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This device has not been approved by the Federal Communications Commission. This device may not be sold, or offered for sale, until the approval of FCC has been obtained. Contact Optoelectronics for information on availability

Monitoring Times™
Vol. 17, No. 1 January 1998

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Cover Story

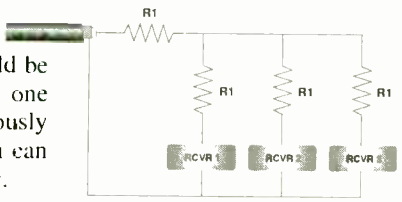
A Trunking System Profile for the City of Atlanta

By Larry Van Horn

You'll get nothing but "just the facts, ma'am" in this comprehensive directory of Atlanta's trunked public safety system by *MT*'s assistant editor. Police department subfleet IDs and dispatch codes, fire department IDs, and equipment and location information are all you need to start following the action with your new trunk tracking radio.

Even if you don't live in Atlanta, sooner or later all airlines come to Atlanta Hartsfield International Airport (Battalion 7). Be prepared by saving the article which starts on page 12.

Cover photos by John Bailey.



Reviews:

Haskell Moore is delighted with the micro-sized MicroCounter from Optoelectronics in his review on page 88. Magne says the Sony ICF-SW12 Travel Radio (page 92) is a good choice for globe-trotters, and Sony's new AN LP1 active antenna is the best active antenna for portables he's tested. Speaking of testing, Parnass guides you through your choices in affordable test equipment (p.94).

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Departments

Editorial Staff

Correspondence to columnists may be mailed c/o Monitoring Times; any request for a reply should include an SASE.

Frequency Manager	Gayle Van Horn	gayle@grove.net
Frequency Monitors	David Datko, Mark J. Fine	
Program Manager	Jim Frimmel	frimmel@startext/net
American Bandscan	Doug Smith, W9WI	72777.3143@compuserve.com
And More!	Jock Elliott KB2GOM	lightkeeper@sprintmail.com
Antenna Topics	W. Clem Small, KR6A	clemsmal@bitterroot.net
Beginner's Corner	T.J. Arey, WB2GHA	tjarey@mosquito.com
Below 500 kHz	Kevin Carey, WB2QMY	KCarey@mdsroc.com
Computers and Radio	John Catalano	j_catalano@conknet.com
DeMaw's Workbench	Doug DeMaw, W1FB	
Digital Digest	Bob Evans	revans@astral.magic.ca
Experimenter's Wkshp	Bill Cheek	bcheek@san.rr.com
Federal File	John Fulford, WA4VPY	johnf@emi.net
K.I.S. Radio	Richard Arland, K7SZ	k7sz@juno.net
Magne Tests	Lawrence Magne	
On the Ham Bands	Ike Kerschner, N3IK	
Outer Limits	George Zeller	George.Zeller@acclink.com
PCS Front Line	Dan Veeneman	dan@decode.com
Plane Talk	Jean Baker, KIN9DD	
Programming Spotlight	John Figliozzi, KC2BPU	johnfig@earthlink.net
Propagation	Jacques d'Avignon	monitor@rac.ca
QSL Corner	Gayle Van Horn	gayle@grove.net
Satellite TV	Ken Reitz, KS4ZR	ks4zr@compuserve.com
Scanning Equipment	Bob Parnass, AJ9S	
Scanning Report	Richard Barnett	ScanMaster@aol.com
SW Broadcasting	Glenn Hauser	ghauser@hotmail.com
SW Broadcast Logs	Gayle Van Horn	gayle@grove.net
Tracking the Trunks	Larry Van Horn, N5FPW	trunktracker@grove.net
Utility World	Larry Van Horn, N5FPW	steditor@grove.net
Washington Whispers	Fred Maia, W5YI	fmaia@internetMCI.com

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

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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)

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Bearcat Intercepts Trunked Radio

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The Bearcat 895XLT is superb for intercepting trunked communications transmissions (see BC235XLT description) with features like TurboScan™ to search VHF channels at 100 steps per second. This base and mobile scanner is also ideal for intelligence professionals because it has a Signal Strength Meter, RS232C Port to allow computer-control of your scanner via optional hardware and 30 trunking channel indicator annunciators to show you real-time trunking activity for an entire trunking system. Other features include ***Auto Store*** – Automatically stores all active frequencies within the specified bank(s). ***Auto Recording*** – This feature lets you record channel activity from the scanner onto a tape recorder. ***CTCSS Tone Board*** (Continuous Tone Control Squelch System) which allows the squelch to be broken during scanning only when a correct CTCSS tone is received. For maximum scanning enjoyment, order the following optional accessories: **PS001** Cigarette lighter power cord for temporary operation from your vehicle's cigarette lighter $14.95; **PS002** DC power cord - enables permanent operation from your vehicle's fuse box $14.95; **MB001** Mobile mounting bracket $14.95; **EX711** External speaker with mounting bracket & 10 feet of cable with plug attached $19.95. The BC895XLT comes with AC adapter, telescopic antenna, owner's manual and one year limited Uniden warranty. Save $80.00...order the package deal above.

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Frequency Coverage:
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29.000-54.000 MHz., 108-174 MHz., 406-512 MHz., 806-823.995 MHz., 849.0125–868.995 MHz., 894.0125-956.000 MHz.

The Bearcat TrunkTracker BC235XLT, is the world's first scanner capable of tracking a selected radio transmission as it moves across a trunked radio system. Now it's easy to monitor fleets and subfleets in analog trunked radio systems. The BC235XLT can also work as a conventional scanner. This 300-channel, programmable handheld scanner provides scanner users with uninterrupted monitoring capabilities of Type I, II, IIi and hybrid trunking systems. One of the biggest obstacles in the scanner industry has been the increasing use of trunking radio systems in business and public service agencies throughout the United States and Canada. This makes it nearly impossible to track a conversation as it moves within a trunk system from frequency to frequency. According to Ken Ascher, WB8LIT, Chairman & CEO of Communications Electronics, "The Bearcat 235XLT is a revolutionary breakthrough in scanner technology. Now it's easy to continuously monitor conversations even though the message is switching frequencies." The BC235XLT comes with AC adapter, CRX120 battery charger, two rechargeable long life ni-cad battery packs, belt clip, flexible rubber antenna, earphone, owner's manual and one year limited Uniden warranty. Not compatible with AGEIS, ASTRO, EDACS, ESAS and LTR systems. Call 1-800-USA-SCAN to order your scanner now.

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It pays to be a *Monitoring Times* magazine reader. Order any scanner or transceiver from CEI. Send or fax this coupon with your order and save. Call 1-800-USA-SCAN to order.

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WASHINGTON WHISPERS

By Fred Maia, W5YI
fmaia@internetMCI.com

• **For the first time in history, the FCC changed 80% of its leadership in one fell swoop!** During early November, the agency swore in four new commissioners which included two African Americans and a Hispanic woman from Puerto Rico. Only Commissioner Susan Ness continues from the previous commission.

Pres. Clinton named FCC General Counsel William E. Kennard as the new FCC Chairman. The others are economist Harold W. Furchtgott-Roth, Gloria Tristani, a state regulator and anti-trust lawyer, Michael K. Powell, son of retired Army chief-of-staff, Colin Powell. The FCC also made numerous simultaneous changes to their bureau staff.

Incoming Chairman Bill Kennard said he was honored that the administration had shown confidence in him and that he would "...continue the FCC's efforts to replace regulation with competition, and to hasten the delivery of many new telecommunications services to the public."

• The U.S. Senate Commerce Committee has approved a bill that would **prohibit state and local governments from taxing business on the Internet for at least five years.** The *Internet Tax Freedom Act* places a moratorium on taxing electronic commerce. The bill now goes to the full Senate for debate and voting. A similar bill has been working its way through the House.

There are more than 30,000 taxing jurisdictions in the U.S. and many want to collect taxes from World Wide Web business dealings. Several states already impose some tax on Internet transactions including Connecticut, Massachusetts, Tennessee, Pennsylvania, Texas, Ohio and Wisconsin. The bill is widely opposed by many states and cities.

• **Effective January 1, 1998, amateur radio stations must conform to the FCC's new radiofrequency safety guidelines.** In 1996, the FCC's Office of Engineering and Technology (OET) adopted new *Maximum Permissible Exposure* (MPE) standards to better protect the public and workers from potentially harmful RF fields.

The FCC had been using a 1982 standard when evaluating the effects of RF radiation on the environment. Under those guidelines, all Amateur Service facilities were categorically excluded from evaluating the effects of RF exposure on the human environment.

The new standards that the FCC adopted are more restrictive in the amount of environmental RF exposure permitted and extends the frequency range under consideration to cover all frequencies from 3 kHz to 300 GHz ...every frequency band used by the Amateur Service.

The new guidelines provide for two levels of exposure limits. One "controlled" level applies to people who are aware of the potential for RF exposure. The other "uncontrolled" level applies to the general public who have no knowledge or control over their exposure.

Since Amateur Radio transmissions can impact both the ham operator who can exercise control over transmitted RF and their neighbors who cannot, Amateur Radio transmissions can be in both controlled and uncontrolled environments

A transition period to the new RF safety rules was established. Effective January 1, 1998, amateur radio stations radiating more than 50 to 500 watts (depending upon the band) must evaluate their stations to determine that they conform to the FCC's RF safety standards. Ham radio stations are no longer allowed to run maximum power in a residential environment without determining if their emitted signals constitute a safety hazard.

The FCC has published OET Bulletin 65 and Amateur Radio Supplement "B" that explains how ham operators go about determining if their stations are safe under the new RF exposure standards. Both documents are on the FCC's Internet Web site at **http://www.fcc.gov**

• **One thing that broadcasters and ham operators both seem to feel important is their station call sign!** Station call letters serve three purposes. They identify the nationality, type of station and licensee. By international agreement, the first letter of the call sign identifies the country. The United States is assigned N, K, W and shares the initial letter A with some other countries. K and W prefixes go to domestic broadcast stations.

Since the start of radio broadcasting in the 1920's, stations have had the privilege of requesting specific call signs. There has been a preference for letter combinations embodying initials of names, places, or slogans.

International Radio Regulations do not require the use of call signs by broadcast stations if some other suitable means of identification is employed. For example, many foreign broadcast stations identify by announcing, "The Voice of such-and-such."

For the last two decades, amateur (ham) radio station call signs have been assigned in sequence rather than on a request basis. Up until recently, two-letter suffix call signs had been the mark of an old-timer.

Now ham operators can also obtain call letters of their choice. Starting in 1996, higher class ham operators have been able to select the make up of their station call sign upon paying a $30 cost of regulation fee (recently increased to $50). As of December 2, 1997, however, the government is permitting *any* licensed ham operator to select their station call sign subject to certain guidelines. Now Technician, Technician Plus and General Class operators are eligible for any available call sign beginning with K, N or W — followed by an area numeral and three user-selected suffix letters. Ham stations are now joining their broadcast counterparts by selecting call sign suffix letters that mean something to them!

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CIRCLE 131 ON READER SERVICE CARD

BNN Defendants Plead Guilty

Steven and Robert Gessman, owners of Breaking News Network, and general manager Vinnie Martin, have pled guilty to charges leveled against them in the New York Southern District in August 1997. BNN is a company which supplies news tips to interested organizations.

The three men pleaded guilty to two counts of intercepting pager messages and passing the information to clients, and to one count of illegally manufacturing and possessing software and cloned pagers. The defendants were charged under Title 18, Chapter 119, Section 2511, "Interception and disclosure of wire, oral, or electronic communications prohibited," and their case marks the first-ever conviction for the illegal interception of pager messages, according to U.S. Attorney Mary Jo White.

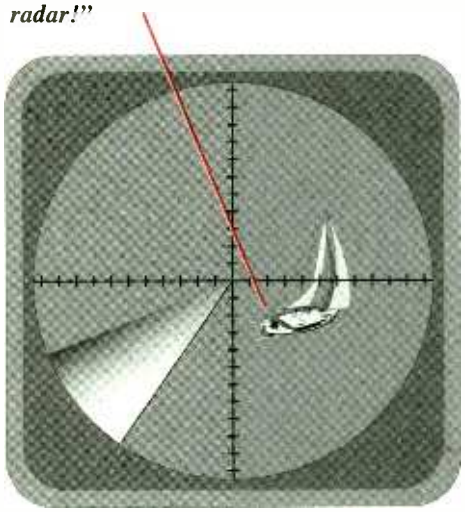
They face a possible maximum penalty of one year in prison and a $10,000 fine. Another defendant, Jeffrey Moss, a former dispatcher for BNN, is still facing charges.

Coast Guard Targets Long Is.

The Coast Guard's number one nuisance is false calls for help, and the number one source of such hoaxes is Long Island, New York. Sixty percent of false maritime distress calls in the U.S. come from the New England coast, but one-third of those are generated in Long Island alone.

Education and toll-free hot lines have reduced the hoax problem in other parts of the country, but they have been ineffective in reducing the calls along this coast line. Now, the Coast Guard has invested $100,000 in setting up three direction-finding sites for the area. Using signals from the three receivers a computer can triangulate and locate the source of a call in 7 to 10 seconds.

"The hilarious part is, the Coast Guard actually thinks they can see me on their radar!"



"Perpetrators" tend to fall into four categories: children playing with the marine band radio on board the family boat; boaters who use the word "mayday" loosely in a transmission; boaters who accidentally leave the radio microphone open; and serious hoaxers well-versed in the proper terminology.

Any search and rescue operation is enormously expensive and often puts rescuers' lives at risk as well. The new equipment should result in enormous savings, as well as pinpointing a location quickly when an emergency is the real thing.

Congress Lowers the Boom on CB

Identical bills are working their way through the House and Senate that would give state and local governments the right to enforce FCC regulations on citizens band equipment and out-of-band operation.

S.608 and H.R.2612 exempts anyone holding any class of FCC license from local enforcement. An appeal process is included in the bills in which the FCC may determine if a local government has acted outside its authority in a particular enforcement.

Beloit, Wisconsin, already has enacted a local ordinance intended to stop high-wattage CB signals from interfering with electronic devices. Mike Elliott, a local CB user, is considering an injunction against the ordinance, which he feels is illegal. If the congressional bills should become law, the situation could become interesting.

How will local governments determine whether equipment is in violation or not? The FCC (the same agency that has neither the funding nor the personnel to enforce current regulations) is to provide technical guidance.

CB Boom

Citizens band radio is experiencing a strong resurgence, says Cobra Electronics Corp, which is seeing its first turn-around in sales in years. CB radio sales at main-line stores such as Sears, Roebuck and Co, Radio Shack, and Circuit City have all picked up.

The boom can be explained in part by cell phones, according to Motorola spokesperson Mike Doheny; people have gotten accustomed to mobile communications, but cellular phone charges can be astronomic. The charge for a CB is just the one-time purchase price.

"Aw, dangit, what WAS my 'handle' back in the '60s?"

Military Action on CB

This story comes to *MT* via Clay Mayrose, WA6LBU, in his own words.

"A couple of years back I was working with a radio operator at Offutt Giant Talk station at Elkhorn, Nebraska. He was a ham as well as an active CBer. About 3 am we decided to play with an unused radio level and were listening to truckers on CB channel 19. When the military traffic picked up, we dropped the radio and went back to running phone patches and other duties.

"After shift change, a problem developed in an active radio and it was replaced by the transmitter that we had been using on channel 19. The frequency for Ch 19 was preset into the transmitter so each time the radio was dialed into a broadcast for an EAM(emergency action message) it automatically switched to Ch 19 and into AM, causing the traffic to be sent to all the truckers in the midwest! At 10,000 watts, it probably took out ch 16, 17, 20, and 21, as well.

"It took about 8 hours for the on duty crew to notice the problem and as best as we could tell five or six EAMs were sent in that time frame. The good news is that CNN didn't report any truckers being diverted and dropping their loads on targets of opportunity!"

Shortwave Transmitter Site Sold

Joe Brasier at World Harvest Radio International advises us that WHRI has purchased the Scott's Corner, Maine, transmitter site.

The modern broadcast site was originally built by Monitor Radio International as station WCSN. A few years later it was then sold to Prophecy Countdown which went on the air as WVHA, but later suffered bankruptcy. The site has been on the auction block for some months.

When operational, the site will be called "Angel 5" with an Africa target area.

Martí Moves to Miami

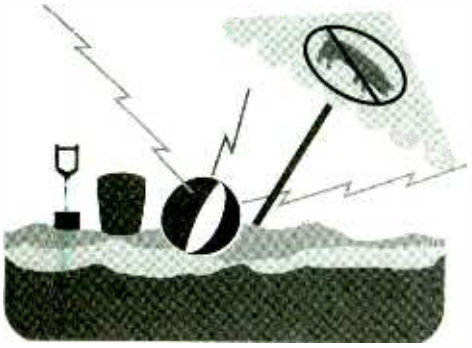
The process has been on-going since last fall, but Radio/TV Martí is gradually making its mandated move out of Washington to a remodeled warehouse in Miami. "Making lemonade out of lemons," is what director Herminio San Roman calls it.

Intended to save money, the move will put the studios closer to the people who understand Cuban issues—plus the rent is cheaper. The station is keeping as much of the same equipment and the same staff as possible.

The move is being financed, in part, by a fund originally established by Congress to help U.S. broadcasters overcome Cuban jamming in retaliation to Radio Martí . The fund was only allocated for five years, and has had little use.

Radio Martí broadcasts on 1180 kHz. In Cuba, Castro counters Martí with high-powered "Tour Radio" on the same frequency.

Beachball Jammer



Who would want to jam the communications of a volunteer emergency service organization in Elkhart, Indiana? Apparently, someone who doesn't like hams. And, someone very creative. Jamming devices were found planted inside beach balls placed along the river last summer. Some were also found placed in homes around the area. One detector reportedly was equipped with a seismic detector that turned itself off if a direction-finding team came too close.

According to the Amateur Radio Relay League Letter and the *Amateur News Weekly*, a couple in Elkhart, Indiana, has admitted planting a number of battery-powered radio jamming devices. The transmitters were designed to block the repeater of the Elkhart County Civil Defense Emergency Response Team.

Although local authorities now know the two people responsible, they say they do not have jurisdiction in the case; reportedly the FCC has been asked to investigate.

Hold the Phone!

The *Tatler*, a British publication, tells the story of three *Daily Express* journalists who went to lunch and spent the time drinking and complaining about their editor. One of them dropped his mobile phone, initiating the speed dial. The entire conversation was recorded on voice mail — of the editor's secretary.

Internet Webcasting

Jim Frimmel reports some interesting statistics about broadcasting on the Internet from the Telecom Interactive 97 conference. Although webcasting is only two years old, more than 700 webcasters are transmitting live audio and/or video in 12 countries 24 hours a day. Most of these are radio and TV stations, but 65 are new Internet-only broadcasters.

An average of 50 new radio webcasters hit the Internet each month with the most growth from international and Internet-only stations. Of the eight available streaming audio technologies, the leader is RealAudio with 87.8% usage. For a continually updated listing of broadcasters on the Internet, check out the BRS Radio Directory (**www.radio-directory.com/**)—probably the most comprehensive site of its kind on the Internet.

Send your news clippings from the world of radio to Rachel Baughn, editor, *rachel@grove.net*. Special thanks this month to our reporters: Anonymous, New York; Kenneth Borndale, New York; Tad Cook, Washington; Bill Dunn, email; Kenneth Dupuis, New York; Jim Frimmel, Texas; Paul Jablonowski, Wisconsin; Maryanne Kehoe, Georgia; Kevin Klein, Wisconsin; Clay Mayrose, email; Richard Sklar, Washington; *The Groundwave*.

BULLETIN BOARD

January 10, 1998: Loveland, CO

Northern Colorado ARC Superfest 9am-3pm at the Larimer Co Fairgrounds, 700 Railroad Avenue. Jeanene Gage N0YHY, 970-351-7327; Info: 970-352-5304. Talk-in 145.115 (- offset 100 Hz) or 146.85 (-)

January 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. Talk-in on 146.85 and 444.925. Admission $3 or 2 for $5 at door. Gaylen Pearson WB0W, 1210 Midyett Road, St. Joseph, MO 64506.

January 28: Special Event Station

Challenger Middle School ARC, KI6YG, will operate a special event station to commemorate the 12th anniversary of the space shuttle *Challenger* tragedy. Operation 1500 - 2400 UTC, on or near 14.250, 21.350, 28.350, and 146.52 simplex. QSL to Challenger Middle School ARC, 10810 Parkdale Ave, San Diego, CA 92126.

January 31: Columbus, OH

Central Ohio Antique Radio Club: Antique Radio Swap Meet, Jan.31, 1998, Columbus, Ohio. Old shortwave radios and antique tube radios. For more details call Chuck Davis (614)7926237, or check out our event webpage at *www2.netcom.com/~sjohn3/swap.jpg*

By Jock Elliott

MT drops in on Wilton Post, N.Y. State Police

You probably wouldn't give the place a second glance, except for the modest sign out front that says "New York State Police" and, in larger letters, "Town of Wilton." It's a long, low white building, perched on a knoll about two miles from I-87, the Adirondack Northway. The radiominded will take note of a large tower behind the building. Otherwise, the most interesting thing about this structure from the outside is a scenic vista to the North.

But appearances are deceiving. Inside, this building houses a communications nerve center, which serves Washington, Warren, and Saratoga counties in upstate New York, and the only police station in the service area that is manned 24 hours a day.

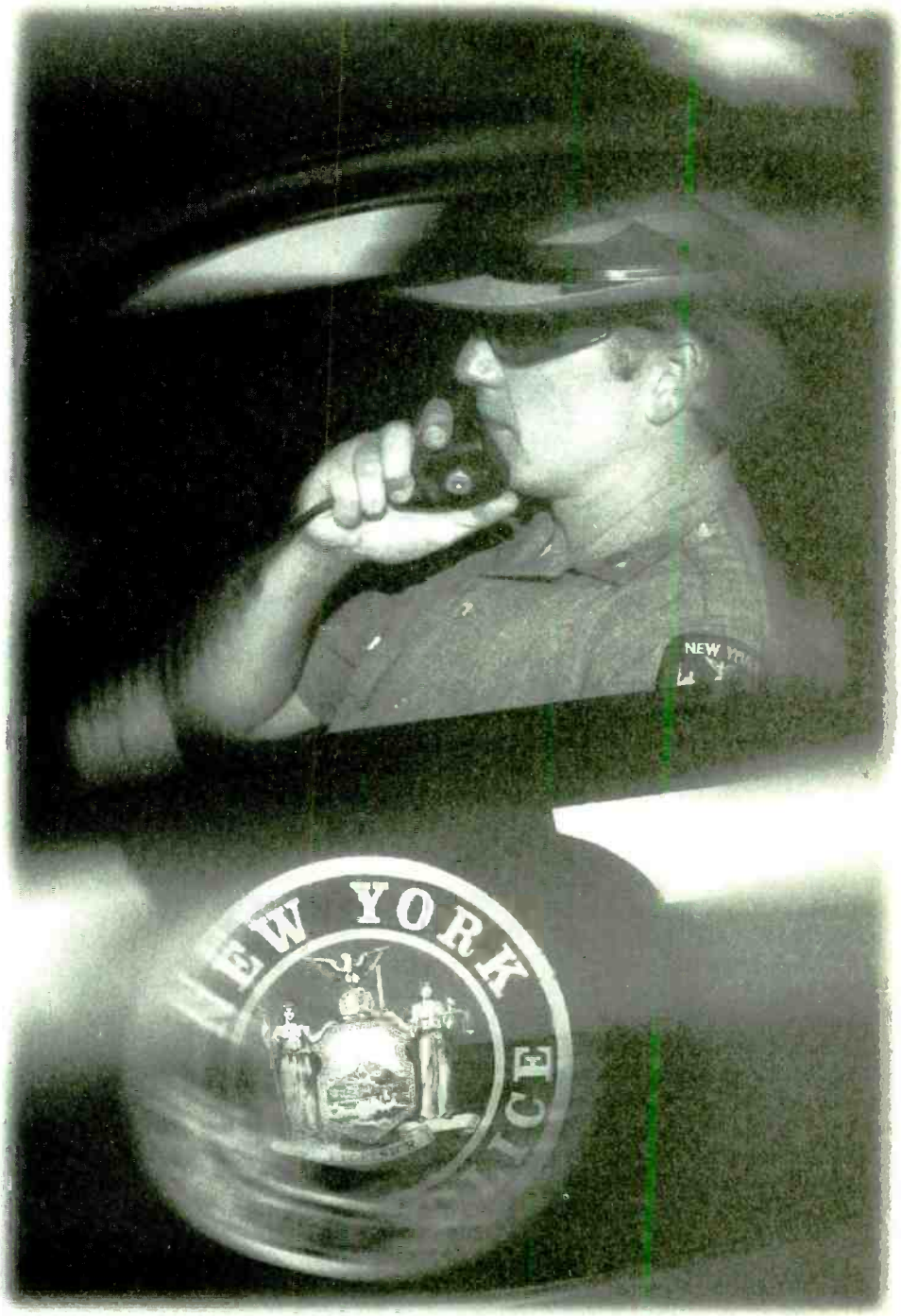
The heart of the operation is a room not much bigger than a large living room, which is normally staffed by two civilian Communications Specialists (or ComSpecs, for short). The ComSpecs at the Wilton post sit at a communications desk that runs nearly the length of the room and is studded with radio consoles, telephone equipment, computer terminals, video displays, fax machines, printers, and all the other gear that they need to do their jobs.

Here, communications for three counties come together: a phone line for cellular 911; a hard line 911 service for Saratoga county; at least 20 additional phone lines; TDD phone for communications with the deaf; and seven radio frequencies. There are many more radio frequencies that the New York State Police use — car-to-car channels, for example — but the communications professionals who occupy this room usually have neither the time nor the need to monitor them.

The room is noisy: phones are ringing constantly; radio calls crackle through the speakers on the console, and, to my amazement, a radio is playing softly on a window sill.

MT Works the Shift

ComSpec Art Kurtz is working at a computer. He's setting up the duty roster for the



ComSpec Pam Neilen answers a radio call.

Trooper Timothy P. Pratt radios the Wilton post.

upcoming 3:00 pm shift change. This information — called a resource message — will be sent to the local sheriff and police departments so they and the State Police can coordinate their law enforcement patrols.

At the other end of the communications console, ComSpec Erin Steinbeck is answering calls on the telephones and radios.

14:16 — Kurtz punches up a ringing phone line — a male, 10 years old, has a possible broken arm and needs an ambulance. It's a cell phone call from a recreation center.

A young woman arrives at a glass "customer service" window located at the far end of the dispatch center. A trooper walks over to speak with her. She wants the troopers to evict her boyfriend from their trailer for "being a jerk." They have a child in common. The trooper spends some time explaining the legal realities of the situation to her, and she leaves.

14:26 — Steinbeck responds to the distinctive ring of the emergency 911 line, but hears no one. Using caller ID, she checks the number, calls back. It's standard procedure to confirm that there is no one there who is in distress and may be unable to speak. She learns it was a child playing with a phone.

14:40 — Steinbeck takes a call from the owners of an overdue tractor trailer. The driver of a blue and white Mack with an aluminum Fruehauf trailer left Rotterdam at 6:00 am, but still hasn't arrived at Pottersville, only 100 miles away.

The communications post is an information sorting and dispersal center. It is also a police station. People call — and show up in person — looking for a lot of answers to a wide variety of questions concerning all kinds of problems. Earlier in the day, Steinbeck took a call from the owner of two dogs. Somehow one dog got a chain wrapped around the other dog's neck. The owner couldn't free it, and the dog died.

State Police policy requires that there be at least one armed officer present at all times. This afternoon, it's Sergeant Barbara McHugh. She is in uniform, a loaded sidearm on her hip. She will be in charge of the communications center during the 3:00-11:00 PM shift.

"We're a full-service information and response center," says Sergeant McHugh, "Most of the time, we answer questions through telephone discussion. Fire and medical emergencies are transferred to the county dispatch center because they are county run services."

15:00 — The shift changes. Steinbeck and Kurtz leave; ComSpecs Pam Neilen, a 13-year communications veteran, and Marleise Cook, who has been on the job three years, come in and settle at the console. It's rare for more than a minute or two to pass with out a ringing telephone or a call on the radio. When Neilen learned her duties, it was chiefly through on-the job-training, but now ComSpecs are sent for 3-4 weeks of intensive education at the state police academy.

Neilen begins logging incidents at a computer terminal and answers my questions when she isn't responding to the radio or phone. When an incident comes in — a *complaint* in ComSpec's lingo — the information is put on a card that looks much like an old computer punch card — which is then time-punched. This allows the ComSpecs to track the information before it is logged into the computer system. The reason they use the cards is that

Trooper Pratt at the wheel of one of the New York State Police's Camaros.

the computer system is too slow to log the information in real time.

The card is punched and put into one of a series of slots in the center of the console. There's a slot for each car. The card is punched again when the patrol car arrives at the location; and punched again when the complaint has been finished. By looking at the slots for the cars, the ComSpecs can instantly tell if there are any incidents that remain open. It's not high-tech, but it works.

15:16 — Cook takes a call concerning a suspicious vehicle on the Northway. The car is abandoned in the U-turn area with all the doors open. The call was received by the Loudonville State Police station via cellular phone and was relayed to Wilton to respond. One of the troopers patrolling Interstate I-87, the Adirondack Northway, is asked to check it out. By the time he arrives, the car is gone. In a cabinet behind Cook, a pair of huge reel-to-reel tape machines record every telephone call, every radio call, complete with a time stamp.

Every car radio has 16 radio channels, they have full capability to talk to the emergency services "world" for whatever they need. The dispatch center has frequencies for talking to the cars and a dedicated 911 emergency channel which is a priority channel. The Wilton post — identified as station KED 924 —has the capability to dispatch the cars for the New York State Police, plus Washington County Sheriff, Saratoga County Sheriff, Charlton Police Department, Stillwater PD, Galway PD, and Police for the Village of South Glens Falls. In addition, they can also dispatch for the New York State Park Police and the Department of Environmental Conservation Police

15:47 — The emergency 911 line rings; Neilen takes it. A woman is calling about her daughter who is pregnant and has fallen. Neilen switches the call to Saratoga County Sheriff's Department, which dispatches an ambulance and provides medical advice for the call. If the need arises, the Wilton State Police ComSpecs have the emergency medical procedure books with which they can walk a caller through emergencies such as childbirth and cardiac arrest.

As of September 12, the day I visited, 14,300 complaints had been handled year-to-date through the Wilton office of the State. But that number is misleading — the ComSpecs typically handle two to three times that number of calls, but the vast majority never make it into the complaint log.

The phone rings virtually constantly. People call for all manner of reasons: to ask for phone numbers; to ask for someone to call a taxi for them; to report injuries and accidents; to ask for protection from abusive spouses; to report custody problems; to ask that a verbally abusive homeless person be incarcerated; to get someone to break up a bar fight; to report theft of property; to deal with animal abuse problems.

The list is endless, and often the calls have nothing to do with what most of us would consider to be police work. Recently, Sergeant McHugh spent an hour trying to find someone to take abused and neglected cats out of a trailer. "The local jurisdiction has a Dog Warden, but he doesn't do cats," the Sergeant explains.

The advent of cellular phones has both helped and hindered the work here. Cell phones allow people to report incidents much more readily, and at the same time, they allow the overreporting of incidents. During a recent forest fire visible from the Northway, the Wilton dispatch center received hundreds of cellular calls to ask if the state police were aware of the situation.

