by that I haven't had the opportunity to greet a new ham on any one of my local repeater systems.

Back in the dark ages when I got my first ham ticket, the VHF action was just getting started. Most new hams started out with a Novice ticket and worked to get set up on the HF bands. VHF gear was relatively expensive but you could home brew a 40 meter HF transmitter to use with your SWL receiver for very little money. Heck, you could do it for free if you knew your way around the inside of a discarded tube type television set. Well, things have obviously changed quite a bit over the years.

So let's say you're one of these new ham radio folks or you may be thinking of getting in on the fun. Maybe it's time Old Uncle Skip put in a few cents about getting that first handheld transmitter.

Handheld vs. Table Top

This is less of a no-brainer than most people think, given the sales record of handhelds. Since your operation will mostly be through any number of local repeater systems (special higher power transceivers mounted in high locations that retransmit your handheld's signals), a handheld transceiver running between 3 and 5 watts can take care of business in most cases. Most true table top units on these frequencies are the more expensive "all mode" transceivers that also cover SSB and CW modes. That's great if you've got the cash, but it's not what we're talking about today.

What folks are more likely to consider are higher power mobile units that can be put to use in the car or run from the desk top with a power supply (similar to what Magne would call a "portatop" in a SW receiver). Here you are talking about rigs that usually run between 30 and 50 watts.

Let me give you some personal experience to get you thinking. I work a little over 35 miles from my home. I can spit on my "home" repeater from my upstairs window. Using my 5 watt handheld with a reasonable roof mounted antenna on my car, I could normally communicate without any complaints on the other end of the conversation out to about 20 miles using my "home" repeater. Switching to a higher power mobile unit allows me to talk all the way to my parking lot at work and well beyond if needed.

If the majority of your communication is going to occur within 15 or so miles of home, a 5 watt handheld is great. To move out further you'll need more juice. This can be done either in the form of a higher power rig or by adding an external amplifier to your handheld.

Further personal experience . . . adding a 20 watt amp to my handheld stretched my string out to about 30 miles. As they say, your mileage will vary. Some of your distance capability will depend on the repeater site's location and its height above ground.

Now consider this: If you can have really reliable communications out to about 15 miles with 5 watts, and if you worked through a repeater that was just about 15 miles away from your location, you could talk to friends 15 *more* miles away in the general direction of the repeater site. This is how I stay in routine communication with some friends that live a couple of counties away from me. We just pick a repeater in between us and meet in the middle, so to speak. Remember that FM repeater communication is not really about chasing DX, although some neat long distance propagation can be found at times. It's more about reliable communication over moderate distances with the enhancement of repeater systems.

While we're on the wattage thing . . . Some new ultra-miniature handheld receivers have come on the market. These are great little units but they often have power limitations under 2 watts. Get to know the location of your local repeater systems before you plan to rely on these lower power units. I've used one around the house because I'm so close to my local repeater. When I'm putting some miles between myself and the repeater I go with my 5 watt handheld or the bigger rig in my car.

Single vs. Dualband

Up until about a year ago I was a dyed-in-wool single band believer. My position seemed pragmatic enough. I used to say to myself and others, "If a dualband handheld breaks, you lose two bands." This is true, but I started to notice folks looking at me funny when I had two handhelds strapped to my waist. Maybe they were actually looking at me funny because I was always tugging at my belt to keep the right side of my pants up.

Now my pragmatic preaching leans more toward how many things I can accomplish with just one dualband transceiver. They are packing a lot of features into this modern crop of dualband handhelds making them well worth a look. Also, my local ARES and RACES operations do a lot of "crossband" communications. Moving between the two popular bands quickly is important in modern emergency communications. But having said all this, I open another can of worms.

New vs. Used Gear

You know I've always been a strong proponent of the value of used equipment. Well, this trend toward dualband handhelds is resulting in a lot of single band transceivers hitting the market at very reasonable prices. So what you need to do once again is look at the repeater activity in your area. Chances are it's mostly 2 meter systems with a couple of 70 centimeter operations. Good two meter rigs abound on the used market.

Remember the chant of the cheapskate ham. "You don't need bells and whistles . . . You don't need bells and whistles . . . You don't need bells and whistles." The only additional expense that I find with most used handhelds is that the battery packs tend to be marginal due to age and use. Replacement battery inserts for these packs usually run between 20 and 50 dollars, so you need to figure this into your dickering before the deal goes down.

If you only plan to work through one or two local systems, you can even find some older crystal-controlled two meter rigs out there for nearly nothing. At a recent hamfest, a friend of mine bought an old crystal rig for eighteen dollars (down from the twenty-five dollar asking price; he bargains hard!) He bought three crystals for his local machines at seven dollars each. Total cash outlay $39.00 and he's got 30 watts into his local systems. That is about one tenth of the cost of a premium dualband handheld, folks!

Ragchewing vs. RACES

This becomes an important consideration even though we all probably do a bit of both. Most hams like the FM repeater bands to chat with folks while on the road in their cars. But, we must remember that these two bands are also the primary operations frequencies for the Amateur Radio Emergency Service (ARES) and the Radio Amateur Civil Emergency Service (RACES) groups.

Using amateur radio to help folks out in times of trouble is a great ham tradition. I'm active in my local ARES and RACES organizations. This has had some effect on my choice of FM equipment. First of all, I lean toward higher power in both handhelds and mobile gear, because in emergency situations you may lose access to a repeater and need to work point to point. Also, because of the need to work with emergency power I look for equipment that can make use of 12 volts DC without a lot of arguments or accessories. You never know when you're going to need to clip up to a car battery to keep things going.

Also, I tend to pick handhelds that have battery packs that let you choose between rechargeable and alkaline cells in case I need to make use of a handful of batteries from a convenience store when all else fails. Several of the newer handhelds are "ruggedized" to higher military specifications to assure performance to tough environments. All of these are points to ponder if you plan on using your amateur radio hobby in service to the wider community.

Features vs. Bells and Whistles

A couple of things that used to be bells and whistles a few years back have become essential features when shopping for ham gear for the FM repeater bands.

Many local repeaters offer additional features that are controlled by a touch tone pad. This is essentially a standard DTMF touch tone keyboard not unlike the one used by your telephone. As a matter of fact, some repeater systems allow you to place telephone calls through the system using the touch tone pad to dial the numbers.

Some repeaters allow you to control aspects of the operation by entering tone sequences. For example, entering a tone or two might give the current time, bring up a local weather report, or play a "brag tape" about the system or the local radio club. Such tones can be used by repeater system control operators to perform essential functions to the repeater from a distance. If your local system allows DTMF based services, you would most definitely want to find a transceiver with a touch tone pad.

Due to the large number of repeater systems on the air, it is possible at times for conditions to allow two or more systems to interfere with one another. Also, some repeater groups want to reserve the privilege of using their system to members only. A common system that allows control over system access and prevents systems operating on the same frequency from getting in each other's way is called CTCSS.

CTCSS stands for Continuous Tone Coded Squelch System and is sometimes referred to by its trade name "PL." CTCSS uses a subaudible tone under the transmitted signal to activate the repeater's squelch circuit allowing its use. CTCSS has grown in popularity so it is highly desirable to find a transceiver that has CTCSS built in.

Another word to folks on the used market: Older gear often had CTCSS on an optional board that had to be user-installed. If you want this feature on that piece of used gear you need to check to make sure it is installed. A quick check of the manual will usually answer all questions in this area.

Well, there you have a little food for thought as you plan the first ham radio purchase. I'll be listening for you.

BELOW 500 KHZ

DXING THE BASEMENT BAND

Kevin Carey, WB2QMY
KCarey@mdsroc.com

Basement Changes

It's been said that history often repeats itself. Certainly, when we consider the longwaves—where amateur radio began—this could soon be true. As the number of commercial and government stations declines, new frequencies could once again become available for experimental use. Many countries have already allocated small portions of the spectrum for ham-type operation.

What's in store for the future? It's probably a safe bet that we'll see even more traditional longwave services vanishing from the band. We can either brood over these losses, or turn them into something positive by exploring new areas of the hobby. Natural Radio and the license-free Lowfer band, for example, offer many worthwhile challenges.

This month, we'll highlight the latest changes in the basement and discuss how they might affect your monitoring efforts. Although most of the news involves stations leaving the band, there are also some bright spots for longwave listeners.

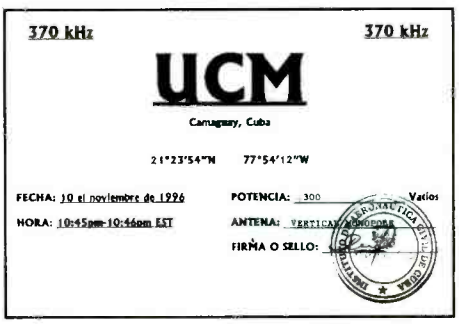

FIGURE 1. *Rare Cuban QSL for UCM (370 kHz), submitted by an unidentified contributor in Florida. This is the perfect time of the year to search for Cuban stations on longwave.*

Omega Now Silent

Omega, the longstanding 10-14 kHz global navigation system, was finally silenced on September 30th at 0300Z. The system, which began service in the 1960s, had become virtually obsolete with the advent of GPS.

Stephen P. McGreevy (CA) caught the shutdown on tape and reported that Omega-D (N. Dakota) was the first to leave the air. This was followed by Omega-C (Hawaii) and finally Omega-H (Japan). The shutdown of these stations was not abrupt, but rather a fade-out over a 1-2 second period. Stephen reported that by 0301 all that was left were the weak beeps of the Russian Alpha system.

The good news is that the Natural Radio band has just become a much quieter place to listen. This, says Stephen, combined with the increasing sunspots and the availability of Natural Radio receivers, could mean that we are entering the "Golden Decade" of Natural Radio.

For more information on this fascinating part of the hobby, be sure to check out the VLF Natural Radio page on the Web at **http://www.triax.com/vlfradio/index.htm**. You can find plans there for a very simple Natural Radio receiver. Not on the Web? Send me an SASE for a copy of the receiver plans.

Loran Termination

The clickety-clack signals of Loran (long range navigation, 100 kHz +/- 20 kHz) may soon be history as well—though I don't think too many DXers will shed tears over this one. The Coast Guard has announced plans to conduct a termination study on Loran in its Local Notice to Mariners # 36-97. The 1996 Federal Radionavigation Plan calls for the termination of Loran service in the year 2000. This study will examine whether or not service should be extended beyond that date.

Comments will be accepted from the public until December 15th. They may be sent by FAX (703-917-3023) or by E-mail (loranc@bah.com). Telephone comments will not be accepted.

Australian DX

From the *ARRL Letter*, Vol. 16, No. 37, comes this news of a longwave achievement: "Down under low-frequency DX firsts: The first two-way VLF CW contacts between Australia and New Zealand have been logged. ZL3FJ used 100 watts on 176 kHz and a 122-meter (approximately 400 feet) mast to work AX2TAR (operated by VK7ZAL) in Australia late last month. Reports were Q5 on both ends of the circuit. An attempt at an SSB contact was less successful. VK7RO and VL7ZAL both had solid copy on ZL3FJ, who was unable to read AX2TAR due to QRM from local power line carriers. The mast used by ZL3FJ had recently completed service for an MF AM broadcast station.--Thanks to Bob, ZL2CA, and the Wireless Institute of Australia."

Many thanks to Perry Crabill (VA) for calling this news item to my attention.

Canadian Lowfers

Every now and then I hear from a Canadian operator interested in setting up a lowfer station. The 160-190 kHz band is available to Canadians under rules quite similar to those imposed on U.S. operators. The best advice is to contact the nearest radio inspector or Industry Canada office. They have literature available on unlicensed low-powered equipment. There are already a handful of Canadian stations on the air and it would be great to hear more.

New Online Resource

If you've been waiting to get on the Internet, you now have a great reason to get started. There is a new listserver dedicated to low frequency topics. List subscribers send their messages to a hub computer which in turn "reflects" these messages to the entire group. The result is a near real-time forum where low frequency enthusiasts can exchange ideas, ask questions, or just read the mail. Any longwave topic is welcome, and I have found this group (now numbering over 100) to be most helpful and friendly.

There is no cost to subscribe. Simply send an e-mail message to majordomo@qth.net and place the words "subscribe lowfer" in the body of the message. The Subject line should be left blank. After a short wait, you will receive easy-to-follow instructions for joining the group. Thanks to Al Waller (K3TKJ) for sponsoring this most useful mailing list.

I'd like to extend the very best holiday wishes from my family to yours. December is a great time to DX, but don't forget to log some special times with the family as well. As always, your questions, comments and loggings are welcome at P.O. Box 98, Brasstown, NC 28902. An SASE guarantees a response. See you next month!

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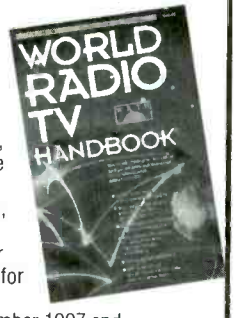

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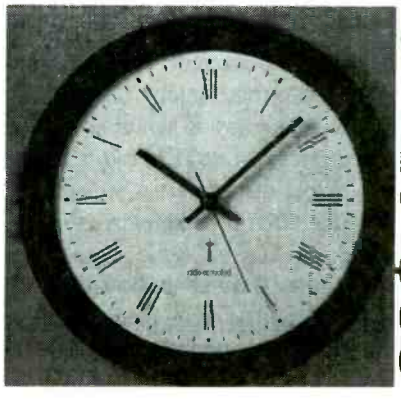

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Anatomy of a Radio

A few months back, I wrote about "phantom" signals—signals you hear on your radio, but that aren't really there. At the time, I alluded to how this happens, but didn't really go into a whole lot of detail. This month, I thought I'd explain some of the circuits found in your domestic-band radio and how they work. For the purpose of this article, and the attached drawing, we'll assume you're in Boston and listening to WBZ-1030 on the AM dial and WSRS-96.1 FM.

All radios start with an antenna of some kind. On AM sets, it's usually a "loopstick" —basically, an electromagnet. On FM (and on AM car radios) a "whip" antenna — a short metal stick — is usually used. The antenna serves to pick electromagnetic waves out of the air and convert them to an electrical signal. As a general rule, the more metal in the antenna, the more electrical signal it can deliver to the radio's circuitry.

The next circuit in some radios is an RF Amplifier. This device (which actually is not present in most AM radios but is common in FM sets) serves to strengthen the received signals from the antenna, and to isolate the local oscillator from the antenna. It contains two tuned circuits, which serve to reject other stations and pass only the station you want to listen to. However, it isn't perfect at this task; other tuned circuits in the IF (more on the IF in a minute) handle this.

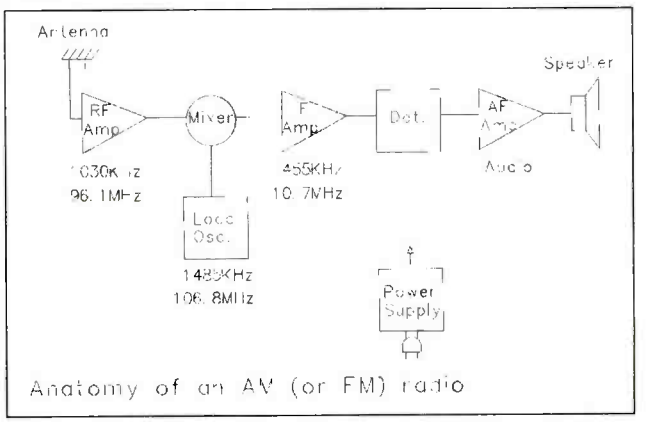
After the RF Amp comes the Mixer and Local Oscillator. These serve to convert the frequency of the received signal to a common intermediate frequency, or IF. The oscillator puts out a pure signal at an adjustable frequency, and the mixer is an electronic multiplier — it multiplies the oscillator and antenna signals. Those more inclined to higher math can do the algebra, but the result of multiplying two radio signals are the two original signals, a signal at the sum of their frequencies, and one at the difference of their frequencies. See the sidebar for the numbers in this case. The frequency of the oscillator signal is adjusted to maintain the difference between it and the desired station at 455 kHz.

OUTPUT OF THE MIXER WHEN LISTENING TO WBZ

In the example radio, tuned to WBZ, the mixer circuit outputs the following signals:

1030 kHz	(the antenna signal from the WBZ transmitter)
1485 kHz	(the signal from the local oscillator)
2515 kHz	(the sum of the two signals)
455 kHz	(the difference of the two signals)

Here's a block diagram of a typical radio. Whether it's a $15 pocket portable or a $1000 high-fidelity stereo, the fundamental circuits are the same:



All four of these signals appear at the input of the IF amplifier. This circuit is probably the heart of your radio, serving two important purposes. For one, it provides most of the amplification in the radio. The signals on the antenna are *very* weak. (Ever tried hooking a crystal set to a speaker? Even if you're just a few feet from the station's tower, the signal won't be very loud.) The IF amplifier brings this signal up to a usable strength.

The other important function is selectivity, the ability to separate stations on nearby frequencies. The IF amplifier always operates on the same frequency, so tuned circuits with extremely tight tolerances can be used. Only signals within about 6 kHz of 455 kHz are passed through this amplifier.

After leaving the IF amplifier, the signals reach the detector. This is the only part of the radio that's really different (except for the frequency to which you're tuned) between an AM and FM radio. Its purpose is to detect the variations in signal amplitude (for AM) or frequency (for FM) and convert them to an audio signal.

You now have an audio signal. In most cases, it could be connected directly to a set of headphones and you'd have a legible — though weak — signal to listen to. The AF amplifier builds up this audio signal to a strength adequate to drive a speaker.

This circuit is common to almost all radios, and works very well. There's something else you might notice about the drawing — that the local oscillator frequency is within the broadcast band. In theory, this isn't a problem; the oscillator signal is supposed to stay inside the radio and get no further than the input of the IF amplifier. In practice, it tends to get to the *input* side of the mixer too. If there's no RF amplifier, this means it gets to the antenna, and can be transmitted to interfere with other stations!

This isn't usually a big problem on AM, as your receiving antenna makes a *very* poor transmitting antenna and doesn't radiate much signal. FM is a very different story. In the example case, this radio tuned to WSRS-96.1 could cause serious interference to WMJX-106.7. This is one of the biggest reasons most FM radios have RF amplifiers; the oscillator signal has a very hard time working "backwards" through the RF amp to the antenna.

Still, it's pretty common to hear this kind of interference on car radios. If you notice your favorite FM station suddenly fade to silence as you pull up to a stoplight, check the frequencies 10.6 and 10.8 MHz lower. There's a pretty good chance you'll find a station there — and that one of your neighboring motorists is listening to it.

CALL CHANGES

The following AM stations have changed callsigns in the last month:

Old call:	City:	New call:
KUKQ-1060	Tempe, AZ	KDUS
KUNA-1400	Indio, CA	KESQ
KDES-920	Palm Springs, CA	KPSI
KPSI-1450	Palm Springs, CA	KGAM
KDFC-1220	Palo Alto, CA	KBPA
WTAI-1560	Melbourne, FL	WTMS
WANM-1070	Tallahassee, FL	WFRF
KNHN-1340	Pittsburg, KS	KSEK
WBIU-1210	Denham Springs, LA	WSKR
WNTL-1030	Indian Head, MD	WWGB
KMSL-1450	Great Falls, MT	KQDI
WLLE-570	Raleigh, NC	WRDT
KXNO-1140	North Las Vegas, NV	KSFN
CFGO-1200	Ottawa, ON	CJBZ
new-1610	Toronto, ON	CHEV
WIVK-990	Knoxville, TN	WNOX
WZRS-710	Smyrna, TN	WFCM
WZHF-1390	Arlington, VA	WVPA
WFOG-1600	Chesapeake, VA	WVBV
WKOY-1240	Bluefield, WV	WKEZ
WCZR-1490	Charleston, WV	WSWW

CHEV-1610 is the new 99-watt portable station mentioned in last month's column.

Speaking of spurious signals, and the "Phantoms" article in September, propagation forecaster Jacques d'Avignon wrote to mention an unusual phenomenon he heard in the 1950s. "My first radio was a crystal set with the cat whisker detector. When you found a good strong station, you could listen to the same station on the regular home radio at double its frequency! It would appear that the crystal radio would re-radiate on double the frequency."

Radio amateurs have fought this problem for years; poor electrical connections (in rusty fences, downspouts, etc.) would rectify their transmitted signals, generating "harmonics" at twice the transmitted frequency. Thanks to Murphy's Law, these harmonics would tend to fall in the most popular local TV channel. This is the first I've heard of anyone using a crystal set to generate such a signal!

Bits and Pieces

• We've received several copies of a newsletter from a club some of you might be interested in. **DecalcoMania** isn't really a DX club, but, as they put it, "the Club for Fans of Radio." Material in the newsletter includes offers to trade "airchecks" (recordings of local stations), talk about personalities and programming, and information about bumper stickers and other promotional material. Send an SASE to Phil Bytheway, 9705 Mary NW, Seattle WA 98117-2334 (or email to *Philip_Bytheway @atk.com)* for more information on this group.

• Some more low-power information stations have appeared on the dial in the last few weeks. Jeff Logan in the Monterey, California, area is hearing one on 840 with information on the Laguna Seca Raceway. Jeff is also hearing an FM pirate, in Spanish, in his area. Sandra Piotrowski near Detroit is hearing a traveler's information station on 1630 kHz; if someone can help her identify this station and possibly land a QSL, please email me or write c/o Monitoring Times HQ.

Finally, an anonymous contributor in New Hampshire sent a flyer from Vermont Tourism Radio, a network of 15 very low power FM stations between 89.7 and 90.5 MHz operating at the various rest areas on that state's highways.

• The FCC still hasn't issued any expanded-band permits, though they have now issued three digital TV permits. (To KITV-4 Honolulu and its relay stations in Hilo and Wailuku. Hawaiian readers: keep an eye on channels 18, 29, and 40.) Note the call-sign change for popular Canadian DX target CJBZ-1200 Ottawa (better known as "Energy 1200") Write me at Box 98, Brasstown NC 28902-0098, or by email at 72777.3143@compuserve.com.