Right now, the communications center is relatively quiet. Neilen says this is the quiet season — between the end of summer tourist season and the beginning of the winter driving season.

17:43 — A burglar alarm goes off; a trooper is dispatched to check it out; a short time later he reports that there is no problem at the location.

During the shift a woman arrives at the Wilton station to wait under the watchful eye of the troopers while her ex-husband returns their children to her custody. Her husband has been violent in the past, and the court has directed that this is where the exchange will take place.

Later, a woman arrives at the customer service window; she is lost and looking for a restaurant at a golf course; Sergeant McHugh gives her directions, and the woman is back on her way.

18:07 — A larceny — theft of clothes from a store at a local mall — is reported. Troopers are alerted that a light tan 4-door Skylark was seen leaving the scene.

18:10 — The emergency 911 line rings; a walk-in medical service needs an ambulance;

NEW YORK STATE POLICE TROOP G "WILTON"

Ch.	Freq.	Use
F1	155.445	(base) / 154.680 (cars)
F2	154.665	car-to—car (Northway patrol, some radar units)
F3	154.695	emergency channel, most bulletins
F4	155.565	motor vehicles data channel
F5	155.370	municipal radio dispatch (intersystem)
F6	154.845	tactical/surveillance
F7	155.475	national police channel
F8	155.625	special investigations
	158.730	Saratoga County Sheriff —
	158.775	Saratoga Country 911 -
	154.725	Warren County Sheriff —
	155.745	Washington County Sheriff —

the call is switched to the Sheriff's to handle.

If it seems that most of the calls handled by the Wilton Dispatch Center concern the day-today stuff of ordinary living; it's true. Only the tiniest percentage of calls appear to involve police work as depicted on television, yet it is clear that the men and women who work here perform a vital service for the community.

Still, there are times when the incidents fit the "Hollywood version" of police work. Last year, woman called 911, saying that this guy was harassing her granddaughter. Within a few seconds she starts screaming that the guy abducted the girl at gunpoint. A trooper gave chase and caught him.

Sometimes the drama strikes closer to home. In 1994, ComSpec Neilen had a massive heart attack while on duty; troopers carried her into a patrol car and rushed her to the hospital at 100 miles per hour just before she went into full cardiac arrest.

18:34 — A man calls to report that his ex-wife has assaulted him; a trooper is dispatched and arrives at 18:38. A short while later, trooper is en route to the station with the woman under arrest.

Sergeant McHugh chats with the Neilen and Cook. An enormous amount of the calls Wilton handles involve domestic situations of one sort or another. McHugh relates some of the recent court judgments that may have a bearing on the way they handle calls.

Peel back the surface a bit, and it is immediately apparent that the seemingly simple job of Communications Specialist has a lot of depth to it, including knowledge of the law, the ability to make judgments on the fly, and the capacity to remain cool and professional in the face of sometimes abusive callers.

If the ComSpecs are busy with calls and additional calls must be taken, troopers from an adjacent room step into the communications center to assist. In an instant, the room can go from relatively quiet to five people at the console, all handling calls.

18:40 — A woman calls to report that a wild animal — possibly a fox — tried to bite her cat but bit her four-year-old daughter on the finger. The call was switched to the Sheriff's department to dispatch an ambulance.

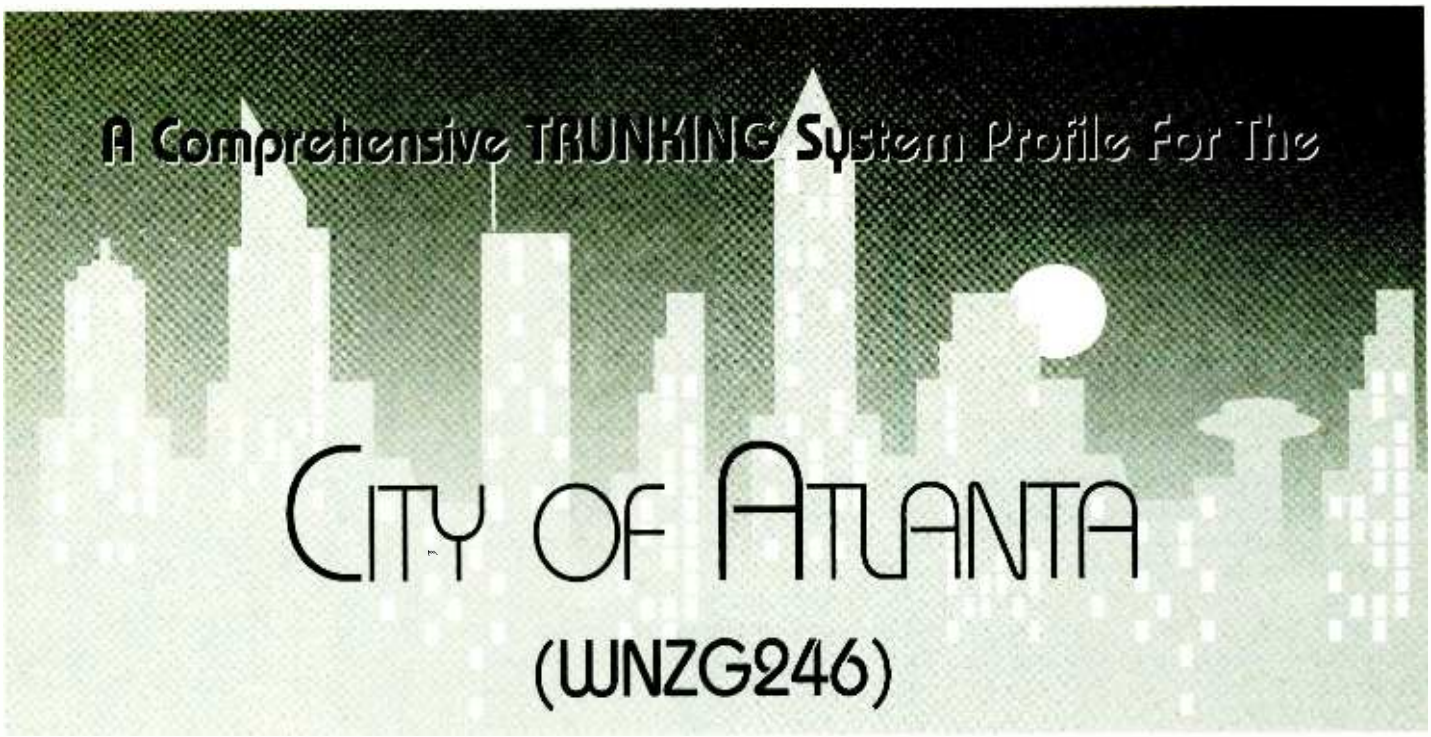
18:42 — The woman calls back to say that she doesn't want to take her daughter to the hospital until someone finds the fox in question. Cook spends a great deal of time explaining to the woman how difficult and futile that task will be. "If you haven't had continuous visual contact with that fox, how will you know you have the right one?" Cook asks. It's evident from Cook's expression that the caller is less than pleased with this commonsense question.

Right, Sergeant Barbara McHugh takes a telephone inquiry while ComSpec Marleise Cook logs an incident.

19:00 — The 3:00-11:00 pm shift at the Wilton Dispatch Center moves into the night. A torrent of calls — far too many for this writer to record — continues to pour in. The ComSpecs handle them, one by one, with aplomb. They seem never to get flustered; each call is handled with the same respect as another.

As I prepare to leave, a thought springs to mind: if the Communications Specialists at the New York State Wilton post were to have a motto, it might be a slight variation on the sneaker slogan — "Just do it, professionally."

The heart of the Wilton Communications Center — the communications console. ComSpecs Pam Neilen (left) and Marleise Cook are on duty.



By Larry Van Horn, *Monitoring Times* Staff

The author wishes to thank the following groups and individuals for their assistance in preparing this special trunked communications profile for *Monitoring Times* magazine: The Atlanta Metropolitan Fire Association, Richard Barnett and *Monitor America (Scanner Master)*, Roger Cravens, Gene Hughes and *Police Call*, Greg Knox, and several individuals who wish to remain anonymous.

We invite readers from other urban areas to compile a similar comprehensive database of your local system (trunked or otherwise) for possible publication in *MT*. Share the wealth!

User installed Trunk Tracker fleet map for Atlanta: b0 S3, b1-b7 S0

856.4625 856.4875 857.4625 857.4875
858.2375 858.4375 858.4625 858.4875
858.7625 858.9375 859.2375 859.4375
859.4625 859.4875 860.2375 860.4625
860.4875 860.7625 860.9375 866.0625
866.3125 866.6125 866.7875 866.8625
867.1375 867.1875 867.3125

Frequencies used for MDTs (Mobile Data Terminals): 859.7625 859.9375 860.4375

City of Atlanta Acronyms Legend

ACIC	Atlanta Crime Information Computer (Local Warrants)
ALS	Advance Life Support Medical Unit
APD	Atlanta Police Department
AFD	Atlanta Fire Department
BLS	Basic Life Support Medical Unit
cfm	Cubic feet per minute
CID	Criminal Investigations Division
EMS	Emergency Medical Service
Extrication	Unit equipped with jaws of life
FOD	Field Operations Division
gpm	Gallons per minute
NCIC	National Crime Information Computer (FBI)
OTG	Olympic Talk Group
SOS	Special Operations Squad or Red Dog Squad
TAC	Tactical

Atlanta Trunking System Subfleet Identifications

Uniden Subfleet IDs	Usage (Motorola Fleet Hex Identifications)
32016	APD Command (7D1-0)
32048	APD Administration (7D3-0)
32080	APD FOD Command (7D5-0)
32112	APD FOD Administration (7D7-0)
32144	APD Zone 1 Dispatch (West) (7D9-0)
32176	APD Zone 1 Surveillance (West) (7DB-0)
32208	APD Zone 2 Dispatch (North) (7DD-0)
32240	APD Zone 2 Surveillance (North) (7DF-0)
32272	APD Zone 3 Dispatch (South) (7E1-0)
32304	APD Zone 3 Surveillance (South) (7E3-0)
32336	APD Zone 4 Dispatch (Southwest) (7E5-0)
32368	APD Zone 4 Surveillance (Southwest) (7E7-0)
32400	APD Zone 5 Dispatch (Downtown) (7E9-0)
32432	APD Zone 5 Surveillance (1 or A) (Downtown) (7EB-0)
32464	APD Zone 5 Surveillance (2 or B) (Downtown) (7ED-0)
32496	APD Zone 6 Dispatch (East Center) (7EF-0)
32528	APD Zone 6 Surveillance (East Center) (7F1-0)
32560	APD SOS/Red Dog Dispatch (7F3-0)
32563	APD SOS/Reg Dog Dispatch to Detective Dispatch Bridge (7F3-3)
32592	APD SOS/Red Dog Surveillance (1000 units–Motorcycles) (7F5-0)
32624	APD SOS/Red Dog Surveillance 1 (1800 units–Cars) (7F7-0)
32656	APD SOS/Red Dog Surveillance 2 (Various units) (7F9-0)
32720	APD TAC 1 (7FD-0)
32752	APD TAC 2 (7FF-0)
32784	APD Special Events 1 (801-0)
32816	APD Special Events 2 (803-0)
32848	Housing Authority Police (805-0)
32912	Taxi Inspection (809-0)
32944	APD CID Command (80B-0)
32976	APD CID Administration (80D-0)
33008	APD CID Surveillance (80F-0)
33040	APD Detective Dispatch (811-0)
33072	APD Fugitive Surveillance Units (813-0)
33104	APD Gang Surveillance Units (815-0)
33136	Organized Crime (OCIU) Surveillance Units (817-0)
33168	Narcotics Surveillance Units (819-0)
33200	Special Investigations Surveillance (81B-0)
33232	APD Training Academy (81D-0)
33264	APD Training Communications (81F-0)
33296	NCIC 1 (821-0)
33299	NCIC 1/ACIC 2 Bridge (821-3)
33328	ACIC 2 (823-0)
33360	NCIC 3 (825-0)
33392	Radio Maintenance/Electronic Shop (827-0)
33424	OPS 1 (829-0)
33456	OPS 2 (82B-0)
33488	APD Stadium (82D-0)

33520	APD Omni (Should not be in use after 7/26/97) (82F-0)
33552	APD Georgia Dome (831-0)
33584	APD General (833-0)
33616	City Wide 1 (835-0)
33648	City Wide 2 (837-0)
33680	All PS (839-0)
33712	Mayor Security (83B-0)
33744	Hartsfield Airport FD Administration (83D-0)
33776	Hartsfield Airport FD Operations (83F-0)
33808	Hartsfield Airport FD TAC-1 (841-0)
33840	Hartsfield Airport FD Rescue (843-0)
33872	Hartsfield Airport FD TAC 2 (845-0)
33904	Hartsfield Airport Administration (847-0)
33936	Hartsfield Airport Operations (849-0)
33968	Hartsfield Airport Tactical (84B-0)
34000	Hartsfield Airport Emergency (84D-0)
34032	Hartsfield Airport F-1 (84F-0)
34064	Hartsfield Airport F-2 (851-0)
34096	Hartsfield Airport PD Investigation Units (853-0)
34128	Hartsfield Airport PD K-9 Units (855-0)
34160	Hartsfield Airport PD Patrol Units (857-0)
34192	Hartsfield Airport PD Tactical (859-0)
34224	Hartsfield Airport PD Dispatch (85B-0)
34256	Hartsfield Airport PD Administration (85B-0)
34288	Hartsfield Airport FAA Emergency (85F-0)
34320	Hartsfield Airport Federal Inspection Service (861-0)
34416	Olympic 1/OTG 1 (Special Details) (867-0) Note: Olympic terminology still being used even though the Olympics are now over.
34448	Olympic 2/OTG 2 (Special Details) (869-0)
34480	Olympic 3/OTG 3 (Special Details) (86B-0)
34512	Olympic 4/OTG 4 (Special Details) (86D-0)
34544	Olympic 5/OTG 5 (Special Details) (86F-0)
34576	Olympic 6/OTG 6 (Special Details) (871-0)
34608	Olympic 7/OTG 7 (Special Details) (873-0)
34640	Olympic 8/EMS (State of Georgia Units) (875-0)
34672	AFD Dispatch (is suppose to be simulcast w/154.160) (877-0)
34704	AFD TAC-2 (879-0)
34736	AFD TAC-3 (87B-0)
34768	AFD TAC-4 (87D-0)
34800	AFD TAC-5 (87F-0)
34832	AFD TAC-6 (881-0)
34864	AFD Administration (883-0)
34896	AFD Arson (885-0)
34928	AFD Inspectors (887-0)
34960	AFD MED 1 (889-0)
34992	AFD MED 2 (88B-0)
35024	AFD Training (88D-0)
35056	AFD Command (88F-0)
35088	AFD Command Operations (891-0)
35120	APD Zone 1 Emergency (893-0)
35152	APD Zone 2 Emergency (895-0)
35184	APD Zone 3 Emergency (897-0)
35216	APD Zone 4 Emergency (899-0)
35248	APD Zone 5 Emergency (89B-0)
35280	APD Zone 6 Emergency (89D-0)
35440	Information (8A7-0)
35504	Hartsfield Airport PD Emergency (8AB-0)
37392	Atlanta Jail Administration (921-0)
37424	Atlanta Jail AC/DC (923-0)
37488	Atlanta Jail Detention (927-0)
37552	Atlanta Jail Grady (92B-0)
37904	Atlanta Jail Technical Services (941-0)
37968	Atlanta Jail Coordination (945-0)
38000	Emergency Control (947-0)
38032	Highway Coordination 1 (949-0)
38064	North Avenue (94B-0)
38096	Hill Street (94D-0)
38192	Sanitation Chester (953-0)
38224	Sanitation Lakewood (955-0)
38256	Sanitation Liddell (957-0)
38288	Sanitation Maddox (959-0)
38320	Bureau of Sanitation Services Administration (95B-0)
38352	Traffic 1 (95D-0)
38384	Sewer 1 (95F-0)
38416	Sewer 2 (961-0)
38448	Pollution Control (963-0)
38480	Department of Public Works Administration (965-0)
38512	Department of Public Works Coordination 1 (967-0)
38544	Department of Public Works Coordination 2 (969-0)
38576	Water INC (96B-0)
38608	Claire Drive (96D-0)
38640	Metro (96F-0)
38672	Off Road (971-0)
38704	Tire Shop (973-0)
38736	Bureau General Services (975-0)
38768	Housing (977-0)
38800	Building/Zoning (979-0)
38832	Plumbing (97B-0)
38864	Electrical (97D-0)
38896	HVAC (97F-0)
38928	Public Works (981-0)
38960	Parks Administration (983-0)
38992	Forestry (985-0)
39024	Park Operations (987-0)
39056	Recreation (989-0)
39088	Site Development (98B-0)
39120	Arborist (98D-0)
39152	Planning Supervisor (98F-0)
39184	Management Services (98F-0)
39216	Material Management (993-0)
39248	Motor Executive (995-0)
39280	Traffic 2 (997-0)
39312	Fire Mutual Aid (999-0)
39344	Hartsfield Airport Fire Emergency (99B-0)
39376	Public Works (99D-0)
39408	Public Works (99F-0)
40016*	APD SWAT (9C5-0)
40048	ID (9C7-0)
40080	Property (9C9-0)
40112	Property Vehicle (9CB-0)
40144	CommNet (9CD-0) (This is a circuit used to talk to security companies that use UHF in the Atlanta area)
40176	School Detectives (9CF-0)
40208	APD Homicide Surveillance (9D1-0)
40240	Traffic 3 (9D3-0)
40272	Pump Station (9D5-0)
40304	Clayton Plant (9D7-0)
40336	Water Works Administration (9D9-0)
40368	Water Processing (9DB-0)
40400	Utoy Plant (9DD-0)
40432	Water Inspection/Metering (9DF-0)
40464	Water Entrenchment (9E1-0)
40496	South River Plant (9E3-0)
40528	Facility Maintenance (9E5-0)
40560	Housing Inspection (9E7-0)
40592	Building Command (9E9-0)
40624	Housing Supervisor (9EB-0)
40656	Cultural Affairs (9ED-0)
40688	Motor/Water Shop (9EF-0)
40720	Public Works Announce (9F1-0)
40752	Highway Coordination 2 (9F3-0)
40784	APD Vice Squad Surveillance (9F5-0)
40816	Fire SOG 1 (9F7-0)
40848	Fire SOG 2 (9F9-0)
40880	Fire SOG 3 (9FB-0)
40912	Fire SOG 4 (9FD-0)
40944	Fire SOG 5 (9FF-0)
40976	Fire SOG 6 (A01-0)
41008	Fire Maintenance (A03-0)
41040	Hartsfield Airport Contractors (A05-0)
41072	APD Zone 1 Supervisors (A07-0)
41104	APD Zone 2 Supervisors (A09-0)
41136	APD Zone 3 Supervisors (A0B-0)
41168	APD Zone 4 Supervisors (A0D-0)
41200	APD Zone 5 Supervisors (A0F-0)
41232	APD Zone 6 Supervisors (A11-0)
41296	APD Robbery Supervisors (A15-0)
41360	Psych Services (A19-0)
41392	Engineering Operations (A1B-0)
004-1	County Services Fleet 004/Size 3–City Wide 1
005-1	County Services Fleet 005/Size 3–City Wide 2

Atlanta POLICE DEPARTMENT Trunking

APD Unit Identifications

1	Chief of Police
2-5	Deputy Chiefs
6-9	Admin Majors
10	SOS Major
11	Zone 1 Major
12	Zone 2 Major
13	Zone 3 Major
14	Zone 4 Major
15	Zone 5 Major
16	Zone 6 Major
x100	Zone 1 Captain (also x200 Zone 2, x300 Zone 3, etc)
x190-x192	Zone 1 Lieutenant (also x290-x292 Zone 2, x390-x392 Zone 3, etc)
x193-x198	Zone 1 Sergeants (also x293-x298 Zone 2, x393-x398 Zone 3, etc)
x199	Zone 1 substation (also x299 Zone 2, x399 Zone 3, etc)
x120	Zone 1 Rovers (also x220 Zone 2, x320 Zone 3, etc)
	All 20 units (i.e. xx21, xx22, xx23, etc) are rover units

x	indicates the shift.
1	Morning Watch (11 p.m.-7 a.m.)
2	Day Watch (7 a.m.-3 p.m.)
3	Evening Watch (3 p.m.-11 p.m.)

Atlanta Police Department Detective Units

4000	Fugitive
4100	Homicide/Assaults
4200	Youth Crimes
4300	Robbery
4400	Sex Crimes
5000	Auto Theft
5100	Burglary
5200	Fraud
5300	Larceny
5400	School Detective
5600	Anti-Crime
6100	Gang
6200	Intelligence
6400	Permit-Ordinances
6500	Narcotics
6600	Vice
6800	Internal Affairs
7400	Communications
7800	Admin Chief's Office
8000	Outer Agency Units
9000	Off Duty units-Patrol

Photo by John Boiley

Atlanta Police/Fulton County Dispatch Codes

1	Stolen/abandoned auto
2	ADT alarm
3	Alarm ringing
4	Ambulance enroute
5	Breaking out street lights
6	Burglar in house
7	Burglar in business
8	Community relations
9	Call fire chief
10	Call police chief
11	Call office
12	Call jail
13	Call home
14	Call SID
15	Call communications
16	Cancel present call
17	Switch to _____
18	Call radio shop
19	Assist in jail
20	Call lights & water
21	Call wrecker service
22	Vandalism
23	Disorderly children
24	Demented person
25	Discharging firearms
26	Discharging fireworks
27	Lunch/Break/Personal
28	Drunk
29	Drunk and disorderly/Fight
30	Drunk in auto
31	Electrical wires down
32	Escaped prisoner
33	Fire
34	Gambling
35	Eviction
36	Holdup in progress
37	Illegal parking
38	Illegal drugs/whiskey
39	Information for officer
40	Investigate or kill animal
41	Investigate auto accident
42	Investigate burglary
43	Investigate hit & run
44	Investigate holdup
45	Investigate larceny
46	Investigate person hit by auto
47	Investigate person injured
48	Investigate person dead
49	Investigate rape or attempt
50	Investigate person shot
51	Investigate person stabbed
52	Stolen vehicle/articles
53	Investigate suicide or attempt
54	Investigate suspicious person/auto
55	Trouble: unknown
56	Lost or missing person/child
57	Loud party or radio
58	Man beating woman
59	Meet officer
60	Molesting woman or children
61	Money transfer
62	Switch zone
63	Officer needs help
64	Panhandling
65	PBA or PHA alarm
66	Peeping tom
67	Investigate person down
68	Person screaming
69	Person armed
70	Prowler
71	Public Indecency
72	Reckless driving/speeding
73	Rush Call
74	Selling Beer/Liquor on Sunday
75	Surveillance
76	Investigate sick person
77	Snatch thief
78	Standby for lookout
79	Stealing auto/from auto
80	Stray animal
81	Sidewalk/street hazard
82	Wagon call/prisoner transfer
83	Wanted person located
84	Work traffic
85	Wrecker enroute
86	Bomb Threat
87	Pull out
88	Special investigation
89	Welfare check
90	Special detail
91	Start EMT to _____

"G" added to signal code means go to that location.

Atlanta Police Status Codes

1	Advise warrant: A-Civil, B-On person
2	Alarm reset
3	Alarm out
4	Cancel
5	Domestic
6	False
7	Food on stove
8	Gone
9	Handled by: A-Crime prevention, B-Detectives, C-Dog Unit, D-Fire Dept, E-Ambulance, F-SPCA, G-Military Police, H-Owner, J-Alarm company, K-Supervisory officer, L-Food man
10	Impound
11	Information
12	Investigation
13	No such number
14	Owner refused
15	Private property
16	Released to owner
17	Report
18	72-hour check
19	Work traffic
20	Small damage, no report
21	Assistance needed
22	Unable to locate
23	Traffic ticket
24	Unfounded
25	Settled

WiNRADiO™

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!

Join the WiNRADiO Club!

See the bands with our Spectrum Scope!

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(314) 791-1206

Amateur Electronics Supply
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(800) 558-0411

CB City
Westhaven, CT
(203) 932-3832

Electronic Distributors Corp.
Vienna, VA
(703) 938-8105

Electronic Equipment Bank
Vienna, VA
(800) 368-3270

Grove Enterprises
Brasstown, NC
(800) 438-8155

Professional Wireless
Orlando, FL
(407) 240-2880

Radio City
Mounds View, MN
(800) 426-2891

Radioware
Westford, MA
(800) 950-9273

Scanners Unlimited
San Carlos, CA
(415) 573-1624

SSB Electronic USA
Mountaintop, PA
(717) 868-5643

The Communication Source
Arlington, TX
(800) 417-8630

The Ham Station
Evansville, IN
(800) 729-4373

Universal Amateur Radio
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(800) 431-3939

Canada

Atlantic Ham Radio Ltd.
Downsview, ON
(416) 636-3636

Durham Radio
Oshawa, Ont.
(905) 436-2100

Dealer enquiries invited.
info@winradio.com

Atlanta FIRE DEPARTMENT Trunking

Atlanta Fire Unit Identifications

100	Fire Chief
102	Deputy Chief-Operations
103	Deputy Chief-Technical Services
104	Assistant Chief-Airport
106	Assistant Chief-Communications/Maintenance
107	Assistant Chief-Fire Marshall
108	Assistant Chief-Special Events Planning
109	Administration Director
111	Fire Chief's Aide
112	Operation's Chief Aide
113	Technical Services Chief Aide
115	Public Information Officer
116	Community Affairs
118	Special Events Planning Aide
201	Chief Special Operations
202	Fire Supervisor SOS
203	Fire Medic
227	EMS Support
230	Atlanta Fire Department Medical Director
301	Office of Professional Standards Chief
302-306	OPS Investigators
310	Recruitment
501	Training Chief
502	Airport Training Chief
503-519	Training Officers
601	Fleet Maintenance Chief
602	Fleet Maintenance Supervisor
603-609	Fleet Maintenance Units
651	Station Maintenance Supervisor
652	Station Maintenance Supervisor
653-658	Station Maintenance Units
659	Electronic Technician
660-661	Station Maintenance Units
730	Chief Arson Investigator
721-731	Arson Investigators
751	Chief of Fire Safety Education
752-759	Fire Safety Educators
761	Chief of Fire Inspections
762-763	Captain of Fire Inspections
764-781	Fire Inspectors
801	Fire Communications Chief
802-804	Communications Shift Supervisors
805	Communications Chief's Aide
880	Field Service Unit-1960 Boyertown/Ford Metropolitan Fire Association's canteen unit (Station 39)
921-924	Property Management
972-976	Psychological Services
993	Fire Department Chaplain

F.D. Battalions/Locations/Equipment

Battalion 2: 1711 Marietta Blvd (NW). Battalion 2 chiefs are responsible for the operation of stations 8, 9, 16, 22, 23, 28 and 38. Battalion 2 operates a 1993 Ford command van and it is staffed by a battalion chief and command technician.

Battalion 3: 170 10th Street (NE). Battalion 3 chiefs are responsible for the operation of stations 1, 4, 6, 11, 12 and 15. Battalion 3 operates a 1996 Ford modular style command van and it is staffed by a battalion chief and command technician.

Battalion 4: 2825 Campbellton Road (SW). Battalion 4 chiefs are responsible for the operation of stations 5, 7, 9, 14, 17, 20, 25 and 31. Battalion 4 operates a 1996 Ford modular style command van and it is staffed by a battalion chief and command technician.

Battalion 5: 447 Boulevard (SE). Battalion 5 chiefs are responsible for the operation of stations 2, 10, 13, 18, 30, and 34. Battalion 5 operates a 1994 Ford command van and it is staffed by a battalion chief and command technician.

Battalion 6: 3201 Roswell Road (NE). Battalion 6 chiefs are responsible for the operation of stations 3, 19, 21, 26, 27 and 29. Battalion 6 operates a 1993 Ford Crown Victoria command car and it is staffed by a battalion chief and command technician.

Battalion 7: Atlanta Hartsfield International Airport. Battalion 7 chiefs are responsible for the operation of stations 24, 32, 35 and 40. Battalion 7 operates a 1992 Ford Crown Victoria command car and a 1988 Ford command van. The command car is staffed by a battalion chief and command technician.Battalion 7 protects the sixth busiest airport in the world.