DX TEST BULLETIN

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

Saturday, December 13, 1997 - KTFI-1270, 606 Blue Lakes Road North, #1270, Twin Falls, ID 83301 DX test at 5,000 watts nondirectional between 2:00 & 3:00 AM EST (0700 - 0800 UTC). Light rock/mor music, plus voice announcements, test tones and Morse code ID's. Send reception reports + SASE to: Mr. Bob Jackson - Announcer, bobj@impactradio.com. Special thanks also to Mr. Allen Sklar - Chief Engineer - for the test.

This test was arranged by J.D. Stephens.

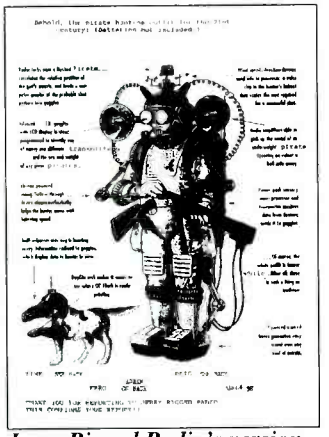
OUTER LIMITS

THE CLANDESTINE, THE UNUSUAL, THE UNLICENSED

George Zeller
George.Zeller@acclink.com

Holiday Season Increases Pirate Activity

1997 has been an extremely good year for North American shortwave pirate broadcasting, with several stations audible almost every weekend. Historically, holidays at the end of the year have been extremely active periods for pirate broadcasting. If you want to hear pirate transmitters, Thanksgiving, Christmas, and New Years are always chock-full of activity.



Jerry-Rigged Radio's version of the FCC

The winter season changes propagation conditions around the 6955 kHz pirate channel on 43 meters. More broadcasts are heard between 1700-0000 UTC, which is a significantly earlier time window than we notice during summer months. Although slightly higher sunspot numbers are expected as solar activity gradually increases, 43 meters should still have a tendency to die out a couple of hours after local sunset. You can already see earlier operating times for pirates listed in our loggings this month.

European pirates will probably take advantage of improving conditions for North American reception. Most Europirates are found in the 3900-4000 and 6200-6400 kHz range. Particularly on the North American east coast, reception may be possible around sunset and sunrise on weekends. If you hear any of these superb DX catches, let us know!

Cuban Clandestine Web Site

A very useful internet web site has appeared that contains a summary of all known clandestine radio stations that have targeted Cuba during the 1980's and 1990's. Nearly three dozen stations are covered, including schedules of those stations still on the air. A URL of **http://www.geocities.com/CapitolHill/Lobby/8115/** takes you to the site. The webmeister says that they are looking for off-air recordings of the stations. If you have some, **clandradio@geocities.com** is their e-mail address, and they'd like to hear from you.

Micropirate Busts

Although there have been no known FCC busts of North American shortwave pirates for three years, some enforcement activity has been taking place on the FM broadcast band. Literally hundreds of low power FM pirates operate throughout the United States. Among these are at least seven low power pirates in Milwaukee. According to *Radio World* magazine, the Milwaukee Area Radio Broadcasters Association complained to the FCC that seven Milwaukee pirates were operating between 93.0 and 99.9 MHz FM in Wisconsin's largest city. Following this complaint from licensed broadcasters, the FCC Chicago office says that they are in the process of sending warning letters to these pirates.

According to the *North Jersey Herald and News*, U.S. Marshals raided **WZVU**, operating on 94.7 MHz from Howell, NJ. They seized broadcasting equipment from Salvador DeRogatis, who said that his station had operated an oldies format on a 24 hour a day basis. This bust was prompted by complaints by the New Jersey Broadcasting Association.

Despite occasional busts, plenty of local pirates continue broadcasting. Why not scan your own local FM frequencies from time to time? There might be an interesting pirate catch in your own area.

What We Are Hearing

Your pirate loggings are always welcome for this column via PO Box 98, Brasstown, NC 28902, or via the e-mail address at the top of this page. All frequencies are in kHz, with times in UTC.

North American pirate stations listed here use the following addresses: PO Box 1, Belfast, NY 14711; PO Box 109, Blue Ridge Summit, PA 17214; PO Box 28413, Providence, RI 02908; PO Box 146, Stoneham, MA 02180; PO Box 11522, Huntsville, AL 35814; PO Box 293, Merlin, Ontario N0P 1W0; and PO Box 510, Basel, Switzerland. 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- 6955 at 2215. "The Voice of the Cat" claims to broadcast from Jamaica. Their reggae music is spiced by songs about cats, including an interval signal of "What's New Pussycat?" Addr: Providence. (William Wilkins, Springfield, MO; John Arendt, Oswego, IL)

Anteater Radio- 6955 at 0015. Using a slogan, "Eighteen Wheel Fire Breathing Radio," this one usually programs rock music. From time to time they relay other stations. Addr: Belfast. (Greg Majewski, Oakdale, CT; Lee Silvi, Mentor, OH)

Argosy Magazine- 6955 at 2000. This new operation specializes in old time radio dramas from the 1930's, with period ads for sponsor *Argosy Magazine*. Addr: Merlin. (Niel Wolfish, Toronto, Ontario; Shawn Axelrod, Winnipeg, Manitoba; Silvi; Wilkins)

CSIC- 6953 at 1945. Pirate Rambo's Canadian comedy shows are always funny. Every 50th reception report is verified by a genuine rubber chicken, so you might want to send one in. Addr: Blue Ridge Summit. (H. K. Poh, East Northport, NY; Dick Pearce, Brattleboro, VT)

Jerry Rigged Radio- 6955 at 0000. Ross was one of many who received a QSL from Simon Bar Sinister at this station. He didn't get the picture QSL we see here; his verification data were all written on a sailor's hat! Addr: Providence. (Ross Comeau, Andover, MA; William Hassig, Mt. Prospect, IL; Silvi)

KIWI- 7475 at 0700. Despite the demise of its own transmitter, this New Zealand pirate is still heard direct from Oceania via **Radio Jemima** facilities. Rob reports receipt of their QSL. Addr: Napier. (Rob Ross, London, Ontario; Hassig)

KNBS- 6952 at 0115. Phil Muzik's veteran marijuana advocacy station has now been around for more than a decade, using a slogan of "The Station with Your Mind in Mind." Addr: Belfast. (Axelrod; Frodge; Pearce; Poh; Silvi; Wolfish)

KRAP- 6955 at 0100. Fred Flintstone's rock oldies tunes come from a powerful AM transmitter, so he's heard almost as well as Radio Metallica. Addr: Blue Ridge Summit. (Joe Wood, North Augusta, SC; Ed Kusalik, Lethbridge, Alberta; Rich and Talea Jurrens, Katy, TX; Axelrod; Hassig; Silvi; Wilkins)

La Voz de Mundano Tiempo- 6955 at 2230. This one's slightly unusual. It plays new age, calypso, Mexican ranchera, and Afro-pop music, with all identifications in Spanish. Addr: Belfast. (Ranier Brandt, Hoefer, Germany; Frodge; Pearce; Silvi; Wolfish)

Lounge Lizard Radio- 6955 at 2300. The syrupy pop music on this pirate allegedly comes from

cocktail lounges in various cities. Addr: Providence. (Axelrod; Brandt; Frodge; Silvi)

Microdot Radio- 6955 at 0045. Lee describes the show he heard as a mix of "music, many IDs, and jokes." Addr: Belfast. (Frodge; Silvi)

Mystery Radio- 6955 at 2030. Long stretches of new age or electronic instrumental music are the trademark fare on this station. Addr: Stoneham. (Frodge; Jurrens; Silvi; Wilkins; Wolfish)

North American Pirate Relay Service- 6955 at 2330. Dick Pistek retired from the pirate bands several months ago, but he's returned unexpectedly with relays of other pirates such as Radio Azteca. Addr: Belfast. (Frodge; Majewski; Silvi)

Joe Mama's sharp Radio Nonsense QSL

Radio 510- 6955 at 2000. This Europirate is carried by several licensed broadcasters such as **WRMI** in Miami, but sometimes they are heard via a genuine pirate transmitter. A repeatedly aired program featured a lengthy pop music tribute to Princess Diana. They were Joel's first pirate log! Addr: Basel. (Joel Altre-Kerber, Buffalo, NY; Frodge; Pearce; Silvi)

Radio Azteca- 6955 at 2300. Bram Stoker has probably transmitted more comedy shows about DXing and DXers than any other similar station. Each show has a Letterman-style top ten list about something involving the DX hobby. Addr: Belfast. (Axelrod; Brandt; Frodge; Hassig; Poh; Silvi)

Radio Clandestine- 6955 at 0100. Somebody has been dusting off old tapes from Clandestine for rebroadcast. Rumor has it that this has been the legendary R. F. Burns himself. Addr: None. (Wood)

Radio Eclipse- 6955 at 0030. Steve Mann plays rock music and promotes the pirate radio scene. Addr: Providence. (Axelrod; Jurrens; Majewski; Wood)

Radio Free Euphoria- 6955 at 2315. Captain Ganja's rock and comedy format leans heavily toward the promotion of marijuana use. Addr: Belfast. (Axelrod; Frodge; Hassig; Pearce; Silvi; Wolfish)

Radio Free Jesus- A press release from the station says that they are organizing a marathon pirate broadcasting schedule featuring dozens of stations. If you're interested in participating, drop them a line. Addr: Huntsville. (Direct from the station)

Radio Metallica Worldwide- 6955 at 2300. Dr. Tornado and Señor El Nino have cut back on their formerly daily schedule, but they are normally audible a few times each week. Their ten kilowatt transmitter, announced as coming from a "cigarette boat" off the east coast, makes them easily the best heard North American pirate of all time. They were Frank's first pirate; congratulations! Addr: Blue Ridge Summit. (Frank Ambrister, Knoxville, TN; Jerry Berg, Lexington, MA; Arendt; Axelrod; Comeau; Frodge; Hassig; Jurrens; Majewski; Pearce; Poh; Silvi; Wilkins; Wolfish)

Radio Nonsense- 6955 at 2130. Joe Mama's station mixes rock music and plenty of funny parody commercials. We see their new QSL here. Addr: Belfast. (Trent Phillips, Cleveland, OH; Gary Neal, Sugar Land, TX; Robert Thomas, Bridgeport, CT; Arendt; Axelrod; Comeau; Frodge; Jurrens; Silvi)

Radio One- 6950 at 0030. Bobaloo's rock oldies format is produced in a highly professional manner, so the sound of this pirate is distinctive. Addr: Belfast. (Hassig; Jurrens; Silvi; Wilkins)

Radio Tellus- 6955 at 0130. Normally this one features rock music, but lately they have been adding old time radio dramas such as "The Shadow" to their entertcinment mix. Addr: Providence. (Hassig; Majewski; Silvi)

Radio Three- 6955 at 2000. I don't know about you, but I'm not a big fan of the syrupy pop music that Sal Amoniac hosts. Apparently he spent money while purchasing the music, so somebody likes it Addr: None; slowly verifies logs in *The ACE*. (Gerald Kercher, Quaker Hill, CT; Silvi)

Radio Tornado Worldwide- 6955 at 2330. They are the most active parody of Radio Metallica. The show consists of repeated off-air recordings of genuine remarks made over the air by Dr. Tornado, so look out for this one before ID'ing a pirate as Metallica. Addr: None; verifies logs printed in *The ACE*. (Axelrod; Majewski)

Radio USA- 6955 at 0045. Mr. Blue Sky and Joe King have begun their 15th year of broadcasting. A recent show was hosted almost exclusively by a female announcer, but a male announcer read their editorial criticizing Princess Diana for being an adulterous welfare recipient. Addr: Belfast. (Garth Goetzel, Kamloops, British Columbia; Dean Burgess, Manchester, MA; Altre-Kerber; Axelrod; Frodge; Hassig; Kusalik; Silvi; Wolfish; Wood)

Southern Music Radio- 6955 at 1515. North American relays of this New Zealand pirate seem to have increased lately, possibly motivated by the very sad news of the death of shortwave hobby legend Arthur Cushen. Addr: Belfast. (Dan Shumaker, Melvindale, MI; Frodge; Silvi)

Take it Easy Radio- 6955 at 0630. Ranier heard this rock music pirate from his European location at this extremely late time, although it was morning in Germany. Addr: Belfast. (Brandt; Hassig; Wilkins)

Voice of Baba Booie- 6955 at 2115. One of Howard Stern's sidekicks is memorialized by this parody pirate. Addr: None. (Altre-Kerber)

Voice of Hell- 6955 at 0015. The Lucifer Network was active well before Halloween this year, but the Devil is apparently not accepting correspondence at the moment. Addr: None. (Hassig)

WLS- 6955 at 2045. Some creative pirate has combined genuine jingles from the old top 40 WLS-890 in Chicago with rock oldies of the period. The effect is nostalgic. Addr: None. (David Krause, Eastlake, OH; Silvi)

WMFQ- 6955 at 1730. They play rock music, but the primary focus of this station is promotion of the QSL process. Addr: Providence. (Hassig; Silvi; Wilkins)

WMPR- 6955 at 0045. A strange mix of rock and new age music comes from this one. Ross says that their sign-off announcements of sound effects are often distinctive. Addr: None. (Comeau; Silvi; Wilkins)

WREC- 6955 at 2345. P. J. Sparx's elaborate shows are best known for his large collection of novelty and comedy recordings, all to the tune of rock hit songs. Addr: Belfast. (James Mansfield, Winston Salem, NC; Axelrod; Brandt; Frodge; Hassig; Kusalik; Phillips; Poh; Shumaker; Silvi)

WRX- 14403 at 2015. Jimmy the Weasel's new station has been operating at times on this unusual frequency. Programming is typical for pirates, with rock music and frequent ID's. Addr: Huntsville. (Chris Lobdell, Stoneham, MA; Silvi)

WRYT- 6955 at 2345. About one-third of shortwave pirates use AM mode instead of sideband. This is one of them. They spice their classic rock music with recorded funny telephone calls, frequently announcing a **bighank@aol.com** e-mail address. Addr: Belfast. (Axelrod; Comeau; Jurrens; Krause; Majewski; Phillips; Silvi; Thomas; Wilkins)

WSRR- 6955 at 2200. Solid Rock Radio is using these call letters lately. Sometimes they program a rap music format, while at other times they concentrate on pop music. Addr: Belfast. (Pearce)

WVOL- 6955 at 0100. Using a slogan of the "Voice of the Loon," they have returned after a silent period of almost six years. Look for rock and comedy programming from them. Addr: Belfast. (Altre-Kerber; Arendt; Hassig; Kusalik)

Ike Kerschner, N3IK

Hand Held Hamming

A lot of new hams (and some not so new) purchase a handheld VHF or UHF rig and use it from the house, the car, or as a pedestrian mobile. Using a handheld for multiple situations is quite practical and saves the cost of buying separate stations for each use. As long as there is a nearby repeater or group of hams, the handheld is usually satisfactory.

Normally on VHF/UHF the low power (1 to 5 watt) output will allow us to communicate with most stations or repeaters within a nominal range. Nominal range will vary depending on the terrain and location of the handheld. Most problems arise when using the handheld in a car or house with the factory equipped rubber duck antenna. Inside a car or house several factors can cause deterioration of our signal—wiring, appliances, metal structures nearby, or the shielding provided by the metal body of our vehicle.

The efficiency of your handheld transceiver (HT) can be improved. For example, in all cases adding an external antenna will increase range greatly. Even a simple quarter wave whip will provide a dramatic improvement. When using the rig inside your home, try to put an antenna on the roof of the dwelling. Gain antennas such as collinear and beam type antennas will provide maximum range.

If the antenna is going to be more than 30 feet or so from the rig use high quality 50 ohm coax to connect the antenna to your HT; small RG-58 or RG-8x is very lossy at VHF frequencies and above and should not be used for long runs.

If you are going to use a beam antenna, an antenna rotor will be needed unless you only want to work stations in one direction. Remember that FM stations are generally vertically polarized so your antenna must be vertical. Horizontal antennas will decrease signal strength up to 20 dB (about 100 times). A vertical antenna is a whip or length of tubing that goes straight up and down, or a beam antenna that is fed with the elements in a vertical position.

An external antenna on your vehicle likewise will provide superior performance to the HT's rubber duckie inside the car. Mobile antennas come in several styles; most are either 1/4 wave or 5/8 wave. The 5/8 wave is usually preferred for longer distances. These antennas mount to the roof of your car with a magnet (mag mount), mount on the glass of a window, or are installed in a hole drilled into the body of the vehicle. The preferred method is a permanent mount (hole in car) mounted in the center of the roof. My second choice is a mag mount in the center of the roof (mounting lower can cause pattern distortions). However, even a trunk or bumper mounted antenna outside the car is much preferred over the rubber duckie inside.

Window or glass mounted antennas are a different story altogether; I have only found one glass mount that I like—the "Larsen"—expensive but effective!

Simply put, the rubber duck antenna leaves a lot to be desired for anything other than use within a few miles of a repeater. When the rubber duck won't cut the mustard, consider some HT-mounted alternatives. There are 1/4 wave, 3/8 wave, and 1/2 wave antennas that snap directly into the BNC fitting of your HT, and provide surprising improvement in performance.

Do not use these extended antennas inside a vehicle due to their length. Use inside a house is okay, but exercise common sense! One brand of HT antennas available from most ham dealers is MFJ.

Power!

Many hams consider an amplifier necessary for adequate communications; at VHF/UHF this is not usually true. If you are attempting simplex communication over extended range, then by all means add an amplifier, beam antenna, and preamplifier for the receiver. But for most communications the under ten watts provided by most handhelds is more than adequate. One must also use caution when using higher power or a beam antenna not to interfere with a repeater that you really do not want to use.

Useful Accessories

If you are using the handheld portable and must move around, then a battery pack is a must, but if the unit is used in the house, a small AC operated power supply will allow extended use without draining the batteries. Likewise, if used in a vehicle, a cable from the cigarette lighter to the HT will provide plenty of operating time at high power: should there be a problem with noise from the alternator or other sources, wiring directly to the vehicle battery often provides relief.

I use a battery pack called the Power Pocket that attaches to the belt for both portable and mobile operation; it allows many hours of operation with each charge. It's available from many dealers, including Grove Enterprises.

Two things that can make your HT hamming easier and more enjoyable are an external microphone and speaker. Though the familiar speaker/mike is easily held in the hand and excellent for average use, I prefer a separate speaker when mobile to overcome external vehicle and wind noise. (I use a powered mobile speaker with built-in amplifier from Radio Shack.) Most speaker mikes have a mini-jack molded into the connector for external speaker attachment.

Another Radio Shack product I use with the HT is their super velcro to mount the rig in a convenient location so it does not slide around in the car.

Happy holidays to one and all!

AND MORE!

RADIO FUN WITHOUT A LICENSE

Jock Elliott, KB2GOM
lightkeeper@sprintmail.com

The most fun you can have without a license?

What the heck is ". . . and more"? Well, it's a brand new column for *MT*. The idea is to focus on two-way radio that people can use without passing a test — working tools that families and individuals can use to stay in touch, to travel more safely, and to run their lives more efficiently.

Among the topics we'll explore in ". . . and more," will be Citizens Band, Family Radio Service, and General Mobile Radio Service. These are all radio services that require either no license or simple payment of a license fee. From time to time, we may even touch on 49 MHz equipment and Marine VHF. Again, these are communications tools that ordinary folks can access with little or no hassle.

The focus will be on legal use of these tools, so if you're looking for a column that is going to discuss 11-meter freeband operations, this isn't it. But if you're interested in great tools for communications that don't have a monthly fee or a licensing test associated with them, grab a cup of coffee and make yourself comfortable, because that's what ". . . and more" is all about.

Finally, this is your column, too. So if you have comments, questions, things you'd like me to write about, examples of your experiences with any of these radio services, or simply opinions you'd like to share, write to me here at *MT* or email me at *lightkeeper@sprintmail.com*.

An SSB unit like this Cobra 2010 can nearly double your range.

The SSB Advantage

Now, let's talk about one of my favorite modes of communications: single sideband CB. To lay some groundwork, Citizens Band is the most popular radio service that can be used by ordinary citizens. Every year, millions of CBs are sold through Radio Shack, Walmart, and countless other retail outlets as well as CB specialty stores. It is estimated that the installed base of CB radios is in the range of 40-50 million transceivers. That's a lot of radios.

CB is "licensed by rule-making." That means you don't have to have a license; instead you are legally obligated, says the Federal Communications Commission, to abide by the CB rules that are packed with every CB radio sold in the United States. If you don't follow the rules, and the FCC catches you, you could be subject to fines of $2,000 or more.

There are 40 channels designated for legal CB operations in the U.S. and Canada, starting at 26,965 kHz and ending at 27,405 kHz. Most CB radios are designed to operate in AM mode and are legally limited to 4 watts transmitter power. The range of AM CBs under the worst conditions is 1-3 miles between mobile units and 3-7 miles between base stations. But there is a way to legally triple the transmitter power and nearly double the range of CB — by operating in single sideband mode.

Here's how it works: an ordinary AM CB signal is a bit like a peanut butter sandwich — it consists of a center carrier (the peanut butter and jelly in the middle) and two sidebands (the slices of bread on either side). The two sidebands carry the actual information in the signal such as the sound of your voice — and they are identical. The carrier, which carriers none of the information and consumes 50% of the transmitter power, is transmitted to give the receiving CB a reference to lock onto.

So, if the sidebands are identical and the carrier contains no information, what would happen if you eliminated one of the sidebands and the carrier? Answer: you'd have a single-sideband signal that concentrates more power into a more efficient package. Instead of four watts, half of which is wasted in a carrier, you'd have 12 watts of power providing some serious "oomph" to your signal.