F.D. Stations/Locations/Battalions

Station 1	71 Elliott Street (NW)	Battalion 3
Station 2	1568 Jonesboro Road (SE)	Battalion 5
Station 3	3500 Peachtree Road (NE)	Battalion 6
Station 4	125 Ellis Street (NE)	Battalion 3
Station 5	2825 Campbellton Road (SW)	Battalion 4
Station 6	Old station is now a fire museum	
Station 7	535 W. Whitehall Street (SW)	Battalion 4
Station 8	1711 Marietta Blvd (NW)	Battalion 2
Station 9	3501 M.L. King Jr. Drive (SW)	Battalion 2
Station 10	447 Boulevard (SE)	Battalion 5
Station 11	20 North Avenue (NE). This station was closed March 5, 1996	
Station 12	1288 DeKalb Avenue (NE)	Battalion 3
Station 13	447 Flat Shoals Road (SE)	Battalion 5
Station 14	1203 Lee Street (SW)	Battalion 4
Station 15	170 10th Street (NE)	Battalion 3
Station 16	1048 Simpson Road (NW)	Battalion 2
Station 17	1489 R.D. Abernathy Blvd (SW)	Battalion 4
Station 18	2007 Oakview Road (SE)	Battalion 5
Station 19	1063 N. Highland Avenue (NE)	Battalion 6
Station 20	590 Manford Road (SW)	Battalion 4
Station 21	3201 Roswell Road (NE)	Battalion 6
Station 22	817 Hollywood Road (NW)	Battalion 2
Station 23	1545 Howell Mill Road (NW)	Battalion 2
Station 24	Atlanta Hartsfield Intnl Airport (Northeast corner of the airport)	Battalion 7
Station 25	2349 B.E. Mays Drive (SW)	Battalion 4
Station 26	2970 Howell Mill Road (NW)	Battalion 26
Station 27	4260 Northside drive (NW)	Battalion 6
Station 28	2040 Main Street (NW)	Battalion 2
Station 29	2167 Monroe Drive (NE)	Battalion 6
Station 30	10 Cleveland Avenue (SW)	Battalion 5
Station 31	2406 Fairburn Road (SW)	Battalion 4
Station 32	Atlanta Hartsfield International Airport (West side of the airport between the two main runways)	Battalion 7
Station 34	3671 Southside Industrial Parkway (SE)	Battalion 5
Station 35	Atlanta Hartsfield International Airport (East side of the airport between the two main runways)	Battalion 7
Station 38	2911 Bankhead Highway (NW)	Battalion 2
Station 39	4697 Wieuca Road (NW) This station is leased to the Fulton County fire department. In the lease agreement the Fulton County fire department has agreed to operate an engine company from this location. This engine company is dispatched by Atlanta dispatchers to all alarms within the city limits of the stations territory. Fulton County dispatches the engine to all alarms outside of the city limits.	
Station 40	Atlanta Hartsfield International Airport (South side of the airport)	Battalion 7

F.D. Apparatus/Station Locations

Air 7	1992 International with a 32 cfm compressor (Station 7)
Air 7B	1983 Ford with a 22 cfm compressor (Station 7)
Echo 1	1991 Wheeled coach/Ford advanced life support ambulance (Station 32)
Echo 2	1989 Wheeled coach/Ford advanced life support ambulance (Station 35)
Engine 1	1991 Quality/Spartan 1500 gpm pumper (Station 1)
Engine 3	1992 Quality/Spartan 1500 gpm pumper. (Station 3)
Engine 5	1991 Quality/Spartan 1500 gpm pumper (Station 5)
Engine 6	(BLS) 1991 Quality/Spartan 1500 gpm pumper (Station 4)
Engine 7	(BLS) 1992 Quality/Spartan 1500 gpm pumper with 5-inch supply hose (Station 7)
Engine 8	(BLS) 1990 Quality/Spartan 1500 gpm pumper (Station 8)
Engine 9	(BLS) 1992 Quality/Spartan 1500 gpm pumper (Station 9)
Engine 10	(BLS) 1993 Quality/Spartan 1500 gpm pumper (Station 10)
Engine 11	(BLS) 1993 Quality/Spartan 1500 gpm pumper (Station 4)
Engine 12	1987 SPI/Spartan 1500 gpm pumper (Station 12)
Engine 13	(BLS) 1990 Quality/Spartan 1500 gpm pumper (Station 13)
Engine 14	(BLS) 1990 Quality/Spartan 1500 gpm pumper (Station 14)
Engine 15	(BLS) 1983 American LaFrance 1500 gpm pumper (Station 15)
Engine 17	(BLS) 1987 SPI/Spartan 1500 gpm pumper (Station 17)
Engine 18	1985 American LaFrance 1500 gpm pumper (Station 18)
Engine 19	(BLS) 1993 Quality/Spartan 1500 gpm pumper (Station 19)
Engine 20	Quality/Spartan 1500 gpm pumper (Station 20)
Engine 21	(BLS) 1982 Seagrave 1500 gpm pumper (Station 21)
Engine 22	(BLS) 1992 Quality/Spartan 1500 gpm pumper (Station 22)
Engine 25	(BLS) 1983 American LaFrance 1500 gpm pumper (Station 25)
Engine 26	(BLS) 1990 Quality/Spartan 1500 gpm pumper (Station 26)
Engine 27	1987 SPI/Spartan 1500 gpm pumper (Station 27)
Engine 28	(BLS) 1987 SPI/Spartan 1500 gpm pumper (Station 28)
Engine 29	1985 American LaFrance 1500 gpm pumper (Station 29)
Engine 30	(BLS) 1983 American LaFrance 1500 gpm pumper (Station 30)
Engine 31	(BLS) 1982 Seagrave 1500 gpm pumper (Station 31)
Engine 34	1992 Quality/Spartan 1500 gpm pumper (Station 34)
Engine 38	(BLS) 1983 American LaFrance 1500 gpm (Station 38)
Field Service Unit 880	1960 Boyertown/Ford Metropolitan Fire Association's canteen unit (Station 39)
Foam 28	1980 Seagrave/National foam unit (Station 28)
Light 10	1963 12-kilowatt light unit (Station 10)
MedCom 1	(ALS) 1990 3D/International advanced life support rescue/supervisor unit (Station 23)
MedCom 2	(ALS) 1990 3D/International advanced life support rescue/supervisor unit (Station 2)

Squad 4	1991 Hackney & Son/Spartan squad (Station 4)
Truck 1	(Extrication) 1990 LTI/Spartan 110 foot tractor drawn aerial (Station 1)
Truck 2	(Extrication) 1990 LTI/Spartan 110 foot tractor drawn aerial (Station 2)
Truck 10	(Extrication) 1991 LTI/Spartan 110 foot tractor drawn aerial (Station 10)
Truck 11	(Extrication) 1993 LTI/Spartan 100 foot tractor drawn aerial (Station 15)
Truck 12	1987 LTI/Suplex 110 foot tractor drawn aerial (Station 12)
Truck 16	1986 LTI/Spartan 100 foot tractor drawn aerial (Station 16)
Truck 17	1987 LTI/Duplex 110 foot tractor drawn aerial (Station 17)
Truck 21	(Extrication) 1994 LTI/Spartan 100 foot tractor drawn aerial (Station 21)
Truck 25	1988 Grumman/Spartan 92 foot ladder tower (Station 25)
Truck 26	1993 LTI/Spartan 90 foot midship mount aerial (Station 26)
Truck 29	(Extrication) 1988 Grumman/Spartan 92 foot ladder tower (Station 29)
Truck 31	(Extrication) 1993 LTI/Spartan 90 foot midship aerial (Station 31)
Wagon 2	(BLS) 1990 Quality/Spartan 1500 gpm pumper with 5-inch supply hose (Station 2)
Wagon 16	(BLS) 1992 Quality/Spartan 1500 gpm pumper with 5-inch supply hose (Station 16)
Yellow 1	1979 Oshkosh M-4000 crash truck (Station 32)
Yellow 2	1979 Oshkosh M-4000 crash truck (Station 35)
Yellow 3	1979 Oshkosh M-4000 crash truck (Station 40)
Yellow 4	Reserve Oshkosh M-4000 ARFF unit (Station 35)
Yellow 5	1990 Quality/Spartan 1500 gpm pumper (Station 32)
Yellow 6	1990 Quality/Spartan 1500 gpm pumper (Station 35)
Yellow 7	1990 Grumman/Spartan 92 foot ladder tower (Station 24)
Yellow 9	1981 Oshkosh T-6 Rapid Intervention vehicle (Station 24)
Yellow 10	1981 Oshkosh T-6 Rapid Intervention vehicle (Station 32)
Yellow 11	1994 K15 Jaguar Rapid Intervention vehicle (Station 35)
Yellow 12	1981 Oshkosh T-6 Rapid Intervention vehicle (Station 40)
Yellow 13	1991 Emergency One 2000 gallon ARFF telesquirt with 55 foot ladder (Station 24)
Yellow 14	1990 Emergency One/Ford mini pumper (Station 32)
Yellow 15	1990 Quality/Spartan 1500 gpm pumper (Station 24)
Yellow 16	1991 LTI/Spartan 110 foot tractor drawn aerial (Station 24)
Yellow 17	1979 service truck casualty unit (Station 24)
Yellow 24	1993 Hackney & Son/Spartan Haz-Mat/Mass Casualty unit (Station 24)

Miscellaneous Fire Apparatus

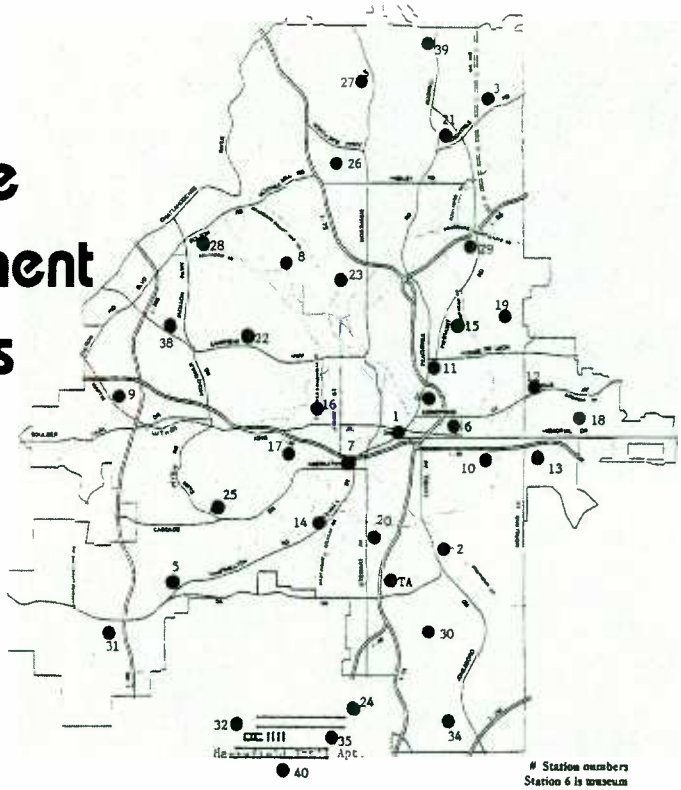
15-foot "V" hull rescue boat (Station 4)
1982 Ford Rescue (Station 4)
1985 American LaFrance 1500 gpm reserve pumper (Station 24)
1991 SCBA unit trailer with a 32 cfm compressor (Station 7)
Reserve Squad-1986 Samaritan/Pirsch squad (Station 4)

Atlanta Fire Department Typical Apparatus Response

Residential House Fire

- First Alarm: 2 Fire Engine Companies, 1 Ladder Truck Company/1 Battalion Chief

Atlanta Area Fire Department Locations



If working a fire, the following units are added:

- 1 SCBA Air Unit, 1 Fire Department EMS unit (either a MedCom or BLS/Engine Company)
- Note: The incident commander may "Special Call" any other units needed for the alarm call such as another engine or truck company, light unit, Squad 4, Foam Unit, etc. without it being an extra alarm.
- Second/Third Alarms: The repeat of the first alarm assignments would be made.

Apartment Fire, Commercial Building Fire, School Fire, Warehouse Fire, Hi-Rise Building Fire

- First Alarm: 3 Fire Engine Companies, 2 Ladder Truck Companies, 1 Battalion Chief

If working a fire. the following units are added:

- 1 SCBA Air Unit, 1 Fire Department EMS unit (either a MedCom or BLS/Engine Company)
- Second/Third Alarms: The repeat of the first alarm assignments would be made.

Grady Memorial Hospital, very large Warehouses

- First Alarm. 4 Fire Engine Companies, 3 Ladder Truck Companies, 1 Battalion Chief, Squad 4

If working a fire, the following units are added:

- 1 SCBA Air Unit, 1 Fire Department EMS unit (either a MedCom or BLS/Engine Company)
- Second/Third Alarms: The repeat of the first alarm assignments would be made.

Motor Vehicle Accident with People Trapped, Aircraft Crash Off the Airport

- First Alarm: 2 Fire Engine Companies, 1 Ladder Truck Company with jaws of life (Extrication units), 1 Battalion Chief/ 1 MedCom unit

Gas Leak

- Depending on the size and type of structure, a first alarm assignment (residential house fire) would be sent with Squad 4 added

Aircraft Crash at Atlanta Hartsfield International Airport

- All Atlanta Fire Department Airport "Yellow" units would respond, 3 Fire Engine Companies, 2 Ladder Truck Companies, 1 Battalion Chief, Squad 4, and 1 MedCom unit would respond to Station 35 as backup. If those units are committed to the scene, another 3/2 assignment would be sent to stand-by.

Atlanta Fire Department Signal Codes (courtesy of Monitor America, 3rd ed.)

1	Open gate
2	Close gate
3	Remain available
4	Message received
5	Repeat message
6	Stand by
7	Phone
8	False Alarm
9	Out of service
10	On scene
10-A	Auto service
10-B	Booster
10-I	Investigate
10-O	Fire Out
10-T	Trash fire
10-W	Working fire
11	Still call
12	Cancel
13	In service
14	Ambulance
15	Send power company
16	Send gas company
17	Send water company
18	Stand by for multiple alarms
19	In quarters
20	Call communications office
21	Call chief's office
22	Call the office
23	Call deputy director's office
24	Call deputy director's office-administration
25	Call deputy director's office-special services
26	Go to Tac 2
27	Call fire department shop
28	Call fire prevention shop
29	Call fire prevention bureau
30	Fire under control
31	Send medical examiner
32	Send arson investigator
33	Structure fire
34	Vehicle fire
35	Outside fire
36	Vehicle accident
37	Rescue call
38	Alarm sounding
39	Person needs assistance
40	Trouble unknown
41	Call administrative office
42	Send police to work traffic
43	Proceed with traffic
44	Send police to investigate: possible death
45	Send police: unruly persons
46	Person hit by auto
47	Person injured
48	Person dead
49	Rape or attempt
50	Person shot
51	Person stabbed
52	Heart attack
53	Suicide
54	Person trapped: no fire
55	Person hit by auto
56	Person injured
57	Person drunk
58	Suicide or attempt
59	Person sick
67	Person down
73	Rush

Code 1	Routine call
Code 2	Urgent call
Code 3	Emergency call

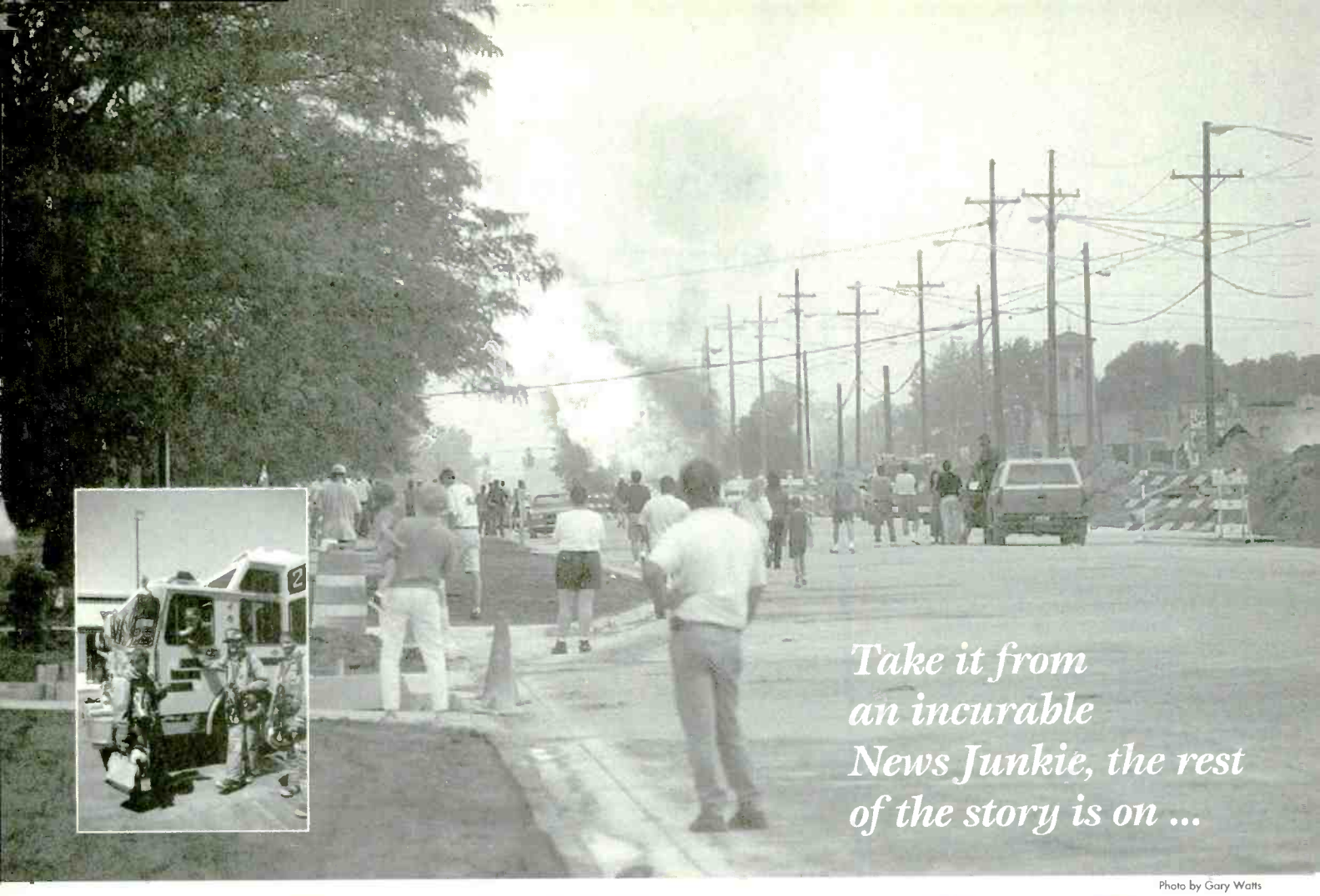


Photo by Gary Watts

... 'Real World' Radio

By Robert M. Felton

Radio talk-show host Ken Hamblin — a successful columnist, newsletter publisher, book author, and one-time photojournalist for the *Detroit Free Press* — recently encouraged his listeners to purchase a scanner and listen to police and fire communications in their home towns for a few weeks. At the end of that time, he said, they'd see their community in a different light — and they'd be skeptical of everything told them by their local, above-ground media outlets, too. Most radio monitors would probably agree; after all, getting the news "straight" is one of the most frequently cited reasons for monitoring public safety agencies.

Hamblin's remark is striking because his commercial success contrasts sharply with the decline of local newspapers, which are sponsoring several nationwide studies now to try to figure out (1) Why are journalists held in such low regard? and (2) Where is the readership going, anyhow?

So: How great is the disconnect between reality and the nation's newspapers of record?

Sometimes, it's huge. During the Soviet coup attempt that ruined Mikhail Gorbachev and catapulted Boris Yeltsin to power, for example, Western journalists and cameramen roamed freely throughout Moscow and sent home reports declaring that civil collapse and revolution were imminent. Naturally, SWLs everywhere dialed-up Radio Moscow: What they heard was . . . business as usual. Where did the truth lie? The savvy shortwave listener would figure it stood somewhere between the government view, determined to maintain appearances at all costs, and the media reports of imminent revolution, since the opposition apparently hadn't power enough to discomfit state communications.

Domestic news production might benefit from an occasional spin through the shortwave bands, too. When a New Hampshire man went on a killing spree that left four dead last August and it was learned that he had a large cache of weapons stored on his property, *CBS Evening News* reporter Jim Stewart went looking for the militia connection. It turned out there was none. He might have been a little slower to jump to such conclusions had he been listening to shortwave radio.

Perhaps it's the romance of the medium — something fueled by the memory of those old movies where "the resistance" tune in to "instructions from London" on a contraband radio — but there is "Patriot Movement" broadcasting on the shortwave bands almost 24 hours a day. A lot of improbable-sounding conspiracy theories get spouted, but there's more violent talk in a football locker room. When the subject of violence comes up at all it is unfailingly contemplated in defensive terms against whatever oppressor is in vogue. These broadcasts are freely available to anyone who cares to listen—even reporters. But the mainstream media's mythology seems to

have replaced the "commie" under the bed with the minuteman in the corncrib.

Speaking of communists, how about that bunch at Radio Havana? Our press keeps portraying Fidel Castro as a mature, world-class statesman eager for responsible relations with the United States, but his propagandists regularly broadcast accusations of U.S.-sponsored plots against Cuba's well-being that are every bit as garish and improbable as anything dreamed up by callers to Tom Valentine or Chuck Harder reporting the latest blue-jeep sighting.

When North Carolina Senator Jesse Helms blocked the appointment of Massachusetts Governor William Weld as ambassador to Mexico, I learned from the BBC, not my local daily newspaper, that the Senator had actually offered to support the Governor to any ambassadorial post he wanted, with the *sole exception* of Mexico. It turned out, not for the first time, that the story was more three-dimensional than the coverage provided by most domestic news outlets.

Dan Roberts, the producer of a 30-minute round-up of news garnered from the shortwave bands and broadcast weekly on K2YX, Mendocino County Public Radio, put the point nicely in a recent letter to *Monitoring Times* editor Rachel Baughn: "Our station airs NPR (National Public Radio) 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. News from Central and South America is rare on NPR despite the proximity and our often dastardly influence upon their nations."

Scanning for the Missing Element

The reporter who arrives at the crime scene seconds after the police has been a staple of mystery novels for a long time; he keeps a scanner in his glove box, don't you know? He's a believable, enduring character because when it comes to local news, scannists are right at ringside.

A year or so ago, for example, during the height of the media clamor about an arson epidemic[1] directed at minority churches, I was idling through the local police and fire frequencies when I picked up a transmission that seemed to be originating from inside a fire — a firefighter resisting orders to evacuate, insisting that he thought it was too soon to retreat. In short order, the chief issued an unambiguous order: GET OUT NOW! The firefighter did — clearing the building just moments before the second-level went down.

That failure to save what turned out to be a historic church, then occupied by a minority congregation, brought on a torrent of familiar recriminations and familiar media introspectives about troubled race-relations. Never once though, not even from the beleaguered fire department, did I hear a single word about that valorous fireman who didn't want to quit. The local newspaper of record didn't get any actual facts wrong, so far as I know, but whether or not it got the story entirely right is arguable.

Photo by Harry Baughn

A few weeks ago, for about an hour, I followed a late-night hunt for an armed assailant that had last been seen fleeing on foot. I followed the chase on a map, plotting sightings, plotting police traverses. It soon became clear that the police weren't merely searching; they also were herding, choreographing on the fly, forcing their man away from innocents and onto a lonely golf course — lonely except for the K9's, that is. The subsequent news story was no more than a few sentences long, and conveyed none of the drama or intelligence that guided the apprehension.

There *was* mention that the fugitive thought he had been shabbily treated (though he required no medical attention), and he would be talking to his lawyer about that.

In defense of the media, though monitoring lends perspective and drama to events, I rarely find that reporters have fumbled the basic Who? What? When? Where? Why? of a story. Usually they're accurate — and objective reporting isn't supposed to be dramatic anyhow.

It's also important for the monitor to take what he hears with a grain of salt, remember-


Photo by Motorola

Photo by Harry Baughn

ing that those caught in the vortex of events aren't seeing things whole; that an excited firefighter or cop might misspeak or misjudge. It would be foolish to assume that broadcasts emanating from the center of events are always more accurate than the story compiled by a disinterested journalist with a panoramic view. I don't eavesdrop because I want more accuracy *per se*; I eavesdrop because I don't want the facts blister packed in politically correct mythology.

As an example of "PC" reporting: police dispatches to the local public-housing projects in response to "shots fired" are common — an almost nightly occurrence. You'd never know it from reading my local newspaper or watching the six o'clock news, though.

On the other hand, some reporter will go interview a couple of grandmas whenever there's a big state or federal grant in the works and come back with a piece implying that public housing is the last stronghold of yeoman virtues. The bare-fanged carnivores behind the daily gunplay seem to exist only when there's a body lying in the street and, frankly, the reporters often seem as sympathetic to them as to their victims.

■ The Scannist as "Techno-creep"

We monitors are the object of an emerging mythology ourselves: to wit, we news junkies who get our fix in real-time — especially scannists — are doing something shady and, at the very least, invading our neighbors' privacy. Ever notice, for example, how often these days the report of a drug raid includes mention that police also confiscated something called a "police scanner?" Now, at least implicitly, there's something sinister about this; presumably, the alleged malefactors were monitoring the police in order to evade capture by them. (The reporters never explain how come the suspect didn't scoot out the back door!)

This is not to say that some of the bad press is not deserved: there are those of us who do show up at fire or crime scenes where we don't belong or routinely invade our neighbors' privacy, and there are laws to cover such cases. On the other hand, there are times the police are grateful for such proscribed actions: I have a thick folder of reports of police arrests arising from overheard portable-telephone conversations. A family in Colorado, for example, overheard neighbors contemplating their murder: arrests followed promptly. In Virginia a scannist went to the scene of an automobile accident and offered assistance. In spite of the fact that he'd broken about a jillion laws by doing so, the police pinned a medal on him.

Scannists really got a black eye when, last December, a couple in Florida illegally taped a cellular telephone conference call whose participants included, among others, Speaker of the House Newt Gingrich. With the assistance of a congressman, a transcript of that call was eventually published in the *New York Times*. The Floridians were fined $500 each, and they promised to assist the federal government's investigation. As of this writing, however, neither the congressman involved nor the *New York Times* reporter has been questioned by any federal investigator,[2] even though repeating, publishing, or profiting from a phone conversation not intended for you is patently illegal. Perhaps their conduct considered a public service, like the rescuer mentioned above...

But, as a private citizen, don't expect to do with impunity the same as the journalist and your hired help in Congress do. The Federal Communications Commission responded to those events on June 13th, 1997, with a Public Notice to remind all members of the public — "including the news media" — that the interception and divulgence of such communications is prohibited. A February ruling, revised July 10th, specified that modification of a scanner to receive cellular frequencies decertifies the scanner, and included threats of fines, seizure, and criminal action against entities which performed modifications on a substantial scale.

These are administrative, not criminal, sanctions by the way. In other words, if you are accused you won't enjoy the presumption of innocence that is supposed to be every American's birthright. If accused, you will have the burden of proving you've done nothing wrong.

No wonder that so many of us regard journalists and politicians with such contempt — and get our news elsewhere in ever-increasing numbers.

■ Setting up your Newsdesk

If you want to use your receiver to keep yourself well-informed, a few inexpensive accessories and good habits are absolutely essential.

For starters, get the best maps you can of the areas you ordinarily monitor. If you scan the local police and fire, for example, get a good city map; personally, I prefer those bound books that contain multiple maps, each presenting a small area of town in detail. Similarly, shortwave listeners should keep a good world atlas within easy reach. Referring to maps when following a story (do this always with ruler or compass in hand) will often clarify the logic of events in a way that spoken communications or conventional news broadcasts don't.

You need a way to keep good records, too, of a type more detailed than most radio log books and software programs are designed to allow. I find that notecards filed by frequency work best for me. Take notes of everything you hear: local news broadcasts, international shortwave news, police and fire transmissions. If you do this consistently you'll soon find that you're "connecting the dots" as well as the "pros"— maybe even better — and that you know exactly where to dial when you want the scoop right now.

Similarly, never go out of doors without a notebook and pen in your pocket or purse. Note where the antennas are, the names of companies whose broadcasts might be interesting, what sort of radios the local MegaMart uses, anything and everything.

Index the latest issue of *Monitoring Times* before throwing it on top of that about-to-tip-over stack in the corner. Again, file cards are good, but use whatever method suits. The point is to know how to put your hands on that article you fuzzily recall reading, oh, gosh, sometime late last year, seems like.

Don't confine your listening to police and fire; any organization that keeps a big fleet of vehicles on the road will yield interesting tidbits. Listening in on school buses, for example, is one of my favorites. They're everywhere, and you get a view of school-related

Photo by Gary Watts

goings-on that you won't get anywhere else. Ditto the cable crews, the electric company, and on and on.

Try monitoring the "real world" activity in your area and compare the results with that "film at 11:00" and the next day's newspaper article.

Notes:

1. Whether or not there was really an "epidemic" is the subject of some dispute — something else you probably never read in your local paper. See the December 1996 issue of *The American Spectator* for a fascinating account of how this story developed into months of nationwide headlines.
2. [A recent story in the *Seattle Times* indicates that the Justice Department is still investigating...ed.]

Raleigh, North Carolina, Area Frequencies

The Raleigh, North Carolina area frequencies in the table have been culled from a variety of sources, including the FCC online databases, various publications, and local hobby groups. Numerous jurisdictions are represented.

Fire
151.1150/153.950
151.3550
153.7700
153.8300
153.8300
153.8900
153.8900
153.9500
153.9500
154.0100
154.0700
154.0700
154.1000
154.1300
154.1450
154.1450
154.1450
154.1600
154.1600
154.1750
154.1900
154.2050
154.2200
154.2200
154.2350/155.085
154.2500
154.2650
154.2650
154.2800
154.2950
154.3100
154.3250/156.060
154.3250
154.3400/153.905
154.3400
154.3700/153.890
154.3850
154.3850
154.4000
154.4000
154.4150
154.4150
154.4150
154.4300
154.4300
154.4450
154.4450
154.8300
155.3550
155.7600
156.2400
453.9750/458.975
460.5750/465.575
460.6000/465.600

N.C. State University
151.0100
151.0550
153.9650
155.1150
155.4150
155.6100/154.725
155.6400
155.7450
155.7900/154.010
158.8800/154.650
453.4000/458.400
453.4750/458.475
453.6250/458.625

N.C. Hwy Patrol/State Police
42.2200
42.3800/42.580
42.5000/42.700
42.5200/42.800
42.6000/42.660
42.6200/42.780
42.6400/42.760
42.8200/42.860
42.9200/42.720
42.9400/42.680
72.1000/42.800
154.6800/159.210
154.6800/155.505
155.4750
453.8250/458.825
460.4000/465.400
460.5500/465.550

State Bureau of Investigation
154.9050
154.9350
159.1500/155.460

Raleigh/Wake County Police
155.1900
155.3700
155.5200/155.910
155.5650/154.815
155.6850
155.9700
453.2500/458.250
460.0250/465.025
460.1500/465.150
460.1750/465.175
460.2000/465.200
460.2250/465.225
460.2500/465.250
460.3250/465.325
460.3500/465.350
460.4750/465.475
460.5000/465.500

Splitting a Signal

By Philip Gebhardt, VA3ACK

It may not be as complicated as splitting an atom, but to radio listeners splitting a signal can have real benefits. The splitters described here can be used from the longwave frequencies right up through to the UHF bands.

Anyone who has more than one TV set knows the basic reason for using a splitter: You have one antenna, but more than one receiver.

There is a variety of situations in which you benefit by using a signal splitter. It could be that you want to go DXing with a friend. It would be great to be able to put up one antenna for both of you to use instead of two separate antennas. That would save time and allow you to get to the DX part of the DXpedition sooner. It's also makes it easier to exchange DX tips. It's frustrating to find that someone else can hear a station, but your antenna won't pull the signal in. Using a single antenna, everyone can hear those great DX catches.

There may be times when you want to compare receivers. You could use a single antenna and a switch. But you can never hear both receivers at the same time with that system. If the signal is fading, you can misjudge the relative performance of the two receivers by using the switching method.

You can also check out devices such as preamplifiers and attenuators. With one signal going into both receivers you will hear the same signal level. Place a preamp or an attenuator in the line leading to one receiver and you can quickly determine the performance of the device.

You might think that in each of these situations you could simply connect both receivers in parallel across the antenna. At the very least, the two receivers will appear as a mismatched load on the antenna. Another problem with this simple solution is that the receivers can interact and interfere with reception.

What you need to do is to isolate the receivers so they don't "see" (or hear) one another while connected to a common antenna.

There are commercial devices that allow you to do that at shortwave frequencies. They are known as multicouplers and they are expensive. With a multicoupler you can connect many receivers to a single antenna.

For most listeners, there is rarely a need to connect six, twelve, or twenty-four receivers to a single antenna. The real solution for most listeners is to construct a simple hybrid splitter. A hybrid splitter that allows you to operate two receivers from one antenna is shown in Figure 1.

The key to the technique is the length of the coax cable. Notice that Rcvr 1 is connected to Rcvr 2 via two paths. The length of the shorter path is λ/2 (one-half wavelength long); the length of the longer path is λ/4 + 3lλ4 or λ (one wavelength long). Since the two paths differ in length by λ/2, Rcvr 1 is not affected by Rcvr 2. The same concept applies if you look from Rcvr 2 back toward Rcvr 1.

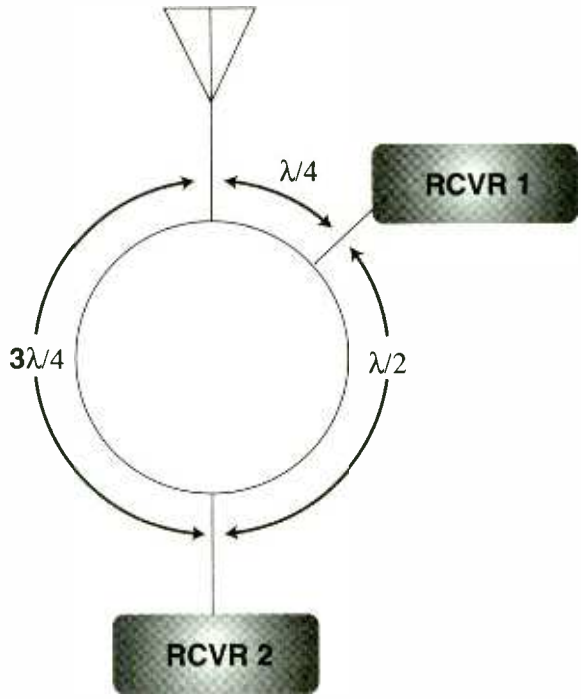


FIGURE 1

A single antenna which uses coax feedline can be used with two receivers provided the receivers are isolated from each other to eliminate interaction. Using three lengths of coax and three T connectors, you can construct a simple and inexpensive hybrid splitter. The lengths of the coax can be calculated using information provided in the text.

There are a few limitations to this circuit. First, you are limited to two receivers. Second, the length of the coax lines limits the frequency coverage. Third, at low frequencies, the coax lines can get fairly long.

The length of a quarter-wavelength of coax can be calculated using Equation 1. The equation takes into account the velocity factor (0.66) of solid polyethylene-filled feedline. If other types of line are used, the velocity factor must be adjusted. (For example, RG-58 with foamed polyethylene dielectric has a velocity factor of 0.79.)

$$\ell = 75000 \times 0.66/f \qquad (1)$$

where ℓ is the length in meters of a quarter-wavelength of solid polyethylene-filled coax and f is the frequency in kHz.

For example, if you want to listen to signals in the 22-meter band (13570 to 13870 kHz), λ/4 would be 75000 x 0.66/13720 or 3.6 meters (11.8 ft.). To construct the hybrid splitter, you would need three lengths of coax—one piece λ/4 or 3.6 m long, a second piece λ/2 or 7.2 m long, and a third piece 3λ/4 or 10.8 m long.

To use the splitter for DXing in the lower portion of the FM broadcast band (where the educational and non-commercial stations are), the lengths required are 0.55 m, 1.1 m and 1.65 m. To DX on the high band VHF TV channels (channel 13, for example) the lengths are even shorter: 0.23 m, 0.46 m and 0.70 m.

It's easy to see that this hybrid splitter is more practical and economical at higher frequencies.

To solve the problems of frequency dependence and to avoid long runs of coax in your listening post, you can use a resistive distribution network. A simple system is shown in Figure 2.

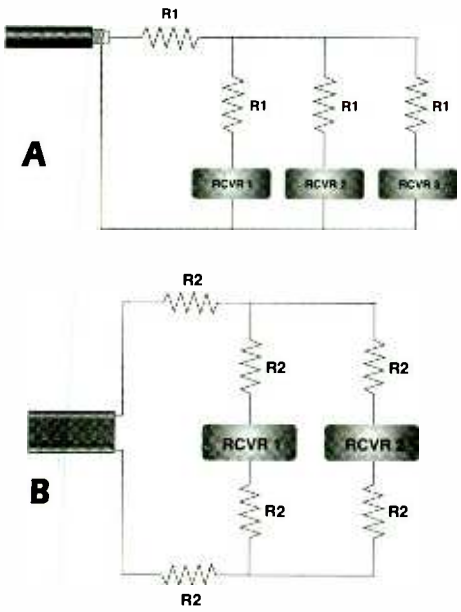


FIGURE 2

Resistive distribution networks are compact, broadband, and have the added advantage that you can connect more than two receivers to a single antenna. A star circuit for use with coax feedline is shown at (a). A similar circuit for use with balanced feedline, such as 300-ohm twinlead, is shown at (b).

Not only is this system not frequency sensitive, you can also connect more than two receivers to a single antenna.

The value of the resistors (R_1) can be calculated using Equation 2.

$$R_1 = Z\,(n-1)/(n+1) \qquad (2)$$

where R_1 is the resistance in ohms, Z is the feedline impedance in ohms and n is the number of receivers. (This assumes that the feedline impedance and receiver impedance are equal.)

If, for example, you use 53.5-ohm coax (RG-58) and want to connect three receivers to an antenna, each resistor will have a value of 53.5 x (2/4) or about 27 ohms.

This seems like the ideal circuit. It's compact and you can connect any number of receivers to an antenna. There is a price, however. Since the receivers are connected in series with resistors, not all the signal from the antenna appears at the receiver input. The received signal will be 1/n of the signal at the input of the distribution network. For a network with two receivers, the signal level will be 1/2 the signal level at the network input; for three receivers, only 1/3 of the network input signal will appear across the input of each receiver.

Depending on the signal level from the antenna and how many receivers are connected, you may need to use a preamplifier to make up for the signal loss in the network.

If you use a balanced line (such as 300-ohm twinlead), use the circuit shown in Figure 2(b). Equation 3 provides the value of R_2.

$$R_2 = 1/2\,Z\,(n-1)/(n+1) \qquad (3)$$

where R_2 is the required resistance in ohms, Z is the feedline impedance in ohms and n is the number of receivers.

To avoid mismatching when using these circuits (and possible ghosting with TV receivers), all network outputs must be connected to a receiver. A solution to this restriction is to connect a resistor equal to the receiver antenna impedance across any unused output.

Figure 3 shows a variation. Although three receivers are shown in this diagram, you can use this polygonal method of connection with two or more receivers. As with the circuit in Figure 2(a), the signal strength at the receiver input will be inversely proportional to the number of receivers connected.

The value of each resistor (R_3) for the circuit in Figure 3 can be determined from Equation 4.

$$R_3 = Z\,(n+1)/(n-1) \qquad (4)$$

where R_3 is the required resistance in ohms, Z is the feedline impedance in ohms and n is the number of receivers.

Anyone with several TV sets and a single antenna knows that hybrid 2-way splitters for

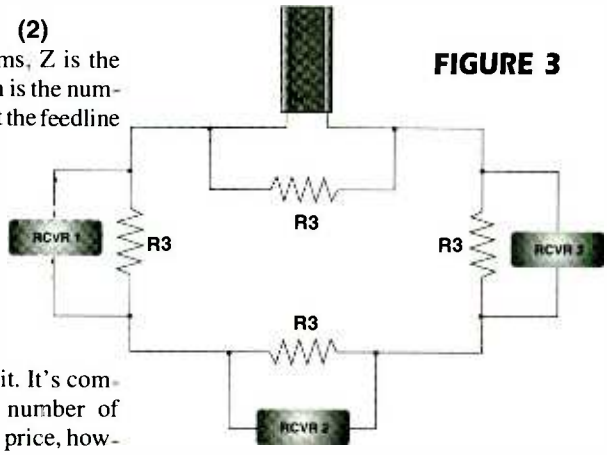


FIGURE 3

A polygonal circuit configuration can also be used to feed several receivers from a single antenna. The more receivers you have connected to the antenna, the more likely it is you will need a preamplifier to boost the incoming signal.

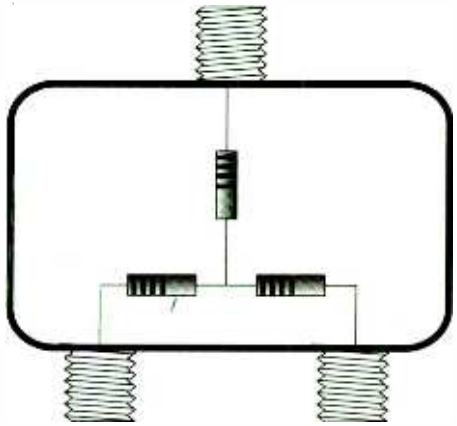


FIGURE 4

The signal splitter circuit is simple enough that it can be housed in a small, aluminum box. A custom-made unit can incorporate the type of socket that fits the plugs on your feedline. The case from a commercially-manufactured splitter can be used if you use F connectors, or if you use adapters to convert the F connector to the type of plug your receivers use.

use on the VHF/UHF TV bands and the FM broadcast band are commonly available in consumer electronics stores. These splitters do not use resistors to maintain broadband characteristics, but use ferrite bead construction for coils.

The metal case of a commercially-manufactured hybrid splitter makes a suitable (and inexpensive) case for the coax hybrid splitter or the resistive distribution network. Check the bottom of the splitter. If it is made of thin metal, simply pry it off. You can then remove the wires, ferrite beads, and capacitors and connect either sections of coax or resistors to the coax sockets. The ground lug inside the case can be used for grounding the shield of the coax. Since not many of us use F connectors (the type used on commercial splitters and on TV sets), you will need to buy adapters to convert the F connectors to the type your receiver uses.

If you want to avoid adapters, you can house the splitter in a small metal box available at Radio Shack and attach RF sockets that match the plugs on your feedline.

Whether you use a splitter at home or at a DX camp, you're bound to find all sorts of uses to increase your enjoyment and knowledge of radio listening. (Plus, you might earn the gratitude of a fellow DXer who doesn't need to put up his own antenna at the next DX camp.)

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Richard Barnett
ScanMaster@aol.com

The Remarkable Transformation of H.R. 2369

This month's column is probably the most important and gratifying I have ever written: it is devoted exclusively to the stunning news of the amendment of H.R. 2369, a bill in Congress whose original language would have effectively put scanner manufacturers out of business and criminalized almost all uses of scanners. Yet, instead of this nightmarish scenario, we can be much more optimistic with the news of the revised legislation.

On Wednesday, October 29, I attended the House Telecommunications Subcommittee Mark-up on H.R. 2369. Even as late as the previous day it was uncertain whether the mark-up would take place. Re-drafts, phone conversations, and personal contacts on Capitol Hill were occurring past 5 p.m. on Tuesday. The informal coalition of manufacturers and equipment users of which I was a part — loosely called the "Scanner Legislation Working Group" — was not aware of the final language until moments before the hearing was about to begin.

Others—including thousands of hobbyists, firefighters, race fans, and more—were also taking the time to contact their own Congressman and members of the Telecommunications Subcommittee, up until the very last moments. It was down to the wire, but all parties worked diligently to offer new language that would fulfill the mission of the Subcommittee to strengthen and extend privacy rights, without causing the immediate demise of the scanner industry. (Many did contact their Congressmen urging that the legislation be shelved, but that, according to staffers across the Hill, was never an option.)

Moments before the mark-up, I met Congresswoman Karen McCarthy (R, MO), as well as her legislative aide, Andy Walker, with whom I worked on the bill. When I said to Rep. McCarthy, "It looks like H.R. 2369 has been fixed properly," she crossed her fingers, looked at me, and said, "Let's hope!"

Congresswoman McCarthy, who is on the Telecommunications Subcommittee, was one of the original cosponsors of 2369. She, like other members of the subcommittee, was committed to protecting the privacy of wireless phone users, but was not aware of the consequences of the original bill. It was pointed out to Rep. McCarthy's office that staffers at the Missouri Highway Patrol support the use of scanners; that SKYWARN activity, so critical in the tornado belt, is well served by scanners; and that volunteer firefighters throughout her district rely upon these radio devices. This is why Congresswoman McCarthy, as well as others, crossed her fingers. Then it was time for the hearing to begin.

During the mark-up, Mr. Tauzin of Louisiana introduced an amended bill which replaced the original language almost in total. The amended bill was reported to the House Commerce Committee without further amendments and without objection.

The amended bill only requires that scanner manufacturers eliminate cellular and PCS frequencies from their radios, not all Commercial Mobile Radio Service (CMRS) frequencies as the original bill stipulated! Of course, cellular was really not an issue as those frequencies are already banned. Broadband PCS frequencies lie near 2 GHz and have never been a concern. Narrowband PCS at 900 MHz will have to be eliminated from scanners, but the manufacturers believe that is "do-able." PCS communications use CDMA, TDMA and GSM digital encoding and are essentially unmonitorable.

As we all know, if the CMRS language had remained in the bill, the scanner business would likely have come to a screeching halt. It would have meant the end to 800 MHz radios (and therefore the TrunkTracker), as CMRS and public safety frequencies are shared at 800 MHz. It would also have meant an end to the popular pastime of listening to auto racing communications, since they rely on the 461-470 MHz business bands which would have been eliminated as well.

Beyond that, the requirements for image rejection of all the eliminated bands would have been essentially impossible to achieve. We, along with the FCC, worked with congressional staff to make clear the problems which the overly broad CMRS language posed. The point was critical; it was made; and Congress appropriately responded.

■ Implications of the Amended Wording

Under the amended bill, it will also be unlawful to manufacture equipment which is capable of decoding "protected" digital SMR systems. This has raised more than a few eyebrows. Many people are concerned that this will not allow scanner manufacturers to decode APCO 25 and similar public safety digital formats. We don't believe this to be the case.

Congress recognizes that there is a legitimate need for scanners, particularly for public safety use (see Rep. Tauzin's comments below). This is why Congress explicitly proscribed "protected" digital SMR and not all digital systems. "Protected" is further defined as "secured by an electronic method that is not published or disclosed except to authorized users..."

APCO 25 is a published standard. Public safety agencies using APCO 25 equipment have the capability to utilized encryption technology for their security. Public safety agencies have made it very clear to Congress that they want and need scanners.

The amended bill also makes it clearly unlawful to modify a scanner in a manner which makes the monitoring of the aforementioned channels (cellular, PCS, digital SMR) possible.

While the dreaded "intercept OR divulge" language remains in the new bill, the proscribed frequencies have been so narrowed that the effect of this language is minimal on the hobbyist. The section has also been reworded to make it clear that "Nothing in this subsection prohibits an interception or disclosure of a communication as authorized by chapter 119 of title 18, United States Code"; i.e., any governmental, law enforcement, civil defense, private land mobile, or public safety communications system; amateur, citizens band, general mobile radio services; any marine or aeronautical communications system, and other transmissions which are readily accessible to the general public.

There is one new provision: it will be unlawful to manufacture a scanning receiver which can read alphanumeric text from a pager

system. What is unclear is whether what is proscribed is a scanner which can be equipped with text-reading gear (through a speaker-jack perhaps), or a scanner which is internally equipped with such gear. As we all know, though, the issue is with paging software, not the scanner, but since it is clear that scanners are an acceptable product, the intent of this language is apparent. (This language was added following the interception of paging messages from the Mayor's Office and the police chief in New York City, as well as the decoding of official White House pager traffic.)

Credits and Cautions

While the bill is much improved, we all must remain vigilant (as there is always the remote chance an amendment will be offered in the Commerce Committee or on the House or Senate Floor). I do believe we can all breathe a sigh of relief. And, I think we all deserve a pat on the back. So many of you wrote your Congressman, contacted Rep. Tauzin, etc. .... the message was heard.

Also, public safety, particularly the fire service, really stepped up to the plate. Most importantly, the scanner industry fought for itself and for all of us. What is so gratifying about this is that the manufacturers, re-sellers, ARRL and others, recognize the importance of this business, this hobby, and the customers. That should make us all feel very good.

You may find certain provisions of the amended bill remain somewhat troubling. But, please remember how the original bill looked. Bear in mind that there is a legitimate case to be made for certain privacy rights. I feel this amended bill is eminently reasonable. It will keep the manufacturers in business and will keep scanners available to public safety, hobbyists, and others.

One very important fact has come out of all this. Congress now has a very good understanding that there are, as Mr. Tauzin himself says below, important, legitimate, socially beneficial uses for scanners. The FCC, which will be responsible, according to the bill, for determining how to enact much of the policy in H.R. 2369 (that's right, much has been shunted to the FCC instead of making it law), must have a clear understanding that Congress wants scanners to be available to the public and that certain digital formats can be a part of the scanner future.

The bill will come before the Commerce Committee for consideration when the second session of the 105th Congress is back to work sometime after the President's State of the Union address in late January. However, in the meantime, it is my opinion that we should abstain from the letter, e-mail, phone and fax campaigns. Mr. Tauzin could have disregarded our concerns. He had bipartisan support and the basic premise of privacy is a popular cause. Yet, he and his staff heard us out and worked with us (quite extensively) to amend his bill. It's terrific to know that you can make a difference and that Congress is willing to listen and amend legislation when it is appropriate.

Even if you decide you still wish to contact Mr. Tauzin or others on the Committee, I suggest that, considering how far we've come, you first remark how much you appreciate their willingness to listen to the concerns of the industry and make the necessary change to the bill. (Congresswoman Eshoo followed the same etiquette herself during the mark-up.) You may then wish to discuss some of the remaining concerns in the bill which we further address below.

You Can't Please 'em All

After I posted my remarks about the amended bill on the Internet, I was gratified to see that most people were pleased with the new language. However, I was slammed by a few people who felt that the bill should have either been completely killed or that more refinements were necessary. Many feel that we have the right to listen to whatever radio signals course through our homes and bodies. Argue all you want that it should be up to the transmitting party, or to his carrier, to provide the protection, but those arguments are just not going to fly with congressmen who use cellular and PCS phone in their governmental duties and for their personal conversations, and with congressmen who have millions of constituents who also use these wireless services and who expect them to be private.

Congress will not change the 1986 ECPA and they do not intend to throw away HR 2369. That's the political reality. We worked to see that hobbyists, the news media, public safety officials, and others, could continue to buy and use scanners while strengthening privacy for cellular, PCS and certain SMR users as best as possible. This is how compromise works. This is how politics and government is supposed to work. It's not perfect, but at least we had a say in the process that was heard.

Thanks to everyone for all your help and support! We've really done ourselves proud and we've demonstrated that we're part of something very worthwhile.

Remaining Concerns with H.R. 2369

In a letter to Congress, you might first wish to say that while you are generally pleased with the amended bill, you hope that your representative works to insure that the original language of H.R. 2369 is never reinstated. Also, you may wish to elaborate on the following points:

Larry Van Horne, *MT*'s Assistant Editor, pointed out to me that, according to the revised legislation, an individual would not be able to sell his cellular-capable scanner at ham flea markets, on-line, or anywhere else. It opens the door for FCC strike teams to selectively target flea markets to prosecute, and set examples, of anyone participating in such illegal selling of unlawful equipment. Technically, I believe Larry is correct.

Do I really think such FCC activity is likely? No. However, as I pointed out to Larry, this kind of detail is something that can be handled in a Committee Report, which is a document which accompanies many bills in order to clarify the exact purpose of the language.

The bill says that it shall be unlawful to decode protected SMRs. Congress should consider making it clear that public safety digital technology, which is the future of public safety communications, is exempt from this restriction.

The inclusion of the "intercept OR divulge" language, even though it has been narrowed considerably, allows Congress to get its foot in a door which may cause problems in a future session. It would be easy for a bill to be introduced three or five years from now which strikes the exceptions provided in the current wording.

It is somewhat unclear whether or not a scanner which can be equipped with outboard/aftermarket devices which break the law, are therefore themselves illegal.

In all these instances, a Committee Report, or perhaps a colloquy before the House, would clarify the issues. It is my belief that there is clear evidence from correspondence with Congress that none of the aforementioned items are real problems; however, it is reasonable to request information, or report language, which clarifies these matters.

■ Statements by Congressmen on H.R. 2369

The following remarks from the mark-up are very interesting and telling. Rep. Tauzin's remarks provide both comfort and concern; however, the true indicator of our efforts are shown in the actual amended bill. Rep. Klink's comments are also fascinating and show that we had success in pointing out the significant problems with language in the original bill.

Opening statement by the Honorable W.J. "Billy" Tauzin Chairman, Subcommittee on Telecommunications, Trade, and Consumer Protection Subcommittee Mark-up of H.R. 2369, the Wireless Privacy Enhancement Act of 1997, October 29, 1997.

"I introduced H.R. 2369 to address the concerns raised at the Subcommittee's first hearing of this Congress.

"Through our hearing, average Americans learned just how insecure their cellular phone calls are. The hearing was also a real eye-opener for many Members of the Subcommittee. What we found was blatant disregard for current privacy protections, and a lack of enforcement by the FBI and FCC. We also learned that many people read nonexistent loop-holes into the law in order to justify their activities.

"I held that hearing to determine what Congress could do to improve the privacy of Americans' wireless conversations. The bill I introduced attempted to extend current privacy protections to all commercial mobile services, including new cellular-like services. What was apparent at the hearing was that a number of my colleagues on both sides of this chair felt strongly that private communications, regardless of the transport medium, deserve to remain private. No one should have a right to eavesdrop on private conversations, merely because such communications are air-borne, or are analog, rather than digital.

"The bill was intended to ensure that electronic stalking in the digital age would not be facilitated by congressional inaction. Instead, H.R. 2369 intended to nip in the bud any mass market developing for scanners capable of decoding digital communications, whether they are digital cellular, paging, specialized mobile radio, or personal communications services.

"The bill was intended to protect users of wireless services that pay for such services. The bill as introduced therefore required the FCC to deny 'equipment authorization' to scanners that could intercept all COMMERCIAL mobile services. The bill was never intended to prohibit the scanning of public safety frequencies or other noncommercial frequencies in which users have no expectation of privacy.

"Over the summer and fall, I have worked closely with the public safety community, amateur radio operators, and scanner manufacturers to address their concerns. Many of their concerns raise legitimate, socially-beneficial goals. Their concerns are not necessarily in conflict with the goals of enhancing the privacy protections for users of commercial mobile radio services. I thank their representatives for working so constructively with this Committee, in order to articulate the goals of enhancing the security of private communications, without threatening the legitimate uses of scanners. I look forward to their continued support for this Committee's goal of enhancing privacy protection of users of commercials wireless services."

Statement of Congressman Ron Klink (D, PA) at the Markup of H.R. 2369 (written remarks entered into the record)

"Mr. Chairman, though I wonder what the great urgency of acting on this legislation now might be, I want to commend you on the reasonable changes you have made to this bill.

"I think on introduction this legislation cast too broad a net. I heard from manufacturers, amateur radio operators and others that H.R. 2369 would have unanticipated consequences because of the prohibition on scanners that can receive commercial mobile radio services.

"That broad a prohibition could severely hamper firefighters, law enforcement, news reporters and others who have legitimate uses for scanners.

"I am pleased that you have scaled back that prohibition to scanners that can pick up cellular or personal communications service (PCS) transmissions.

"I also believe that prohibiting the modification of a scanner is a necessary change and will close the loophole that was identified at our subcommittee's cellular privacy hearing earlier this year.

"Furthermore, I appreciate the requirement that the FCC investigate and act upon complaints about violations of wireless communications privacy. I think enforcement was also a problem identified in our hearing. However, I worry about adding to the commissions's workload without providing further resources.

"Finally, Mr. Chairman, just a word of concern about changing the requirement that a violation of Section 705(a) of the Communications Act would consist of either intentional unauthorized interception OR divulgence of radio communications, instead of the current requirement of both interception and divulgence. I hope we are not casting another overly wide net into the waters of unintended consequences with this provision.

"Nevertheless, Mr. Chairman, you have done fine work on this legislation to this point and have made a concerted effort to protect the privacy of consumers of wireless services. I look forward to working with you to perfect H.R. 2369 when we take it before the full Committee."

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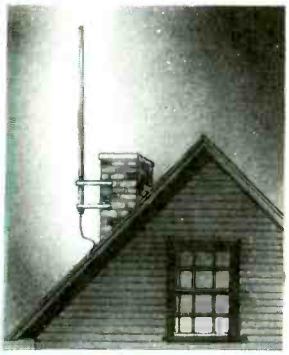

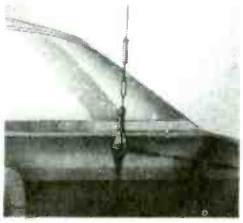

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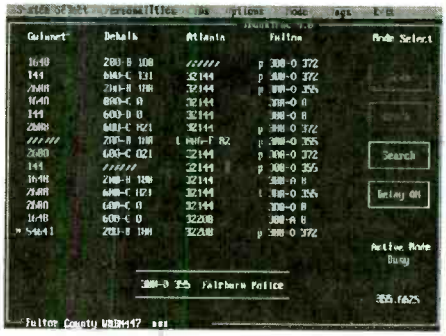

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steditor@grove.net

New Nationwide HF System Approved

On July 23, 1997, the Wireless Telecommunications Bureau of the Federal Communications Commission (FCC) conditionally issued a license (experimental callsign KF2XHI) to Flash Comm, Inc. of Melbourne, Florida, to use 2.8 MHz of the HF radio spectrum (3 to 27 MHz) for its nationwide two-way tracking and messaging network. Targeted primarily at the transportation and public service industries, this network allows real-time tracking of buses, trucks, trailers and railcars, as well as two-way messaging at a fraction of the cost of any currently existing system.

"This is a huge boost for the transportation industry," said Terry L. Scott, President and CEO of the company. "Until now, companies monitoring their goods and services as they moved across the nation were faced with high costs or incomplete coverage. The FCC authorization gives us unprecedented access to hundreds of radio channels and the capacity we need to provide a reliable, contiguous service."

"Because of the nature of the HF spectrum, the country can be covered with a small number of terrestrial receive sites. This gives us a significant advantage since we can build a system for a fraction of the cost of systems using other technologies. Maintenance and operating costs are also lower than those for alternative technologies because our receive sites are on the ground and do not involve satellites. We believe we will be the low cost provider of two-way data communication services."

Messages are delivered to vehicles and remote stationary units using a network of high power commercial FM stations. The vehicles reply using Flash Comm's proprietary HF technology. Since the range of a single receive site is as much as 1,800 miles, just a few sites provide overlapping coverage for the entire continental United States.

These devices are GPS-equipped so the customer can request the current location or status of an asset and see it plotted on a map on his computer screen, or the remote device may initiate a call to notify of an alarm condition. Right now, Flash Comm's demonstration system covers between 150,000 and 200,000 square miles in the Southeast United States, and appears to be using frequencies in the 10 MHz range.

The U-2 provides continuous day or night, high-altitude, all-weather, stand-off surveillance of an area in direct support of U.S. and allied ground and air forces. U-2 aircraft are common visitors to HF frequencies, especially the Global HF network. (U.S. Air Force photo by Master Sgt. Rose Reynolds)

Flash Comm plans to target a wide range of nationwide wireless two-way data communication applications. Besides transportation asset location and control, Flash Comm will also address applications in mobile transportation, security, and fixed remote telemetry. In all cases, the system offers two-way messaging, tracking and reporting, deviation alarms, and various forms of inbound and outbound e-mail.

Flash Comm transponders will be installed on such platforms such as trucks and railroad rolling stock, as well as fixed infrastructure such as warehouses, railroad crossings, or highway bridges. These transponders, which Flash Comm calls "Intelligent Transceiver Units," will make it possible to track the location or monitor the status of the vehicles and infrastructure, no matter where in the United States they are located.

The remote device (about the size of a laptop computer) and its antenna take about an hour to attach to the underside of a trailer, within a cab, or next to a fixed asset. According to the company the battery operated package provides reliable, verified communications in canyons, cities, and mountainous areas regardless of weather, foliage, or other environmental factors.

Each transponder will transmit only when directed to by the Flash Comm system. When commanded, it will transmit a short digital packet "burst," less than 2 seconds in duration on average, on an unoccupied (at that moment in time) HF channel selected automatically by the Flash Comm system. The system will choose an optimal HF channel for the transponder to use based on ionospheric propagation algorithms and a clear channel assessment process involving six geographically diverse scanning receivers.

The Flash Comm system will make use of HF transmissions using only specified carrier frequencies. An initial list of the carrier frequencies authorized by the FCC appears in Table 1.This list of carrier frequencies may be modified after consultation with the Federal Communications Commission and the National Telecommunications and Information Administration, provided that a 15 kHz guard band is preserved between Flash Comm operations and aeronautical, radio astronomy, maritime, amateur, time standard, and industrial, scientific and medical bands.

The total spectrum specified for use by the Flash Comm system cannot exceed 11.7 (2.8 MHz) percent of the spectrum between 3 and 27 MHz. Flash Comm's service can only operate as a secondary service and cannot cause interference to authorized users of the frequencies listed in Table 1.

TABLE 1: Flash Comm HF Channel Carrier Frequency Ranges (kHz)

(All frequencies below are spaced 3 kHz)

3170-3209, 4453-4492, 4925-4976, 5120-5231, 5745-5865, 6780-6840, 7540-7738, 9105-9345, 10234-10420, 11415-11577, 12170-12215, 13425-13572, 14365-14524, 15815-16130, 17425-17533, 18045-18051, 18183-18336, 19115-19310, 19815-19863, 20025-20124, 21865-21907, 22870-22906, 23365-23515, and 25025-25037.

TABLE 2: Sample Flash Comm Log Report from the Company Website

Reception Report for 11/03/97.
FLASH COMM, INC.
Operating under Experimental License
Call Sign - KF2XHI

Date/Time	Unit	Freq	Dur.	Coverage Area
11/03/97 14:24	GMT20	10388Hz	1333ms	WYKZ-Jasper, SC - FS
11/03/97 14:24	GMT20	10214Hz	1333ms	WYKZ-Jasper, SC - FS
11/03/97 14:25	GMT20	10316Hz	1333ms	WYKZ-Jasper, SC - FS
11/03/97 14:25	GMT20	10373Hz	1333ms	WYKZ-Jasper, SC - FS

5.33 WattSecs = Total WattSeconds
1.33 Secs = Average Transmission Time

End-Of-Data.

Each HF transmitted packet must be identified by a digital identifier embedded in the preamble of the packet. The duration of each HF transmission cannot exceed 4 seconds.

The company must also maintain a daily record of the seven day moving average of the durations of all completed HF transmissions (see Table 2) and notify the FCC by letter if it appears that such average is regularly exceeding two seconds. The log must be publicly available via the Internet (the URL is **http://www.flashcomm.com/**) and include the time, frequency, location and duration of all completed company HF transmissions for the prior 24 hours.

The companies' HF transmitting equipment must be capable of compliance with the following technical specifications in order to receive a grant of type-acceptance:

- The transmitter power output must not exceed 15 watts.
- The operational modulated emission type must be 2K80G1D. Type N0N emission capability is permitted in a test mode; otherwise the energy must spread over a 2.8 kHz bandwidth. The authorized bandwidth is 3.0 kHz.

Flash Comm was formed in 1994 to commercialize communications technology originally developed by Harris Corporation for the military. Commercial launch of service is expected in early 1998.

More Digital Tones and the Global HF System

Imagine you're sitting in front of your shortwave receiver listening to 11175 kHz and Offutt Global is transmitting an Emergency Action Message (EAM). As the transmission ends, you hear two tones.

For many years listeners who monitor the U.S. Air Force Global High Frequency System (GHFS) have asked, "What are these tones we hear being transmitted by the various Global stations on HF?"

One of our longtime *MT* readers who works at one of the Global stations has provided the answer to this question and some insight into future changes that will occur within the Global network. "Mr. Global" explains:

"The Global stations are configured so that each station (except Incirlik AB, Turkey) can be remotely controlled from the net control station (NCS) or the alternate NCS. Offutt AFB, Nebraska, is the primary NCS for the Global system. Andrews AFB, Maryland, and McClellan AFB, California, are the alternate NCS stations in the GHFS. Remote control of the various transmitters is accomplished by DTMF (dual-tone multi-frequency) tones. There are many control signals that originate within each station that are not heard during the such a transmission. The two tones that are heard are the 'star 0' (Key) and 'star 9' (unkey) DTMF tones." (*As seen on your telephone touch tone pad-Larry*).

"Each operator console can key and unkey the radios from the DTMF pad on the console or from a foot pedal. One will sound like a manual key and the other will be quick and will sound automatic. If an operator steps on the pedal while a transmission is in progress, multiple DTMF tones will be heard.

"Another function of the 'star 0' and 'star 9' tones is to mute the receivers during the various transmissions. In all GHFS stations the transmitter and receive sites are seperated by several miles. At Offutt, for instance, the receiver site is 38 miles northeast of the control/transmitter site.

"Using these DTMF tones the NCS and ANCS stations can seize all seven Scope Signal III (SSIII) systems and transmit high priority traffic simultaneously through those stations. For those of you that only hear Offutt when they are transmitting an EAM, you are probably receiving the signal from an SSIII transmitter near you.