Does it work? You bet! Throughout New England and in many other parts of the country, there are sideband networks that operate evenings on CB Channels 36-40, usually in lower sideband mode, although some groups operate in upper sideband. These operators routinely talk station-to-station at distances of 30 miles and more (when long distance, or skip, propagation is operating, it's possible to talk across oceans with just 12 watts). And sidebanders are a different breed from AM CBers — they use identification numbers instead of CB handles; they frequently use ham radio lingo, such as CQ, QRM, and the like; and they generally seem to have a great deal of fun.

There's a rub, though. If you're operating in sideband (SSB) mode, you can only talk to, and understand signals from, another sideband station operating on the same sideband. But since all sideband-equipped CBs sold in the U.S. also have AM capability, with the flip of a switch you can be back in AM mode if you chose.

My experience with years of sidebanding has been overwhelmingly positive: the operators are courteous and often offer interesting conversation. Is CB sideband the most fun you can have without a license? I think so. Give it a try and find out for yourself!

Doug Demaw, W1FB

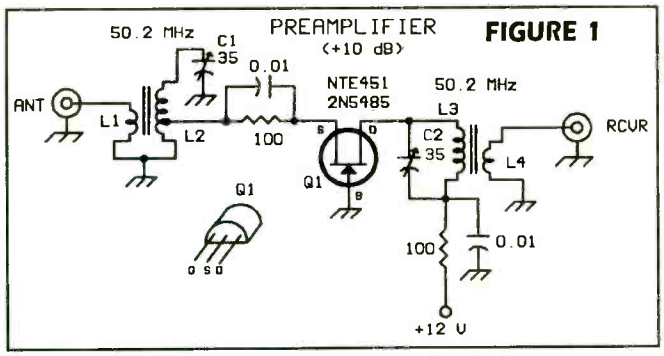
Monitor the Amateur 6-Meter Band

Propagation at the upper end of the high-frequency spectrum, and well into the VHF region, will improve more and more as the sunspots increase. Sporadic-E skip will become more and more common from roughly 25 through 150 MHz. However, sporadic-E propagation is somewhat rare above approximately 100 MHz, but it does provide occasional openings in the amateur 2-meter band. I recall working a station in Minnesota on 144.7 MHz while living in Connecticut.

I was operating with 10 watts of SSB power and using my 10-meter, 4-element Yagi beam! My signal report was 5 X 8 in Minnesota. This proved once more that low power and almost any antenna will suffice when the conditions for E-skip occur. That is one of the principal delights of monitoring during this special propagation event.

Sporadic-E propagation takes place when various cloud layers become ionized by solar radiation. The signals reflect off these charged cloud layers to provide long distance communications, some of which are of very short duration.

The amateur 6-meter band extends from 50.0 to 54.0 MHz. Most of the SSB voice activity occurs between 50.1 and 50.3 MHz. FM communications (simplex and repeaters) occur between 51.0 and 54.0 MHz. Unfortunately, there are not many commercial receivers or transceivers that include the 6-meter band. A number of older tube types of receivers included the 6-meter band, but performance at 50 MHz was dismal by today's standards. These older receivers can be perked up by using a low-noise preamplifier ahead of them. A suitable circuit is provided in figure 1.



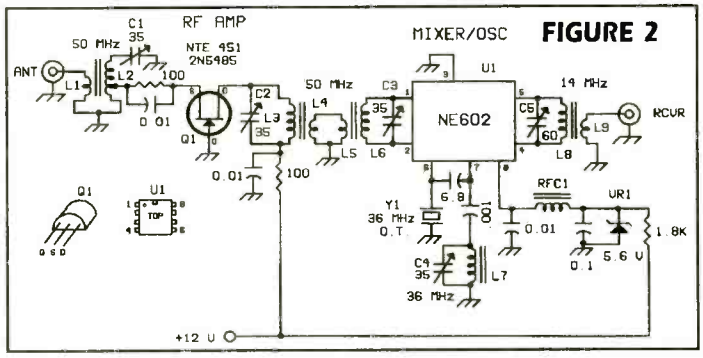
A simple RF preamplifier that can be used with older receivers to improve the sensitivity at 50 MHz. C1 and C2 are 35 pF trimmers.[3] L1 and L4 consist of two turns of no. 24 enam. wire at the lower ends of L2 and L3. Windings L2 and L3 have 14 turns of no. 24 enam. wire on Amidon T-37-10 toroid cores. Tap L2 at 4 turns above the grounded end. Decimal value capacitors are in μF.

Receiving at 50 MHz

You may build the simple converter in figure 2 if you do not have provisions for receiving the amateur 6-meter band. Only two devices are needed for this circuit. A junction field-effect transistor (JFET), Q1, is used as a low-noise RF amplifier. U1 is the popular NE602 mixer/oscillator integrated circuit (IC). When operating the converter you can tune from 50.0 to 50.3 MHz by using the 20-meter band of your receiver or transceiver as the tunable IF (intermediate frequency). Ham band receivers can be tuned from 14.0 to 14.3 MHz for coverage from 50.0 to 50.3 MHz. If you own a general coverage HF receiver you may monitor the entire 6-meter band by tuning from 14.0 to 18.0 MHz. The standard SSB calling frequencies on 6 meters are 50.125 and 50.2 MHz. The national FM simplex calling frequency is 52.525 MHz. There is an AM calling frequency at 50.4 MHz. CW operation takes place from 50.0 to 50.1 MHz. Propagation beacons may be heard between 50.0 and 50.1 MHz during band openings.

If you do not want to construct a 6-meter converter, you may purchase an MFJ Enterprises 9406 mini transceiver for 6 meters.[1] Available also is the Ten-Tec model 1208 6-meter transverter kit at a modest price.[2] These units should appeal especially to those who have amateur licenses. They transmit as well as receive. The transmitter power for each unit is approximately 10 watts on SSB.

Schematic diagram of the simple 6-meter converter. Decimal value capacitors are in μF. Others are in pF. Resistors are 1/4-W carbon. C1, C2, C3, C5 and C5 are ceramic or plastic trimmers.[3] L1 and L4 have two turns of no. 24 enam. wire over the lower ends of L2 and L3. L5 is two turns of no. 24 enam. wire over the center of the L6 winding. L2 (0.5 μH) has 14 turns of no. 24 wire on an Amidon T-37-10 toroid.[5] Tap at 4 turns above grounded end. L3 and L6 (0.5 μH) have 14 turns of no. 24 enam. wire on T-37-10 toroids. L7 (1 μH) has 18 turns of no. 26 enam. wire on a T-37-10 toroid. L8 (3.2 μH) contains 25 turns of no. 26 enam. wire on a T-50-2 toroid. L9 is 3 turns of no. 24 wire over the lower end of L8. RFC1 consists of 10 turns of no. 24 enam. wire on an Amidon FT-37-43 ferrite toroid. U1 is an 8-pin DIP IC.[3] VR1 is a 5.6-V, 400-mW or 1-W Zener diode.[3] Y1 is a 36-MHz 3rd overtone crystal (Digi-Key no. SE-3450-ND).[4]



Simple Antennas Can Suffice

Casual monitoring of the 6-meter band does not require an elaborate antenna. Directional beam antennas, such as Yagis and cubical quads, can be used with a rotator to obtain maximum gain and directivity for a chosen beam heading. However, for sporadic-E propagation, an omnidirectional antenna is usually adequate. Quarterwave vertical ground-plane antennas are easy to build. They work effectively for 6- or 10-meter reception. CBers have long favored vertical antennas for local and skip operation on 11 meters.

Figure 3B contains information for constructing a 6-meter vertical ground-plane antenna. Details are included in figure 3A for constructing a half-wave dipole. The dipole may be erected vertically or horizontally. It will be directional off its broad side (figure-8 pattern) if it is erected horizontally. Vertical mount-

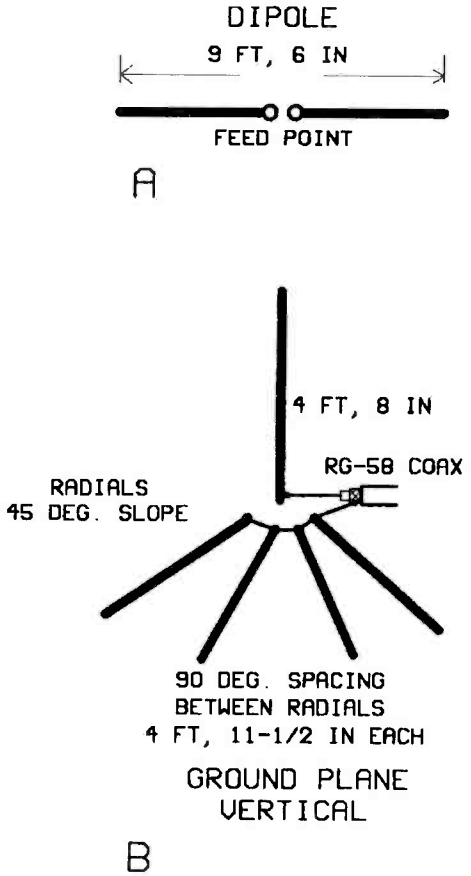


FIGURE 3 — *Dimensions for a 6-meter dipole (A). A 6-meter ground plane vertical is shown at B. The radials can be made from no. 14 wire. Aluminum tubing or copper pipe will serve as the vertical element. Wire may be used for the vertical element if the upper end has an insulator and the system is hung from a tree limb or other support.*

ing makes it omnidirectional. The coaxial feed line must come away from the vertical dipole at a 90-degree angle for at least 10 feet in order to prevent the feed line from affecting the antenna balance.

Dimensions for a simple 3-element Yagi beam antenna are given in figure 4. You may use 3/8- or 1/2-inch OD aluminum tubing for the elements. The 1- or 1-1/4 inch OD boom is 10 feet long. This antenna should be used with a rotator and erected horizontally for best results. Antenna gain in the favored direction is approximately 7 dB. The characteristic feed point impedance is 35 ohms with the specified quarter-wave spacing between the elements. Therefore, a coaxial impedance-matching section, L1, is included in the figure 3 design. This matching section establishes an SWR (standing wave ratio) of 1.5:1 or less at 50.1 MHz.

The Yagi dipole (center element in figure 3) must be insulated from the boom in order to prevent the feed point from being grounded. A 3/8- or 1/2- inch thick piece of durable plastic, such as delrin or nylon can be attached to the boom for this purpose. Small U bolts may be used to affix the two dipole sections to the plastic block. U bolts may be used also for attaching the insulating block to the boom. Metal plates and U bolts can be employed for attaching the remaining elements to the boom.

The Nature of the 6-Meter Band

There will be days when no signals are heard on 6-meters. The band can become alive instantly, just as though a switch had been turned on. Signals can fade or vanish just as rapidly, depending upon radical propagation changes. During conditions of intense sporadic-E activity, 50 MHz is likely to be as alive with SSB signals as is 14 MHz on a good day.

Band openings are most likely to occur in the mid forenoon and early evening hours. However, openings can and do take place at all hours of the day.

If you live in a large urban area it is likely that local 6-meter activity will be heard regularly during the evening hours and on weekends. A rotatable beam antenna is helpful for homing in on local signals that may otherwise be weak.

Converter Construction Tips

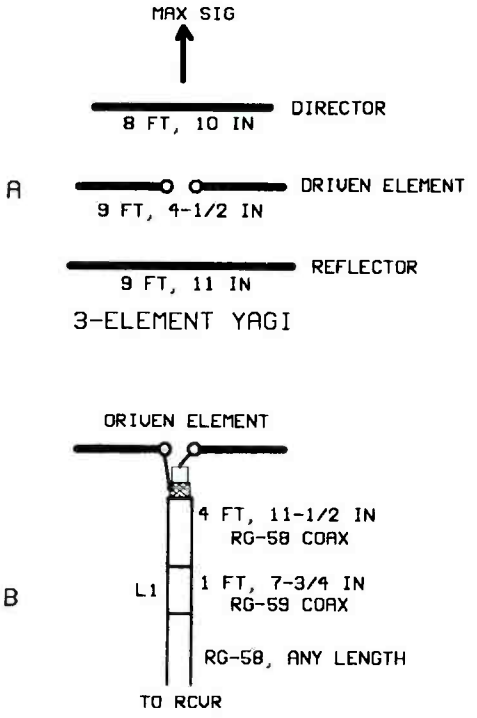
VHF and UHF circuits require greater layout care than is required for HF circuits. The shortest piece of wire can become part of a coil or circuit element. Long PC board conductors or wires act as additional unwanted inductances. Therefore, all RF connections should be as short and direct as practicable. Likewise for the leads on capacitors, resistors and transistors. The figure 2 converter can be assembled "dead bug" style or on a piece of perforated board. Experienced builders may want to design a small PC board for this project.

Adjustment and Use

Attach a 50-ohm, 6-meter antenna to the converter input jack. Connect your receiver to the converter output jack. Tune your receiver to 14.2 MHz. Apply +12 volts to the converter. Adjust C4 until you hear a significant increase in receiver background noise. This will indicate that Y1 is oscillating at 36 MHz. If you can find a weak 6-meter signal near 50.2 MHz, adjust C1, C2, C3 and C5 for maximum signal strength. If there are no signals available, use an electric razor to generate hash while adjusting the trimmers for maximum noise response. Amateurs may use the 7th harmonic of 7.171 MHz as a tuneup marker for 50.2 MHz.

Since the converter draws very little dc current (roughly 25 mA), you may use an inexpensive +12-volt dc wall transformer for the power supply. Reasonable performance may be expected when using a +9-volt wall transformer.

FIGURE 4 — *Dimensions for a simple 3-element, 6-meter Yagi (A). Antenna gain is roughly 7 dB. Element spacing is 1/4 wavelength. See text for more details. Illustration B shows the driven element and the matching section, L1. The feed line should be sealed against dirt and moisture at the junctions of the 75-ohm coax transformer section, L1.*



Closing Comments

Most of the parts for the figure 1 and figure 2 circuits can be obtained from Dan's Small Parts.[3] Crystal Y1 and other parts for these circuits are available from Digi-Key Corp.[4] The toroid cores may be obtained by mail from Amidon Assoc., Inc.[5]

Notes

1 — MFJ Enterprises, Inc., Box 494, Mississippi State, MS 39762. Phone: (601) 323-5869.
2 — Ten-Tec, Inc., 1185 Dolly Parton Pkwy., Sevierville, TN 37862. Phone: (423) 453-7172.
3 — Dan's Small Parts, Box 3634, Missoula, MT 59806-3634. Phone: (406) 258-2782.
4 — Digi-Key Corp., 701 Brooks Ave. South, Thief River Falls, MN 56701-0677. Phone: 1-800-344-4539.
5 — Amidon Associates, Inc., 250 Briggs Ave., Costa Mesa, Ca 92626. Phone: (714) 850-4660.

Jean Baker, KIN9DD

A Guide to VHF Aero Freqs

Season's greetings and welcome aboard! Today, we present a look at the VHF aero communications band.

The communications portion of the VHF aero band begins at 118.000 MHz and runs through 136.975 MHz. 108.000 through 117.975 is allocated to navaids.

118.000 - 121.400 Air Traffic Control

121.500 International VHF Emergency Frequency. Its UHF counterpart is 243.000 (121.500 times two). The VHF frequency can be utilized for both voice and emergency locator transmitter (ELT) purposes. Upon impact, the device is supposed to begin emitting a downswept-type of tone, enabling rescuers to pinpoint the location of the aircraft in distress. However, ELTs have been known to go off for no reason whatsoever, leading to a great deal of embarrassment.

121.600 - 121.95 ATC Ground Control.

121.975 - 122.675 Flight Service Stations. These stations provide general aviation (private pilots) with information on airport conditions, radio navigational and communications aids, plus facilities for helping pilots to process flight plans, dispense weather sequence information and to perform many other functions. They are located all across the country and are operated by the FAA.

122.700 - 122.950 Unicom Frequencies. Unicoms are usually operated by private enterprise. They are defined as aeronautical advisory communications facilities and are usually located at or nearby an airport. At quite a few small air fields, a Unicom is the only communications facility located on site. In the absence of a control tower, the Unicom provides general information on wind direction, runway conditions, and field status. They may also offer some information on local accommodations, fuel, and repair services.

122.975 - 123.075 Helicopter Unicom. Utilized by helicopters air-to-air and air-ground-air.

123.100 - 123.125 Search and Rescue. Used by the Coast Guard, Civil Air Patrol (CAP), and others involved in rescue activities.

123.125 - 123.425 These frequencies are used by manufacturers engaged in design, development, evaluation and testing of aircraft components. They are also used for other purposes, such as Multicoms.

123.450 - Air-to-Air. This frequency is where pilots of commercial aircraft carry on conversations with others in the area. Transmissions on this freq can be *very* interesting!

123.500 - Flight Schools. Also utilized by glider pilots and towing craft for coordination with ground stations.

123.525 - 123.575 Flight Test.

123.6 - 123.650 Arrivals and Departures. When a flight service station is located at an airfield where an ATC Control Tower is not available, pilots of arriving and departing aircraft will use this frequency for communication with FSS personnel.

123.675 - 128.800 ATC frequencies.

128.825 - 132.000 Aeronautical Company Stations and ARINC. These can be very interesting and fun to listen to. Give 'em a try.

132.050 - 135.975 Air Traffic Control

136.000 - 137.000 Company Stations, Air-to-Air, ATC

Readers' Corner

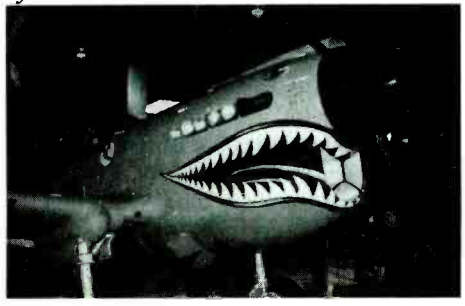
• Larry Fowler (NY) wrote a very timely letter to us concerning the last category (above) of company stations. Yes, there is life on the 136.000-136.975 portion of the aero band! To put it in his own words: "While listening to the local ARTCC sector, one day, I heard two TOURJET flights acknowledge each other after Boston (Center) pointed out they should take note that each had 'company' on the frequency.

"One flight asked the other in a heavy foreign accent to 'switch over to company.' The other flight couldn't understand the request so he repeated 'come up on 136.800.' I switched over there also and found out they both were headed into Sanford, Maine.

"This was the first time I'd heard anything from 136 - 137 MHz. But this got my interest and I added this to my search scanning. After a few days, I had another hit identified in this range: 136.525 Emery Freight at Logan Int'l, Boston, Mass. I did find one more on 136.250, but never did find out who was using it. A friend recently gave me a freq he had found in this range, too: 137.000. It's being used as an air-to-air freq by the Air National Guard F-16s from Burlington, Vermont, 158th FG. So you never know who you're going to find in that range!"

Larry added that all transmissions heard were in the AM mode.

This ferocious P-40 "Warhawk" was sent in by Bert Hunneault.



• Jim Taylor (TX) sent the following San Antonio International Airport freqs to share with everyone:
Tower - 119.800
Approach\Departure - 124.450,125.100, 125.700, 127.100, 128.050
ATIS: 118.900
Clearance Delivery: 126.700
Ground Control - 121.900

A Seasonal Poem

"Jolly Old St. Nicholas, I'm from the FAA.
I've been told that you have no
transponder on your sleigh.
Christmas Eve is coming soon,
so listen close to me
Get your sleigh transponder-rigged,
be sure it has mode C!
"When the clock is striking 12
and the kids are all asleep
Controllers at their radar scopes
an eye on you will keep.
While you're flying through the sky
and no mode C appears
Put your reindeer out to graze,
you're grounded for 5 years!"

The above poem can be sung to the tune of "Jolly Old St. Nicholas," and was sent in anonymously. I can see why, hi!

That's all for this month. See you in January; until then 73 and out.

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DELTACOMM I-8500 Communication Manager for the ICOM IC-R8500 communication receiver. With speed as a design goal DELTACOMM's QUICK LOG function will log signal level, frequency, mode, date, time and optional Global Positioning System (GPS) coordinates at speeds in excess of 2400 channels per minute. Here are a few examples of the many advanced features DELTACOMM I-8500 has to offer.

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Visit our Internet Web Page or Phone/FAX us for program features, new product releases and pricing schedule. DELTACOMM is available for ICOM R9000, R7100, R7000, R71, R72, IC-735 (features vary with type of radio). Also check out our DELTATONE 2.0 repeater programmer.

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Note on advertisement below: As of 4/26/94 it became unlawful to market cellular-capable receivers in the U.S. Atlantic Ham Radio assures us that it will give a full refund and hold customers harmless from shipping expenses if a purchased unit is returned to the vendor by US Customs.

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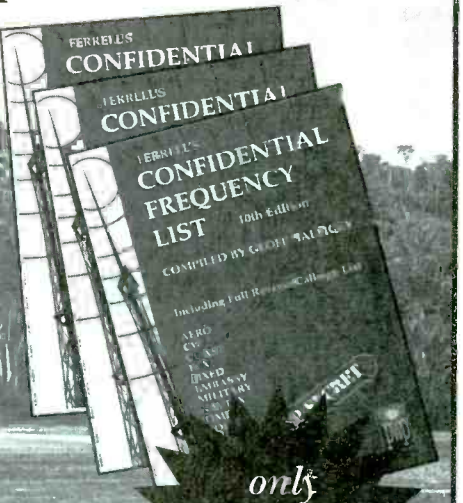

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FEDERAL FILE

A GUIDE TO GOVERNMENT COMMUNICATIONS

John Fulford, WA4VPY
email: JOHNF0413@aol.com

Waiting for Blast Off...

As you may know, I am located in Southern Florida approximately 125 miles south of the Cape. Events get interesting down my way occasionally, when there is a chance a rocket launch might not go as planned. The Cassini probe to the planet Saturn, for example, was the source of much controversy at its launch in October. Since sunlight at the surface of the planet Saturn is approximately 100 times less than what hits the surface of planet Earth, solar power sources were out of the question. Hence, the Cassini used a nuclear reactor powered with approximately seventy pounds of plutonium on board for its power source.