"In conclusion, The DTMF tones will gradually be going away. A new system, tagged Scope Command, will be coming on line soon and when each station is converted to the new system the controls will be digital."

So, in the near future those DTMF tones you are used to hearing will be disappearing. Recent monitoring indicates that Offutt has been changed over to the new system. So the next time you hear one of the Global stations broadcasting an EAM, you might not hear those familiar tones you have become accustomed to over the years.

I hope everyone had a safe and happy holiday season. And to start 1998 out on a positive note, it is time to see what you have been monitoring in the Utility World radio spectrum.

Utility Loggings

UTILITY WORLD

Larry Van Horn

Abbreviations used in this column

ALE	Automatic Link Establishment		System
AM	Amplitude Modulation	INA	Iraq News Agency
ANDVT	Advanced Narrowband Digital Voice Terminal	Meteo	Meteorology
		NASA	National Aeronautics and Space Administration
CAMSLANT	Communications Area Master Station Atlantic	RAF	Royal Air Force
		RTTY	Radioteletype
CANFORCE	Canadian Forces	SAM	Special Air Mission
CW	Continuous Wave (Morse code)	SITOR-A	Simplex teleprinting over radio system, mode A
DV	Distinguished Visitor		
Fax	Facsimile	Unid	Unidentified
FEMA	Federal Emergency Management Agency	USB	Upper Sideband
		VIP	Very Important Person
GHFS	Global High Frequency		

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

2472.0 PBC-Dutch Navy Goree Island, with 75 baud RTTY text plus call at 1947. (Paolo De Berti via email)

2606.0 FUO-French Navy Toulon, France, with a 75 baud RTTY test transmission at 0349. (Paolo De Berti)

2743.0 ULX-Israeli Mossad number station at 1930. Also noted on 4880. (Takashi Yamaguchi-Nagasaki, Japan)

2943.0 SYN2-Israeli Mossad number station at 1545. Also noted on 4165 and 6370. (Yamaguchi-Japan)

3042.0 Freedom Star working Cape Radio at 0250. Moved to 2837. In support of a space shuttle mission. (Bunyan-MO)

3092.0 Rescue 314 working Trenton Military (CANFORCE) at 0142. Also on 4703, 6694, and 9007. (Bunyan-MO)

3322.0 R-Russian Navy single letter HF CW marker at 1715. (Yamaguchi-Japan)

3438.0 Unid station 2RC8 repeating "V 8L6S de 2RC8" at 1140 in CW. (Yamaguchi- Japan)

3552.7 Unid station L9CC repeating "V CP17 de L9CC" at 1650 in CW. (Yamaguchi- Japan)

4450.5 Lima, Quebec and Tango working Foxtrot with position reports at 0312. (Bunyan- MO)

4463.0 FTJ-Israeli Mossad number station at 1500. (Yamaguchi-Japan)

4490.0 SAM 86971 working Andrew (Mystic Star) at 0355. (Bunyan-MO)

4560.0 YHF-Israeli Mossad number station at 1800. Also noted on 5820. (Yamaguchi- Japan)

4575.0 V-Russian Navy single letter HF CW marker at 1312. On another day heard the F marker at 0819. (Yamaguchi-Japan)

4745.0 Reach Golf 3 (USAF C-141 tail no 50239) working Thule GHFS at 0033. (Bunyan-MO)

4770.0 Korean female 5-digit number station using a powerful AM signal at 1400. (Yamaguchi-Japan)

4992.0 SAM 60202 working Andrews on F-417 at 0435. (Bunyan-MO)

5091.0 MIW2-Israeli Mossad number station at 1915. First time I've ever heard MIW2 on this frequency. Usually hear JSR. (Yamaguchi-Japan)

5170.0 CIO2-Israeli Mossad number station at 1945. Also noted on 10352. (Yamaguchi- Japan)

5230.0 MIW2-Israeli Mossad number station at 2115. Also noted on 8641. (Yamaguchi- Japan)

5246.0 *USS Scott* working DOD Cape at 2335. Moved to 20390. In support of a space shuttle mission. (Bunyan-MO)

5396.0 Eraser working Yellow and Blue at 1150. Passed phonetic 5-character groups. (Harry Riddell-Rochester, NY)

5401.0 Fighting Freddie working Eagle and Seagull Control at 0608. (Bunyan-MO)

5422.0 English female 5-digit Lincolnshire Poacher number station at 1800. Also noted on 6485. AT 1700 heard on 6485 and 8464. (Yamaguchi-Japan)

5430.0 ART2-Israeli Mossad number station at 1800. (Yamaguchi-Japan)

5530.0 CIO2-Israeli Mossad number station at 1545. (Yamaguchi-Japan)

5629.0 CIO2-Israeli Mossad number station at 1545 causing interference to San Francisco aero. Another day had SYN2 at the same time period. (Yamaguchi-Japan)

5684.0 Thule GHFS working an unid callword followed by 117 at 0551. (Bunyan-MO)

5692.0 12C with a phone patch to Panther via CAMSLANT Chesapeake at 0040. (Bunyan-MO)

5711.0 King 83 working Moffett Rescue with operations report at 0441. (Jeff Jones-CA)

5730.0 BAA24-Beijing Meteo, China, with a 50 baud RTTY meteo transmission at 2148. (Paolo De Berti)

5756.5 Unid station 4XML repeating "V BFR7 de 4XML" in CW at 2016. (Yamaguchi- Japan)

5820.0 YHF-Israeli Mossad number station at 1800. Also noted on 4560. (Yamaguchi- Japan)

5932.0 Unid CW station transmitting "TTT 936 936 936" at 2042. (Jack Dix-Yonkers, NY)

6370.0 SYN2-Israeli Mossad number station at 1545. Also noted on 2953 and 4165. On another day noted the VLB2 station at 1445. On another day heard SYN2 at 1445. (Yamaguchi-Japan)

6658.0 KPA2-Israeli Mossad number station at 2015 and at 1415. (Yamaguchi-Japan)

6706.0 Merlin 421 working Trenton Military at 1300. IDed as helicopter on trip from Shearwater to St. John, NF Canada. (Riddell-NY)

6709.5 Avenger working Oreo at 0511. (Bunyan-MO)

6715.0 Korean female 5-digit number station at 1535 in AM. (Yamaguchi-Japan)

6751.0 Razz 19 (E-6) calling Husker 15 (KC-135) at 1714. (Paul Bunyan-Kansas City, MO)

6760.0 Broadsword working Crossbow 3 at 1200. Setting up some kind of electronic link. (Riddell-NY) *Probably a Defense Communication System (DCS) long haul circuit-Larry.*

6761.0 SAM 26000 working data circuit here with Andrews VIP at 0522. (Jones-CA)

6785.0 Unid station 6PXJ repeating "V ABYZ de 6PXJ" in CW at 0940. (Yamaguchi- Japan)

6976.0 English female 3/2-digit number station in AM at 1510. Also noted on 10723. (Yamaguchi-Japan)

6989.0 C32 calling 3USA and MSH at 0228. Moved to F-8. (Bunyan-MO)

7039.0 C/F/S-Russian Navy single letter HF CW markers at 1715. All three station simultaneously on the same frequency. On another day heard F/C/P/S on at the same time and frequency at 1839. (Yamaguchi-Japan)

7062.0 Unid station L9CC repeating "V CP17 de L9CC" in CW at 1343. (Yamaguchi- Japan)

7232.0 FTJ-Israeli Mossad number station at 1500. Able to heard every night. (Yamaguchi-Japan)

7322.0 FTJ2-Israeli Mossad number station at 1300. (Yamaguchi-Japan)

7337.0 English female 5-digit Lincolnshire Poacher number station at 2000. Also noted on 9251. (Yamaguchi-Japan)

7484.0 English female Cherry Ripe number station at 1300. Also noted on 13866 and 11750. (Yamaguchi-Japan)

7668.0 Unid station 8BY (*French station at St. Assise-Larry*) repeating "VVV 8BY" followed by a 3-digit number separated by a slant bar in CW at 1940. (Yamaguchi-Japan)

7687.0 SAM 201 (DV-2 + 6) departed Travis at 1940, ETA Hickham 0120 working Andrews VIP. (Jones-CA)

7755.0 English female 5-digit Lincolnshire Poacher number station at 1600. Also noted on 6485 and 10426. (Yamaguchi-Japan)

8014.0 English 3/2-digit number station in AM at 1500. Unable to find a parallel frequency. (Yamaguchi-Japan)

8026.0 Nightwatch 01 calling SAM 29000 for a radio check at 0245. (Bunyan-MO)

8027.5 Coast Guard Group St. Petersburg calling R1K "in the red" at 0531. (Bunyan-MO)

8028.0 ANDVT communications noted here at 0320.(Jones-CA)

8080.0 MKK-RAF London, UK, with 50 baud RTTY call test tape at 0758. (Paolo De Berti)

8082.0 Slapstick working Flapjack at 0315. (Noted "Black"=ANDVT). (Bunyan-MO)

8145.0 IMB55-Rome Meteo, Italy, with a fax 120/576 transmission of meteo charts at 0811. (Paolo De Berti)

8150.0 PBB-Den Helder Radio, Netherlands, with a 75 baud RTTY text plus call test tape at 2151. (Paolo De Berti)

8406.0 Unid station 4XML repeating "VBFR7 de 4XML" in a dirty, chirpy CW signal at 0947. (Yamaguchi-Japan)

8495.0 C/F/S-Russian Navy single letter HF CW marker at 1314. All three stations on simultaneously. (Yamaguchi-Japan) P station heard here at 2329 and C at 2330. (Dix-NY)

8948.0 Nagpur calling Bombay at 1225. Nagpur working various aircraft at 1300. Delhi working various groundstations. How long they been here? This is my favorite monitoring time and one of my favorite bands, but this is the first time I've heard these guys here. (Riddell-NY)

8960.0 Midlands SK working Portishead Radio, UK, at 0501. Moved to 10291. (Bunyan- MO)

8965.0 LK01 working Thule GHFA at 0349. (Bunyan-MO)

8968.0 Sooner 83 (C-130) and Husker 75 (KC-135) working Husker Control at 2031. (Not a phone patch). (Bunyan-MO)

8992.0 Spanish female 5-digit number station at 0815 (Wed UTC) on this GHFS frequency. (Bunyan-MO)

9023.0 Deerhunter, Thumper, Coffin Corner working Link-11 communications. Mentioned crypto circuit on 5520 kHz at 0130. (Jones-CA)

9025.0 Spar 67 with a radio check with Thule GHFS at 1433. Moved to 13242. (Bunyan- MO)

9041.0 5YE-Nairobi Meteo, Kenya, with 100 baud RTTY meteo text at 1820. (Paolo De Berti)

9120.0 SAM 31681 with a radio check to Andrews (Mystic Star) on F-005. (Bunyan-MO)

9143.5 Hard Rock 30 Charlie calling Gunpost and Wolfman at 1500. (Bunyan-MO)

9320.0 Nightwatch 01 (Gordo 11) working MacDill GHFS (moved to 8040). Nightwatch 01 wanted a klaxon test at 0103. (Bunyan-MO)

9467.0 English female 3/2-digit number station in AM at 1200. Also noted on 10597. (Yamaguchi-Japan)

10160.0 YIL71-INA Baghdad, Iraq, 75 baud RTTY news at 1312. (Paolo De Berti)

10194.0 WGY9410 (one of the new four digit call signs), FEMA, unknown location, working WGY914, FEMA, Thomasville, GA, after several ALE bursts in USB. (Jack Metcalfe-KY)

10223.0 English female 3/2-digit number station in AM at 1200. Also noted on 7547. (Yamaguchi-Japan)

10262.0 English female 3/2-digit number station in AM at 1300. Also noted on 7547. (Yamaguchi-Japan)

10426.0 English female 5-digit Lincolnshire Poacher number station at 1600. Also noted on 6485 and 7755. (Yamaguchi-Japan)

10597.0 English female 3/2-digit number station in AM at 1500. Also noted on 7600. (Yamaguchi-Japan)

10872.0 F/P/C-Russian Navy single letter HF CW markers at 1430. All three station heard simultaneously. (Yamaguchi-Japan) C station noted here at 1949 and S station heard at 2054. (Dix-NY)

10969.0 Unid SITOR-A station transmitting 5-letter groups at 1953. (Dix-NY)

10995.0 Phoenix 2 calling home plate at 2339. Negative contact. (Bunyan-MO)

11053.0 Paccom 01 (USAF tail no 60204) with a phone patch to Crossbow via Andrews (Mystic Star) at 0116. (Bunyan-MO)

11108.5 MUE7 calling MUH7A, MUE5, MUE7B at 1400. No joy. (Riddell-NY)

11116.0 Unid station 6SQ repeating "GPD de 6SQ ZNN" using very chirpy CW with a distinctive hum. (Yamaguchi-Japan)

11175.0 Venus 21 (USAF tail no 60201) with phone patch through MacDill GHFS at 1655. Thunderbird 15 (USAF tail no 80937) with a phone patch to Hilda East via McClellan GHFS at 1503. (Bunyan-MO)

11178.0 Sparrow 1 working PJK at 1245. Plenty of interference from 11175. Sparrow 1 also believed to have self IDed as PEMMA when working PJX. Mention of checking de icing. (Riddell-NY)

11217.0 NASA 02 working NASA 831 at 2141. Wiley 16 working Cajun Control at 1511. Talking about Milstar Net 3. (Bunyan-MO)

11220.0 SAM 86971 working Andrews (Mystic Star) at 0035. Andrews using full carrier USB. (Bunyan-MO)

11250.0 Whitehorse working Vancouver Military (CANFORCE) at 0125. Also on 13254. (Bunyan-MO)

11271.0 Spar 76 working Thule GHFS at 1550. Moved to 13242. (Bunyan-MO)

11413.0 SAM 20375 working Andrews (Mystic Star) on F-574 at 2103. (Bunyan-MO)

11460.0 SAM 201 (DV-2 + 6) working Andrews VIP for preflight frequencies for next trip (Frequencies given: F-731 and F-295). Around 0120. (Jones-CA)

12087.0 Nightwatch 01 working Paccom 01 on possible F-126. (Bunyan-MO)

12107.0 Ascension GHFS calling SAM 26000 at 0503, no joy. (Bunyan-MO)

12221.0 English female 3/2-digit number station in AM at 1315. Also noted on 11123. (Yamaguchi-Japan)

12705.0 Unid 8BY repeating "VVV 8BY" in CW at 1240. (Yamaguchi-Japan)

12950.0 CIO2-Israeli Mossad number station at 1445. Also noted on 10352 and 7605. (Yamaguchi-Japan)

13203.0 Unid German Air Force aircraft working another unid station at 1620. (Jones-CA)

13204.0 Rick 49 (KC-10?) Working 52 at 1519. (Bunyan-MO)

13241.0 SAM 60202 working Andrews with a phone patch to Mildenhall Metro at 1536. (Bunyan-MO)

13528.0 F/C/S/P-Russian Navy single letter HF CW markers at 0958. All four stations heard simultaneously. (Yamaguchi-Japan) F station heard at 1434. (Dix-NY)

13533.0 EZI2-Israeli Mossad number station at 1530. Also noted on 11565. (Yamaguchi- Japan)

14000.0 English female repeating "Frank Young Peter" at 1400. Possible Nancy Adam Susan number station. (Yamaguchi-Japan)

14402.0 MKD-RAF Akrotiri, Cyprus, with Piccolo 6 crypto text at 1203. (Paolo De Berti)

14469.0 English female 5-digit Cherry Ripe number station at 1100. Also noted on 13866 and 9263. (Yamaguchi-Japan)

15043.0 Reach 20 Tango 1 with a phone patch to Ramstein Metro via Thule GHFS at 1534. (Bunyan-MO)

15094.0 Quencher working MacDill GHFS for a data check at 1855. (Bunyan-MO)

15097.0 Nightwatch working an unid station for data at 1530. (Bunyan-MO)

15616.0 English female 5-digit Cherry Ripe number station at 1000. Also noted on 17499 and 10452. (Yamaguchi-Japan)

16198.0 English female 3/2-digit number station in AM at 0000. Also noted on 15460. (Yamaguchi-Japan)

17410.0 EZI2-Israeli Mossad number station at 1100. Also noted on 15980. (Yamaguchi- Japan)

17499.0 English female 5-digit Cherry Ripe number station at 1000. Also noted on 10452 and 15616. (Yamaguchi-Japan)

17973.0 Overtone with a radio check to MacDill GHFS at 1426 (moved from 15043). (Bunyan-MO)

18027.0 Reach 129BS working Lajes GHFS with a phone patch to Hilda East at 1345. (Bunyan-MO)

18290.0 Nightwatch 01 working Andrews on F-633 for data check at 2220. (Bunyan-MO)

18331.0 SAM 90300 (DV2+3) with a phone patch to Carpet via Andrews on F-551 at 2042. (Bunyan-MO)

18415.0 Unid station 8BY (*French station at St. Assise-Larry*) repeating "VVV 8BY" followed by a 3-digit number separated by a slant bar in CW at 1040. Heard same at 0940. (Yamaguchi-Japan)

18515.0 English female 3/2-digit number station at 1100 in AM. Also noted on 16086. (Yamaguchi-Japan)

19715.0 EZI-Israeli Mossad number station at 0830 and 0930. Also noted on 17410. (Yamaguchi-Japan)

19884.0 English female 5-digit Cherry Ripe number station at 0000 and 0100 (powerful signal). Also noted on 15616 and 21866. (Yamaguchi-Japan)

20011.0 English female 3/2-digit number station in AM at 0415. Also noted on 18518. (Yamaguchi-Japan)

20048.0 C/S-Russian Navy single letter HF CW markers at 1045 and 1128. (Yamaguchi- Japan)

20474.0 English female 5-digit Cherry Ripe number station at 2300. Also noted on 17499. (Yamaguchi-Japan)

20970.0 English male 5-digit number station in AM at 0900. This station started at 0900 by repeating "837" until 0905, "902" plus "45" each sent twice then into random 5-digit numbers. Ended with "00000" at 0913. Able to hear similar transmissions every day at this time. (Yamaguchi-Japan)

21866.0 English female 5-digit Cherry Ripe number station at 0100. Also noted on 19884 and 15616. (Yamaguchi-Japan)

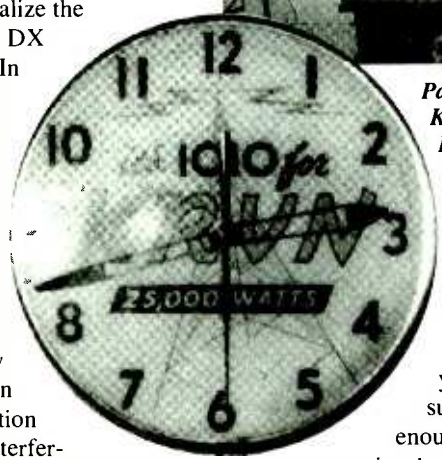
27870.0 ALE burst noted here at 1730. Also heard burst on 11226, 11250, 13215, 15043, 18003, 20631, and 23337. (Bunyan-MO)

Doug Smith, W9WI
72222.3143@compuserve.com

A Cool Beverage

No, I'm not going to explain how to brew your own beer... this Beverage is an antenna. In fact, it's probably the most effective antenna you can use for AM DXing, and it can be easily built — even if you're "technically challenged" — for just a few dollars. Of course, there's a catch: the Beverage is a *very* long antenna, you'll need lots of land to build one. But if you occasionally visit an isolated vacation spot (or if you're lucky enough to have several acres at your disposal), this antenna is well worth trying.

If you've been DXing the AM band for any length of time, you realize the primary limit on your DX catches is interference. In most locations, you can find a station on every frequency, and many frequencies have between a handful and several dozen stations fighting for dominance. Small loops receive equally well from most directions but very poorly in a narrow range of angles. You can point the antenna's direction of poor reception at an interfering station — but if there's more than one source of interference, you're out of luck. The Beverage, on the other hand, receives quite well in a narrow range of angles, and quite poorly in all other directions. The difference in DX results can be truly amazing!



Patrick Griffith of suburban Denver found KRVN-880's original mixing console at the Dawson County Museum in Lexington, Nebraska. Note KRVN's old frequency and power (1010 kHz, 25,000 watts) on the clock above the board (also see inset below)!

What exactly is a Beverage? It's a very long wire antenna — in theory, between 1500 and 6000 feet — very close to the ground, between 1 and 10 feet high. (Though antennas as short as 400 feet will work quite well.) It's grounded at the far end through a terminating resistor of approximately 500 ohms, and connected to the receiver through a matching transformer. The antenna receives quite well in the direction of the terminating resistor, and poorly in all other directions.

How do you build one? First, you need some wire. I bought a 1/4 mile spool of aluminum electric fence wire at a local hardware store. Next, you need some kind of supports. If your land has enough trees on it, you can simply wrap the wire once around a tree trunk every 50 feet or so. If it's bare like mine, you'll need some wooden stakes or something similar. Run the wire out as far as you can, starting at your house and going in the direction of the stations you want to hear.

Once you have the wire strung, you need two ground rods, one at each end. I had an eight-foot rod which I sawed in half, using half at each end. Drive the rods into the ground with a hammer, leaving enough exposed to connect some wire. At the far end, hook a 470-ohm resistor between the end of the antenna and the ground rod. I'd use binding posts (Radio Shack #274-662) and a small project box (RS #270-1801 or similar) to protect the resistor from the elements.

In theory, if your receiver has a 50-ohm input impedance you should use a 9:1 matching transformer at the near end of the Beverage. I have had fair success without the transformer, though to be honest it works better with it. Palomar's MLB-1 (see the ad on page 65 of November *MT*) should work fine, or you can wind your own from plans in most ham antenna books. If you're using a GE SupeRadio or similar small portable, the antenna input is probably already high impedance, and you don't need a transformer. Connect the center conductor of a length of coax to the near end of the antenna (again, using the matching transformer if you choose) and the outer conductor to the ground rod. Of course, the other end of the coax goes to your receiver.

What kind of results should you expect? I'm located about 30 miles outside Nashville, Tennessee; my Beverage is about 400 feet long and aimed northwest. These tests were run late morning to around noon, when propagation on the AM band is at its worst. On 1560 kHz, with the Beverage, I receive a good quality, interference-free signal from WPAD Paducah, Kentucky; with my 160-meter ham antenna, WPAD disappears, replaced by WMRO Gallatin, Tennessee. KMOX-1120 St. Louis, about 250 miles northwest, is armchair copy on the Beverage; on the ham antenna, I can just barely tell there's a station there. At night, I've received stations like CFAC-960 Calgary, WKKD-1580 in suburban Chicago (only 200 watts!), and KPBI-1510 Greenwood, Arkansas, is received despite my location only 15 miles from 50,000 watt WLAC on the same frequency.

■ Bits and Pieces

• I went overboard with the delete key while writing the November column; I suspect the first item in *Bits and Pieces* didn't make much sense. What's newsworthy about this incident, where a newsmagazine printed the contents of intercepted cellular phone calls, was that it happened in Colombia! And, that the scandal it brought into the open involved political favoritism in the assignment of frequencies for new FM broadcast stations in that South American country.

• Jerry Monroe KC2UT of central New York had a few comments on Philip Gebhardt's article on meteor scatter. (*Radio That's Really Out of this World*, page 14 of October *MT*) Jerry (and I) found it fascinating reading. But what Jerry says wasn't mentioned was the connection between major meteor showers and sporadic-E events. "I have heard 'pings on the FM dial' suddenly change into hours-long E-skip on channels 2-6 and the FM band!"

The true cause of sporadic-E is not known, though there are plenty of theories. (Some, myself included, believe there's more than one cause!) There's an excellent two-part series on sporadic-E in the October and November issues of the ham magazine *QST*. The author's theorem supports Jerry's suggestion of a connection between meteors and skip. Some of Jerry's FM DX appears in the sidebar.

• Kiwa Electronics has introduced a Pocket Regeneration Module (PRM) for their Pocket Loop antenna. This module uses regenerative amplification to increase gain by 18-24dB and improve selectivity. (I've experimented with the regeneration on a friend's big Kiwa loop, and find the improvement in selectivity fantastic.) This is just the ticket for clearing up some of those frequencies you can't DX because they're too close to a strong local station. Grove has it in their catalog for $47.95; give them a call at 800-438-8155.

SKIPPING IN

Here are some of Jerry Monroe's FM catches, logged via meteor-induced sporadic-E skip near Syracuse, New York:

WOKI	100.3	Oak Ridge, TN
KSYG	103.7	Little Rock, AR
KUMR	88.5	Rolla, MO
WSTO	96.1	Owensboro, KY
KXOK	97.1	St. Louis, MO
WMXS	103.3	Montgomery, AL

CALL CHANGES

The following AM stations have changed callsigns in the last month:

Old call:	City:	New call:
KAMO-1390	Rogers, AR	KREB
KFWJ- 980	L. Havasu City, AZ	KBBC
KCUB-1290	Tucson, AZ	KOAZ
KBTL- 540	Costa Mesa, CA	KGXL
KXMG-1150	Los Angeles, CA	KCTD
KBAI-1150	Morro Bay, CA	KJQY
KNTA-1430	Santa Clara, CA	KVVN
WJNA-1040	Boynton Beach, FL	WJNO
WANM-1070	Tallahassee, FL	WFRF
WJNO-1230	W. Palm Beach, FL	WJNA
WRAJ-1440	Anna, IL	WIBH
WEJM- 950	Chicago, IL	WIDB
KQAM-1410	Wichita, KS	KMYR
KZSN-1480	Wichita, KS	KQAM
WDOZ-1310	Dearborn, MI	WYUR
WIFN-1590	Marine City, MI	WHYT
KMAY-1240	Billings, MT	KMZK
WXLX- 620	Newark, NJ	WJWR
WJIC-1510	Salem, NJ	WNNN
new -1550	Canandaigua, NY	WCGR
KRAF-1370	Holdenville, OK	KKNG
KWJJ-1080	Portland, OR	KOTK
KLVP-1040	Tigard, OR	KSKD
KZUS-1230	Toledo, OR	KPPT
WZGO-1470	Portage, PA	WFJY
KPSO-1260	Falfurrias, TX	KLDS
KRGO-1550	W. Valley City, UT	KMRI
KKBY-1450	Puyallup, WA	KSUH

WEJM-950 changed briefly to WZDB before changing again to WIDB.

• Niel Wolfish of Toronto has identified the continuous time station on 1630 kHz reported by Sandra Piotrowski last month. It's in Detroit, and is part of a system of traffic information cameras.

• How's your AM antenna working this season? Are you hearing anything exotic by meteor scatter? Write me at Box 98, Brasstown NC 28902-0098, or by email at *72777.3143@compuserve.com.*

Glenn Hauser, P.O. Box 1684-MT, Enid, OK 73702
E-mail: <ghauser@hotmail.com>; fax: (580) 233-2948, ATT: Hauser

A Very Good Time For Shortwave

Japan carried out an extensive experiment in November with audio and video on Internet, and BBC finally starting streaming its programs, especially news.

But shortwave is still a vital, attractive medium for opposition stations and those in war-torn areas: witness Eritrea, with two new clandestines, Liberia with more intrusions into the aeronautical band.

Embarrassed by its own order to close down the Darwin site, preventing Radio Australia from reaching Asia as it had before, the Australian government also had to reject a request from Radio Free Asia, which would love to use the facility, and take China's side against RFA's "intrusion into internal affairs." But a lot more money is coming for RFA, which will find somewhere else to broadcast from, such as the Tinian site under construction. VOA's new high-power site in Sri Lanka began testing; will it be allowed to carry RFA? Some of the old Bethany, Ohio, transmitters may wind up in these places, while its historic site is turned over to golf course and commercial development.

With good engineering and a clear frequency, you don't need megawatts—Halifax makes it to us and to Europe with only 50 watts.

KGEI is making a comeback, under a new name, from a new country: Argentina. World Harvest Radio gets WVHA at a discount, and another new American missionary station is about to start up from Georgia.

And the sunspot count is climbing, for better and better reception.

ANGOLA From 2010 on new 6220, pop music and Portuguese talk, 2056 canned "VORGAN" intro to news, gave frequency as 6220, to return at 5:50 am on 9770 (Jay Novello, NC) ID for R. Nacional heard on 6220.2, during Portuguese program from 1950, quite strong at 2030, off promptly at 2100* (Carey et al., Mohawk Valley SWL Club DX Camp, NY) 6220 VORGAN seems to replace 7100 (Mahendra Vaghjee, Mauritius, *Cumbre DX*)

ARGENTINA R. Malargüe, 6160.7 is irregular; try Sat and Sun after 1100. R. Nacional Mendoza, 6180 has been inactive for the last three years and has no plans to come back (Horacio Cilmi, Argentina, *Cumbre DX*)

Rev. José Holowaty, whose radio ministry was pulled out from under him when FEBC decided to close down KGEI, is finally making a comeback on the same SW frequency KGEI used (gh) R. América Internacional heard testing in late Oct on 15280 at 2252-2335*; gave phone numbers in Bay Area and in Buenos Aires (José M. Rangel N., Colombia via Barrera) Holowaty told me they were planning 16 hours per day in Spanish, some English and Portuguese. Site is in General Pacheco area, 30 kW, since they were not successful in getting access to the old V. of Chile transmitters (Gabriel Iván Barrera, *BC-DX*)

ARMENIA V. of Armenia daily English on 9965 shifted to 2115-2145; had mailbag on a Sat (Brian Alexander, PA, and Ivan Grishin, Ont., *World of Radio*) Also Sunday only at 1000-1030 on 15270 (Hubert Gams, Austria, *BC-DX*)

AUSTRALIA RA's English toward Pacific, NAm, for W97 adjusted to: 2100-0600 17795, 2130-0200 13755, 2200-0900 15510, 0200-0800 15240, 0600-0830 11880, 0800-1400 9580, 1200-1800 6020, 1200-2130 9415, 1400-2130 5995, 1700-2130 11880 (RA website) See also GREECE

R. Free Asia wants to rent the dormant RA transmitters at Darwin. ABC and RA officials object that use by a "propaganda station" might contaminate RA's good name as a non-biased news provider into Asia (Dick Speekman, Australia, *BC-DX*) Turned down for technical and policy reasons (RA News webpage via Matt Francis, Mick Ogrizek, *Electronic DX Press*) China made it clear this would damage relations with Australia (BBCM)

BULGARIA R. Bulgaria has cancelled a number of transmissions and reduced power on the remaining ones. Two 500 kW at Plovdiv are operating at 300 kW; three 250 kW at 150 kW. Most or all transmissions from the Stolnik and Kostinbrod sites have ceased (*Panview*)

CAMBODIA Khmer Rouge radio announced name change to V. of the National United Army (*sathani vitthyu samleng kangtoap samakki cheat*) (BBCM) That's on 5407v around 1200 (gh)

CANADA CHNX, 6130, weak but in the clear around 1030 with carrier and USB, no LSB, besides "Oldies 96" running special SW ID twice within 10 minutes, still only 50 watts? (gh, OK) Yes, nothing but an exciter. The 500 watt transmitter which broke in March, is to be replaced by a 1 kW Harris. The station has this transmitter but there are no plans to put it on the air in near future: no budget for SW. But engineer Wayne Harvey is very committed to keeping SW on. Canadian Navy ships based in Halifax tune in the station while at sea (Hans Johnson, *Cumbre DX*)

RCI replaced *This Morning Tonight* with Canadian Forces program in English and French UT Tue-Sat 0300-0400 on 6155, 9755, 9780 (Bill Westenhaver, RCI)

CHILE Survey of SW stations as of Oct: R. Santa María, Coyhaique, 6029.6, 10 kW M-Sa 0900-0300, Sun 1000-0300; relays R. Chilena M-Sa 0900-1000, 1640-1800, 2200-2230, daily 0200-0230, Sun 1100-1130, 1600-1630. During soccer Sun only relays after 2000.