If the unthinkable had occured and the Titan launch vehicle experienced a launch failure, there was a very remote chance that the plutonium could go into the atmosphere. The dispute spawned numerous demonstrations in the area of the Cape.

Our old monitoring friend, John Mayson, has provided what he considers the most interesting frequencies audible from his listening site west of the Cape. Keep these handy for those times when monitoring could get truly "interesting."

Frequency	Use
165.1125	Cape communications
163.5125	Director of operations--Eastern Test Range
409.4750	Department of Energy
163.5875	FCA net
165.0875	Security--Tac 3
170.1250	Security--Main channel
157.6000	Coast Guard
156.8000	Coast Guard
157.0500	Coast Guard Range Control
157.1000	Coast Guard
157.1750	Coast Guard

The most interesting monitoring prior to the launch took place on the Cape Canaveral Air Force Station (launch site for the probe) on their security frequency of 165.0875 MHz. The traffic was not routine. Almost all of it was devoted to the Cassini protestors. The Poseidon Marine Patrol Boat and the Trident Marine Patrol Boat were heard in communications regarding attempts to gain access to the launch area by coming in from the Atlantic Ocean in small boats. On the other hand, local police frequencies—both municipal and state—were quiet because the security folks at the Cape handed out their radios to every type of law enforcement that came into town.

Prior to the last launch of the shuttle *Atlantis*, the following frequencies were monitored in the Cape area:

KSC = Kennedy Space Center
PAFB = Patrick Air Force Base

Frequency	Use
126.6500	KSC weather spotter airplanes
133.7500	PAFB tower
139.0500	PAFB ALCP
141.3000	PAFB air support--this is in A.M. mode
143.4500	USAF MARS discussing launch
163.4875	KSC security
164.7000	PAFB crash/fire
173.0250	PAFB security
259.7000	Atlantis orbiter to ground during launch
282.8000	Military air operations
294.6000	US Coast Guard
344.6000	PAFB air
373.2000	PAFB air

Prior to a launch, there is also a lot of interesting shortwave activity coming from Cape Radio. During the last *Atlantis* shuttle launch, the shortwave frequencies of 3187 kHz and 5246 kHz provided an up to the minute report of what was transpiring prior to the launch. The Department of Defense operates the Cape Radio system.

Some of the players monitored on with Cape Radio were DOD Cape, CapeCom, *USS Scott*, King 1,2,3,4 (these are aircraft). During the post-launch search and rescue exercise, WWV/WWVH was broadcast over 3187 and 5246 kHz as a time marker. The WWV signal yielded to any comms from any units on the frequency. These frequencies sure beat the information provided by the local television stations.

While on the topic of space operations, there are two other installations that have been monitored in the recent months. The first is the NASA Ames Research Center at Mountain View, California. They operate on a trunked system in the UHF bands. The system layout is as follows:

Trunk Channel	Frequency
Chan 1	406.550
Chan 2	407.350
Chan 3	408.350
Chan 4	408.950
Chan 5	409.750
Chan 6	411.350

The NASA facility at Greenbelt, Maryland, was one of the first federal agencies in the northeast to switch to a trunked system. Frequencies are as follows:

410.275	417.225	Control/Voice
409.525	416.700	Control/Voice
408.625	415.525	Control/Voice
408.150	412.250	Control/Voice
407.000	412.000	Phone patch

An Update:

In the October 1997 Federal File, I mentioned a data delivery signal on 142.9250 MHz. This is an offshoot of the discontinued 163.350 MHz EMWIN weather signal. Mr. Jerry Johnson of the National Weather Service, one of our loyal readers, is involved with the radio project and has brought us up to date.

The 163.350 MHz signal has been recently moved to 400.1750 MHz by the National Weather Service. The signal on 142.925 MHz is transmitted at double the data rate of the original EMWIN signal (2400 baud) and they use this frequency to test new technologies and software that will be migrated to the GOES satellites and to other EMWIN ground stations.

The signal originates in Laurel, Maryland, at a power of 100 watts. The National Weather Service has nothing to do with the 139.650 MHz data signal also mentioned in October. Thanks, Jerry....

The Wild West

A lot of reports have come to us from out west regarding federal monitoring, so let's look at some of them. The **City of Las Vegas'** FBI office provided local monitors with a very convincing hostage rescue/SWAT Team exercise. All comms were on 164.550 MHz with 167.9 Hz tone. This is referred to as Channel D-1. Las Vegas has an extensive FBI repeater system. Here is the latest frequency layout according to the "Las Vegas Scanner Guide" Fourth Edition, Feb. 1997.

Rptr Out	Rptr In	Channel
167.2125	163.9125	Hotel-6
167.2625	163.8875	
167.3875	163.9875	Bravo-2
167.4875	163.8375	
167.5375	163.8625	Delta-6
164.5500	168.8625	Delta-1
167.5625	Simplex	

Dale from **Kansas City, Kansas**, updates us on federal activities in his city. In October, I mentioned the DEA using a trunked system in Garden City, New Jersey. It was Garden City, *Kansas*. Sorry about that. The information was good, though, and here is some supplemental

info for those of you with TrunkTrackers in that area.

DEA uses the Nextel radio system with a fleet map of E1P1. The frequencies are 861.1125 through 865.1125 MHz and 861.6125 through 865.6125 MHz. The ID for the DEA Task Force is 001-14. The DEA has just recently installed a repeater on 418.9000 MHz and also use 418.7500 MHz for simplex. Most of the traffic is in the clear. Hope this helps make up for the error.

The following is a Kansas City frequency assignment for the Immigration and Naturalization Service.

Frequency	Use
163.6250	KS base PL 100.0 Hz
162.9000	Portable rptr output
165.9000	Portable rptr input
163.6750	KS investigators
163.7250	Tac 1
163.7750	Tac 2
163.7500	Tac 3
163.6500	Tac 4

Our monitor Chris Parris in **Houston, Texas**, has been receiving some interesting communications on 167.8750 MHz. The traffic is from a repeater with units identifying as Radio Shop, Command Post, 519 Security. The traffic seems to be coming from the Texas Nuclear Project in Matagorda, Texas, which is about 90 miles southwest of Houston. It turns out this frequency belongs to the Department of Energy. One station has identified as Beaumont, which could be Beaumont, Texas. Is this a network of stations along the coast to monitor radiation in the event of an accident at the Texas Nuclear Project?

While we are down in Texas, it appears that President George and Barbara Bush are back at their Houston residence for the long winter months. There has been increased activity on the USSS Protective Detail channel in the Houston area. They are using the Baker frequency of 165.7875 MHz. They do *not* appear to be using the PL tone of 103.5 Hz. Our monitor Chris Parris, again, has been monitoring the Secret Service channels with the PL activated in his BC-9000 radio but was not hearing any activity. Thinking something was amiss, he turned off the PL capability and there they were.

President George is Timberwolf and Barbara is Tranquility. The Bush residence in Houston is Tuxedo. The callsigns of Tracker and Transport will be heard when the Bushes go out and do the town.

... and Elsewhere

John Schaffner provides us with the FBI frequencies he is monitoring in **Ohio**. They are:

Dayton:	167.4875	163.9875	173.1750	173.1750
	167.3625	170.9000		
Columbus:	170.6750	170.6250		
Lima:	167.2875	167.7875		

Our monitor in **Rochester, New York**, Ed Mathes, reports that the local FBI frequencies are *dead*. A friend of his, "in the know" reported to him that 99.9 percenrt of the FBI traffic is being done over cellular phones. Even the SMR trunked systems have not seen any FBI activity there. Keep monitoring...

An unidentified monitor in the **Washington, D.C.**, area asked about the DC law enforcement unit that identifies with the callsign "Boardwalk." They are using the frequencies of 415.9750 and 414.6750 MHz. This is the Foreign Missions Branch, Uniformed Division, United States Secret Service. These are the ones that guard the embassies, among other things. Other elements of the USSS can be found on 414.850 and 415.650 MHz. The White House units are usually on 418.775 and 418.350, but these are usually encrypted. All tones are 103.5 Hz.

Alan Henney reported a **Washington, D.C.**, mystery to the Scan-DC mailer list. Often seen on Capitol Hill, near the White House and in the area of the Willard Hotel, are dark blue Lincoln Towncars with DC tags. These Towncars stick out among the other vehicles. Some of them have as many as four, elevated-feed, 800 MHz style antennas on the trunk and a VHF quarterwave on the rear deck.

Inside the cars there appear to be a mobile data terminal and at least one cell phone. It is apparently not uncommon to find several of these Towncars parked with the drivers just sitting inside. These cars do not appear to belong to any commercial limo company in the Washington area. The tags generally come back to Ford Motor Credit Company.

Cars like these can be seen at the Army garage located in the 1200 block of 22nd Street NW. This is known as location Carpet. They have similar 800 MHz antennas on them. Our monitor Ed Ashcraft has also noticed them out at Ft. Mead. A couple of weeks ago they were occupied by a Special Response Team or a SWAT Team personnel. Any clues?!

Also down at Ft. Meade—home of the National Security Agency—one of the NSA frequncies has been operating "in the clear." Check out 410.025 MHz. This channel is usually encrypted.

Those of you in the **Washington and Baltimore** area that have been accustomed to monitoring the State Sword nets on 139.175, 139.350, and 143.175 have probably been noticing the decreasing activity. The radio users are slowly switching over to the trunked system at Ft. Belvoir. These trunked channels are:

406.200 406.300 406.525 406.775 407.950 408.850 409.250 411.200

The VHF system is still used, but is becoming a backup system.

Our monitor down near the **Quantico Marine Base**, Bob Brubaker, sent in the following frequencies from Quantico:

Frequency	Use
41.950	Tower
125.800	Tower
126.200	Approach/Control
134.100	Radar service
140.100	Marine Corps crash rescue
149.450	Emergency opns rptr output
150.125	Emergency opns rptr input
169.500	FBI Academy
140.275	Ambulances
140.550	Medical paging
149.100	MP Rptr output
149.425	MP Rptr input
149.130	MP secondary simplex
149.350	Fire Department rptr output
150.075	Fire Department rptr input
149.375	Base operations

In closing for this month, a *new* Customs frequency for **South Florida** has been discovered here in my backyard. It is 170.725 MHz output and is referred to as the "Palm Beach Repeater" covering Ft. Pierce down to Ft. Lauderdale.

Happy listening and happy holidays...

Ken Reitz, KS4ZR
e-mail: ks4zr@compuserve.com

Your Satellite TV Questions Answered

Computers drive the electronics industry. From microprocessors for tuning radios to software for controlling dish movements in satellite TV gear, computers are an inescapable fact of modern life. This column is written on a computer and e-mailed to the editor whose computer fits it into the magazine format. If you want to ask a question about satellite TV you have only to crank up your computer and fire off a note to the above e-mail address — In fact, many of you have, and that's the subject for this month's Adventure.

Of course, if you're not "on-line" the U.S. Mail still does a decent job of delivering the first class stuff and a note to the address in the front of this magazine will also get a reply. (Mail queries should be accompanied by a self-addressed stamped envelope.) So, here are a few of the questions most recently asked.

***Q.** Can you hear the audio stations on a transponder where the video is scrambled, or does it have to be in the clear to be able to hear the radio portion as well?*

Hispavision is a service of TVE (Television Espana) transmitted from Spain to Latin America and may be received in much of Eastern U.S. on Ku-band.

A. This is a great question because it's very sensible. Well, the answer is pretty sensible, too. It turns out that the audio and the video are sent on different parts of the signal, which is called the *carrier*. The audio is picked up in a separate part of the receiver which has its own tuning section. Typically, the bandwidth on a satellite transponder is so wide that, not only can a full video signal be transmitted, but there's plenty of room for more than one audio subcarrier.

However, in the case of the VideocipherII (VCII) encryption systems, the audio is sent in a digital format which is decoded by the VCII module of the receiver, not the regular audio tuner. Therefore, without a module installed, no program audio would be heard. Still, there's room for analog audio subcarriers, which is what we have, for instance, with the Playboy Channel on Galaxy 5 channel 2.

The video and program audio is VCII encrypted, but if you tune the receiver to 5.58 and 5.76 MHz (left and right channels; it's stereo!) you will hear KLON-FM from Long Beach, CA, a non-commercial jazz station. Knowledge TV which is on Galaxy 5 channel 21, has analog video programming in the clear. In addition, there are six pairs of frequencies used as subcarriers for the "Super Audio" group of audio services (see chart on the left).

The best part is that you don't have to watch TV to enjoy listening to satellite audio, and there are nearly 100 audio subcarriers listed in the "Satellite Radio Guide" section of the latest *Satellite Times*. Programming ranges from many international shortwave broadcasters such as The BBC World Service and Deutsche Welle (both on 24 hours a day) to FM broadcasters like WQXR-FM, New York, and specialty services such as reading services for the sight impaired.

Others include CNN Radio, religious broadcasters, and Yesterday USA, which plays old-time radio dramas and comedies all day long. It's a fascinating line-up of listening which is unrivaled in any radio market. Listeners searching for news in their native tongue will find Japanese, Spanish, French, Italian, Portuguese, German, Arabic, Tagalog, Greek, Sangeet, and Inuit, among languages spoken daily on satellite audio.

To get the best sound, take the audio out from your satellite receiver and plug it into the auxiliary input of your stereo system. You'll get the full stereo, high fidelity sound possible with satellite audio.

SATELLITE AUDIO SERVICES ON GALAXY 5

Transponder / Service		Freq (MHz)	Programming
2	KLON-FM	5.58/5.76	Jazz
	Safe Harbor	6.80	Easy Listening
3	Trinity Broadcasting Radio	5.58/5.78	Religious
	Trinity Radio Service (Spanish)	5.96	Religious
5	CNN Radio Network	6.20	News
6	World Radio Network	6.20	Shortwave Broadcasts
	Brother Stair Radio	6.45	Religious
	World Radio Network	6.80	Foreign Language SW
	National Black Radio Network	7.38	Occ. Audio
7	WFMT-FM	6.30/6.48	Classical Music
	Yesterday USA	6.80	Old-time Radio
11	All News 670, Portsmouth, VA	5.94	AM Radio News
	Standard News Network	6.12	News
17	CNN Radio Noticias	7.56	CNN Radio Spanish Service
18	WWTN-FM Nashville	7.56	Talk Radio
	Motor Racing Network	7.40	Occ. Audio
19	USA Radio Network	6.20	Occ. Audio
20	BET Music Services	5.95	Occ. Audio
21	America's Country Music	5.04/7.75	Country
	Soft Hits	5.22/5.40	Lite Rock
	Light and Lively Rock	5.94/6.12	Contemporary Rock
	Classic Collections	6.30/6.48	Classical Music
	New Age of Jazz	7.38/7.56	Lite Jazz
	Classic Hits	8.10/8.28	Oldies Rock
22	CNN Radio News	6.20	News
	CNN Headline News	7.56	Audio from CNNHN

FULL-TIME INTERNATIONAL TV BROADCASTS

(C-band in the clear, analog)

Service	Country	Satellite	Transponder
NHK	Japan	Galaxy	6,6
RTP	Portugal	Galaxy	6,13
ANA	Saudi Arabia	GE-2	22
UAE	United Arab Emirates	Galaxy	7,10
CBC	Canada	Anik	E2
	Mexico	Morelos 2	-
Deutsche Welle	Germany	C4	5
(Ku-band in the clear analog)			
Chung Ten	Taiwan	Galaxy	4,7
TVB	Hong Kong	Galaxy	4,18
WMNB	Russia	SBS 5	12

Q. *I live in Houston, Texas. How can I receive European TV programming?*

A. It depends on what countries you're interested in watching. In our region there are C and Ku-band satellites which broadcast programming from sources outside the U.S. all day. For instance, RTP, from Portugal, transmits 24 hours a day on Galaxy 6 channel 13 (see chart of full-time foreign broadcasters). However, full-time broadcasts from BBC, Eurosport, RTL and other popular broadcasters will have to await the introduction of DBS-style packages which will likely be a reality in another five years.

You might think that if you could see satellites over the Atlantic you could pick up some Euro-broadcasts, but the only thing available full-time, in the clear comes from Hispasat which transmits programming from Spain to Latin America. Curiously, it's on Ku-band but has a whopping signal and may be receivable as far west as Texas. Occasional feeds from various European countries abound but cannot be counted on for regular viewing.

Q. *I'm setting up a satellite TVRO system on a shoe-string budget. What used satellite receivers would you recommend?*

A. Now is a pretty good time to be looking for a used satellite system. The popularity of DBS has taken many viewers away from C-band and these folks are eager to get rid of their equipment. If you like, you can get an entire system—which is to say, dish all put together and everything—for a fairly cheap price.

I recently bought a neighbor's dish with C/Ku feed, C and Ku-band LNBs, and actuator for $100. They are converting to DBS and were happy to sell. The best part was that it was already assembled and it was a matter of lifting it off his pole, putting it in a pick-up, carting it off to my house, and sticking it on my pole. After hooking up the wires and doing a quick alignment, we were watching satellite TV.

Virtually all dealers have complete used systems in stock and are happy to sell them. Look for General Instrument, Drake, and Uniden receivers. I name these specifically because they are all part of well-established companies which have strong repair divisions. It's most important to have access to parts in the event you need repairs and these companies stock them. There are other popular brands which have gone out of business but it's unclear how long repair parts will be available. If you're buying a used system from a dealer, make sure the system works and try to get a 30 day warranty. If it lasts that long, it could last years.

If you have an out-of-warranty system or one from a company no longer in business and which needs repairs, the best place I know is Professional Satellite Repair. You can reach them at Route 350 North, Sandy Ridge, PA 16677 or call 814-342-5635.

Finding extra remote controls for satellite systems can be a problem. Radio Shack claims that their catalog division can find any name-brand remote or even hard-to-find remotes. Call 1-800-THE-SHACK.

Q. *Must dishes be mounted outside the house? Can they be mounted in the attic? Can you get local network affiliates on satellite TV?*

A. More good questions. In the case of C-band satellite dishes, yes, they must be mounted outside. This is because (1) they tend to be from 6 to 10 feet in diameter and would be tough to put inside and (2) because microwaves need an unobstructed view of your dish to be received.

But wait: there is a way to disguise your dish. Under Cover Satellite Systems makes an outdoor patio umbrella which hides your C-band dish. It's also possible to mount DBS dishes in the attic (or living room, for that matter) provided that they have a clear window to "see" through. Satellite Enclosures, Inc. makes a Plexiglass skylight which can be mounted in your attic. There's also a bogus, fiberglass rock which can hide your DBS dish and turn it into a landscaping feature. (For details on all these items see this column in the January 1996 *MT*).

As to receiving local TV channels via satellite: cable viewers who switch to DBS are finding that the local channels they used to get via cable now have to be picked up the old fashioned way, over the air. In most cases a simple attic mounted antenna will do the job, but the further you are from your local stations the more important it is to have an outdoor antenna.

As a result, there are a number of products being offered which attach TV antennas to your satellite TV dish. Whether it's C-band or DBS you can affix a VHF/UHF outdoor antenna to your dish mount. The most important thing you can add to your outdoor TV antenna is a signal amplifier. In fringe locations the improvement is startling. However, such an amp in an urban setting will only overload your TV's receiver and cause all manner of on-screen interference. When you are setting up an outdoor antenna, use RG/6 coaxial cable with appropriate connectors. This cable has a lower loss than RG/58 particularly at UHF frequencies.

Bill Cheek
email: bcheek@san.rr.com

Upgrading WiNRADiO - Communications Update

This is the third in a series of enhancements for the WiNRADiO wide-spectrum communications receiver. My Sept-97 column has instructions for safe and complete disassembly of the WiNRADiO receiver. The October and November columns presented the first two modifications: one to reduce crossover distortion and one to improve receiver sensitivity. You should save those columns for posterity! This month, we reduce the phase noise in WiNRADiO's PLL circuits. I will also clue you on how to hyperwarp the Internet . . . literally.

This WiNRADiO mod is more detailed than the first two, but it's not scary. We just replace seven components with the same types, but different values. The result is 12-13 dB less phase noise at the 20 kHz offset. Don't worry if you don't understand this terminology — it's not important. The important thing is the reduced interference and cleaner signals, especially weak ones.

FIG-1: DAUGHTERBOARD (BOTTOM)

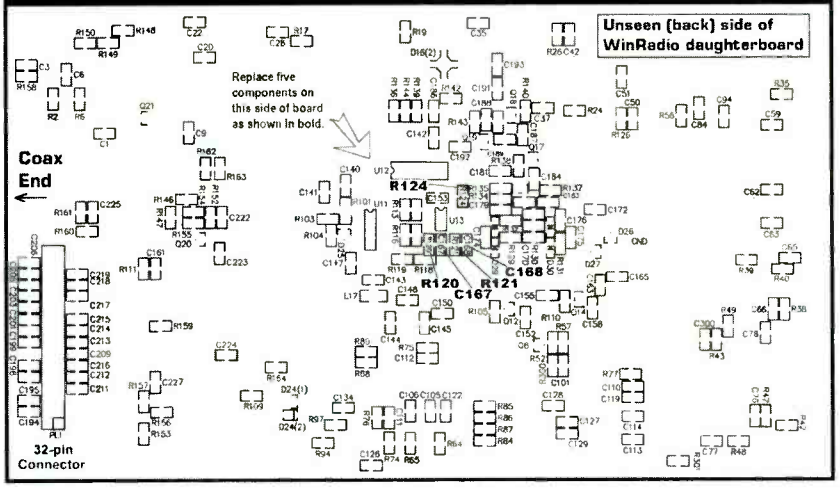


TABLE 1: PARTS LIST

Ckt Symbol	Old Value	New Value	Type *
C159	.039-µF	.001-µF	X7R 0805
C160	.039-µF	.001-µF	X7R 0805
C167	.027-µF	0.1-µF	X7R 0805
C168	.027-µF	0.1-µF	X7R 0805
R120	47k-ohm	18k-ohm	5% 0805
R121	47k-ohm	18k-ohm	5% 0805
R124	1.2k-ohm	12k-ohm	5% 0805

** See this column in MT-Oct-97 for detailed explanation*

PLL Phase Noise Improvement

This hack is in the PLL circuit of U13b, Pin3. (See Fig-3). You will need seven surface-mount parts as defined in Table 1:

The capacitors and resistors are standard SMT parts. Do not substitute values.

Step by Step

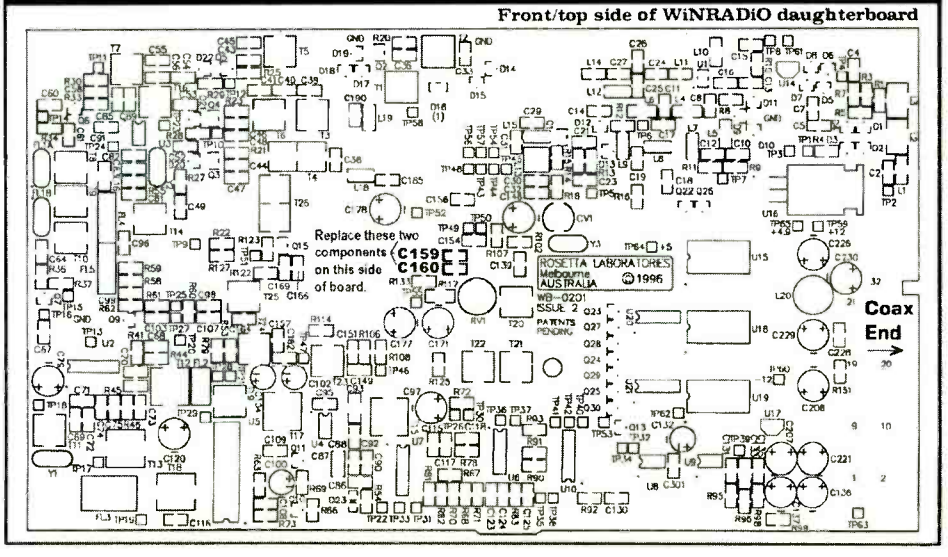
Refer to Table 1 and Figures 1-3, and follow these six steps:

1. Disassemble WiNRADiO per instructions in my Sept-97 column.
2. On the normally unseen (back or bottom) side of the smaller WiNRADiO daughterboard, locate and remove R120, R121, R124, C167, and C168. See Fig-1 for locations of these five parts. Refer to my Oct-97 column for clues and hints for working with surface mount parts.
3. Solder the replacement parts onto the newly vacated pads, using Table 1 and Fig-1 for reference.
4. On the visible (top or front) side of the smaller WiNRADiO daughterboard, locate and remove C159 and C160. See Fig-2 for locations of these two parts.
5. Solder the replacement parts onto the newly vacated pads, using Table 1 and Fig-2 for reference.
6. Check all your work; ensure that solder blobs can't touch other pads and/or components. Reassemble the WiNRADiO.

That's it for the Phase Noise Improvement. It makes a notable difference in the quality of reception and is worth doing if you're not afraid of surface-mount technology. The first two mods should have warmed you up and put you "in the mood" by now.

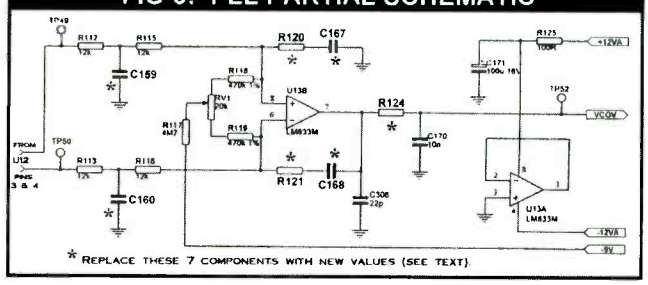
Kits of parts for the first four WiNRADiO mods are available for those who can't meet minimum orders required by some vendors. The kit ensures that all the exact parts are handy, too. The twelve parts and a bit of wire are US$7.00 domestic. All foreign is US$10.00 ppd, surface. Allow more for airmail. You can order my part no. WRKit1-4, by e-mail, fax, voice, or postal

FIG-2: DAUGHTERBOARD (TOP)



mail. You can also get most everything from DigiKey (800) 344-4539; Mouser (800) 346-6873, and/or Future-Active (800) 655-0006.

FIG-3: PLL PARTIAL SCHEMATIC



More Information

The latest information and software updates for WiNRADiO are available at their US Web site at **http://www.winradio.com** and at the Australia site: **http://www.winradio.net.au** If you don't have a WiNRADiO, you can still download the software and run it in demo mode. I freely provide tech support on the WiNRADiO mods and all my *MT* articles by e-mail or (heaven forbid) postal mail that includes an SASE. Fax inquiries are fine, but cannot be fax-replied. Please include an e-mail address if you need a reply.

Hyperwarp the Net - Cable Modem Service

I've waited a while to clue you in on something, and now it's time. Write this down: *the conventional analog modem is dead.* R.I.P. 'Sniff.

Oh, to be sure, analog modems don't know they're dead yet, and some may argue the point, but that's okay. Several years ago, visionaries pronounced MS-DOS dead. It took a while for it to quit squirming and gnashing its teeth, but you sure don't see anything new and exciting in MS-DOS anymore, now do you? So call me an amateur visionary. Data communication over the public voice telephone network has hit an impenetrable ceiling of speed and bandwidth.

Luckily, a fledgling revolutionary alternative has emerged. This replacement to analog data communication is no secret now. Actually, there are at least two contenders; one is reality, others are still in the labs. I'll mention one of the latter first.

ADSL — Still Vaporware

ADSL (Asynchronous Digital Subscriber Line), the high speed baby cream-puff of the telephone companies, is still in R&D where it is likely to remain for a while. ADSL is an extremely fast (10-Mbps) computer communications technology that may someday, if the telcos ever release it, be available on your POTS (plain old telephone service) lines. ADSL uses regular twisted-pair voice lines, but there is little else in common between it and data communication by existing modems.

Slow vs. Fast

Analog modems are capable of a maximum of 33,600 bits per second (bps). (Or 57,600-bps with special techniques from Internet Service Providers—ISP). Analog modems are commonly limited to 28,800-bps (or slower) on low quality lines. One other telco data service that I'll mention in passing is ISDN, good for up to 128-kbps. ISDN is expensive, non-standard, not widely implemented, and immensely overshadowed by the vaporware ADSL and the newest real datacom technology.

Cable Modems Rule!

Cable Modem Service isn't a good name and the device is not a modem, but that's what it's called. Cable modem service, having emerged early this year, is provided by cable TV (CATV) companies. The "cable modem" equipment connects between the CATV cable and a personal computer. That's right: the one cable brings in normal TV and a 2-way high-speed connection to the Internet. Telephone lines are not involved. Therefore, no dialup; no time limit; no infernal logging on and off, and for the most part, no delays in surfing the Internet. You just log on and stay logged on for as long as you please ... days, weeks, months.

Cable modem service is utterly awesome at Ethernet speeds of up to 10-Mbps. In practice, there are factors that interfere with that upper limit, but I downloaded the 10.5 MByte Microsoft Internet Explorer during "prime time" in 18 sec for a speed of 5.8 Mbps. Another time took 16 sec (6.5 Mbps).

[Note: lower case "b" means *bits* while upper case "B" means *bytes*. Telecom speed is measured in bits per second (bps) while file sizes are usually stated in bytes (B), kilobytes (kB), or megabytes (MB). There are normally 8-bits in a byte, but in telecom, start and stop bits are added to each byte, so figure 10 bits per byte when calculating telecom performance.]

Cable Modem Benefits

The significance of cable modem service is clear: speed is as fast or faster than a hard disk drive. On-line time is not limited. Real-time or near-real-time connectivity with others is the rule rather than the exception, affording audio-video-chat collaboration and much more. Even the fastest analog modems are very, very slow in the most conservative comparisons. The sluggard performance of analog modems, not to mention the hassle of watching your connect time and logging on and off with ISP's, evolves a certain on-line "way of life." Cable modem service redefines that way of life and charts new turf.

It's almost unthinkable to download a 10-MB file via analog modem (1-hour, if everything goes perfectly). You barely blink about it with a cable modem (15-sec, typical). See what I mean about a whole new way of life? And, it only gets better!

Cable Modem Service Areas

Cable modem service is being rapidly implemented in larger metro areas. The following are said to have operational networks as of this writing: Seattle, Portland, San Francisco, Palo Alto, Los Angeles, Orange County, San Diego, Phoenix, San Antonio, Houston, Omaha, Chicago, Minneapolis, Detroit, Columbus, Louisville, Atlanta, Tampa, Baltimore, Philadelphia, Hartford, Boston, and Long Island. Others have probably come on-line by now and many more are certainly in the planning stages.

Cable modem service is still relatively new and unknown. You may not have been aware of the service or you may have dismissed it as "pie in the sky" or even as a gimmick or a fad. Not to worry, it has come of age, so you should contact your CATV company and poignantly ask when they are going to implement the service. Also ask if you can get on their beta test team if the service hasn't been implemented. Pre-launch cable modem service providers tend to be secretive and tight-lipped about their plans, so don't be afraid to pester them into 'fessing up. Sometimes, that's the only way you'll get any information out of them.

Cable Modems & Radio

The object of this update on cable modem service is...of course...radio! Look at it this way: if you are connected with the world's storehouse of information, then you'll be inclined to pursue your interest in radio to a depth never before possible. Cable modem service represents the most formidable tool yet for the radio warbag, so don't hesitate to investigate it. The following two URL's are good places to launch your search for more information:

http://www.mot.com/MIMS/Multimedia/prod/specs/modem.html
http://www.cnet.com/Content/Features/Techno/Cablemodems/?dd

Merry Christmas and a prosperous, Happy New Year to all!

E-mail: bcheek@san.rr.com
WWW: http://ourworld.compuserve.com/homepages/bcheek
FTP: ftp://ftp.cts.com/pub/bcheek or ftp://204.210.20.47
FAX: (619) 578-9247 anytime
Postal: PO Box 262478; San Diego, CA 92196-2478

John Catalano, PhD
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Total RecAll

I'm always on the prowl for software that will be of interest and use to our *Monitoring Times*' readers. Well, this month I think we have a program that we all can use. For professionals and hobbyists, SWLers and Scanner people, **RecAll** is a program you may have wanted for a long time.

So What is RecAll?

We have all wanted to monitor an event such as a space shuttle launch only to have a small obstacle get in our way: our jobs! Working certainly interferes with our lives and our monitoring. I'm sure you would like to know what goes on in your town during the course of a day. One of the best ways is to monitor the local police, fire and emergency services frequencies. But who has the time to sit in front of a scanner all day? Even then, most of the time is full of silence punctuated by seconds of messages.

There have been a number of products on the market over the years that record, or "log" voice messages while you are away. These hardware "loggers" range from $59 to $150 and leave a lot to be desired when it comes to quick retrieval of messages and time/date stamping. Add to this the web (no pun intended) of tangled wires and power supplies that comes along with many of these loggers.

But what would you say if I told you that you can have exact time stamping, easy message recovery based on time of message, only one wire to connect and all for $15? Yup, that's what I thought you'd say. There is one catch. You need a 386 computer (or better), Windows 3.1 or 95, a simple sound card (.wav compatible) and a hard drive. RecAll's hardware requirements are extremely modest. You can download a free demo "non-crippled" version from their web site, **www.sagebrush.com**.

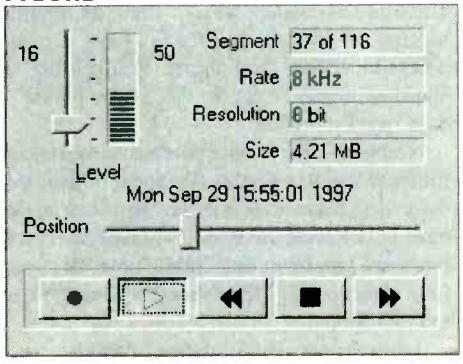
How Does a $15 Logger Perform?

We begin by downloading the RecAll file from the Internet to a holding file on floppy or hard drive. This is quickly accomplished in a few minutes since the file is only 300K in size. RecAll comes in two flavors, RECALL10.ZIP for Windows 3.1 or RECALL21.ZIP for Windows 95. For this first try we will run the program in Windows 95 on a Pentium 133 MHz. Once downloaded, the compressed program requires the use of an Unzip program (either DOS or Windows based). Then, you're ready to go.

Starting the program in Windows 95 brings up Figure 1. I connected the sound card's port labeled "input" to the earphone output of an old GE portable radio with squelch control (purchased at a hamfest for $1). The radio was tuned to the local constabulary in the 150 MHz band.

Then I adjusted the radio's volume control so that, with a signal present, the vertical window on the left side of RecAll showed a value of 40 or greater. Dragging the "Level Set" arrow on the side of the window sets the "recorder" turn-on level. I set it to 15; below the signal present level to insure turn-on. Now we're almost ready to start digital recorder logging.

FIGURE 1



Clicking the "Options" menu at the top of the RecAll screen opens a menu which allows you to set the amount of hard drive space RecAll can use for its logging session. Of course, the amount of hard drive space will limit the total recording time. For example, if you allow the program to use 10 Meg of your hard drive this equates to about 22 minutes of recording time. Remember, since the RecAll only turns on when a signal is present this 22 minutes can be many hours, or even days, of elapsed time depending on channel(s) activity. If you have 1 Gig of drive free, you can record 2182 minutes, or 36 hours, of active signals.

Also set the directory where you would like you "recorded" files saved. Other useful parameters can be set via pulldown menus. I used the default values for all parameters which did not require me to set anything. RecAll still worked like a charm.

Now go back to RecAll's main menu. Click on the left button to start logging messages. The tape recorder-like buttons are straightforward and easy to use. That's it. And if you think that was easy, just check out playback.

Play It Again Sam

Once you hit the stop button, or you reach your hard disk memory limit, RecAll will be ready for playback. First use the "File" and then the "Open" menu to select the file you want to play back. Then press Play and a square will move horizontally from left to right. Above it will be the exact date and time (to the second) when the word you are hearing was logged. Clicking and dragging the square allows you to position the playback at any point in the logging. In fact, as you drag the square you will notice that the time stamp displays, in minutes and seconds, the real time of that specific message reception. Very elegant, and all for $15!

Using it with a number of other scanners and receivers gave equally excellent results. I also tried RecAll with a microphone instead of the radio connection. This resulted in crystal clear playback, making it useful as a dictation machine or "Honeydew" reminder device ("Honey, do this ... Honey, do that").

What's Not To Like

The answer to this for RecAll is ... nothing. The performance is excellent, system requirements minimal, works in either Win 95 or 3.1, is very easy to use, and includes a brief on-line help file. At $15 it blows away any other hardware message loggers. Yes, you need a computer and sound card. Well, yesterday, at the local hamfest I picked up a 386 computer, sound card, and 120 meg hard drive for $35! So those of you who are saying, "But you need a computer to use RecAll!" just stop before you make yourself look foolish.

RecAll works in the background of Windows so, in theory, you can use your computer with other programs while RecAll automatically logs. On Windows 3.1 I saw a slight start delay, when using it in the background. But the results were still perfect copy. And if you are smart you'll watch for a $35 computer deal and have a "monitoring only" dedicated computer.

Co-Existing with Monitoring Software

OK. So on its own merit RecAll performs great and is definitely worth $15. But how about when we are using one computer for both RecAll and a receiver control and frequency logging program? Good question. Next time we get together we'll have the answer by trying a couple of popular of control programs and RecAll in both Windows 3.1 and Windows 95. Stay tuned.

Talking About Windows...

The number of people I speak to who are having problems with Microsoft's Windows seems to be on a steep increase. A few of you have contacted me concerning problems you're having with communications in the Windows environment. Let me say that I run Windows 95 on my business computer, Windows 3.1 on my personal and laptop computers, and DOS/Win3.1 on my "playing around" computer. The first two are Pentiums and the others are 486s.

It's no industry secret that Windows 3.1 was (and is) an excellent effort by Microsoft to bring the ease of a graphical user interface (GUI) to the world of DOS command line users. But if you cut through all the marketing hype you'll find that Win 3.1 *is* a DOS program and not truly a new operating system. This allowed program developers and users to stop Windows 3.1 and fall back to their DOS roots if problems occurred—in some cases a regular occurrence.

The stitching together of existing DOS and Windows 3.1 is still an unnatural act, in my opinion. In order for applications to run in Win 3.1 they must meet the Windows system's condition as well as DOS system conditions. Lots of combinations of hardware parameters result; some of them causing a conflict and a resulting Windows' crash. Usually, this will result in us being thrown back into DOS. But at least it is manageable in DOS when things go wrong. Enter Windows 95. The images of people actually waiting on line at midnight in New Zealand to get the first copies of Win 95 come to mind. (Oh, the power of marketing propaganda. And the small evolutionary step between humans and sheep.)

Windows 95 is a stand-alone operating system—at least that's what Microsoft implies. The user never sees a DOS "C:" prompt, even when a problem occurs. Many potential problems Win 95 handles on its own quite nicely. But the problems that it cannot handle result in a system crash with little, if any, information on the reason. The only option left to the user is to start the system again and resort to divine intervention ... and I don't mean from Microsoft.

Foundations of Sand?

As we try to use our personal computers for more and different applications, and as programmers attempt to provide more powerful applications including sound and motion, is it surprising that we are experiencing problems? The 1983 IBM PC and the 1986 AT are still the basis for our hot new Pentium 200 MHz running Windows 2000. We are trying to expand our luxury two story house to become a skyscraper. But, buying into the assumption that bigger is always better, we seem surprised when the foundation starts to crack and fail.

Oh, sorry. Next time your system seems to crash for no reason, or an application that has worked hundreds of times before will not load, don't worry. Just keep dancing around in colorful cleanroom suits and waiting on line for Win 9X. Remember, life is good ... that's what the holy TV ads say.

In this season, let's just take a minute, cut away all the commercialism, and reflect on what's of real meaning and value in our short mortal lives. Maybe we'll live the next year with a slightly different perspective. Till next year... !

Rich Arland, K7SZ
k7sz@juno.com

Tuning in to ATUs

I have no idea who authored the quote, "you can't live with'em and you can't live without 'em," but surely he had to be referring to antenna tuners!

First of all, let's make one thing perfectly clear: antenna tuning units (ATUs) *do not tune antennas*. They perform impedance matching between the radio and the feedline going to the antenna. ATUs are also known by a variety of names including "transmatch," "matchbox," "antenna tuner," and "tuner." They all perform the same basic function: to make the antenna circuit look like the proper impedance (Z) for the transmitter and/or receiver.

Who needs an ATU? Conservatively, about 99.5% of those involved with the radio hobby. Why? Without going into mountains of electronic theory, let's just say that you get the maximum signal transfer (both on transmit and receive) when the antenna impedance matches the impedance at the output of the transmitter or the input to the receiver. In essence, an ATU allows you to maximize your receiver/transmitter efficiency.

An ATU also serves to provide another stage of tuned circuitry which helps to suppress harmonic radiation in transmitters and reject unwanted incoming signals in receivers. With the trend by radio manufacturers in the last 15 years to give us wideband receivers, this extra stage of tuned circuitry can actually help reduce receiver intermod and increase your receiver's performance. Therefore, ATUs are not just for the ham radio operator. Anyone using receiving equipment in the HF spectrum can benefit from an ATU.

Buy or build? Either will improve your reception.

Four versions to buy or build

Now that I have pointed out the benefits of a tuner, do you build or buy? Well, that is entirely up to you. Antenna tuners are not all that complicated. Various configurations of inductance (L) and capacitance (C) will work quite effectively to boost the overall efficiency of your antenna farm.

Figure 1 shows the basic L/C tuner configuration. This is about as simple as it gets! The neat part about this particular ATU is that it can be reversed in the circuit (by taking the coaxial cable from the receiver or transmitter and connecting it to the "antenna" side of the circuit and connecting the antenna to the "input" side of the circuit) to accomplish various matching requirements. This tuner works great with random length wire antennas or verticals.

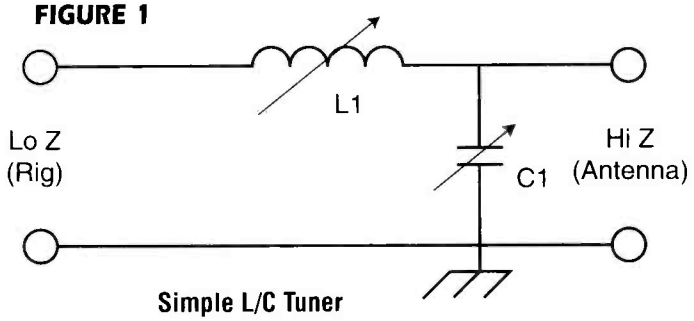
It will also work with coaxial fed antennas, too. However, by adding a second tunable capacitor (C-2) on the "radio" side of the circuit, you now have a much more flexible tuning unit that will tune a wider range of impedances (see Figure 2). This configuration is called a "PI" tuner, because it looks like the Greek letter π. This tuner does an excellent job of suppressing second harmonics from transmitters. There is one more knob to play with, but this is a very flexible design that is very easily duplicated using junque box components.

Figure 3 shows the "SPC Tuner" by Doug DeMaw, W1FB: a variation on Lou McCoy's "Ultimate Transmatch." This design has been featured in the *ARRL Radio Amateurs Handbook* [1] for at least 10 years or more and performs very well. It provides a constant input impedance for the transmitter or receiver and tunes a very wide range of impedances. It is more complicated than the previous two tuners but it works great and, providing you are an adroit scrounger, you should be able to procure all the parts for this circuit at hamfest fleamarkets.