R. Patagonia Chilena, Coyhaique, 6080, 1 kW, M-Sa 0900v/0930v-0300, Sun 1000-0200. SW currently irregular due to serious economic problems. No more relays of R. Portales, but instead relays R. Zero, Santiago FM station direct from satellite.

R. Esperanza, Temuco, 6090, 10 kW, M-F 24h, except for a break currently at 2000-2030, but during summer will be 24h every day. Has English daily exc Sat 0630-0700; German Sun only at 1130-1200.

R. Triunfal Evangélica, Talagante, 5824.9v, 50 watts, daily 2100v-2400v exc Thu & Sun; heard with good signal *2131-2408* with gospel. Chile is on UT-3 from Oct 11 to Mar 14 (Gabriel Iván Barrera, visiting Chile, *BC-DX*)

COLOMBIA R. Patria Libre, irregular clandestine on 6248.2, heard on a Monday at 2210-2235 with *Rompiendo Cadenas* program (Rafael Rodríguez R., *World of Radio*)

COSTA RICA RFPI changed USB frequencies, first to 6970 and then 6980 at 0000-1200 with a new small curtain array; and resumed 21465-USB 1200-2400, only 3 kW, but excellent all day long here (gh, OK)

CR issued a 45 colones stamp in 1997 commemorating the 50th anniversary of R. Nederland. Shows a man watching a child playing with a radio on a windowsill (gh)

CUBA RHC replaced 13715-USB with 13605-USB at 2000-2200 to Eu, including English 2030-2130; unfortunately it's blown away by the super-splatter Marian monster WEWN on 13615 (gh, OK)

I'm 99.9% sure the bubble-jamming against RFPI 7385 comes from Cuba, due to matches in timing and sound of jammers on other frequencies such as 7315 (James Bean, ME) Same jamming even hit R. Australia 9580 after Greece left; jamming your enemies is one thing, but nonsensical indiscriminate jamming makes Cuba truly a menace to the short airwaves. What can be done? Lacking an address for the jammer, perhaps we should bombard RHC with complaints and/or boycott it (gh)

CZECH REPUBLIC R. Prague, Litomysl, 7345 in German at 0730-0800 put very strong spurs on 7291.1, 7398.9 (Wolfgang Büschel, Germany, *BC-DX*)

ECUADOR HCJB's two separate English frequencies 9365 and 9645 at 0700-0845+ produce mixing products on 9085, 9925, the latter interfering with Belgium (Brian Alexander, PA, *World of Radio*)

ERITREA [non] Steve Martin had an unID in Arabic on 9230 at 1510-1535, using the phrase *Sowt al Haq* which means Voice of Truth (Hans Johnson, *Cumbre DX*) Another day perhaps same station was on 9155.77 at same time (Steve Martin, CA, *Cumbre DX*)

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.

Two different stations use the same transmitter maybe in Sudan: V. of Free Eritrea (Arabic: *Sawt Eritrea al-Hurrah*; Tigrigna: *Demtsi Natsa Eritrea*) first observed in Nov, of the Eritrean National Alliance of three groups opposing the government, 1415-1445 daily on 9230. And V. of Truth (Arabic: *Sawt al Haqq*) supporting the Eritrean Islamic Jihad Movement, timing varies, daily 1500-1545 in Arabic on 9230, announced as 9300 (BBCM)

GREECE [non] V. of Greece began the W97 season clashing with Australia on 9580 at 1200-1350 via Greenville; after two weeks VOG moved to 9690. The USA relays at 1800 on 17705, 15485 now start with 15 mins of English news, the rest in Greek to 2200 (John Babbis, MD, *Review of International Broadcasting*) Direct to NAm also at 1200-1350 on 15630, 15175, 12105; 0000-0350 on 9425, 7450, 6260, 5895 (via Christos Rigas, IL) 9580 (and presumably still 9690) was 32° from Greenville; 15485 75° from Delano right across the USA; 17705 164° from Greenville (Babbis) Website: **http://www.greeknews.ariadne-t.gr/Docs/Era5_1.html** Technical reports to <skalai@leon.nrcps.ariadne-t.gr> and program content matters to <fonel@hol.gr> (VOG via Babbis)

HAWAI'I *DXing with Cumbre* on KWHR: Sat 0230 17510, Sat 1200 11565, Sun 0030 17510, Sun 1630 and 1830 7560 (*Cumbre DX*)

HONDURAS HRMI, 5890 has been off the air since July. Ran into unfixable problem with the transmitter, so have ordered a new sesquikW unit. Will return to air when it arrives in Dec. Still authorized for 5 kW (Wayne Downs, HRMI via Ulis Fleming, *Cumbre DX*)

INDONESIA VOI English at 2030 heard on new 11785 mixed with Iraq, announcing 9525 which was absent (Paul Ormandy, New Zealand, *The Four Winds*) And at 0100 on 9525 (Wolfgang Büschel, Germany) 0100 on 9525 and 11785 (Alok Das Gupta, India, *EDXP*)

INTERNATIONAL VACUUM *World of Radio* confirmed on C-SPAN Audio, Sat 1700 UT on Satcom F3, transponder 7, 5.2 MHz audio subcarrier relaying WRN // Galaxy 5, tr 6, 6.08 (Mickey Delmage, Alta., *Review of International Broadcasting*) So maybe then on some FM cable or SAP systems too (gh)

R. New Zealand International joined WRN in mid-Nov with a weekly program to Eu Sat 1500, NAm Sat 1800, Africa/Asia Sun 0500 which includes *Dateline Pacific* (RNZI website)

INTERNATIONAL WATERS [non] Objecting to remarks in our Nov column, Scott Becker and Allan Weiner contacted us in mid-Nov. The *Electra* is a sea-going tug and was ready to make the two-week 6-8 knot voyage to a still secret Caribbean island as soon as a new pilot was aboard. One 10 kW SW transmitter would be used, with another transmitter on board as backup. Yesterday USA network was no longer expected to be carried. Weiner was finished with his work on this and did not expect to be aboard the ship or do any programming himself. Becker was to run the operation from within territorial waters of the host country, and said it was fully funded (gh)

IRAN [non] Democratic Voice of Iran is now on 6210, 5835 at 1830-1900 (*World of Radio*) Letter in English verified previous 5900, via fax (+44) 1541 525051, signed by Shahrlar Azari (Björn Fransson, *Distance* via *Play-DX* via *The Four Winds*)

V. of the Mojahed at 0254 bounced back and forth among 5620, 5660, 5670 to avoid roving jammer, rarely spending more than a few minutes on any frequency, and jammers were also sitting on 5630, 5640; two other jammers alternated among 5620, 5660, 5670, 5680. Through the bubbles could hear spelling addresses and phone numbers in English (Jay Novello, NC, *World of Radio*)

VOIRI English as updated by monitoring in Nov: 0030-0125 on 6050, 9022, 9685; 1100-1230 on 15260, 11875, 11830, 9585; 1530-1630 on 7215, 11790, 13605; 1930-2030 on 9022, 7260, 7160; 2130-2225 on 6175, 6165 (Wolfgang Büschel, *BC-DX*)

IRAQ [non] Some clandestine addresses discovered by accident on the Internet: V. of Iraqi People, V. of Free Iraq, Republic of Iraq Radio at The National Accord / Iraqi National Congress, 9 Pall Mall Deposit, 124-128 Barlby Road, London W10 6BL. V. of Rebellious Iraq at Shii Supreme Council of the Islamic Revolution of Iraq (SCIRI), 27a Old Gloucester St., London WV1N 3XX, UK (Nick Grace, *Cumbre DX*)

JAPAN One less English broadcast for us from NHK Warudo, R. Japan: the RCI relay on 5960 at 0300 this winter is in Japanese; English only at 0500 on 6110, 1200 on 6120 (gh)

KOREA SOUTH After months of promotion and listener input, RKI *Shortwave Feedback* renamed *Multiwave Feedback*—except they pronounce it like "Martiwave" so maybe not such a good choice! (gh)

KURDISTAN V. of Iraqi Kurdistan, on behalf of the KDP from Salah al-Din in Kurdish and Arabic: 0345-0600, 1645-1930 on 4060v, one hour earlier in summer. V. of the People of Kurdistan, previously based in Galalah and Sulaymaniyah, in Kurdish and Arabic 1400-1700 on 6030v, 4100v, repeated at 0400-0700 on 4100v, and at 1030-1330 on 6030v (BBCM)

LATVIA R. Latvia's English on 5935 is M-F 2130-2135, Sat 2000-2030; one hour earlier in summer. Audio available at **http://www.radio.org.lv**(BBCM) Sky Radio, England, experimented with a relay on 5935 in late Oct, presumably from Latvia (gh)

LIBERIA Star Radio info from the Fondation Hirondelle website, **http://www.hirondelle.org/newsf10.stm**—0500-0800 on 3400, 1700-2000 on 5880, in Bassa, Dan, English, French, Gbande, Gola, Grebo, Liberian English, Lorma, Kissi, Kpelle, Krahn, Kru, Mandingo, Mano, Mende and Vai. Says Star Radio is staffed by Liberian journalists and managed by the Swiss NGO Fondation Hirondelle with financing from the US Agency for International Development through the International Foundation for Election Systems. Site carries transcription of daily news items in its 0630 and 0730 English bulletins (BBCM)

R. Veritas Liberia, new Catholic station on 3450 in mid-Nov, 2045-2402* (Jay Novello *et al.*, NC) Also after 0600 in English (Martin Elbe, Germany, *BC-DX*) Between 0500 and 2200*, claims to be on 5470, in WRTH[ital] as ELCM (Finn Krone, Denmark, *DSWCI DX Window*)

MÉXICO XEOI, R. Mil on 6010 is studying the possibility of separating SW programming from MW simulcast. It is very important for listeners to send reception reports and opinions on its programming, asking for some in English. There could be DX and mailbag shows. Reports should cover at least 20 minutes of details, SINPO rating, receiver and antenna, etc. If possible, several receptions at different times of day. Reports will get a QSL and station souvenirs. The Encuentro DX group is undertaking the study [who previously did the DX and mailbag shows on XERMX]. Send to Apartado Postal 21-1000, 04021 México, DF (via Héctor García B., *World of Radio*) E-mail address is <inform@nrm.com.mx> (Tom Messer, WI, *Cumbre DX*)

XEYU, R. UNAM, still turns on its 9600 transmitter every day but is unheard, and the signal seems to be going to ground instead of antenna, Julian Santiago and Alejandro Morales found out upon visiting the site (Héctor García B., *Cumbre DX*)

Universidad de Colima may apply for a SW frequency, easier to get than MW (Álvaro, XERMX *Estación DX*)

MONACO TWR English at 0745 to UK moved from 9755 to 9870 due to conflict with Finland, also on 9685 Albania (Mike Barraclough, England, *World of Radio*)

MOLDOVA R. Moldova International, W97 English: WEu 2200-2225, 2300-2325 on 7520; NAm 0330-0355, 0430-0355 on 7500 (RMI)

MONGOLIA VOM finally making it to ENAm, 12085 audible from 1000 past 1300 in Oct including English at 1200-1230 (John H. Cobb, GA, *World of Radio*)

MOZAMBIQUE R. Maputo, 11835 English heard 1110-1125 (Mark Fine, VA, *Cumbre DX*)

NIGERIA [non] V. of Free Nigeria, studios in Indianapolis, transmitter believed in Algeria, changed from 11680 to 11715, Sat 1900-2000 (BBCM) Strong here, anti-government talk, Afro pops, website given (Brian Alexander, PA, *World of Radio*) Moved to avoid N. Korean interference (Hans Johnson, *Cumbre DX*) No trace of it here in mid-Nov on either freq (gh, OK)

R. New Nigeria sked in Nov: Sat 0600-0629 WAf 11670, Sun 0100-0129 NAm 5905, 1500-1529 CEu 6175 (NAGDHR) 5905 via Germany, and presumably also the others. At least for "special" program 0100 expanded to most of the hour (gh)

PAKISTAN R. Pakistan English monitored in Nov includes: 1105-1120 on 15550, 17835; 1600-1630 on 9650, 11570, 15375v, 15570, 17720 (Noël Green, UK, *BC-DX*)

PAPUA NEW GUINEA An aggrieved former employee of NBC won a judgement against NBC, which threatened to force it to auction its assets, but the government rescued NBC financially (*PNG Post-Courier and The National* via BBCM)

R. East New Britain (Maus Bilong Tavurvur) is getting a new studio costing more than 8 megakina, thanks to Japanese aid (PNG *Post Courier* via BBCM) Much stronger signal on 3385 (John Kecskes, Australia, *Cumbre DX*)

PERÚ UnID on 7205.8 at 2307-2400+ with lots of mensajes, stingers on harp, UT-5 time checks, errant Peruvian? (Bob Hill, MA, DSWCI *DX Window*) New station on 7205.6v is R. Paraton, heard before and after 1100; name doesn't make sense and location not determined, perhaps in the north near Ecuador (Rafael

Rodríguez, Colombia, *World of Radio*) It's in Huarmaca, 7205.66, *1026-1045 (Dave Valko, PA, *Cumbre DX*) Also at *1030 and 0000 (Hans Johnson, TX, *ibid.*)

New station on 6815.8 sounds like La Voz de la Colina, from Huancabamba province at 0159-0237* with folk music, announced as 6800 kHz; not to be confused with 6811.3, Ondas del Rio Mayo, heard a few minutes earlier (Gabriel Iván Barrera, Chile, *The Four Winds*)

R. Atlántida, 4790, sent very friendly personal letter, Tourist Trail booklet, map of Iquitos, list of local fiestas, pennant. *Trocha Turística* is daily at 2300 and Jan 28 will be program's 25th anniversary (B. Gornati, Italy, *Play DX* via *The Four Winds*)

R. La Voz de San Antonio, Bambamarca, verified after several years for 6627 with info about the left-wing station, "totally peasant," affiliated with Coordinadora Nacional de Radio, now showing frequency as 5645 (Henry Lazarus, LA, DSWCI *DX Window*)

R. Soledad, Parcoy on new 4717 ex-4528 around 1050, 0215. R. San Juan, Aramango near Bagua, listed on 4420, now heard on 4910.4 around 1030, 0215-0304 with lots of dead air; apparently bought the transmitter of Super R. San Ignacio formerly on 4910.4. R. Perú, San Ignacio, 5637 around 1130 now IDs only as Estudio 97. R. Ilucán on new 5629.8 at 2200-0200+, 1130, great folk music. R. San Ignacio, 7040.4 heard until 2300* (Don Moore, Cuenca, Ecuador, HCJB *DX Partyline*)

R. San Juan on 4190.4 at 1040, next day *1020, not sure of ID; this was the inactive frequency of R. Selva Superior (Hans Johnson, TX, *Cumbre DX*) Presumably either 4190.4 or 4910.4 not both

PHILIPPINES R. Pilipinas W97 via VOA Poro and Tinang sites: 0230-0330 in Pilipino and English on 11805T, 15120T, 15270T; 0330-0400 Pilipino and English on 13770P, 15330P, 17730P; 1730-1930 in English on 11730T, 11890T, 15190T (Usenet via *BC-DX*)

ROMANIA RRI English of 56 mins includes, mostly to WEu/NAm: 1300 on 15250, 15390, 17735, 17745; 1700 on 7195, 9690, 11940; 2100 on 5955, 5990, 6175, 7195; 2300 on 5955, 7195, 9570, 11830; 0200 on 6155, 7195, 9510, 9570, 9690, 11940; 0400 on 5990, 6155, 11740, 11940, 15335; 0600 on 5965, 6155 (*BC-DX*)

RUSSIA Between 0400 and 1000, the only language used by V. of Russia is English (BBCM) Zena Levashova, the VOR announcer with the "veddy proper" British accent, retired recently (Ol'ga Troshina, VOR via Maryanne Kehoe, *Cumbre DX*)

Special News for Polar Regions, W97: 1615-1645 on 6025 Novosibirsk 335°, 7255 Samara 140°, both 100 kW (Nikolai Rudnev, Russia, *BC-DX*)

SERBIA R. Yugoslavia W97 English to us: 0100 6195, 7115; 0200 6180, 7130 (Sanchovich, TX, *World of Radio*)

SINGAPORE SBC made major changes for W97: Home Service: English 2300-2400 on 6160, 0000-1100, 1400-1600 on 6155. Chinese 2300-1100, 1400-1600 on 6000; Malay 2300-2400 on 7260, 0000-1100, 1400-1600 on 7245. Tamil 2300-1600 on 7170. External Service RSI all at 1100-1400: English 6015, 6155; Chinese 6000, 6120; Malay 6070, 7245 (via Bob Padula, *EDXP*)

SOMALIA R. Hargeisa, the Voice of the Republic of Somaliland (Somali: *Halkani wa Radio Hargeisa, Codka Jamhuriyada Somaliland*), observed in Oct and Nov on 7061-7071v at 1500-1800 and at 0330-0400+ (BBCM) Formerly on 7537v (Hans Johnson, *Cumbre DX*) 7071-USB, presumed, 1715-1800* Somali songs and talk, poor (Mahendra Vaghjee, Mauritius, DSWCI *DX Window*)

V. of the Masses of the Somali Republic, 6890 at 2000 with external service in English as R. Mogadishu, news and songs to 2030 then in Somali, weak to fair and distorted (Mahendra Vaghjee, Mauritius, *Cumbre DX*)

SOUTH AFRICA One change to the Channel Africa schedule in Dec *MT* page 48: at 1300-1455 Sat & Sun 17870 not 15330 (Kathy Otto, SENTECH)

SOUTH AMERICA R. Cochiguaz, pirate with 100-watt LSB on 7570, carried out several broadcasts with its own program and those of R. Blandengue and Jolly Roger Radio International, Ireland. They were widely reported in SAm, but little if any reception in NAm. E-mail contact perhaps will bring notice of future broadcasts: <rc@srs.pp.se> and <radio.blandengue@usa.net> (gh)

SRI LANKA VOA's new Iranawila site began testing numerous frequencies from 6 to 21 MHz in late October; eventually will have at least 4 x 500 kW; unknown yet if it could be used for R. Liberty or R. Free Asia (VOA *Communications World*)

[non] IBC Tamil Radio from London tried 7400, then 7475 in Nov via Georgia at 0100-0200 (Jeff Cohen, WRN)

SWEDEN Contrary to info last month, R. Sweden still has two morning broadcasts to us, 1230 and 1430 on 11650, 15240 (gh)

SWITZERLAND SRI for W97 expanded English to a full hour at 0400 on all three frequencies, 9905, 9885, 6135; and also an hour at 1100 to FE on 9885, 12075, 13635; SEAs at 1300 now via Beijing relay only on 7230, 7480; 1400 C&SAs on 9885, 12075, 13635; but there's also a 15-minute English at 1600 on same frequencies. *Capital Letters*, 2nd and 4th Sats, announced contract with Interflora has expired, so no more flowers to lucky listeners each month. The SRI program guide is also a supermarket, with 21 Swiss items sold by mailorder, priced from 5 to 150 SFr (gh)

TAIWAN New Star Broadcasting, the Chinese numbers station added a fifth frequency, 13750, Channel 5, in the 2300-0900 period; also uses 11430, 15388, 9725, 8300, designated Ch 1 through 4 (Hans van den Boogert, Taiwan, *hc-dx*)

TURKEY TRT W97 sked shows USB usage: 1830-1930 German 6035; 1930-2030 English 6175; 2030-2130 French 7150 all from Emirler site (TRT) English to us no good: at 2300 9655 often blocked by fados from Portugal; at 0400 7300 weak and jammed (Gigi Lytle, TX)

UKRAINE RUI W97 English hours: 0100 on 7150; 0400 on 5985, 6020, 7150, 7205; 1200 on 7285, 17725; 2200 on 6085 (J. Sajuk, Germany via Wolfgang Büschel)

USA The FCC frequency schedule of US SW stations for W97 can be found at: **http://www.gov/ib/pnd/neg/hf_web/hfff4w97.txt** and for Z98 tentative, change last part to **2z98.txt** (Jim Moats, *Review of International Broadcasting*)

WWBS, Macon GA, is shooting for a target date of Feb 1 on 11910. Antenna was to be mounted on tower in mid-Nov. Target area Canada, per Joanne Josey (Hans Johnson, *Cumbre DX*)

WVHA, Maine, was purchased by LeSEA for only $1.5 million, planned to be back on air by Xmas (George Thurman, *World of Radio*) Calls to be WHRA, beaming to Africa at half power 250 kW (Joe Brashier, WHRI) Despite Prophecy Countdown's Pastor Osborne's concerns, LeSEA certainly paid a "fire sale" price for WVHA. LeSEA is paying less than 20% of the amount that the C.S. Church paid to build the station, $8 million (Jim Moats, OH)

WORLD OF RADIO on WWCR changed to: Thu 2130 9475, Sat 0700 3210 and 5070, Sat 1230 5070, Sun 0730 5070, Mon 0400 3215, Tue 1330 15685 (gh)

WMLK, 9465, is still heard, but always weak, and never on Saturday, such as at 0433 after AWR closed, also at 0645, 0905 checks and at *1700 with teachings of Yahweh, scripture readings (Brian Alexander, PA, *World of Radio*) Also heard just after 0400 (Jim Moats, OH)

The single KVOH transmitter has two modulators; heard testing on two frequencies at once, 17775 and 9975 in Spanish around 2145 (George Thurman, TX and gh)

For advance topics of VOA's *Talk to America* M-F at 1706 on 15120 and many others check **http://www.voa.gov/talk** (Sven Ohlsson, Sweden, *R.I.B.*)

VOA's Mandarin Chinese service, which is jammed, has started a free news service by E-mail direct to people in China. More and more are signing up. The number of PCs in China is growing rapidly compared to SW radios (Jay Henderson, VOA *Communications World*)

The deactivated VOA Bethany, OH, site is likely headed to the scrap heap. Part of the 600-acre property should be sold for business development and the rest used for a high-tech learning center, public golf course and recreational facilities, according to a preliminary report released by the GSA. The property is valued at $600 million but much of it is customarily given away to local governments (Kevin O'Hanlon, AP via David Alpert, Jim Moats)

R. Free Asia got approval from House for $50 million budget increase allowing 24h in Mandarin, Cantonese, Tibetan and others. (AFP via Valter Aguiar, *radio-escutas*) Senate and president expected to approve (VOA *Communications World*) See also AUSTRALIA

Rock-It Radio, which used to be on WRMI, now broadcasts live RealAudio via the web: **http://www.palmsradio.com** (Bennie Dingo, *hard-core dx*)

In quiet rural location I hear harmonics such as WANO, Pineville KY, 2460 = 2 x 1230, as late as 1500 as "The New Way-no"; and WWZQ, Aberdeen, MS, on 2480 = 2 x 1240, 1105-1300 as "Golden Oldies Station 105.3" (Ron Trotto, IL)

WHAM, Rochester NY, on 2360 = 2 x 1180 at 1111, Newsradio 1180 WHAM ID (Mark Mohrmann, VT, *Cumbre DX*)

[non] Brother Stair's 12 frequency-hours of relays via Deutsche Telekom started Nov 1 on a somewhat different schedule than given last month; after a couple of weeks became parallel with WRNO, WWCR as satellite feed put in place (Jim Moats, OH) B.S. gave sked as 0000-0200 on 5840, 0200-0400 on 5880, 7335 [swamping CHU, which keeps getting blasted by ignorant European frequency managers], 0600-0800 on 9500, 1600-1800 on 6175, 1700-1900 on 11650. Says he has option to run 24h on "Radio Jewlick" (gh)

UZBEKISTAN R. Tashkent English monitored and/or announced: 0100-0130 on 5040, 5955, 5975, 7205, 9540; 1200-1230 and 1330-1400 on 5060, 5975, 6025, 9715; 2130-2200 and 2230-2300 on 7105, 9540 (Wolfgang Büschel, Germany, *BC-DX*) 7105 fairly decent at 2130 (Tom Sundstrom, NJ)

VIETNAM V. of Vietnam domestic service has four channels: 1—2200-1600 (Fri - 1700) news, current affairs, music, on 5925 and 10060 for N & C mountain regions. 2— at 2200-1600, economic, cultural, social, literature, art, educational, on 5960, 12035 for N & C mountains. 3— ethnic minority programs in H'Mong, Khmer, Ede, Giarai, Bana. Only H'Mong is on SW, 2200-2230 on 5035, and on 6165 at 0500-0530, 1200-1230, 1300-1345. 4— news and music on FM 24h (VOV website via Kubiak, WWDXC via NASWA)

[non] V. of Vietnam at 0300 Spanish, 0330 English on new 5905 ex-7260 which was Russia (Ivan Grishin, Ont., *Review of International Broadcasting*) via Krasnodar, 500 kW, 290° (Nikolai Rudnev, Russia, *BC-DX*)

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

Broadcast Loggings

GLOBAL FORUM

Gayle Van Horn

0044 UTC on 15290
PHILIPPINES: VOA relay. ID and news bulletin, followed by *VOA Business Report* at 0010, with stock market news. Fair to poor signal. (Jim Moats, Ravenna, OH)

0044 UTC on 5522
PERU: Radio Sudamérica. Great Peruvian music to announcements to pop/easy listening tunes. ID format at 0100. Peru's **Radio Ilucan** audible on 5629.8, 0107-0132, frequent time checks. (Mark Veldhuis, Borne, Netherlands/*Hard Core DX*)

0133 UTC on 6055
SPAIN: Radio Exterior España. World news on Kenya to press review. Item on Spanish rock star in a musical. (Howard J. Moser, Lincolnshire, IL) VOA relay noted on 11805 1700-1710, // 15215 faded by 1710. (Lee Silvi, Mentor, OH)

0135 UTC on 7290
SWEDEN: Radio Sweden. Discussion on the Social Democratic Party conference in northern Sweden. (Moser, IL) News to *Sixty Degrees* program on 11650 at 1231. (Sue Wilden, Columbus, IN)

0159 UTC on 7285
GERMANY: Deutsche Welle. Interval signal to ID and newscast. *News Link* program, // 6035. Fair signal quality with co-channel interference from Radio Sweden. (Moats, OH)

0200 UTC 4890
PERU: Radio Chota. Pop music to Spanish comments from host. Peruvian huaynos music to clear "Radio Chota" ID at 0209. Poor signal quality. (Charles Bolland, Lake Worth, FL/*Cumbre DX*)

0230 UTC on 9570
PORTUGAL: Radio Portugal. Excellent Portuguese music to text, with good signal. Noted also on 9570 at 0345. (Moser, IL)

0234 UTC on 7160
ALBANIA: Radio Tirana. National news to item on the fate of Albanian immigrants in Italy. Very good signal. (Moser, IL)

0305 UTC on 7300
VATICAN CITY: Vatican Radio. Discussion on Antarctica and upcoming program promo for *Popes of the 20th Century*. (Wilden, IN)

0310 UTC on 4980
VENEZUELA: Ecos del Torbes. Spanish programming of regional news and pop vocals. (Wilden, IN)

0405 UTC on 7585
COSTA RICA: RFPI. Rap music to *Our Green Earth* program to RFPI promotional. (Wilden, IN; Tom Banks, Dallas, TX)

0525 UTC on 13650
NORTH KOREA: Radio Pyongyang. Korean. Nationalistic music to 0530, station ID to French newscast and French martial music. (Jerry Witham, Keaau, HI) Heard on 11700 at 2300, // 11335 with program features. (Bob Fraser, Cohasset, MA)

0620 UTC on 7295
DENMARK: Radio Denmark Int'l. Danish. Female announcer hosting two interviews, closing with English ID at 0630. (Amber Hill, Anchorage, AK, via Keaau, HI)

0640 UTC on 7320
UKRAINE: Radio Ukraine Int'l. Ukrainian. Performance of Beethoven's symphony # 3, performed by New York Philharmonic. (Hill, HI) Audible on 7150 at 0335. (Moser, IL)

0705 UTC on 9795
NEW ZEALAND: Radio New Zealand. Sports news to 0710 ID, *Dateline Pacific* show with news of the Pacific region (Hill, HI)

0720 UTC on 11840
JAPAN: Radio Japan. Court music of Cambodia with music descriptions from announcer. Afghanistani folk music with a vocal and instrumental ensemble. Entertaining! (Witham, HI) Japan's **Radio Tampa** on 3925 at 2130. (Mahendra Vaghjee, Rose Hill, Mauritius/*Hard Core DX*)

1040 UTC on 4765
BRAZIL: Radio Rural. Portuguese chatter from DJ to ID. Regional music audible to 1100. (Tom Messer, River Falls, WI/*Hard Core DX*) Brazil's **Radio Record** heard on 9505 at 2127. **Radio Bandeirantes** on 9645 // 11925 at 2303. (Alessandro Bertoglio, Torino, Italy/*Gatflash!*)

1143 UTC on 3264.66
INDONESIA: RRI-Bengkulu. Indonesian. Conversation from male/female duo to 1146. Music // with **RRI-Ujung Pandang** on 4753.21. Signal fair to poor. Indo's **RRI-Ternate** (Maluku) noted on 3344.88 at 1148-1200; tentative ID for Indo's **RRI-Kupang** on 3385 at 1217, fair signal quality. (Bolland, FL)

1200 UTC on 6950
CHINA: China Radio Int'l. English broadcast with very clear signal. CRI noted as; 2200-2226 on 6950; 2225-2256 on 6933. (Silvi, OH)

1223 UTC on 15155
FRANCE: Radio France Int'l. *Asia File* program in progress at tune-in with reports on Sri Lanka conflict and Israeli Peace Center, // 13625, 15195, 15540, 17575. (Moats, OH) French service 0040 on 7120. *Arts in France* feature on 13620 at 1245. (Wilden, IN)

1229 UTC on 17705
UNITED KINGDOM: BBC World Service. Promo for *BBC On Air* publication into report on Hong Kong stock market, // 17640, 15565, 15220, 9515. (Moats, OH)

1225 UTC on 15290
BULGARIA: Radio Bulgaria. Lady hostess to station ID, English commentary and music. (Bolland, FL) Report on parliament proceedings on 9700 at 1925. (Fraser, MA)

1342 UTC on 15009.76
VIETNAM: Voice of French service from lady announcer. Regional music, // 98340. (Veldhuis, NLD) Audible on 15009.7 in English. News to commentary at 2338, 2357*. (Mark Fine, Remington, VA) National news on 7250 at 0122. (Moser, IL)

1400 UTC on 11570
PAKISTAN: Radio Pakistan. English news from duo. Station IDs at 1404 and 1409. Regional language at 1415, signal weak but clear. (Harold Sellers, Ontario, Canada; Zacharias Liangas, Thessaloniki, Greece/*Hard Core DX*)

1455 UTC on 7295
MALAYSIA: RTM. Radio 4 jingle to ID. QRM from RAI-Rome's interval signal on 7290 at 1500. (Veldhuis, NLD)

1600 UTC on 15395
UNITED ARAB EMIRATES: UAE Dubai. English program then to Arabic, 15395 co-channel to very audible VOA Sri Lanka in English, fading badly at 1641+. (Silvi, OH; Frank Hillton, Charleston, SC)

1650 UTC on 9515
SOUTH KOREA: Radio Korea Int'l. Story about a Japanese chrysanthemum grower, his problems with high prices and low profits. (Witham, HI) Audible 0000-0100 in Korean, into Spanish at 0100 to English at 0200. (Silvi, OH)

1650 UTC on 5985
CONGO: Radio Congolaise de la Liberte. French news to ID at 1700 as, "Radio Democratic Congolaise," lengthy speeches to additional ID as, "Radio Congo." Good signal quality for french news bulletin. Vaghjee, MAU)

1716 UTC on 4976
UGANDA: Radio Uganda. English text to, "this news broadcast comes to you from Radio Uganda in Kampala" to musical interlude. (Veldhuis, NLD)

1752 UTC on 3330
ZAMBIA: Christian Voice. Easy-listening music to English program *God and Lifestyle* to station ID, address and frequencies. (Veldhuis, NLD)

1753 UTC on 13780
INDIA: All India Radio. Regional sitar music to 1800 ID and English news. Signal strong and good alternative to // 11620, QRM from Deutsche Welle's German service. (Fine, VA) **AIR via Calcutta** on 4820 at 1750. (Giampiero Bernardini, Chieti, Italy/*Gatflash!*)

1754 UTC on 6055
RWANDA: Radio Rwanda. Vernacular text of presumed newscast. Good reception to 1757, when Radio Slovakia came on the air. SINPO=44444. (Veldhuis, NLD)

1850 UTC on 13695
TURKEY: Voice of Turkey. Program on architectural characteristics of older houses in Turkey. (Witham, HI) Report on ancient Lydians at 2220 on 9655. (Fraser, MA)

1900 UTC on 5020
SOLOMON ISLANDS: SIBC. Station sign-on with drums/pipes signal. National anthem to garbled ID. Weak signal faded out by 1920. No signals noted from Niger. (Fabrizio Magrone, Italy; David Diamond, Australia/*Hard Core DX*)

1959 UTC on 7465
ISRAEL: Kol Israel. Time pips to ID into *Israel News Magazine* program, with stock market reports and 1998 budget plans, // 9435. fair signal quality. (Moats, IL; Fraser, MA)

2012 UTC on 7475
TUNISIA: RDTV Tunisienne. Regional music to 10 minutes of Arabic news on the hour. (Lee Silvi, Mentor, OH)

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

QSLing the X-Band

Driving in your car on a dreary night, you casually tune through your AM dial. The scan button picks up the loudest stations that enter your radio. Suddenly, your radio performs an abnormal function. It enters, the "X-Band."