Our final tuner (Figure 4) is a variation of the Grove TUN-3, which was a great little receiver accessory which unfortunately is no longer manufactured. Since this ATU is designed for use with receivers only, you can get by with using molded inductors and small capacitors to save space. Mouser Electronics[2] has the necessary parts for this project and even an inexperienced builder should only spend one evening constructing this ATU.

Notice it is a basic L/C tuner and therefore will work very well with end fed, random length wire antennas. I have also used this tuner to couple my receivers to the aluminum rain gutters on my house. It works great and definitely improves receiver performance. RE-

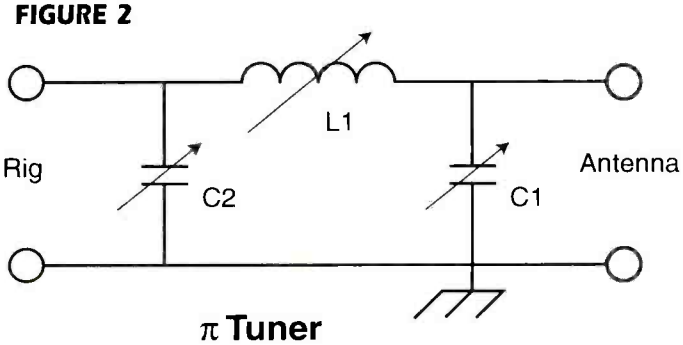
FIGURE 1



Simple L/C Tuner

Lo Z = 50 Ω or less
Hi Z = More than 50 Ω

FIGURE 2



π Tuner

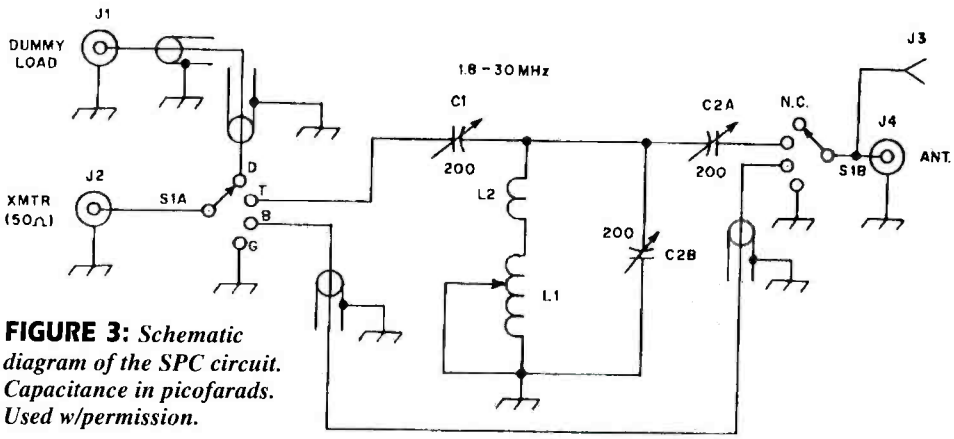


FIGURE 3: *Schematic diagram of the SPC circuit. Capacitance in picofarads. Used w/permission.*

MEMBER: this is a light duty tuner and you *cannot transmit* through this device.

Going Commercial

Commercial transmatches are offered by a number of companies. MFJ [3] has a fine selection of tuners for a variety of budgets as well as a host of radio accessories at reasonable prices.

Many of MFJ's tuner designs use a tapped air-core coil and a rotary switch to change inductance values. This is definitely a step above those tuners that use toroidal inductors for the main coil, because toroid coils tend to saturate quite easily in the presence of RF which changes their inductance dramatically.

Recently MFJ started marketing several roller inductor models of their previously proven ATU designs. The big difference is that with a roller inductor you can achieve a perfect match, since the roller inductor will allow you to select an infinite number of L/C combinations. I have been using the MFJ model 969, featuring the Air Core Roller Inductor™ and 160 through 6 meter coverage, for about six months with my classic Drake TR-4C transceiver. Rated for 300 watts of RF power, the MFJ 969 is an excellent choice for those of us who do not have the time or inclination to construct a tuner from scratch.

I use my MFJ-259 antenna analyzer when initially setting up my tuner's controls. By coupling the analyzer into the tuner and tuning the ATU for minimum SWR on the analyzer, I am assured of fast, accurate band changes when operating. These switch and knob settings are logged on a small index card that sits next to the tuner. When I change bands, it is a simple matter of presetting the MFJ 969 ATU controls per the index card, and tuning the transmitter. A quick touch-up of the tuner controls while watching the big cross-needle SWR meter in the tuner and I am ready to go.

Retail cost of the MFJ 969 is $179.95, but you can find them cheaper at hamfests or dealers. In all, it is a solid performer that won't break the bank.

The KIS Project

Let's take another look at Fig 4. This simple little project is a good starter project for those new to home construction and will provide the builder with a very useful receive-only ATU for about $25, if all parts are purchased new. A little junque box scrounging should substantially cut the costs.

About the only critical component is the case. Stay away from plastic or non-metallic cases. A Hammond Series 1590 diecast aluminum enclosure would be ideal. These are RF tight enclosures and, although they are a bit pricey, they do offer excellent isolation for tuner components. Antique Electronic Supply [4] offers a selection of Hammond boxes. Part number P-H1590C is about the right size for this project.

The rest of the parts are readily obtainable. A tuning capacitor from an AM transistor radio is used for capacitor C-1. Inductors L-1 to -4 are molded RF chokes available from Mouser Electronics. Input/output connectors can be BNC, 5-way binding posts, SO-239s, or whatever you have handy. Parts spacing is non-critical. Just do a good job soldering so your connections are clean and shiny.

Switch S-1 is a multi-position, single pole, non-shorting rotary switch. Use what you have on hand. Unused switch poles need not be connected together. If you have a 12 position rotary switch and only use the first five positions, that's OK.

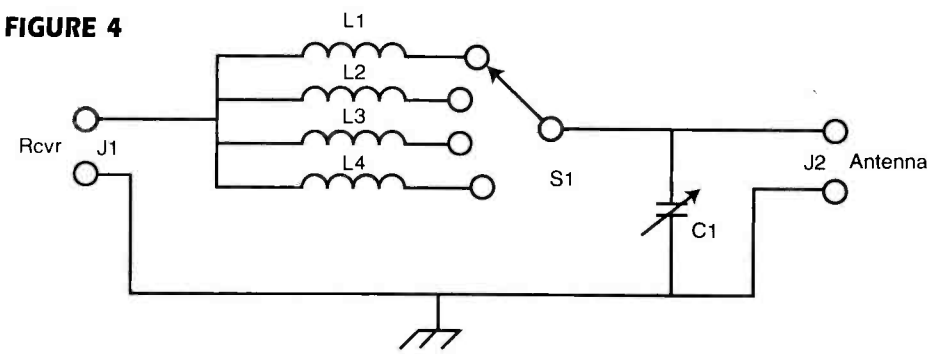
Place your new L/C tuner in between the antenna and your receiver. *Do not try transmitting through this device as it is designed for receiving only!* Pick a band, peak your receiver preselector (if it has one) and then rotate the tuner capacitor to obtain maximum noise. Step through the various inductor settings on S-1 and quickly tune the main tuning cap again to find the L/C combination that provides the most noise or signal strength on your S-meter.

That is all there is to using this little device. Rest assured that your new tuner is providing the most signal into your receiver once it is "peaked." Additionally, this unit will provide an extra tuned circuit ahead of your receiver, helping to eliminate out of band signals that can degrade receiver performance.

For the more adventurous, if you want to modify the design and add another capacitor to the input side of this tuner, you will then have a classic "PI" tuner which will be capable of matching wider impedance ranges and provide more attenuation of unwanted signals. Feel free to improve upon the basic design.

That's it for this column. Enjoy your new tuner and have fun on the bands. And remember to **K**eep **I**t **S**imple!

FIGURE 4



SIMPLE L/C RECEIVER TUNER

S1 = 4 psn Non-shorting rotary switch
Mouser #105-14571
C1 = 365 pF air variable (old BC receiver)
L1 = 1000 µH Mouser # 43LQ103
L2 = 150 µH Mouser # 43LQ154
L3 = 47 µH Mouser # 43LQ475
L4 = 4.7 µH Mouser # 43LQ476

Footnotes:

[1] Americon Rodio Relay League, 225 Main Street, Newington, CT 06111 TEL: (860) 594-0200 FAX: (860) 594-0259

[2] Mouser Electronics, 2401 Hwy 287N., Mansfield, TX 76063-4827 TEL: (800) 346-6873

[3] MFJ Enterprises, PO Box 494, Mississippi State, MS 39762 TE: (800) 647-1800 FAX: (601) 323-6551

[4] Antique Electronic Supply, P.O. Box 27468, Tempe, AZ 85285-7468 TEL: 602) 820-5411 FAX: (602) 820-4346 or (800) 706-6789

Avcom PSA65C Spectrum Analyzer

Anyone who has been exposed to radio reception for very long eventually comes across the spectrum analyzer, a handy tool for adding vision to hearing for acquisition of signals. Spectrum analyzers graphically represent a large chunk of radio spectrum as a left-to-right baseline across the screen, low frequencies to the left and high frequencies to the right; active signals pop up as peaks or "spikes" on the screen, relative to their position in the spectrum.

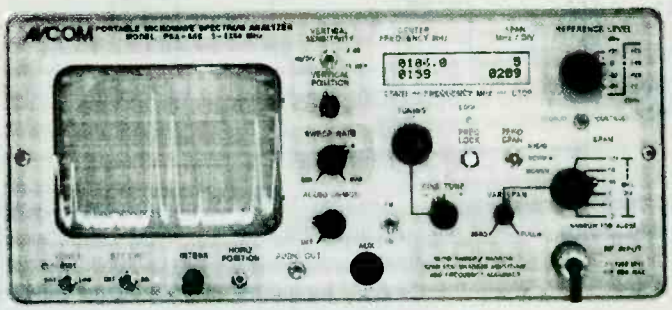
For example, if you are "looking" at signals between, say, 88 and 174 MHz, you would see tall spikes clustered at the left representing powerful FM broadcasters, and somewhat reduced spikes between 150-174 MHz where the land mobile radio services operate.

More advanced models include FM or even AM detectors to enable the spectrum analyzer to hear the communications for their identification. A digital frequency display helps nail down the unknown even further.

The spectrum analyzer is the one instrument valued most by technical surveillance countermeasures (TSCM) specialists — "debuggers" who offer their services to "sweep" offices, homes, industrial installations, and other vulnerable targets of eavesdroppers. A quick look at the screen, and roughly 99% of the surreptitious radio transmitters in use can be spotted.

Spectrum analyzers are also invaluable for field testing radio frequency (RF) systems, antennas, aligning satellite systems, cable TV maintenance, electronic R&D labs, manufacture and production, and for technicians of cellular, trunking, and conventional two-way radio systems.

Arguably, the most popular, low cost spectrum analyzer on the market is the AVCOM PSA65C (upgraded from the former PSA65A). With competitive units selling upwards of $10,000 and more, the



basic AVCOM costs less than $3000. It provides 1-1250 MHz frequency coverage (extendable to 200 kHz-4200 MHz with optional accessories); AM and FM demodulators may be purchased separately for audio recovery of signals.

The amount of spectrum which can be displayed at one time (span) is variable from 0-1250 MHz. Sensitivity is on the order of -95 dBm, roughly 3-4 microvolts, adequate for general signal detection and monitoring. The optional FM and AM demodulators are rather wideband, but do a reasonable job on stronger narrowband signals which aren't too closely spaced in the spectrum.

The spectrum analyzer can also be used as a spectrum display unit with any receiver equipped with an IF output, such as the popular ICOM R7000, R7100, R8500, and R9000 series, as well as the AOR AR3000 and AR5000 receivers.

Front panel controls include a calibrated attenuator and span selector, as well as scope adjustments.

The unit is powered by 120 VAC, an external source of 12 VDC, or its own internal rechargeable battery, good for a half hour or more. The well shielded, metal cased AVCOM weighs a hefty 18 pounds and measures 11-1/2"W x 5-1/2"H x 13-1/2"D. A BNC connector is provided for antenna attachment.

Frequency readout is provided by a backlit, microprocessor-controlled LCD; accuracy is only good to about one decimal place (roughly 100 kHz), but usually adequate to identify the likely signal. The display also reads span and start/stop frequencies. Although the VCO does drift, strong signals may be stabilized for monitoring by digital frequency lock function. There is no memory storage.

The Bottom Line

Scanner and shortwave listeners will find the PSA65C very handy, but a little obstinate to use. A tiny touch of the main tuning knob skews the dial far in frequency; although a second (fine tuning) knob is provided. Signals do drift, requiring retuning. Wide bandwidth means stronger signals are favored at the expense of weaker signals. The AVCOM is heavy and big. Dial accuracy of +/-100kHz is rather coarse compared to the high-resolution readouts available on scanners and communications receivers. You can't sweep a spectrum and hear a signal at the same time.

On the other hand, a combination wide-coverage receiver and matching spectrum display unit (SDU) can provide better single-signal reception and finer frequency readout, but it represents two pieces of expensive equipment, and the span of such combinations is limited to a mere 10 MHz maximum, compared with more than 1000 MHz on the AVCOM.

Keep the spectrum analyzer in perspective. It is not intended to replace a communications receiver, it is designed to give a visual command of the entire spectrum and allow monitoring of signals present. And in that respect, the AVCOM PSA65C probably delivers the biggest bang for the buck.

(Contact Grove Enterprises for pricing with accessories)

WHAT'S NEW?

TELL THEM YOU SAW IT IN MONITORING TIMES

Radio Shack PRO-90

In this era of trunked communications, any scanner that even hopes to follow public safety and emergency communications needs to incorporate trunk-tracking technology. Manufacturers are meeting the demand; Uniden introduced handheld and desktop models of their TrunkTracker™ radios earlier this year, and Radio Shack now introduces their PRO-90—a trunk tracking handheld scanner manufactured for Radio Shack by Uniden.

Like the BC-235XLT, the PRO-90 is a triple-conversion receiver with coverage from 29-54, 108-174, 406-512, 806-956 MHz (less cellular). It will follow Motorola type I, II, IIi, Hybrid, Smartnet, and Privacy Plus analog systems.

Three hundred memory channels plus 10 priority channels provide flexibility. The PRO-90 comes with an ac adapter/charger, belt clip, rubber antenna, one battery pack, manual, and frequency guide. It's available from your local Radio Shack, or for $269.95 from Grove Enterprises, 800-438-8155.

Take Control of your AR5000

When you're the proud owner of the AR-5000 wide-coverage receiver and Spectrum Display Unit combination, the AOR Hawk 5000 software has the ability to simplify your life by allowing you to control both units at your computer screen. Adding the power of your computer to this sophisticated monitoring system will not only add remote and automatic operating features, but make it more manageable, as well. $169.95 from Grove Enterprises; call 800-438-8155 for system requirements.

VLF Radio!

For a sample of the omnidirectional beacons we've featured in this issue of *MT*, the VLF Radio! cassette tape by Kevin Carey is a valuable resource. Kevin Carey, *Below 500 kHz* columnist and a favorite speaker at the now-discontinued Grove Expo, brings the same clarity and thoroughness to this informative, 60 minute tape.

Also in this VLF sampler are recordings of ships at sea, European broadcasters, experimental lowfers, military stations, WWVB, the nearly defunct Omega and LORAN systems, and recordings of natural radio—those radio signals generated by natural phenomena.

The many examples of on-air transmission modes can be useful for utility reception on other bands, not just VLF. The tape also includes suggested resources for further reading and even a beacon-related poem! Accompanying the tape are reference notes, a longwave spectrum chart, and a reproducible logsheet.

VLF Radio! is available from Kevin Carey (P.O. Box 56, West Bloomfield, NY 14585; email: *kcarey@mdsroc.com*) for $11.95 U.S.

Audio Accessory

Looking for a stocking stuffer? Here's something useful for anyone who listens to communications as a hobbyist or on the job. For only $9.95 the MFJ-281 ClearTone external speaker will turn the typically tinny audio of a handheld radio or transceiver into more intelligible speech. The speaker is designed to improve voice audio in the range 600 - 4000 Hz, while reducing noise, static, and hum. It even claims to improve the sound of CW, making it easier to copy.

The speaker houses a 3-inch Mylar cone speaker in a case measuring roughly 3-3/4 inches by 2-1/4 inches. It will handle 8 watts @ 8 ohms, and comes with a six foot cord ending in a 3.5 mm mono plug. For your nearest dealer or to order call MFJ Enterprises at 800-647-1800. And tell them you saw it in *Monitoring Times*!

Portable Power

Cutting Edge Enterprises has expanded its line of portable power supplies to fill your needs whenever you're on the go. Users of handheld scanners or transceivers should be delighted with the new 35 watt base station. Just drop your handheld into the removable side pocket for transport, or plug it into the PowerPort RF-35 for operation. The RF-35 ($179.95) is rechargeable and provides 9 amp hours of 12 V dc power. Ham radio

operators will get two and a half hours of solid transmit time and extensive standby before recharging is required.

Slightly lighter in weight and power is the RF-35 Jr. ($159.95) at 2.3 amp hour dc power, giving 45 minutes solid talk. Both units come fully charged, with RG-174/U mini-cable, BNC connector, and a mini J, two-meter antenna on 10 ft. of cable which tucks into an accessory pocket.

If you think that's great, you can even get a rechargeable power supply with enough "oomph" to power light hand tools and small motors as well! PowerPort 259 supplies up to *500 watts* to start heavy loads, with a continuous output of 250 watts at 115 volts AC. If you need DC power, it will

provide up to 20 amps. One DC and two AC outlets make several tool or lighting combinations available at one time. It's also perfect for recharging small hand tools, video cameras, laptop computers, etc. while in the field. PowerPort 259 is $179.95 plus shipping; 140 watt and 50 watt versions also available.

Contact Cutting Edge Enterprises, 800-206-0115, *cutedgent@aol.com* (1803 Mission St., Suite #546, Santa Cruz, CA 95060).

Opto R11

What has twice the sensitivity of an Opto Scout frequency counter and costs less than half the price of the Opto Xplorer? It's the new R11 Near Field Test Receiver from Optoelectronics. Fans of the old R-10 know what a handy tool the little receiver can be—not only locking onto the strongest FM signal in the near field but reproducing the audio for you to hear. No need to fumble with a frequency counter/receiver combination.

New features in the R11 are its ability to lock out up to 1000 unwanted signals like FM broadcast stations, increased sensitivity which allows reception of a 5 watt UHF signal at a distance of 600 feet, and the ability to hold and lock on a desired signal until you are ready to sweep again.

The R11 sweeps a range of 30MHz-2GHz (less cellular) in less than one second! When it locks onto a strong signal, LEDs indicate the general frequency range of the locked signal—another requested feature added by Opto.

Using the R11 together with a Scout frequency recorder adds some additional features, including the ability to Reaction Tune to any frequency captured or recorded by the Scout. (A $9 patch cord CB-RT is required.) At $399 the R11 is a moderately-priced test receiver with a multitude of applications.

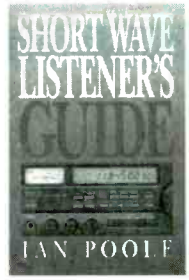
The R-11 is awaiting FCC type acceptance. For more information or to order, call Optoelectronics 800-327-5912 or visit:
www.optoelectronics.com

Zenith Radio

Few flea market radios stir the interest as the Zenith brand, a classic in every sense. Enthusiasts and collectors alike will delight in *Zenith Radio, The Early Years 1919-1935* by Harold Cones and John Bryant. This new pictorial essay highlights the birth and glory years of this American radio manufacturer. Hundreds of product photos, many in full color, combine with an extensive illustrated history of the company. The book, published by Schiffer, is $19.95 plus shipping from Grove Enterprises, 800-438-8155.

UK SW Listener's Guide

The *Short Wave Listener's Guide* by Ian Poole — a new, 200 page work by the prominent British author of radio-related publications — is a little more technical than most "how to" shortwave listeners' (SWL) books, but this is refreshing in that the explanations are done well and



should be appealing to listeners who wish a little more girth to their rudimentary SWL knowledge.

Being British, some of the vernacular may seem "foreign" at first ("earth" for "ground," "aerial" for "antenna," etc.), but it is quite understandable. Concepts like superheterodyne design, intermodulation, propagation, synchronous detection, phase noise, and countless others are explained in layman's terms. Minimal math is used to show signal phasing and mixing.

Additional chapters cover services to be heard on the SW spectrum, listening tips and techniques, and charts listing amateur prefixes and call areas.

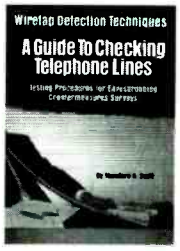
Short Wave Listener's Guide is $28.95 from Butterworth-Heinemann, PO Box 4500, Woburn, MA 01801-2041; ph. (617) 928-2500.

Sound Card Logging

Here's a nifty way to use your computer: If you have a sound card that allows wave audio recording, you can use it to record the audio from your radios (whether shortwave or scanner) using Digital Audio Logger software from Scan*Star. The program saves time and channel information along with the audio. When you play it back the screen displays the actual time of intercept, the frequency, PL/DPL tone, and channel identification.

This is a new addition to the Scan*Star for Windows Plus; as an upgrade it is available for $49.95, or you can purchase the entire package for $199.95 including the audio logger. Call Grove Enterprises at 800-438-8155 for system requirements and scrap your paper logs forever!

Wiretap Detection Techniques



Counter-surveillance professionals will quickly recognize the name of Ted Swift, an experienced, government trained, countermeasures authority who has taught the subject for years. He is the author of *Wiretap Detection Techniques; A Guide to Checking Telephone Lines*.

While radio bugs are relatively easy to detect, non-radiating bugs are not. Telephone lines must be electrically analyzed and physically examined. And since they extend from the immediate premises for great distances, extensive knowledge about phone systems is mandatory.

Swift begins with the basics, a description of the telephone and the line as it extends toward the central office, along with voltage measurements and a glossary of terminology. A step-by-step instruction is painstakingly presented, along with recommendations of inexpensive tools and test equipment for the job.

One of the most informative chapters is the list of 99 frequently asked questions, along with authoritative answers. A handy glossary helps define unfamiliar technical terms.

Wiretap Detection Techniques; A Guide to Checking Telephone Lines by Theodore N. Swift is $35 plus $3 shipping from ACM Research Service, PC Box 4021, Gaithersburg, MD 20885; ph.(301) 975-0073. For more information visit their Web site at **http://angelfire.com/biz/investigator**.

NSA Goes Commercial

NSA — so secretive that it has been popularly known as "No Such Agency" — has opened up a museum and gift shop at its headquarters in Fort Meade, Maryland. Only four years ago you would have found no signs that even identified the existence of the National Security Agency. The gift shop opened this past summer, and items with the NSA seal, such as coffee mugs and mouse pads, were an instant sell-out.

The museum is open Mon-Fri 9-3, Sat 10-2. A map can be found at the NSA website at **www.nsa.gov**. The exhibits feature displays such as a fragments of a U-2 spy plane and the Berlin Wall and the famed "Enigma" coding machine used by the Nazis in World War II. At the "spy shop" you can buy a code-book with disappearing ink, books, a golf towel with NSA insignia, and more.

Books and equipment for announcement or review should be sent to "What's New?" c/o Monitoring Times, P.O. Box 98, 7540 Hwy 64 West, Brasstown, NC 28902 Press releases may be faxed to 704-837-2216 or e-mailed to mteditor@grove.net.

Lawrence Magne
Editor-in-Chief, Passport to World Band Radio

Grundig Traveller III Portable

For those of us whose idea of a perfect day is getting up before sunrise to catch DX from Latin America, Asia and the Pacific, there are some obvious favorites among portables. Such models as the Sony ICF-2010 are replete with helpful operating controls, superior performance and useful features like synchronous selectable sideband.

The Grundig Traveller III has "quite good" selectivity, although in some other respects performance is modest, according to Magne.

Smaller and cheaper equals better

But these beauties also tend to be relatively large and costly. For the everyday traveler who wants to keep in touch with news on the go, smaller, cheaper models make more sense. They fit better into carry-on bags, and if they're lost — or "lost" — the financial hit isn't intolerable.

It's not just hotels and the like where electronic gear disappears, either, as I found on a recent trip to Europe. I use my cell phone going to and from airports, so it's always with me when I go abroad, even though it won't function overseas. The flight had been delayed by a couple of hours, so I was using the cell phone while in the waiting area before boarding, right in front of over 100 fellow passengers. When I boarded the plane, I stowed it in my zippered carry-on, stuck it in the overhead bin, then slept throughout most of the flight.

When I arrived, the phone was nowhere to be found. Someone, it seems, found it to be irresistible and made off with it while I was sawing logs.

So it's not surprising that Grundig has had considerable success selling low-cost world band portables to the traveling public. Chief among these hot sellers has been its "Traveller" series of portables, which tend to get modest marks in our reviews in *Passport to World Band Radio* and *MT*. These radios are widely sold on aircraft, at airports, and in other places frequented by international travelers, and so are often the first shortwave radios people own.

Handy travel features

The Grundig Traveller III—"traveller" is the British spelling—is the latest and best in the series, and at $129.95 the least inexpensive. Unusually compact and light, the TR III, which is remarkably similar to Grundig's snazzier Porsche-designed G2000A, has numerous travel-oriented features. These include a travel power lock, timer, 24-hour clock, alarm, and delayed-off "snooze" control to override hotel noise. Alas, the LCD is not illuminated, a drawback for listening in dimly lit hotel rooms or evenings on surfside patios. Being intended for travel, it has no AC adaptor, although like most portables it has a socket for one.

It comes with no tuning knob, but includes a keypad in standard telephone-key format, a handy meter-band control selector, "signal-seek" scanning to automatically bandscan active channels, up/down slewing and 20 station presets—ten for world band, five for FM and five for AM. Although this is more than adequate, there's an archaic SW1/SW2 switch to select that has to be used to go between the lower and upper portions of the shortwave spectrum. Too, there's an annoying one-second pause when tuning from one channel to the next.

Omits coverage from 7405-9395 kHz

The TR III tunes the usual FM band, as well as the extended AM band and shortwave from 2300-7400 and 9400-26100 kHz. An obvious shortcoming is that it misses world band stations operating from 7405-7600 and 9000-9395 kHz, although powerful stations between 7405 and 7600 kHz can often be tuned on "image" frequencies 900 kHz lower; thus, for example, a station on 7465 kHz might be audible on 6565 kHz—a solution that is probably too arcane for world band newbies. Also, the TR III doesn't tune longwave, which is used in such parts of the world as Europe and North Africa.

The LCD displays digits in the XX.XX MHz/XX.XX5 MHz format peculiar to cheaper Chinese-made radios.

Tuning is in 5 kHz increments, which although somewhat coarse for radio aficionados is handy for casual shortwave listening. The frequency display is shared with the clock display, but you can check the time while listening by pressing a button.

Other features are a microprocessor reset control, which can be a godsend in the unlikely event that the microprocessor "freezes," and a marginally useful single-LED tuning indicator. The antenna rotates and swivels, a plus for optimal reception on FM and shortwave, as well as insurance that the antenna won't break at its base.

Modest overall performance, but superior selectivity

Overall, performance is pedestrian. The bright spot is selectivity, which is quite good

even though there is but one bandwidth and there is internally generated interference from a plethora of annoying "image" signals. Audio quality is quite reasonable on shortwave and AM, although on FM there is little in the way of low-frequency ("bass") response.

But weighing against these virtues is mediocre sensitivity to weak signals, especially below 7400 kHz. This can be a real problem in much of Asia, Australasia, Latin America and even North America west of the east coast. In Europe, North Africa and the Middle East, where signals tend to be strong, this is less important, but even there Americans trying to tune in evening signals from North America will find that many simply won't come through unless a length of wire is clipped directly onto the set's built-in telescopic rod.

The Traveler III has obvious appeal as a travel radio, and serves a commendable "missionary function" by introducing the flying public to world band radio. Still, the Grundig Yacht Boy 305, which goes for the same price, is only slightly larger and is a much better performer. If you can stand the slight increase in size, the harder-to-find 305 is the way to go.

Japan Radio NRD-545 planned for 1998

Toshimichi Ohtake, one of our veteran colleagues at *Passport to World Band Radio*, recently had an opportunity to lay hands on a pre-production version of the planned new Japan Radio NRD-545 "superset." With digital signal processing, *à la* the pricey Watkins-Johnson HF-1000, this receiver holds great promise for DX purists.

Nevertheless, he reports that the '545 has a ways to go before it will be developed adequately to go into production. Best bet is that the bugs will be ironed out sometime in 1998, and we'll keep you up to speed as to how this interesting saga unfolds.

Sony service kudos

Referring to earlier comments in this column about Sony's now-remedied difficulties in providing parts and service for the current ICF-2010 portable, reader Michael Herman of New York points out that he has had excellent results getting parts for his discontinued ICF-2002. His point, that Sony overall does a good job with parts and service, is well-taken. To which I can but add that in my 20 years of evaluating world band radios I have rarely encountered such stubborn determination to remedy a problem as Sony of America showed when a glitch developed getting parts for the '2010.

Weighty issue raises questions

Numerous readers, having seen the Mahatma-like photo of me on page 72 of the 1998 *Passport to World Band Radio*, have asked for the secret for my apparently successful weight reduction plan. Alas, I cannot add this to the roster of helpful advice offered in the pages of *MT* as that photo was taken before I met Jane, my current wife, whose culinary expertise is evidenced by the more recent photo of yours truly which appears in splendid anonymity on page 138 of that same edition.

This equipment review is performed independently by Lawrence Magne and his colleagues in accordance with the policies and procedures of International Broadcasting Services, Ltd. It is completely independent of the policies and procedures of Grove Enterprises, Inc., its advertisers and affiliated organizations.

RADIO DATABASE INTERNATIONAL WHITE PAPER® reports contain virtually everything found during exhaustive tests of premium shortwave receivers and outdoor antennas. For a complete list, please send a self-addressed stamped envelope to RDI White Papers, Box 300M, Penn's Park PA 18943 USA; or go to www.passport.com.

Bob Parnass, AJ9S

Uniden Bearcat BC895XLT TrunkTracker

The Uniden Bearcat BC895XLT is a triple conversion scanner designed to scan conventional and popular types of Motorola trunked radio systems. Its 300 channels are allocated among 10 banks and a 2 second rescan delay may be programmed on a per channel basis. A query feature identifies duplicate memory channels and a Send key permits moving the contents of any nonpriority channel to another channel.

A large tuning knob serves as a channel selector or as a VFO control but can be disabled via a Lock key. We found a trick which lets you load a frequency into the VFO without writing into a memory channel, an improvement over the BC9000XLT:

1. Press the Freq/Chan key to put the BC895XLT into Freq mode, enabling the VFO.
2. To load a frequency into the VFO, press the digit keys, then twist the tuning knob. To load a frequency into both the VFO and memory, press the digit keys followed by Enter.

Table 1 shows the keypad/powerup tricks we discovered by experimentation and we suspect there are more tricks to be found.

Various combinations of banks may be scanned and our BC895XLT scans a mixture of frequencies at a speedy 85 channels/sec (CTCSS off). Though you can program frequencies into memory in any order, the TurboScan algorithm scans frequencies in ascending frequency order within each selected bank. Memory scan wastes no time scanning empty channels. Individual channels can be locked out from memory scanning, and pressing the L/O key for 2 seconds restores all locked channels in a bank.

One channel in each bank can be designated a priority channel and is sampled every 2 seconds in manual or search modes. A single pair of frequency limits can be

programmed for searching up or down. Up to 20 frequencies may be locked out from a limit search. Like the BC9000XLT, the new BC895XLT incorporates a silent Auto Store facility which permits frequencies found during a search to be stored automatically in banks of your choosing.

AM and NFM emission modes are selected automatically depending on the frequency and cannot be overridden. This limits flexibility in the 225 - 400 and 137 - 144 MHz ranges, home to both AM and NFM government activity. The BC895XLT lacks a WFM detector needed for monitoring military airborne multiplex transmissions.

Other Features

Uniden used the Philippine-manufactured BC895XLT to showcase useful new features such as built-in CTCSS decoding squelch, CTCSS "tone finding," computer control port, and 5 segment S-meter.

A nonstandard, 5 pin computer connection is available through a hole on the rear panel, but Uniden does not support the software or cables, which must be provided by unnamed third party vendors.* The communications protocol and pin assignments remain a mystery as they don't appear in the BC895XLT Operating Guide.

Factory preprogrammed NOAA weather frequencies are scanned by pressing the WX key. The BC895XLT can serve as a Weather Alert radio, armed to emit a bone-chilling siren upon receipt of a NOAA severe weather emergency tone.

The AUX feature permits remote activation of a tape recorder or other auxiliary device on a per-channel basis. Switching is accomplished using an internal relay and the contacts are brought out to a rear panel phono jack.

Trunking

The BC895XLT, like its portable BC235XLT brother, is designed to follow conversations in Motorola Type I, Type II, Type IIi, Hybrid, SMARTNET, and PRIVACY PLUS 800 MHz analog trunk systems (see July 1997 *MT* for BC235XLT review). It will not track Ericsson EDACS, E. F. Johnson, 400 MHz, or 900 MHz trunked systems, which must be scanned in the conventional mode. The BC895XLT defaults to Motorola Type II systems which divide a large number of users into several groups, called talk groups. We easily programmed three public safety Type II trunked systems by entering their frequencies.

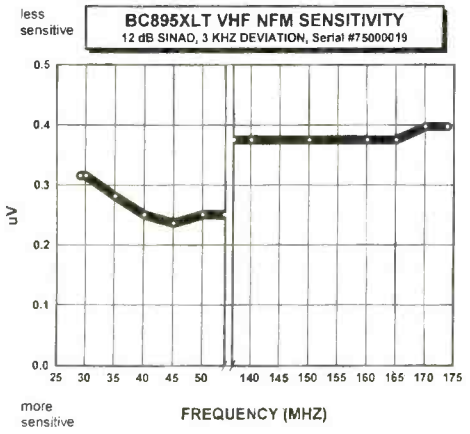
The older Type I systems organize users into fleets and subfleets. Programming a Type I or IIi system is more complicated because it requires entering something called a "Fleet Map." There's no easy way to

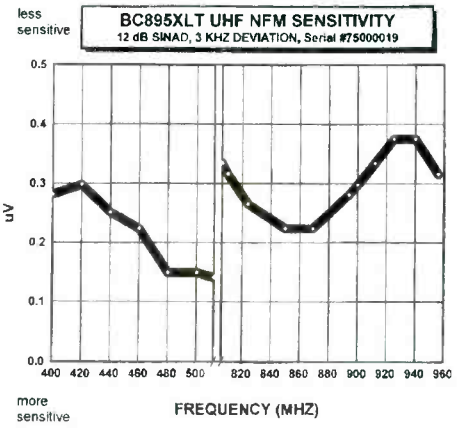
TABLE 1. BC895XLT Keypad Tricks

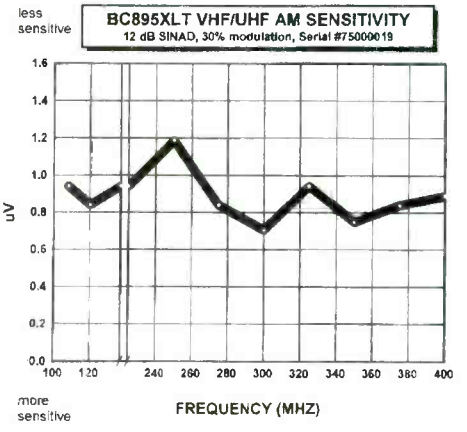
We found that powering on the BC895XLT while pressing these keys simultaneously produced interesting results:

Manual, 2, 9 - Reset. Erases all memory channels.
Scan, 2, 9 - loads test frequencies into channels 1 - 17.
Delay, 2, 9 - displays 000 0F. Can use Hold and Limit keys to step through addresses 000 - FFF.
Data, 2, 9 - displays LOAD
CTCSS, 2, 9 - displays H 162.400. Press ALRT to test alert tone.
Priority, 2, 9 - loads channels 1 - 300 with frequences between 144 and 149.98 MHz in 20 kHz increments.
Trunk, 2, 9 - displays Ct, trunk, scanner beeps.

*Cable and software to control non-trunked scanning functions is currently available from Scanner Master, 8000-0722-6701.







determine *apriori* the proper Fleet Map unless someone tells you. You can try each of BC895XLT's 16 preset Fleet Maps or enter a custom Fleet Map through the keypad.

Finding the right Fleet Map can be a long, trial-and-error process. You have to try each Fleet Map, one at a time, listen to the trunked system, and try to determine if the BC895XLT is tracking the fleets properly. If not, you must go on to the next Fleet Map.

The BC895XLT skips over telephone calls and conversations on talk groups designated as private. Our BC895XLT also skips over DVP scrambled transmissions, but we could hear a brief noise burst at the start of scrambled transmissions.

Each of the BC895XLT's 10 banks can be programmed with the frequencies for a single trunked system or with frequencies for conventional use, but you cannot follow trunked conversations and scan conventional systems at the same time. A Trunk key selects between trunking and conventional operation.

When using the BC895XLT for trunk tracking, think in terms of talk groups or fleets instead of frequencies. Talk group and fleet numbers, not frequencies, are displayed while searching or scanning in the trunked domain. Fortunately, Uniden designed the BC895XLT's delay, hold, and lockout facilities so operation is very similar in both trunk and conventional domains. One difference is that the trunking rescan delay is 5 seconds instead of 2 seconds.

You can search or scan for active talk groups in the trunked domain and lock out up to 100 uninteresting talk groups. You can program up to 5 lists per bank with 10 talk group numbers for scanning.

Wrinkles

Our BC895XLT scanned slowly and scanned empty channels when first removed from the box. The user manual does not specify a processor reset procedure, so we applied the same reset procedure used in earlier Uniden models (see Table 1). Our scanner behaved normally after reset.

The BC895XLT uses the same first and third IFs as the BC9000XLT, but the second IF differs (see Measurements table). Despite the high first IF, our BC895XLT hears images of cellular phone signals in both the civil and military air band. Image rejection in those areas measures 38.5 dB and 43.0 dB, respectively. Digital paging signals from a 929 MHz paging transmitter located 2 miles away interferes with our 168 MHz reception.

The internal surface mount circuitry spans two printed circuit boards. A metalized plastic shield covers front end components and is fastened to the main board with several screws. Most of the screw heads have been covered with tamper resistant epoxy, perhaps due to FCC pressure to hamper expanded frequency coverage modifications.

It's a Winner

We are enthusiastic about the BC895XLT. Despite hearing a few paging and cellular images, reception quality is head and shoulders above the BC890XLT we tested in June 1995. Trunk-tracking and CTCSS tone finding features are impressive and we heard little or no intermod.

Uniden should document the computer control interface and replace the frail, 5 pin computer port with an industry standard DB9 or DB25 connector as found in the ICOM IC-R8500 and AOR AR-5000. We hope Uniden will develop a new model, which merges the BC895XLT's trunking, computer interface, tone finder, and weather features with the BC9000XLT's wider frequency coverage, alpha labels, per-channel hit counter and attenuator, and selectable modes.

MEASUREMENTS, UNIDEN BEARCAT BC895XLT SCANNER, S/N 75000019

Frequency coverage (MHz):
- 29 - 54 (NFM)
- 108 - 136.995 (AM)
- 137 - 174 (NFM)
- 216 - 224.995 (NFM)
- 225 - 399.995 (AM)
- 400 - 512 (NFM)
- 806 -823.985, 849.015 - 868.985, 894.015 - 956 (NFM)

Sensitivity: see graphs
FM modulation acceptance: 13 kHz
Intermediate Frequencies:
- 380.8 or 254.4, 10.85, and 0.45 MHz

Image rejection due to first IF:
- 32.5 dB @ 155 MHz
- 38.5 dB @ 118.6 MHz
- 43.0 db @ 370 MHz

Audio output:
- 1.73 W into 8 ohms at 10% distortion

Practical memory scan speed: 85 channels/sec.
Search speed:
- 267 steps/sec. (5 kHz steps)
- 100 steps/sec. (12.5 and 25 kHz steps)

TRACKING THE TRUNKS

Larry VanHorn
tracker@grove.net

Trunking Info on the Web

Not a day goes by that I don't see a new website announced on our Trunkcom newsgroup that has trunking information for 235/895 users. One such site is in my native state of Texas by well-known scanner enthusiast Ben Saladino, KC5IRJ, author of the *Radio Manager for Windows* and *Frequency Manager for Windows.* Ben recently wrote:

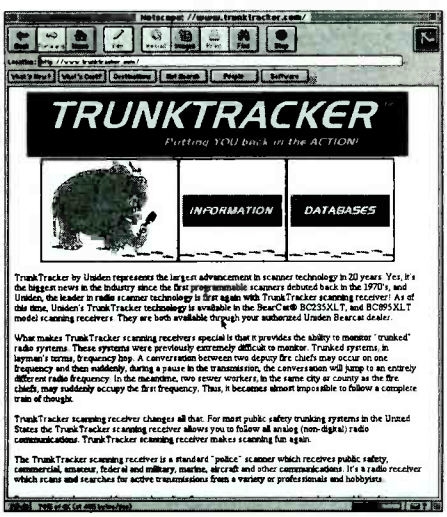
"I'm glad to see the new *Tracking the Trunks* column in *Monitoring Times.* I've been a subscriber for years and really enjoy the magazine.

"I have a website with local scanning information, including Trunk Tracking information, for the Dallas/Fort Worth Texas Area. The URL address is: **http://www.interplaza.com/scandfw/**

"I'm also a shareware author, and I'm working on a *Trunk Manager for Windows* computer program for storing, searching, and web publishing trunked radio information. It's about 50 percent complete and I will let you and *MT* readers know when it is done."

More Websites for Trunking

Since we are exploring internet websites, let's see what else is available for the 235/895 users on the internet. The official Trunk Tracker web site is located at URL **http://www.trunktracker.com.** This is the web site mentioned in the Uniden literature that comes with the radio. It is run by Trunking Technologies, LLC, and is not associated with Uniden. As of presstime you will find trunking info on this site for 21 states



John McColman has a great website for those of you in Central Virginia. If you are looking for trunking information from that corner of the country, you don't want to miss John's *Big Kahuna's Ugly Web Page* at **http://www.richmond.infi.net/~jmccolma/.**

I will have more websites in next month's column.

Baltimore's New Trunking System

James Smith has passed along the following information and question. According to a Motorola press release, the City of Baltimore's new 800 MHz digital trunked two-way radio communications system will have 28 channels and will employ Motorola's ASTRO XTS 3000 portable radios, Spectra mobile radios, and ONCORE XT global positioning system receivers.

The press release states that the new ASTRO system will provide sophisticated secure communications features. The system is scheduled to go live in early 1998. Will the BC-235XLT and the BC-895XLT be able to monitor this trunked system?

For James and others: if the system is set up as a Motorola digital system, the Trunk Trackers will follow the system, display subfleet identifications, but the only thing you will hear out of the speaker will be digital noise, no clear voice analog comms (unless the owners of the system configure it that way).

The Escondido Report

Steve Ralston has been *Tracking the Trunks* in his hometown of Escondido, California, located in Northern San Diego County. Below is Steve's first report on that trunking system.

I would like to thank Steve for sharing the information above on his area trunking system and if you have some info to share, please pass it along to us at: *Tracking the Trunks*, P.O. Box 98, Brasstown, NC 28902 or via e-mail to **tracker@grove.net.**

I hope everyone has a safe and happy holiday season. Uniden, Bearcat, and TrunkTracker are all trademarks of Uniden America Corporation.