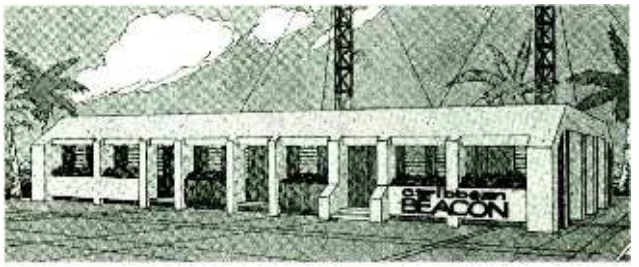
You hear stations giving travelers' information, weather forecast, and airport schedules, all of which repeat at regular intervals. Nearly hypnotized, you continue your search. You encounter children's music, a spanish language radio station, and several freelance radio stations who seem to not be from this world.

Yes, the X-Band can be a scary place.

Known as the expanded AM band or the X-Band, stations in this part of the mediumwave spectrum operate from 1610-1710 kHz.

Each station is allowed to run 10,000 watts during the day and 1,000 watts at night, using an omnidirectional antenna, and now there are three expanded band broadcast stations on the air.

Broadcasting from California, and heard by listeners worldwide, KXBT-AM can be found on 1640 and on parallel 1190. Address? 3267 Sonoma Blvd, Vallejo, CA 94590.



The author's Caribbean Beacon QSL from Anguilla.

Need to add New Jersey to your totals? Try WJDM-AM on 1660 and 1530. Reports go to: 9 Caldwell Place, Elizabeth, NJ 07201

The newest station to the X-Band is WCMQ-AM 1700 and 1210 in Florida. The station is licensed for Miami Springs, Florida; however, send your AM report to 1001 Ponce de Leon Blvd., Coral Gables, FL 33134.

Enclose two U.S. mint stamps or one IRC for foreign addresses, and don't forget to share your X Band QSLs with *MT*!

ANGUILLA

Caribbean Beacon, 6090 kHz. Full data verification on station letterhead signed by B. Monsell Hazell-C.E.O. Dr. Scott's frequency schedule enclosed. Station address: P.O. Box 690, Anguilla, West Indies. (Randy Stewart, Springfield, MO; Gayle Van Horn, Brasstown, NC)

Caribbean Beacon, 1610-AM. Full data color studio picture card unsigned. Received in 30 days for an English AM report. Card noted they are using a Nautel transmitter with a 350 foot omnidirectional antenna. Station address: same as above. (Frank Hillton, Charleston, SC)

BAHRAIN

A9M, Bahrain Telecommunications Co., 8448 kHz. Full data logo QSL card signed by Homan A. Nezam-Maritime Operating Centre. Received in 29 days for an English utility report and one U.S. dollar. Station address: P.O. Box 14, Manama, Bahrain. (Stewart, MO)

CANADA

Radio Canada Int'l, 6040 kHz. Full data QSL card unsigned with stickers and schedule enclosed. Received in six months for an English report. Station address: P.O. Box 6000, Montreal, H3C 3A8 Canada. (Jose Moura, Washington, DC)

COLOMBIA

Caracol Bogotá, 5075 kHz. Partial data logo/globe card unsigned. Received in 45 days for a Spanish report, mint stamps and a souvenir postcard. Station address: Apartado Aereo 9291, Santafé de Bogotá, D.C., Colombia. (Hillton, SC)

FM

CJAM-FM 91.5. Full data prepared QSL card and personal letter from Dave Fazekas-Transmitter Maintenance Engineer, plus station sticker. Letter says I was the first QSL request since they increased their power. Received for an English FM report and mint stamps. Station address: 401 Sunset Ave., Windsor, Ontario N9B 3P4, Canada. <email: **cjam@windsor.ca**> (Robert Ross-VA3SW, London, Ont Canada/*AMFMTVDX*)

WHUG-FM 101.9. Full data prepared QSL card signed by Burton Waterman-Chief Engineer, plus personal letter, business card and coverage map. Received in three weeks for an English FM report and mint stamps. Station address: 4 Way Radio, Box 1199, Jamestown, NY 14701. (Ross-CAN)

WKNB-FM 104.3. Personal letter, station sticker and amateur operator QSL card from W.R. Bud Boyd W3PHC-Chief Engineer. Received in 14 days for an English FM report and mint stamps. Power reported to be 4700 watts and they have been on the air since 1995, they own two other stations, and Bud says he has worked for them for 50 years! Station address: 625 East Street, Warren, PA 16365. (Ross, CAN)

WVKS-FM 92.5. Full data prepared QSL card signed with illegible signature as General Manager/VP. Received in one month for an English FM report and mint stamps. Station address: Jacor Broadcasting, 125 S. Superior St., Toledo, OH 43602. (Ross, CAN)

LITHUANIA

Radio Vilnius 9855 kHz. Full data QSL card unsigned plus small schedule card. Received in 41 days for an English report, souvenir postcards and one IRC. Station address: c/o English Service, Konarskio 49, LT-2674 Vilnius, Lithuania. (Rich Barnes, Springfield, IL)

MONGOLIA

Voice of Mongolia, 12085 kHz. Full data QSL card, info sheets, schedule and personal letter from David O'Connor. Received in 35 days for a taped report and one U.S. dollar. Station address: CPO Box 365, Ulaanbaatar 13, Mongolia. (Stewart, MO)

MOROCCO

Medi Un, 9575 kHz. Full data station logo card with illegible signature and station sticker enclosed. Received in six months for a French report. Station address: Boite Postal 2055, Tangier, Morocco. (Mahendra Vaghjee, Rose Hill, Mauritius)

SAUDI ARABIA

BSKSA, 11870 kHz. Full data station logo card signed by Sulaiman Samnan-Director of Frequency Management. Received via registered mail in 105 days for an English report on BSKSA report form. Station address: P.O. Box 61718, Riyadh 11575, Kingdom of Saudi Arabia. (Stewart, MO)

SHIP TRAFFIC

Great Lakes-WI7731, 156.65 MHz (Small Coastal Tanker) Full data verification letter and prepared QSL card signed by the First Mate, plus photo of vessel. Received for an English utility report and mint stamps. Ship address: Island Park Tanker Corp., 3245 Richmond Terrace, Staten Island, NY 10303. (Hank Holbrook, Dunkirk, MD)

Miss Freedom-WYF7443, 156.7 MHz. (Ferry Boat) Handwritten letter signed by Capt. Sal T. Sciabarra, plus an 8x10 black & white photo of the vessel. Received for an English utility report and mint stamps. Ship address: Circle Line-Statue of Liberty Ferry, Inc., 17 Battery Place, New York, NY 10004-1101. (Holbrook, MD)

UZBEKISTAN

Radio Tashkent, 5975 kHz. Partial data unsigned color card. Received in 93 days for an English "period report," souvenir postcard, one U.S. dollar, and one IRC sent to London bureau. Station address: 72 Wigmore St., London W1 8 9L, United Kingdom. (Stokes Schwartz, Madison, WI)

How to Use the Shortwave Guide

1: Convert your time to UTC.

Eastern and Pacific Times are already converted to 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: Featured this month is BBC (AF) stream, Austria, Belgium, Canada, WWCR #1 and #3, and West Coast Radio Ireland. Also included are special feature programs scheduled for January by Radio Netherlands and the BBC. See the 1615 Sat listing for a new BBC series about ancient civilizations.

Canada: The CBC now has a web site for the people of far north Canada. CBC North **<www.cbcnorth.cbc.ca/>** offers pages for radio and television and provides high quality live audio in the RealAudio format (16 kbps). You can listen to separate audio links for CBC Yukon from Whitehorse, CBC Mackenzie from Yellowknife in Northwest Territories, and CBC Eastern Arctic from Iqaluit, Baffin Island. CBC Yukon is all-English, CBC Whitehorse broadcasts in five languages serving the Western Arctic, and CBC Eastern Arctic serves listeners in English and native languages in the new Nunavut Territory and Arctic Quebec.

These are not full-time operations, so you might want to view the web site for broadcast times. The website also offers interesting links to resources in the north. Be sure to check out the link to the Arctic Winter Games 1998 to be held in Yellowknife March 15-27.

Whitehorse: During the Klondike Gold rush of 1898, gold miners thought the rapids at Miles Canyon looked like the manes of charging white horses. The name stuck and Whitehorse is now the capital of the Yukon. Read all the facts at **<www.city.whitehorse.yk.ca/facts.htm>** while listening to their station via RealAudio.

Yellowknife: So how did "The Gateway to the Arctic" get its name, you ask? Well, the city was a mining town in its early days and dynamite suppliers used a copper knife to open powder cases because a steel knife could cause a spark. Read all about it at **<www.city.yellowknife.nt.ca/welcome_frame.html>**.

Nunavut: This new Canadian Territory will be officially established on April 1, 1999, and spans an area larger than Texas. Its closest neighbor is Greenland. Tour Iqaluit on Baffin Island by visiting **<www.nunanet.com/touriqal.html>** (while listening to their station, of course). Why do you suppose that Nunavut has more children per capita than just about any other region in Canada?

Waveguide Software: Last month we announced the availability of WaveGuide Electronic Edition, a monthly E-mail mailing list of shortwave broadcasts and DX/Media programs (send E-mail to *frimmel@startext.net* with "Subscribe WaveGuide" in the subject). Now, Macintosh users can get free WaveMaster software to display the information provided by WaveGuide.

Also, in cooperation with Mark Fine of FineWare (and frequency monitor of *MT*), WaveMaster will also convert and import FineWare's subscription service of shortwave broadcast schedules and DX files. The free software and sample files can be downloaded at **http://www.crosslink.net/~mfine/**. (See the Index of Advertisers for FineWare.)

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			
0000-0100	Costa Rica,RF Peace Intl	6980am	7385am		
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			
0000-0100	Germany,Overcomer Ministr	5840na			
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			
0000-0100	North Korea, R Pyongyang	11845na	13650na	15230na	
0000-0100 vl	Papua New Guinea, NBC	9675do			
0000-0100	Russia,Voice of Russia WS	5940na	7105na	7125na	7180na
0000-0100	Singapore, SBC Radio One	6160do			
0000-0100 vl	Solomon Islands, SIBC	5020do			
0000-0100	Spain, R Exterior Espana	6055am			
0000-0030	Thailand, Radio	9680af			
0000-0030	UK, BBC Asian Service	3915as	6195as	7110as	9410as
		9580as	11945as	11955as	15280as
		15310as	15360as		
0000-0100	UK, BBC World Service	5970sa	5975am	6175na	9590am
		9915sa	11750sa		
0000-0100	USA, KAIJ Dallas TX	5810am			
0000-0100	USA, KTBN Salt Lk City UT	7510am			
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, WJCR Upton KY	7490na			
0000-0100	USA, WRMI/R Miami Intl	9955am			
0000-0100	USA, WRNO New Orleans LA	7355am			
0000-0100	USA, WWCR Nashville TN	3215am	5070am	7435am	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	11905na			
0030-0100	UK, BBC Asian Service	5965as	6080as	6195as	9410as
		11955as	15310as	15360as	
0050-0100	Italy, RAI Intl	6010na	9675na	11800na	

SELECTED PROGRAMS

Sundays

0000 Canada (North-Quebec): News/Sports.
0000 Canada, RCI Montreal: CBC Radio News. News, sports, and weather from the Canadian Broadcasting Corporation.
0000 USA, WWCR #1 Nashville TN: Weekly Presidential Radio Address. Bill Clinton's weekly report to the nation.
0000 USA, WWCR #3 Nashville TN: The Hour of Courage. Ron Wilson talks politics and the precious metals market.
0005 USA, WWCR #1 Nashville TN: The Republican Response. A noted Republican rebuts the President's weekly radio message.
0007 Canada, RCI Montreal: Quirks and Quarks. Updating what's new and what's next in science.
0015 USA, WWCR #1 Nashville TN: The Blessed Word of Life. Perry L. Johnson preaches in Spanish and English from Washington, DC.
0030 USA, WWCR #1 Nashville TN: The People's Gospel Hour. From Nova Scotia, Canada, Perry Rockwood interprets scripture for Christian life.

Mondays

0000 Canada, RCI Montreal: CBC Radio News. See S 0000.
0000 USA, WWCR #1 Nashville TN: The Down Home Gospel Program. Brother Gary and Sister Wanda evangelize from California.
0000 USA, WWCR #3 Nashville TN: Discoveries in Health (hour 1) (live). A health and herbs show from the American Freedom Network in which new treatments are discussed.
0005 Canada, RCI Montreal: Sound Advice. See S 2330.

Tuesdays

0000 Canada (North-Quebec): As It Happens.
0000 Canada, RCI Montreal: The World at Six. See M 2300.
0000 USA, WWCR #1 Nashville TN: Freedom Now (live). Irwin Schiff, a self-professed leading authority on federal income tax, talks from Las Vegas.
0000 USA, WWCR #3 Nashville TN: The Baker Report (live). Across the nation and around the world with Jeff Baker (1st hour).

Wednesdays

0000 Canada (North-Quebec): As It Happens.
0000 Canada, RCI Montreal: The World at Six. See M 2300.
0000 USA, WWCR #1 Nashville TN: Freedom Now (live). See T 0000.
0000 USA, WWCR #3 Nashville TN: Newswatch Magazine. See M 1200.

Thursdays

0000 Canada (North-Quebec): As It Happens.
0000 Canada, RCI Montreal: The World at Six. See M 2300.
0000 USA, WWCR #1 Nashville TN: Freedom Now (live). See T 0000.
0000 USA, WWCR #3 Nashville TN: The Baker Report (live). See T 0000.
0054 Radio Netherlands: Documentary. Berlin--The Once and Future Capital (8th). See A 2354.
0054 Radio Netherlands: Documentary. Italy--Cultural Heritage (29th). Louise Williams reports of the problem of art theft in Italy.
0054 Radio Netherlands: Documentary. Italy--Young & Old (22th). See F 2354.
0054 Radio Netherlands: Documentary. The Netherlands--Liberalism versus The Rules (15th). See F 1454.
0054 Radio Netherlands: Documentary. Time (1st). See W 1254.

Fridays

0000 Canada (North-Quebec): As It Happens.
0000 Canada, RCI Montreal: The World at Six. See M 2300.
0000 USA, WWCR #1 Nashville TN: Freedom Now (live). See T 0000.
0000 USA, WWCR #3 Nashville TN: Newswatch Magazine. See M 1200.

Saturdays

0000 Canada (North-Quebec): As It Happens.
0000 Canada, RCI Montreal: The World at Six. See M 2300.
0000 USA, WWCR #1 Nashville TN: Freedom Now (live). See T 0000.
0000 USA, WWCR #3 Nashville TN: The Baker Report (live). See T 0000.

MT MONITORING TEAM

Next Reporting Deadline: January 16, 1998

Gayle Van Horn
Frequency Manager
swbcsked@grove.net

Jim Frimmel
Program Manager
DXComp@aol.com

Jacques d'Avignon
Propagation Forecasts
Ontario,Canada
monitor@rac.ca

Dave Datko, California
Mark Fine, VA

THANK YOU...

ADDITIONAL CONTRIBUTORS TO THIS MONTH'S SHORTWAVE GUIDE:

Sonny M. Ashimori, Japan; John Babbis, Silver Spring, MD; Gordon Bell, USA; Carl T. Craig, Shelbyville, TN; Bob Fraser, Cohasset, MA; Clyde Harmon, Anniston, AL; Glenn Hauser, Enid, OK; Jon Horen, Fairbanks, AK; Jim Moats, Ravenna, OH; Harold Sellers, Ontario, Canada; Robert E. Thomas, Bridgeport, CT; Larry Van Horn, Brasstown, NC; BBCMS/World Media; *Cumbre DX*; *Fine Tuning; Gatflash!; Hard-Core-DX; The Four Winds*; *DX Ontario*; *NASWA Journal*; *World of Radio*; Usenet newsgroups.

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	6980am	7385am		
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	5840na			
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	15570as	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	7105na	7125na	7175na	12010na
		12050na			
0100-0130 mtwhfa	Serbia, Radio Yugoslavia	6195na	7115na		
0100-0200	Singapore, SBC Radio One	6160do			
0100-0130	Slovakia, R Slovakia Intl	5930na	7300af	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	UK, BBC Asian Service	5965as	6195as	9410as	11955as
		15280as	15310as	15360as	
0100-0200	UK, BBC World Service	5970sa	5975am	6175na	9590am
		9915sa	11750sa		
0100-0200	Ukraine, R Ukraine Intl	5905eu	5915na	5940eu	6010eu
		6020eu	7150na	7205na	7290eu
0100-0200	USA, KAIJ Dallas TX	5810am			
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	5955eu	5975eu	9540eu	
0100-0127	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
0130-0200	Guam, AWR/KSDA	17645as			
0130-0200	Lithuania, Radio Vilnius	5910na			
0130-0200	Sweden, Radio	7265as			
0140-0200	Vatican State, Vatican R	5980au	7335au	9650au	

Selected Programs

Sundays

0100 Canada (North-Quebec): News/Sports.
0100 USA, WWCR #1 Nashville TN: What Does the Bible Say?. M. H. Reynolds exposes other religions.
0100 USA, WWCR #3 Nashville TN: World of Prophecy. Texe Marrs and a guest discuss the evils and pitfalls of today and the outlook for tomorrow.
0107 Canada (North-Quebec): Finkleman's 45's.
0130 Austria, R Austria Intl: Report from Austria. A magazine program covering all aspects of Austrian life and events in the news and opening with the latest news bulletin.
0137 Austria, R Austria Intl: Postbox. Radio Austria's mailbag program.
0146 Austria, R Austria Intl: Music. Listen to some of Austria's famous music.

Mondays

0100 Canada (North-Quebec): News.
0100 USA, WWCR #1 Nashville TN: The Jesus Time Network. Walter Bails evangelizes from Gatlinburg, Tennessee.
0100 USA, WWCR #3 Nashville TN: Discoveries in Health (hour 2) (live). The second hour of the health and herbs show from the American Freedom Network.
0105 Canada (North-Quebec): Onstage.
0130 Austria, R Austria Intl: Report from Austria. See S 0130.
0130 USA, WWCR #1 Nashville TN: Harvest Time. Gospel music and inspiration from the United Pentecostal Church International.
0145 USA, WWCR #1 Nashville TN: Faithful Teaching Ministry. Jeffrey Hayes.

Tuesdays

0100 Canada (North-Quebec): News.
0100 USA, WWCR #1 Nashville TN: Newswatch Magazine. See M 1200.
0100 USA, WWCR #3 Nashville TN: The Intelligence Report (live). A patriot radio program with Ted Gunderson.
0130 Austria, R Austria Intl: Report from Austria. See S 0130.

Wednesdays

0100 Canada (North-Quebec): News.
0100 USA, WWCR #1 Nashville TN: Newswatch Magazine. See M 1200.
0100 USA, WWCR #3 Nashville TN: The Intelligence Report (live). See T 0100.
0130 Austria, R Austria Intl: Report from Austria. See S 0130.

Thursdays

0100 Canada (North-Quebec): News.
0100 USA, WWCR #1 Nashville TN: Newswatch Magazine. See M 1200.
0100 USA, WWCR #3 Nashville TN: The Intelligence Report (live). See T 0100.
0100 West Coast Radio Ireland: News from Ireland.
0110 West Coast Radio Ireland: Sports News.
0115 West Coast Radio Ireland: Irish Music and Listener Phone Calls.
0130 Austria, R Austria Intl: Report from Austria. See S 0130.

Fridays

0100 Canada (North-Quebec): News.
0100 USA, WWCR #1 Nashville TN: Newswatch Magazine. See M 1200.
0100 USA, WWCR #3 Nashville TN: The Intelligence Report (live). See T 0100.
0130 Austria, R Austria Intl: Report from Austria. See S 0130.

Saturdays

0100 Canada (North-Quebec): News.
0100 USA, WWCR #1 Nashville TN: Newswatch Magazine. See M 1200.
0100 USA, WWCR #3 Nashville TN: The Intelligence Report (live). See T 0100.
0130 Austria, R Austria Intl: Report from Austria. See S 0130.
0154 Radio Netherlands: Documentary. Berlin--The Once and Future Capital (10th). Marijke van der Meer examines the preparations for the German government's move from Bonn to Berlin in 1999.
0154 Radio Netherlands: Documentary. Italy--Cultural Heritage (31st). See A 0054.
0154 Radio Netherlands: Documentary. Italy--Young & Old (24th). See F 2354.
0154 Radio Netherlands: Documentary. The Netherlands--Liberalism versus The Rules (17th). See F 1454.
0154 Radio Netherlands: Documentary. Time (3rd). See W 1254.

Hauser's Highlights

ALBANIA: R. Tirana

W97 in English
To Europe:
1945-2000 7135, 6025
2200-2230 7135, 6025
To North America:
0245-0300 7160, 6115
0330-0400 7160, 6140
(Roger Tidy, UK, *World of Radio*)

FINLAND: YLE R. Finland

W97 SSB usage:

1000-1030	15225	90°
1130-1200	15225	90°
1400-1430	13645	130°
1500-1600	13645	325°

(Arto Mujunen, *Electronic DX Press*)

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			
0200-0300	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	6980am	7385am		
0200-0205	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	5880na	7335na		
0200-0300 vl	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	6105na	6155na	7195na	9510na
		9570na	9690as	11940na	
0200-0300	Russia,Voice of Russia WS	5920na	5930na	7105na	7345na
		9580na	9850na	12030na	13665na
		13790na			
0200-0230	Serbia, Radio Yugoslavia	6180na	7130na		
0200-0300	Singapore, SBC Radio One	6160do			
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	5980na	7130au	9680na	15435as
0200-0300	UK, BBC African Service	6050af	6135af	7125af	9610af
0200-0300	UK, BBC Asian Service	9410as	9605as	9825as	11760as
		11955as	15280as	15310as	15360as
		15405as			
0200-0230	UK, BBC World Service	5970sa	5975am	6175na	9590am
		9915sa			
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, 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	5745am			
0200-0300 mtwhf	USA, WHRI Noblesville IN	5745am			
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	11805me	15120me	15270me	
0230-0300	Sweden, Radio	7280na			
0230-0300	UK, BBC World Service	5970sa	5975am	6175na	7325sa
		9895am			
0230-0300 vl	Zambia, R Zambia/ZNBC 2	6165do			
0245-0300	Albania, R Tirana Intl	6115na	7160na		
0245-0300	UK, BBC World Service	5995am	6110am	6190ca	9515am
0250-0300 sf	Greece, Voice of	5895na	6260na	7450na	9425na
0250-0300	Vatican State, Vatican R	6095am	7305ca		
0255-0300 vl	Zambia, R Zambia/ZNBC 1	4910do			

Selected Programs

Sundays

0200 Canada (North-Quebec): News/Sports.
0200 Canada, RCI Montreal: RCI News. News, weather, and sports from Radio Canada International.
0200 UK, BBC London (af): Newsday. Coverage of the breaking stories and a background briefing on the main news issues of the day.
0200 USA, WWCR #3 Nashville TN: Tomorrow's News Today. George Hyatt is the not the presenter, he's the evangelist.
0207 Canada (North-Quebec): Finkleman's 45's.
0207 Canada, RCI Montreal: Venture Canada. A new weekly magazine promoting Canadian business achievement.
0230 UK, BBC London (af): In Praise of God. Weekly programme of worship and meditation.
0230 USA, WWCR #3 Nashville TN: Dixie Rising. Dan Meredith wants the South to rise again.
0231 Canada, RCI Montreal: Earth Watch. Environment and ecology matters.

Mondays

0200 Canada (North-Quebec): Onstage.
0200 Canada, RCI Montreal: RCI News. See S 0200.
0200 UK, BBC London (af): Newsday. See S 0200.
0200 USA, WWCR #1 Nashville TN: First Hand. Rick Livingood with a world evangelism update.
0200 USA, WWCR #3 Nashville TN: Exotic Research Radio. NEW! Discussion of new developments in science, technology and things in everyday living.
0207 Canada, RCI Montreal: The Arts in Canada. A look at the Canadian arts scene.
0215 USA, WWCR #1 Nashville TN: Christ at the Door. Leland Wood.
0230 UK, BBC London (af): Variable Feature. See S 0615.
0230 USA, WWCR #1 Nashville TN: Standing in the Gap. Rose Ondush evangelizes from the Pocono Mountains in Pennsylvania.
0231 Canada, RCI Montreal: The Mailbag. Listener letters, musical selections, and happenings in Canada.
0245 USA, WWCR #1 Nashville TN: The Last Day Message. Rick Long's message is garnished with fire and brimstone.

Tuesdays

0200 Canada, RCI Montreal: RCI News. See S 0200.
0200 UK, BBC London (af): Newsday. See S 0200.
0200 USA, WWCR #1 Nashville TN: Live Fire (live). L. Pratt.
0200 USA, WWCR #3 Nashville TN: The Stan Solomon Show (live). A newstalk radio program.
0211 Canada, RCI Montreal: Spectrum. A weekday magazine program of current affairs, features, and a business report.
0230 UK, BBC London (af): Variable Feature. See S 0615.
0245 UK, BBC London (af): Seven Days. Roundup of the week's news, plus sports highlights, finance and the weather.
0255 Canada, RCI Montreal: News. News from either the Canadian Broadcasting Corporation (CBC) or Radio Canada International (RCI).

Wednesdays

0200 Canada, RCI Montreal: RCI News. See S 0200.
0200 UK, BBC London (af): Newsday. See S 0200.
0200 USA, WWCR #1 Nashville TN: Investigative Reporter (live). Karen Lee Bixman.
0200 USA, WWCR #3 Nashville TN: The Stan Solomon Show (live). See T 0200.
0211 Canada, RCI Montreal: Spectrum. See T 0211.
0230 UK, BBC London (af): The Farming World. Reports on new developments from around the world.
0245 UK, BBC London (af): Record News. See S 0815.
0255 Canada, RCI Montreal: News. See T 0255.

Thursdays

0200 Canada, RCI Montreal: RCI News. See S 0200.
0200 UK, BBC London (af): Newsday. See S 0200.
0200 USA, WWCR #1 Nashville TN: Perspective on America (live). Jeff Bennett.
0200 USA, WWCR #3 Nashville TN: The Stan Solomon Show (live). See T 0200.
0211 Canada, RCI Montreal: Spectrum. See T 0211.
0230 UK, BBC London (af): Assignment. A weekly examination of a topical issue.
0254 Radio Netherlands: Documentary. Berlin--The Once and Future Capital (8th). See A 2354.
0254 Radio Netherlands: Documentary. Italy--Cultural Heritage (29th). See A 0054.
0254 Radio Netherlands: Documentary. Italy--Young & Old (22th). See F 2354.
0254 Radio Netherlands: Documentary. The Netherlands--Liberalism versus The Rules (15th). See F 1454.
0254 Radio Netherlands: Documentary. Time (1st). See W 1254.
0255 Canada, RCI Montreal: News. See T 0255.

Fridays

0200 Canada, RCI Montreal: RCI News. See S 0200.
0200 UK, BBC London (af): Newsday. See S 0200.
0200 USA, WWCR #1 Nashville TN: Perspective on America (live). See H 0200.
0200 USA, WWCR #3 Nashville TN: The Stan Solomon Show (live). See T 0200.
0211 Canada, RCI Montreal: Spectrum. See T 0211.
0230 UK, BBC London (af): Variable Feature. See S 0615.
0255 Canada, RCI Montreal: News. See T 0255.

Saturdays

0200 Canada, RCI Montreal: RCI News. See S 0200.
0200 UK, BBC London (af): Newsday. See S 0200.
0200 USA, WWCR #1 Nashville TN: Health Wise (live). Gary Montgomery explains how nutrition is the key to good health.
0200 USA, WWCR #3 Nashville TN: The Stan Solomon Show (live). See T 0200.
0211 Canada, RCI Montreal: Spectrum. See T 0211.
0230 UK, BBC London (af): People and Politics. See F 2130.
0255 Canada, RCI Montreal: News. See T 0255.