CITY OF ESCONDIDO, CA TRUNKING SYSTEM

Motorola Type II
861.25 862.25 863.25 864.25 865.00 865.25
861.00 (Standard repeater and FAILSOFT frequency)

TT ID	Usage	Channel
16	Public Works	Safety
48	Unidentified	
80	Unidentified	
176	Park Rangers	Rangers
208	Police Dispatch	PD1
210	Police	Not Known
240	Police Dispatch	Dispatch 2 (Used when emergency traffic is on PD1)
272	Police Inquiry	PD2
304	Police Car to Car	Cars
400	Detectives	Investigations
432	Unidentified	
464	Police Sergeants	Supervisors
528	Fire Dispatch	PAGECOM (Tone-out)
560	Fire Command	Command 1 (Response)
592	Fire Command	Command 2
656	Fire Tac 2	Tac 2
688	Fire Prevention	Fire-10 (Arson)
752	Fire Car to Car	Cars
816	Citywide	SAU (Interdepartment Calls)
1360	Public Works	Water
1584	EMT to Hospital	Palomar Hospital
1712	Public Works	Water
1744	Public Works	Building Maintenance

Talk-around, private calls and data channels cannot be heard in trunking mode.

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- Selectable Tune Steps
- Priority Key
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- Battery Indicator
- Signal Strength Meter
- Mono/Stereo Switch
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- Cassette Record Jack
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- 8¼" x 5.0" x 1½"

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CIRCLE 131 ON READER SERVICE CARD

Clem Small, KR6A

The Many Faces of Half-Wavelength Antennas

We frequently hear the term "half-wavelength antenna." Indeed, with the exception of vertical-quarterwave and loop antennas, I think that the majority of antenna designs are built, in one way or another, from half-wavelength elements.

But there are many antenna designs in which the entire antenna consists of a simple, half-wavelength conductor. When we begin to add modifiers such as center-fed, end-fed, folded, and so on to our basic term "half wavelength," then we come up with a number of interesting and useful antennas. Let's talk about some of them now.

Single-wire, Halfwave Dipoles:

Probably the most common antenna on the HF band is the half wavelength, horizontally-oriented, centerfed dipole (fig. 1A). This design is also useful on the upper end of the MF band, and on VHF and UHF.

The Zepp antenna was popular in the days before we had low-loss, low-impedance feedline that could match the low impedance at the center of a half-wavelength antenna. The Zepp was an end-fed half-wavelength antenna fed with one quarter wavelength of open-wire feedline (fig. 1B).

Open-wire feedline is very-low loss, and allows efficient transfer of the signal to and from the antenna. This antenna got its name from the fact that it was originally designed for use in Zeppelin air ships. Fed with an antenna coupler, this antenna can also be a good multi-band skywire, operating at harmonics of its design frequency. Actually, any halfwave dipole can be operated as a multiband antenna at or near its odd-harmonic frequencies.

The J antenna (fig. 1C) is frequently employed on the VHF band. It is a half wavelength conductor with a quarter-wavelength open-wire feedline attached as with the Zepp. However the J is usually oriented vertically, and the open-wire feedline of the J usually is in-line with the antenna as shown in fig. 1C. A coax feedline from the receiver or transmitter is attached to the open-wire feedline at a point where a decent impedance match between the two feedlines is found.

Multi-conductor, Halfwave Dipole Antennas:

A single conductor, halfwave dipole mounted a half wavelength above ground has a center-feedpoint impedance of about 75 ohms. If we "fold" the antenna by adding a second halfwave connected to the first as shown in fig. 1D, the antenna's feedpoint impedance becomes 300 ohms.

At this higher impedance 300-ohm, low-loss, TV-twinlead can be used as the feedline. The signal-strength advantage of this low-loss feed system was more important in the past when low-loss coax had not yet been developed. Now we have coax with acceptably low losses, and designs needing 300-ohm twinlead or open-wire feeders are much less frequently used.

It is possible to raise the center-feedpoint impedance of a halfwave dipole even higher by adding more conductors to the dipole, or by varying the size of the antenna's conductors. The center-feedpoint impedance of multi-element, directive (beam) antennas is usually quite low if a single-conductor halfwave dipole is used as the driven element. The impedance transformation obtained by using a multi-conductor dipole as the driven element can be helpful in bringing the feedpoint impedance up to a practical value.

An interesting folded-dipole design known as the "halo" became popular in the early days of mobile VHF ham radio. The horizontal halfwave dipole was probably the most common base-station antenna in those days, and thus most VHF ham signals were horizontally polarized (see below). To maximize response to those signals with their mobile communications, hams utilized the horizontally-polarized halo. The halo was essentially an ordinary, halfwave, folded dipole bent to form a circle and mounted on a mast attached to the bumper of the vehicle which housed the radio. Bending it into a circle made its size manageable for mobile work. The antenna did resemble a halo somewhat.

Today, VHF base stations have come to employ vertical polarization in order to match the vertical whip antennas which have supplanted the halo completely. As a matter of fact, vertically-polarized antennas are essentially universal for mobile work these days.

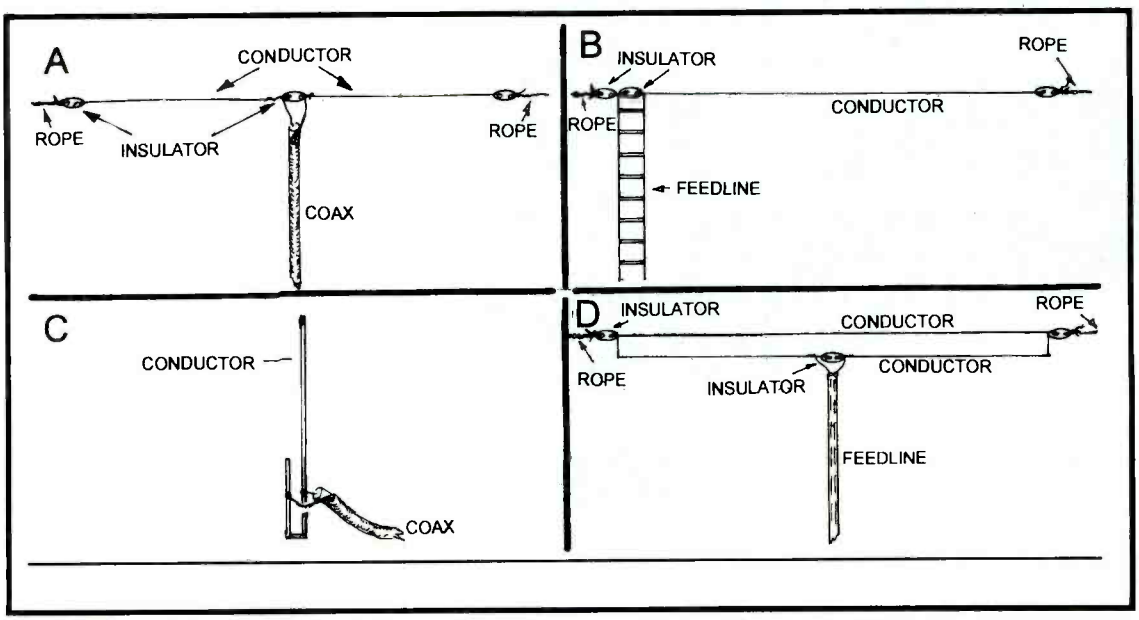

FIGURE 1. *A basic center-fed, halfwave dipole (A), A Zepp antenna (B), a J-antenna (C), and a folded dipole antenna (D).*

Polarization:

The polarization of a signal or of an antenna refers to the orientation of the electric field which is transmitted

from the antenna, or the orientation of the electric field of a signal to which the antenna will maximally respond in reception.

Generally the polarization of a dipole, and the signals it transmits or responds to maximally, can be determined by looking at the antenna: dipoles oriented vertically are vertically polarized, and those oriented horizontally are horizontally polarized. Antennas at a slant from vertical are polarized at the angle of that slant.

Generally speaking, good results can be had on HF with halfwave antennas mounted at any angle of polarization. The most common polarization on HF is horizontal, although antennas mounted at an angle (slopers), and vertical antennas are also popular. Once an HF signal bounces off the ionosphere its polarization may be radically changed from its original polarization.

On VHF and UHF vertical polarization is the norm due to the prevalence of mobile units using whip antennas as mentioned above.

Matching Feedlines to Dipole Antennas:

For efficient transfer of energy between ar antenna and its feedline the impedance of the antenna and feedline should be matched. Actually, a halfwave antenna can present a wide range of impedance values to its feedline. One important determiner of this feedpoint impedance is the antenna's height above ground. For instance a center-fed halfwave horizontal antenna may have impedance values from near zero ohms to near 100 ohms depending on its height above ground.

As with the zepp just mentioned the feedpoin impedance at either end of a halfwave antenna is very high — in the thousands of ohms. Feeding the same wire at its center rather than its end gives a feedpoint of nominally 75 ohms. As mentioned above these values can change significantly with variations in the antenna's height above ground.

A halfwave antenna can be fed at any poin along its length to give values intermediate between the high impedance of end feeding and the lower impedance of center feeding. This variation of feedpoint impedance with location of feedpoint is also true of other lengths of wire besides the halfwave. For instance, the G5RV multiband antenna makes use of this variation with its off-center fed design to provide a decent match between coax and antenna on several bands.

RADIO RIDDLES

Last Month:

I told you that the antenna-routing panels we discussed depend on a radio operator to switch between antennas when necessary. On the other hand, there is a technology which is used to design devices which automatically switch between antennas as fading occurs. The idea here is that the antenna with the strongest signal is automatically selected, and connected to the system's receiver. Then I asked you "What is the technology which provides these designs?"

Well, that technology is known as "diversity reception." Antennas which are separated by significant distance, or which have different polarization, tend to deliver different output levels from the same signal. The diversity system monitors the input from two or more antennas, and automatically switches to the antenna with the strongest signal as fading occurs at the antenna currently connected to the receiver. Often this greatly reduces the effects of fading on signal intelligibility.

This Month:

There are a number of halfwave antenna designs which we haven't discussed. Among them are two antennas with the same name: "sleeve antenna." How are these antennas constructed? That is, what do they look like?

In closing this month's column I'd like to pay my respects to Doug Demaw, a real radioman's radioman. Goodbye, Doug, you will be much missed by many. 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 Merry Christmas.

ASK BOB

ANSWERS TO YOUR RADIO QUESTIONS

Bob Grove, WA4PYQ
bgrove@grove.net

Q. *I have just erected a 100 foot wire antenna, connected at the center by only the inner conductor of a coax feedline; the shield is connected at the bottom, however, to the receiver chassis. On lower frequencies like medium wave, signals and noise are both much stronger if I disconnect the shield at the bottom as well, just inserting the plug's center pin into the receiver's antenna jack. At shortwave, it doesn't seem to make much difference. How can I get stronger signals, but reduce the electrical interference? (Bill Hughes, Sag Harbor, NY)*

A. You must not only connect the shield at the radio to eliminate the locally-generated electrical noise, but you must connect it at the wire antenna as well for an efficient transfer of the signal currents from the antenna to the coax. Insert an insulator at or near the center of the wire antenna and connect the coax center conductor to one side and shield to the other.

From a reception standpoint, the signals should hit the wire broadside; in other words, for signals from the north or south, the wire axis should be pointed east and west. Two identical antennas can be erected at right angles to each other (and even nearly touch where they cross), fed by separate coax lines, and switched between for best reception.

Q. *When pilots fly over my area I hear them refer to streets by name, and even restaurants. How can they see these from such heights? (Robert Brock, Phoenix, AZ)*

A. A pilot flies using either visual flight rules (VFR) or instrumented flight rules (IFR). If he is low enough to see streets (and the straight lines are visible from considerable altitude) and is familiar with the region, he is probably using VFR and simply recognizes landmarks, otherwise he will use instrument headings and vectors which are reported as numbers.

It is also possible that he is also calling out an intersection from his charts as he moves from one to another; these are named and not numbered.

Q. *I recently purchased a scanner which includes the 225-400 MHz military aircraft band. While frequencies are assignable every 25 kHz (and easily could be 10 kHz...ed.), most communications are separated by 100 kHz, far in excess of what is necessary for a 6 kHz bandwidth AM signal. Even then, I rarely hear much going on there. With unused frequencies in such high demand, isn't this a terrible waste of radio spectrum? (Roger Morse, Binghamton, NY)*

A. Yes, but efforts to pry it loose from the Department of Defense (DOD) have been futile. The DOD assignments are classified, and they are commonly protected under the guise of "national defense." The recent withdrawal of 200 megahertz of government spectrum for reassignment to the civilian sector makes government users even less eager to share.

Q. *As a newcomer to monitoring, I have several questions about my medium wave antenna, which is a 120 foot wire, 15 feet high, and my ground which is a 6 foot buried copper rod connected by a copper*

Bob's Tip of the Month

Try This Cheap, Easy, Effective Scanner Antenna

A letter from reader J. Darrell Gammon of Cary, NC, prompted this suggestion for a simple solution to scanner reception. An inexpensive, magnetic mount cellular telephone antenna makes a dandy, general coverage, scanner antenna for VHF high band, UHF, and 800 MHz. It works less well on VHF low band (30-50 MHz), but this is of little consequence to most scanner hobbyists.

I am presently using such an antenna for my own mobiling, both general coverage scanning and effective 144-160 MHz transmitting as well!

The TNC connector is quickly and easily converted to a convenient BNC connector by using a Radio Shack 278-144 adaptor. But its usefulness doesn't stop there.

For motels or other indoor use, the antenna may be placed atop a filing cabinet, refrigerator, or other large metallic surface for effective reception and transmission. If there is no metallic surface available, make one out of a 36" length of aluminum foil and set the antenna in the middle!

braid. My receiver is a GE Super Radio.

(1) Does a longwire have to run in a straight line?

(2) During a lightning storm, will unplugging the radio, disconnecting the antenna and reconnecting it to the ground braid add protection?

(3) How can I use a loop antenna effectively in an aluminum-sided house?

(4) How can I improve the reception of frequently fading signals?

(Alan Anderson, Gt. Barrington, MA)

A. (1) No, but your wire should be much higher than it is.

(2) Yes, for nearby discharges, but nothing will withstand a direct strike.

(3) By placing it outdoors! You can try a window, or an attic crawl space above the siding, but at those wavelengths, the shielding and reflections will be severe.

(4) A long, high, outdoor antenna should do the trick. Use coax transmission line. You may wish to erect two, at right angles to each other, and switch between them for additional directivity. Using a receiver with synchronous detection will also help reduce the consequences of fading.

***Q.** The old conundrum, "If a tree falls in the forest, and there is no one around to hear it, was there sound?" raises an interesting question. Does this mean that when my radio is turned off, there are no radio waves in my room? (Mark Burns, Terre Haute, IN)*

A. First of all, there *is* a sound when the tree falls, whether or not a human is around to hear it. Sound waves are an acoustic vibration of roughly 20-20,000 Hz (the human hearing range), detectable as sound by any number of non-human species. I'm sure that many fuzzy creatures of the forest are sent scurrying at the first crack of the falling timber.

The question is rhetorical, intended for meaningless debate among people with little else to do, centered on the vacuous argument that sound is a human phenomenon, which it's not.

And so far as the radio waves go, yes, they are very much there when the radio is turned off, just as a flashlight beam isn't extinguished when you close your eyes.

***Q.** I live far from the coast and wonder if the VHF maritime frequencies (156-157 MHz range) can be licensed for other services? I've heard that farmers in the midwest use these frequencies unlicensed; is this true?*

A. Yes, as well as by truckers, taxi services, campers, and others, but usually without benefit of license. While the frequencies are assigned to the maritime and coastal services on a primary basis, they are legally assignable to inland mobile services on a secondary basis as well.

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 **bgrove@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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MORSE CODE

(Continued from Page 27)

elimination, you have the correct call sign. Most of the other answers follow the same logic. Cities (QTHs) might be stated as: 1. Cleveland, 2. Oakland, 3. San Francisco, 4. Lima. You don't have to be a rocket scientist to know that if you have an "S," you can deduce that the answer is one containing that letter. At a recent testing session, the scene went something like this:

A very nervous code test taker sat down for the five wpm Novice test. With a shaking hand, he copied the practice portion of the test, then, with headphones adjusted and volume set, he did his best to put down what he heard. When finished, I passed him the question sheet. He didn't miss a single question.

"Wanna try the 13?" I asked. Reluctantly, he agreed, still shaking. I popped in the 13 wpm tape and tried to make him relax, to no avail. He was very nervous and doubted that he could copy at that speed. When he finished, I again passed him the answer sheet. He missed one question.

Our VE team was just about ready to end the test session, but I suggested that as long as he was doing so well ("being on a roll and all") that he try to 30 wpm test! To this, he outright refused! "Ahhh, give it a try," I said as I put the 20 wpm tape into the machine. "What can happen?" I asked. "You've already paid your fee so you have nothing to lose."

I explained that he should copy every letter that he heard. If he missed a few letters, to just grit his teeth *and keep copying*! He wiped his sweaty hands on his pants and said, "Well, maybe I could give it a try." I tossed him the earphones and hit the "go" button. He started copying the practice session, then shook his head "no."

"Keep going," I implored. He did. I left the test table so that he wouldn't be intimidated by the presence of the examiner. When he machine cut off, I handed him the question sheet. "But what I have on paper doesn't make sense!" he groaned. Actually, he had plenty of text on his copy sheet. "Try!" said I.

After a few minutes he turned in his answer sheet. He missed only a single question and walked out of the test session with a credit for the Extra class code test.

On Your Own

After a candidate leaves the test session with a code license, code proficiency can take place only with use. The standard advice to those who wish to develop code skills is simple: "Get on the air and enjoy!" To that I add, "Don't worry about your speed, it will come later. You won't be able to stay slow for very long. Trust me."

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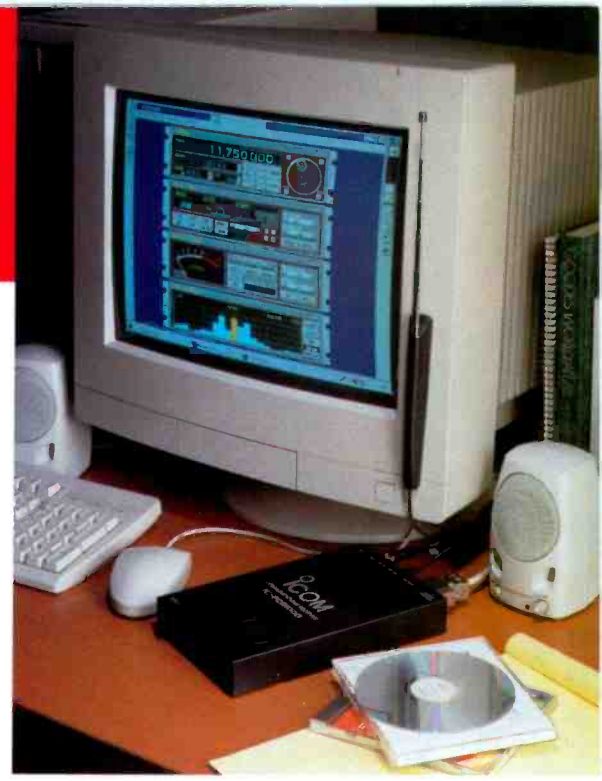

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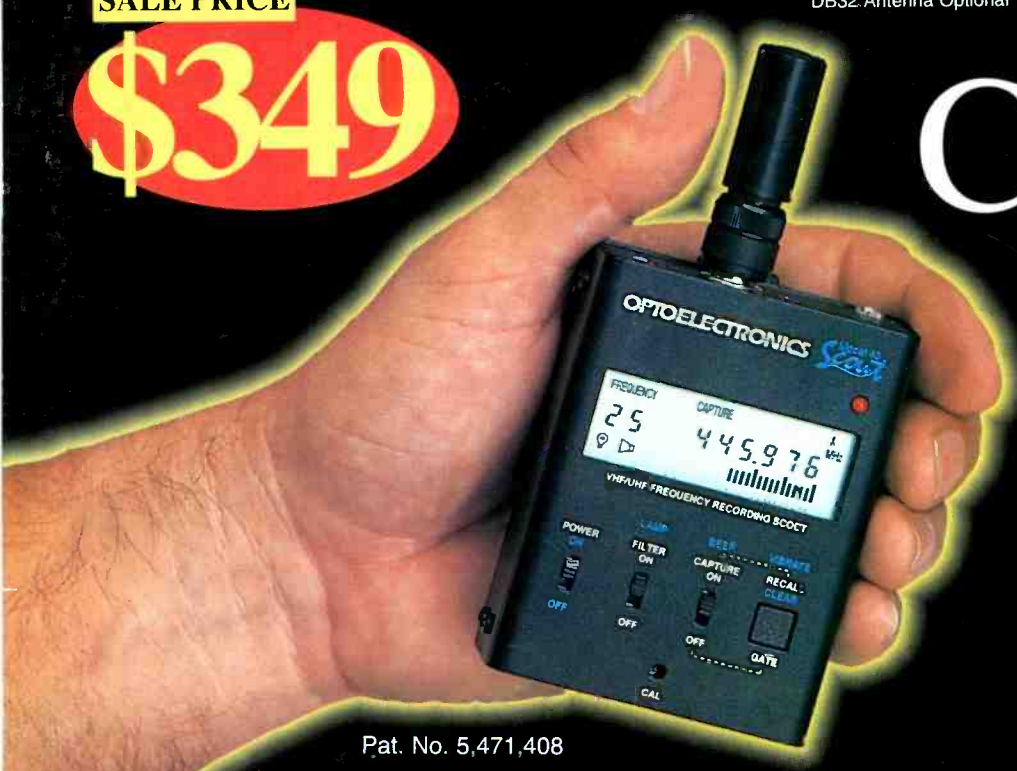

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