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			
0300-0359 mtwhf	Canada,Can Forces Net (RCI)	6155am	9755am	9780am	
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	6980am	7385am		
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	5880na	7335na		
0300-0400	Guatemala, Radio Cultural	3300do			
0300-0400 vl	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	11805as	15120as	15270as	
0300-0400	Russia,Voice of Russia WS	5920na	5930na	5940na	6150na
		7105na	7175na	7345na	7350na
		9850na	13645na	13790na	
0300-0330	S Africa, Channel Africa	5995af			
0300-0400	Singapore, SBC Radio One	6160do			
0300-0400 vl	Solomon Islands, SIBC	5020do			
0300-0400	Sri Lanka, Sri Lanka BC	9730as	15425as		
0300-0400	Taiwan, Taipei Radio Intl	5980na	9680na	11740au	11825as
0300-0330	Thailand, Radio	11890na			
0300-0315 mtwhf	Uganda, Radio	4976do			
0300-0330	UK, BBC African Service	3255af	6005af	6135af	6190af
		9600af			
0300-0330	UK, BBC Asian Service	9605as	15310as	15360as	17790as
		21660as			
0300-0330	UK, BBC World Service	5970sa	5975am	6175na	6195eu
	7325sa 9410eu	9895am	11760me	11850as	11955as
	12095af 15280as	15340as			
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	6095am	7305ca		
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	13770as	15330as	17730as	
0330-0400	Sweden, Radio	7115na			
0330-0400	Tanzania, Radio	5050af			
0330-0400	UAE, Radio Dubai	12005na	13675na	15400na	21485na
0330-0400	UK, BBC African Service	3255af	6005af	6190af	9600af
		9610af	11730af		
0330-0400	UK, BBC Asian Service	9605as	11955as	15280as	15310as
		17790as	21660as		
0330-0400	UK, BBC World Service	5975am	6175na	6195eu	9410eu
		9895am	11760me	12095af	
0330-0357	Vietnam, Voice of	5905na			
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 Canada, RCI Montreal: CBC Radio News. See S 0000.
0300 Canadian Forces Network (CFN): News. News from either the Canadian Broadcasting Corporation (CBC) or Radio Canada International (RCI).
0300 UK, BBC London (af): World News. Broadcast on the hour of 5, 10, or 15 minutes in length.
0300 USA, WWCR #3 Nashville TN: Spectrum (live). SWLs and Hams call 1-800-774-7435 with technical questions and comments.
0305 Canadian Forces Network (CFN): Report to the Peacekeepers. Information about Canada for Canadian Forces overseas.
0305 UK, BBC London (af): World Business Review. A look back at the previous week's business and a preview of upcoming events.
0306 Canada, RCI Montreal: Madly Off in All Directions. The program that travels to all points of the country to bring listeners a wide variety of comedic talent (hosted by Lorne Elliot).
0315 UK, BBC London (af): Sports Roundup. The latest sports news.
0330 UK, BBC London (af): African Quiz (1). A monthly test of the listener's knowledge of Africa.
0330 UK, BBC London (af): Postmark Africa. Expert answers to any question under the sun.

Mondays

0300 Canada, RCI Montreal: CBC Radio News. See S 0000.
0300 UK, BBC London (af): World News. See S 0300.
0300 USA, WWCR #1 Nashville TN: World of Prophecy. See S 0100.
0300 USA, WWCR #3 Nashville TN: The Mike Jarmus Show (hour 1) (live). Mike, his guests, and callers discuss UFOs and other far out topics.
0305 UK, BBC London (af): Write On. See S 0905.
0306 Canada, RCI Montreal: Tapestry. A look at the broad range of spiritual and human issues facing people of various cultures and religions.
0315 UK, BBC London (af): Sports Roundup. See S 0315.
0330 UK, BBC London (af): Network Africa. Breakfast show of news, sport, personalities, music, and listener's comments.

Tuesdays

0300 Canada, RCI Montreal: CBC Radio News. See S 0000.
0300 Canadian Forces Network (CFN): News. See S 0300.
0300 UK, BBC London (af): World News. See S 0300.
0300 USA, WWCR #3 Nashville TN: The Stan Solomon Show (live). See T 0200.
0305 UK, BBC London (af): World Business Report. See M 0905.
0306 Canada, RCI Montreal: This Morning Tonight. David Enright and Avril Benoit co-host this CBC magazine program.
0314 Canadian Forces Network (CFN): Report to the Peacekeepers. See S 0305.
0315 UK, BBC London (af): Sports Roundup. See S 0315.
0330 UK, BBC London (af): Network Africa. See M 0330.

Wednesdays

0300 Canada, RCI Montreal: CBC Radio News. See S 0000.
0300 Canadian Forces Network (CFN): News. See S 0300.
0300 UK, BBC London (af): World News. See S 0300.
0300 USA, WWCR #3 Nashville TN: The Stan Solomon Show (live). See T 0200.
0305 UK, BBC London (af): World Business Report. See M 0905.
0306 Canada, RCI Montreal: This Morning Tonight. See T 0306.
0314 Canadian Forces Network (CFN): Report to the Peacekeepers. See S 0305.
0315 UK, BBC London (af): Sports Roundup. See S 0315.
0330 UK, BBC London (af): Network Africa. See M 0330.

Thursdays

0300 Canada, RCI Montreal: CBC Radio News. See S 0000.
0300 Canadian Forces Network (CFN): News. See S 0300.
0300 UK, BBC London (af): World News. See S 0300.
0300 USA, WWCR #3 Nashville TN: The Stan Solomon Show (live). See T 0200.
0305 UK, BBC London (af): World Business Report. See M 0905.
0306 Canada, RCI Montreal: This Morning Tonight. See T 0306.
0314 Canadian Forces Network (CFN): Report to the Peacekeepers. See S 0305.
0315 UK, BBC London (af): Sports Roundup. See S 0315.
0330 UK, BBC London (af): Network Africa. See M 0330.

Fridays

0300 Canada, RCI Montreal: CBC Radio News. See S 0000.
0300 Canadian Forces Network (CFN): News. See S 0300.
0300 UK, BBC London (af): World News. See S 0300.
0300 USA, WWCR #3 Nashville TN: The Stan Solomon Show (live). See T 0200.
0305 UK, BBC London (af): World Business Report. See M 0905.
0306 Canada, RCI Montreal: This Morning Tonight. See T 0306.
0314 Canadian Forces Network (CFN): Report to the Peacekeepers. See S 0305.
0315 UK, BBC London (af): Sports Roundup. See S 0315.
0330 UK, BBC London (af): Network Africa. See M 0330.

Saturdays

0300 Canada, RCI Montreal: CBC Radio News. See S 0000.
0300 Canadian Forces Network (CFN): News. See S 0300.
0300 UK, BBC London (af): World News. See S 0300.
0300 USA, WWCR #3 Nashville TN: The Stan Solomon Show (live). See T 0200.
0305 UK, BBC London (af): World Business Report. See M 0905.
0306 Canada, RCI Montreal: This Morning Tonight. See T 0306.
0314 Canadian Forces Network (CFN): Report to the Peacekeepers. See S 0305.
0315 UK, BBC London (af): Sports Roundup. See S 0315.
0330 UK, BBC London (af): Focus on Faith. See F 0915.

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	6150me	9505me	9645me	
0400-0500	China, China Radio Intl	9560na	9730am		
0400-0500	Costa Rica,RF Peace Intl	6980am	7385am		
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 vl	Honduras, LV Evangelica	4890am			
0400-0430	Iraq, Radio Iraq Intl	11785eu			
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	7225na	9690na
		11740na	11940na	15335as	
0400-0500	Russia,Voice of Russia WS	5920na	5930na	6065na	6150na
		7175na	7260na	7345na	9580na
0400-0430	S Africa, Channel Africa	5955af			
0400-0500	Singapore, SBC Radio One	6160do			
0400-0430	Slovakia, AWR Europe	9465af			
0400-0500 vl	Solomon Islands, SIBC	5020do			
0400-0430	Sri Lanka, Sri Lanka BC	9730as	15425as		
0400-0500	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			
0400-0430	UK, BBC African Service	3255af	6005af	6190af	7160af
		9610af	11730af		
0400-0430	UK, BBC World Service	3955eu	5975am	6175na	6180eu
	6195eu 9410eu	9895am	11760me	12095af	15575as
0400-0500	Ukraine, R Ukraine Intl	5915na	5985na	6020eu	6030na
		7150na	7205eu		
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	17510as	17555pa	
0400-0500	USA, Monitor Radio Intl	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, WMLK Bethel PA	9465am			
0400-0500	USA, WRMI/R Miami Intl	9955am			
0400-0500	USA, WRNO New Orleans LA	7395am			
0400-0500	USA, WWCR Nashville TN	2390am	3215am	5070am	5935am
0400-0500	USA, WYFR Okeechobee FL	6065na	9505na	9985eu	
0400-0430	Vietnam, Voice of	5940na	7270na	7400na	9840na
		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 twhfa	Portugal, R Portugal Intl	6150am	9570am		
0430-0500	Swaziland, Trans World R	3200af	4775af	6100af	
0430-0500	UK, BBC African Service	3255af	6005af	6190af	7160af
		9600af	15420af		
0430-0500	UK, BBC Asian Service	11955as	15280as	15310as	17790as
		21660as			
0430-0500	UK, BBC World Service	5875eu	5975am	6175am	11760me
		12095af	15575as		
0430-0500 s	UK, BBC World Service	3955eu	6180eu	6195eu	9410eu
0455-0500	Malaysia, Voice of	6175as	9750as	15295au	
0459-0500	New Zealand, R NZ Intl	11905pa			

SELECTED PROGRAMS

Sundays

0400 Canada, RCI Montreal: RCI News. See S 0200.
0400 UK, BBC London (af): Newsdesk. World news and dispatches from overseas and UK correspondents.
0400 USA, WWCR #1 Nashville TN: Faith Mountain Ministries. Henry Vanderbush.
0400 USA, WWCR #3 Nashville TN: USA Radio News. News summary from the USA Radio News Network.
0405 Canada, RCI Montreal: Venture Canada. See S 0207.
0405 USA, WWCR #3 Nashville TN: The Golden Age of Radio Theater. Relive the golden moments of radio's yesteryear.
0430 UK, BBC London (af): The Art House. No information available.
0430 USA, WWCR #1 Nashville TN: The Street Preacher. Steven Keeler.
0445 USA, WWCR #1 Nashville TN: A Study in God's Word. From North Carolina, Hezakiah Smith reads Scripture.

Mondays

0400 Canada, RCI Montreal: RCI News. See S 0200.
0400 UK, BBC London (af): Newsdesk. See S 0400.
0400 USA, WWCR #1 Nashville TN: World of Radio. Glenn Hauser's communications program for shortwave radio listeners.
0400 USA, WWCR #3 Nashville TN: The Mike Jarmus Show (hour 2) (live). See M 0300.
0407 Canada, RCI Montreal: The Mailbag. See M 0231.
0430 UK, BBC London (af): Network Africa. See M 0330.
0430 USA, WWCR #1 Nashville TN: The Old Record Shop. Ken Berryhill with thirty minutes of selections of music from the days of the 78 rpm record. Recommended.

Tuesdays

0400 Canada, RCI Montreal: RCI News. See S 0200.
0400 UK, BBC London (af): Newsdesk. See S 0400.
0400 USA, WWCR #1 Nashville TN: Newswatch Magazine. See M 1200.
0400 USA, WWCR #3 Nashville TN: Scriptures for America (live). Peter J. Peters hosts this outreach ministry of the LaPorte Church of Christ in Colorado.
0411 Canada, RCI Montreal: Spectrum. See T 0211.
0430 UK, BBC London (af): Network Africa. See M 0330.
0430 USA, WWCR #1 Nashville TN: The Prophecy Club. Stan Johnson discusses bible prophecy from Topeka, Kansas.

Wednesdays

0400 Canada, RCI Montreal: RCI News. See S 0200.
0400 UK, BBC London (af): Newsdesk. See S 0400.
0400 USA, WWCR #1 Nashville TN: Newswatch Magazine. See M 1200.
0400 USA, WWCR #3 Nashville TN: Scriptures for America (live). See T 0400.
0411 Canada, RCI Montreal: Spectrum. See T 0211.
0430 UK, BBC London (af): Network Africa. See M 0330.
0430 USA, WWCR #1 Nashville TN: The Prophecy Club. See T 0430.

Thursdays

0400 Canada, RCI Montreal: RCI News. See S 0200.
0400 UK, BBC London (af): Newsdesk. See S 0400.
0400 USA, WWCR #1 Nashville TN: Newswatch Magazine. See M 1200.
0400 USA, WWCR #3 Nashville TN: Scriptures for America (live). See T 0400.
0411 Canada, RCI Montreal: Spectrum. See T 0211.
0430 UK, BBC London (af): Network Africa. See M 0330.
0430 USA, WWCR #1 Nashville TN: The Prophecy Club. See T 0430.
0454 Radio Netherlands: Documentary. Berlin--The Once and Future Capital (8th). See A 2354.
0454 Radio Netherlands: Documentary. Italy--Cultural Heritage (29th). See A 0054.
0454 Radio Netherlands: Documentary. Italy--Young & Old (22th). See F 2354.
0454 Radio Netherlands: Documentary. The Netherlands--Liberalism versus The Rules (15th). See F 1454.
0454 Radio Netherlands: Documentary. Time (1st). See W 1254.

Fridays

0400 Canada, RCI Montreal: RCI News. See S 0200.
0400 UK, BBC London (af): Newsdesk. See S 0400.
0400 USA, WWCR #1 Nashville TN: Newswatch Magazine. See M 1200.
0400 USA, WWCR #3 Nashville TN: Scriptures for America (live). See T 0400.
0411 Canada, RCI Montreal: Spectrum. See T 0211.
0430 UK, BBC London (af): Network Africa. See M 0330.
0430 USA, WWCR #1 Nashville TN: The Prophecy Club. See T 0430.

Saturdays

0400 Canada, RCI Montreal: RCI News. See S 0200.
0400 UK, BBC London (af): Newsdesk. See S 0400.
0400 USA, WWCR #1 Nashville TN: Newswatch Magazine. See M 1200.
0400 USA, WWCR #3 Nashville TN: Scriptures for America (live). See T 0400.
0411 Canada, RCI Montreal: Spectrum. See T 0211.
0430 UK, BBC London (af): African News. See S 1740.
0430 USA, WWCR #1 Nashville TN: The Prophecy Club. See T 0430.
0431 UK, BBC London (af): African Quiz (1). See S 0330.
0431 UK, BBC London (af): This Week and Africa. A roundup of the week's political developments across the continent.

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, CBC N Quebec Svc	9625do			
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	China, China Radio Intl	9560na			
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	6980am	7385am		
0500-0600	Cuba, Radio Havana	6000na	6180na	9820na	9830na
0500-0600 vl	Cyprus, BRT International	6150do			
0500-0600	Ecuador, HCJB	9745am	21455am		
0500-0550	Germany, Deutsche Welle	5960na	6065na	6120na	6185na
		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			
0500-0600	North Korea, R Pyongyang	3560as	11740as	13790as	
0500-0600 vl	Papua New Guinea, NBC	9675do			
0500-0600	Russia,Voice of Russia WS	5905na	5920na	5930na	6005na
	6065na 6150na	7175na	7330na	9580na	
0500-0530	S Africa, Channel Africa	9675af			
0500-0600	Singapore, SBC Radio One	6160do			
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	UK, BBC African Service	3255af	6005af	6190af	7160af
		9600af	15420af	17885af	
0500-0530	UK, BBC Asian Service	9740as	11955as	15280as	15310as
		15360as	17760as	17790as	21660as
0500-0530	UK, BBC World Service	3955eu	5975am	6175am	6180eu
	6195eu 9410eu	11760me	12095eu	15575as	17640af
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	9930as	17555pa	
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		
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	2390am	3215am	5070am	5935am
0500-0600	USA, WYFR Okeechobee FL	5985na	9985af	11580eu	
0500-0520	Vatican State, Vatican R	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			
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	7230eu			
0530-0600	Thailand, Radio	15115eu			
0530-0548	UAE, Radio Dubai	15435as	17830as	21700as	
0530-0600	UK, BBC Asian Service	9740as	11955pa	15310as	15360as
		17760as	21660as		
0530-0600	UK, BBC World Service	3990eu	5975am	6050eu	6175am
	7150eu 7270eu	11760me	15575as	17640af	
0530-0600 as	UK, BBC World Service	3955eu	6180eu	6195eu	9410eu
		12095eu			
0530-0600 vl	Zambia, R Zambia/ZNBC 1	7220do			
0530-0600 vl	Zimbabwe, Zimbabwe BC	5975do			
0545-0600	UK, BBC African Service	7275af	9710af		

Selected Programs

Sundays

0500 Canada (North-Quebec): News/Sports.
0500 USA, WWCR #1 Nashville TN: The Old Land Mark Church. R. L. Mitchell presents the Holy Way Hour from Chicago.
0500 USA, WWCR #3 Nashville TN: USA Radio News. See S 0400.
0505 USA, WWCR #3 Nashville TN: The Bible's Greatest Heroes. Sound tracks from animated Bible stories.
0508 Canada (North-Quebec): Sound of the Blues.
0530 Austria, R Austria Intl: Report from Austria. See S 0130.
0530 UK, BBC London (af): Postmark Africa. See S 0330.
0537 Austria, R Austria Intl: Postbox. See S 0137.

Mondays

0500 Canada (North-Quebec): News/Sports.
0500 UK, BBC London (af): Newsday. See S 0200.
0500 USA, WWCR #1 Nashville TN: USA Radio News. See S 0400.
0500 USA, WWCR #3 Nashville TN: The Extraordinary Science Radio Hour. J.W. McGinnis of the Tesla Society.
0505 Canada (North-Quebec): Jazz Beat.
0505 USA, WWCR #1 Nashville TN: The Golden Age of Radio Theater. See S 0405.
0530 Austria, R Austria Intl: Report from Austria. See S 0130.
0530 UK, BBC London (af): Network Africa. See M 0330.

Tuesdays

0500 Canada (North-Quebec): News/Sports.
0500 UK, BBC London (af): Newsday. See S 0200.
0500 USA, WWCR #1&3 Nashville TN: Scriptures for America (live). See T 0400.
0507 Canada (North-Quebec): That Time of the Night.
0530 Austria, R Austria Intl: Report from Austria. See S 0130.
0530 UK, BBC London (af): Network Africa. See M 0330.

Wednesdays

0500 Canada (North-Quebec): News/Sports.
0500 UK, BBC London (af): Newsday. See S 0200.
0500 USA, WWCR #1&3 Nashville TN: Scriptures for America (live). See T 0400.
0507 Canada (North-Quebec): That Time of the Night.
0530 Austria, R Austria Intl: Report from Austria. See S 0130.
0530 UK, BBC London (af): Network Africa. See M 0330.

Thursdays

0500 Canada (North-Quebec): News/Sports.
0500 UK, BBC London (af): Newsday. See S 0200.
0500 USA, WWCR #1&3 Nashville TN: Scriptures for America (live). See T 0400.
0507 Canada (North-Quebec): That Time of the Night.
0530 Austria, R Austria Intl: Report from Austria. See S 0130.
0530 UK, BBC London (af): Network Africa. See M 0330.

Fridays

0500 Canada (North-Quebec): News/Sports.
0500 UK, BBC London (af): Newsday. See S 0200.
0500 USA, WWCR #1&3 Nashville TN: Scriptures for America (live). See T 0400.
0507 Canada (North-Quebec): That Time of the Night.
0530 Austria, R Austria Intl: Report from Austria. See S 0130.
0530 UK, BBC London (af): Network Africa. See M 0330.

Saturdays

0500 Canada (North-Quebec): News/Sports.
0500 UK, BBC London (af): Newsday. See S 0200.
0500 USA, WWCR #1&3 Nashville TN: Scriptures for America (live). See T 0400.
0507 Canada (North-Quebec): That Time of the Night.
0530 Austria, R Austria Intl: Report from Austria. See S 0130.
0530 UK, BBC London (af): African News. See S 1740.
0531 UK, BBC London (af): Talkabout Africa. See W 1615.

Hauser's Highlights
GEORGIA: "KVOH"

via Tbilisi registered for W97:

1600-2200	6290	302° Eu
1430-2000	7520	332° Eu
1300-1530	9310	122° India
1600-1700	9310	151° EAf

(George Jacobs & Associates)

Hauser's Highlights
GUAM: KTWR

W97 in English:

0740-0915	FE	15200
0855-1000	SPac	15330
1000-1100	NEAs	9865
1500-1630	SAs	15105

Pacific DX Report (includes DX news from *EDXP*)
Fri 1045, Sat 0940, Mon 1615, Tue 0900
(Bob Padula, *Electronic DX Press*)

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			
0600-0659	Canada,CanForces Net (RCI)	6050va	6150va	9740af	9760va
		11905af			
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			
0600-0700	Costa Rica,RF Peace Intl	6980am	7385am		
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			
0600-0641	Romania, R Romania Intl	5965na	6155na	7225na	9690na
0600-0700	Russia,Voice of Russia WS	5905na	5920na	5930na	6005na
	6065na 6150na	7175na	7270na	7330na	7345na
	9580na 9825na	9895na	12025as	12055na	15460na
	15470au 17570au	17795as	21790au		
0600-0630	S Africa, Channel Africa	11900af			
0600-0630	S Africa, Trans World R	11730af			
0600-0610	Sierra Leone, SLBS	3316do			
0600-0700	Singapore, SBC Radio One	6160do			
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	UK, BBC African Service	6005af	6155af	6190af	7160af
		9600af	11940af	15420af	17885af
0600-0700	UK, BBC Asian Service	7145pa	9740as	11955pa	15310as
		15360as	17760as	17790as	21660as
0600-0630	UK, BBC World Service	3955eu	5975am	6175am	6180eu
		6195eu	7325eu	9410eu	11760me
		12095eu	15565eu	15575as	17640af
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	9930as	17555pa	
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			
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, WRNO New Orleans LA	7395am			
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		
0600-0620	Vatican State, Vatican R	5883eu	7250eu		
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	UK, BBC World Service	5975am	6175am	6180eu	7325eu
	9410eu 11760me	12095eu	15565eu	15575as	17640af
0630-0700 as	UK, BBC World Service	3955eu	6195eu		
0630-0645 s	UK, BBC World Service	6010eu	9740eu		
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	
0641-0656	Romania, R Romania Intl	5965na	6155na	7105eu	7225na
		9510eu	9625eu	9690na	11775eu
0645-0700	UK, BBC World Service	5875eu	7260eu		

SELECTED PROGRAMS

Sundays

0600 UK, BBC London (af): World News. See S 0300.
0600 USA, WWCR #1 Nashville TN: These Last Days. Apparitions and prophecies of the Lady of the Roses.
0600 USA, WWCR #3 Nashville TN: Ham Radio and More. Amateur radio and satellite news and techniques with Len Winkler.
0615 UK, BBC London (af): Variable Feature. Special features and new series.
0630 Austria, R Austria Intl: Report from Austria. See S 0130.
0630 UK, BBC London (af): African Perspective. A considered view of life and issues facing the African continent.
0630 USA, WWCR #1 Nashville TN: The Lutheran Reformation Hour. Richard Shekner preaches from Chicago Heights, Illinois.
0637 Austria, R Austria Intl: Postbox. See S 0137.

Mondays

0600 Canadian Forces Network (CFN): News. See S 0300.
0600 UK, BBC London (af): World News. See S 0300.
0600 USA, WWCR #1 Nashville TN: Rock the Universe. See S 1300.
0614 Canadian Forces Network (CFN): Report to the Peacekeepers. See S 0305.
0615 UK, BBC London (af): Sports Roundup. See S 0315.
0630 Austria, R Austria Intl: Report from Austria. See S 0130.
0630 UK, BBC London (af): Network Africa. See M 0330.
0630 USA, WWCR #3 Nashville TN: The Hour of Courage. See S 0000.

Tuesdays

0600 Canadian Forces Network (CFN): News. See S 0300.
0600 UK, BBC London (af): World News. See S 0300.
0600 USA, WWCR #1 Nashville TN: USA Radio News. See S 0400.
0607 USA, WWCR #1 Nashville TN: For the People (hour 1). Chuck Harder is back with his old talk radio show.
0614 Canadian Forces Network (CFN): Report to the Peacekeepers. See S 0305.
0615 UK, BBC London (af): Sports Roundup. See S 0315.
0630 Austria, R Austria Intl: Report from Austria. See S 0130.
0630 UK, BBC London (af): Network Africa. See M 0330.
0630 USA, WWCR #3 Nashville TN: The Hour of Courage. See S 0000.

Wednesdays

0600 Canadian Forces Network (CFN): News. See S 0300.
0600 UK, BBC London (af): World News. See S 0300.
0600 USA, WWCR #1 Nashville TN: USA Radio News. See S 0400.
0607 USA, WWCR #1 Nashville TN: For the People (hour 1). See T 0607.
0614 Canadian Forces Network (CFN): Report to the Peacekeepers. See S 0305.
0615 UK, BBC London (af): Sports Roundup. See S 0315.
0630 Austria, R Austria Intl: Report from Austria. See S 0130.
0630 UK, BBC London (af): Network Africa. See M 0330.
0630 USA, WWCR #3 Nashville TN: The Hour of Courage. See S 0000.

Thursdays

0600 Canadian Forces Network (CFN): News. See S 0300.
0600 UK, BBC London (af): World News. See S 0300.
0600 USA, WWCR #1 Nashville TN: USA Radio News. See S 0400.
0607 USA, WWCR #1 Nashville TN: For the People (hour 1). See T 0607.
0614 Canadian Forces Network (CFN): Report to the Peacekeepers. See S 0305.
0615 UK, BBC London (af): Sports Roundup. See S 0315.
0630 Austria, R Austria Intl: Report from Austria. See S 0130.
0630 UK, BBC London (af): Network Africa. See M 0330.
0630 USA, WWCR #3 Nashville TN: The Hour of Courage. See S 0000.

Fridays

0600 Canadian Forces Network (CFN): News. See S 0300.
0600 UK, BBC London (af): World News. See S 0300.
0600 USA, WWCR #1 Nashville TN: USA Radio News. See S 0400.
0607 USA, WWCR #1 Nashville TN: For the People (hour 1). See T 0607.
0614 Canadian Forces Network (CFN): Report to the Peacekeepers. See S 0305.
0615 UK, BBC London (af): Sports Roundup. See S 0315.
0630 Austria, R Austria Intl: Report from Austria. See S 0130.
0630 UK, BBC London (af): Network Africa. See M 0330.
0630 USA, WWCR #3 Nashville TN: The Hour of Courage. See S 0000.

Saturdays

0600 UK, BBC London (af): World News. See S 0300.
0600 USA, WWCR #1 Nashville TN: USA Radio News. See S 0400.
0606 USA, WWCR #1 Nashville TN: For the People (hour 2). See T 0607.
0615 UK, BBC London (af): Letter from America. See S 1230.
0615 USA, WWCR #3 Nashville TN: Lyon Gold and Silver Magnet Program. Jackie Lyon hawks a variety of products for healing.
0630 Austria, R Austria Intl: Report from Austria. See S 0130.
0630 UK, BBC London (af): African News. See S 1740.
0631 UK, BBC London (af): African Quiz (1). See S 0330.
0631 UK, BBC London (af): This Week and Africa. See A 0431.

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	6980am	7385am		
0700-0704	Croatia, Croatian Radio	11730au			
0700-0800	Ecuador, HCJB	5865eu	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			
0700-0756	Romania, R Romania Intl	11940af	15105af	17775af	
0700-0800	Russia,Voice of Russia WS	5905na	5920na	5930na	6005na
	6065na 6150na	7175na	7330na	9580na	12025as
	12055as 15460as	15470as	17570as	17795as	17860as
	21790as				
0700-0710	Sierra Leone, SLBS	3316do			
0700-0800	Singapore, SBC Radio One	6160do			
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			
0700-0715	UK, BBC African Service	6005af	6190af	9600af	11940af
		17830af			
0700-0800 as	UK, BBC African Service	17885af			
0700-0800	UK, BBC Asian Service	7145pa	9740as	11955pa	15310as
		15360as	17760as	17790as	21660as
0700-0730	UK, BBC World Service	5975am	6175am	6180eu	6195eu
		7325eu	9410eu	11760me	12095eu
		15485eu	15565eu	15575as	17640eu
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	9930as	11565pa	
0700-0800	USA, WEWN Birmingham AL	5825eu			
0700-0800	USA, WHRI Noblesville IN	5760am	7315am		
0700-0800	USA, WJCR Upton KY	7490na			
0700-0800	USA, WRMI/R Miami Intl	9955am			
0700-0800	USA, WRNO New Orleans LA	7395am			
0700-0800	USA, WWCR Nashville TN	2390am	3210am	5070am	5935am
0700-0800	USA, WYFR Okeechobee FL	7355eu	9355na	9985eu	13695af
0700-0800 vl	Vanuatu, Radio	3945do	4960do		
0700-0730 mtwhfa	Vatican State, Vatican R	5883eu	7250eu	9645eu	11740eu
		15595va			
0700-0800	Zambia, Christian Voice	6065af			
0700-0800 vl	Zambia, R Zambia/ZNBC 1	7220do			
0700-0800 vl	Zimbabwe, Zimbabwe BC	5975do			
0715-0730 s	Greece, Voice of	7430eu	7450eu	9425au	9775au
		11645eu			
0715-0730	UK, BBC African Service	6005af	6190af	9600af	11940af
		15400af	17830af		
0715-0730	UK, BBC World Service	9635eu	11680eu	11845eu	13745eu
		15325eu			
0730-0800	Georgia, Radio	11805eu			
0730-0745 s	Greece, Voice of	7430eu	7450eu	9425au	9775au
		11645eu			
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	UK, BBC African Service	6190af	9600af	11940af	15400af
		17830af			
0730-0800	UK, BBC World Service	5975am	6175am	7325eu	9410eu
		11760me	12095eu	15485eu	15565eu
		17640eu			
0730-0800 as	UK, BBC World Service	15575as			
0730-0745	UK, BBC World Service	5875eu	7260eu		
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		
0745-0800 as	Monaco, Trans World Radio	9755eu			
0755-0800 mtwhf	Monaco, Trans World Radio	9755eu			
0758-0800 as	New Zealand, R NZ Intl	9700pa			

0800 UTC

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	6980am	7385am		
0800-0804	Croatia, Croatian Radio	11730au			
0800-0857	Czech Rep, Radio Prague	9505eu	11600as		
0800-0900	Ecuador, HCJB	5865eu	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	11785as		
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	15460as
		17795as	17860as		
0800-0900 f	Seychelles, FEBA Radio	15540as			
0800-0810	Sierra Leone, SLBS	3316do			
0800-0900	Singapore, SBC Radio One	6160do			
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 as	UK, BBC African Service	17885af			
0800-0810	UK, BBC Asian Service	7145pa	11750as	11955pa	15310as
		15360as	17760as	17790as	21660as
0800-0900	UK, BBC World Service	7325eu	9410eu	11760me	12095eu
		15485eu	15565eu	17640eu	
0800-0900 as	UK, BBC World Service	15575as			
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			
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			
0810-0900	UK, BBC Asian Service	9740as	11750as	11955pa	15310as
		15360as	17760as	21660as	
0815-0900 mtwtf	Nigeria, FRCN/Radio	3326do	4770do	4990do	
0816-0900 mtwhf	New Zealand, R NZ Intl	9700pa			
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	11990as	17485au	21705au	
0830-0900	UK, BBC African Service	6190af	11940af	15400af	17830af
0855-0900	Guam, TWR/KTWR	15330pa			

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			
0900-1000	China, China Radio Intl	9785pa	11755pa		
0900-1000	Costa Rica,RF Peace Intl	6980am	7385am		
0900-0904	Croatia, Croatian Radio	11730au			
0900-1000	Ecuador, HCJB	5865eu	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		
0900-1000	Guam, TWR/KTWR	15330as			
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	9825au	9835au	9875as	17795as
		17860as			
0900-1000	Singapore, SBC Radio One	6160do			
0900-1000 vl	Solomon Islands, SIBC	5020do			
0900-1000	UK, BBC African Service	6190af	11940af	15400af	17830af
		17885af			
0900-0915	UK, BBC Asian Service	6065as	6195as	9580as	9740as
		11750as	11765as	11955as	15280as
		15310as	15360as	17760as	17790as
		21660as			
0900-1000	UK, BBC World Service	9410eu	11760me	12095eu	15190sa
		15485eu	15565eu	15575as	17640eu
		17705af			
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		
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		
0915-0945	UK, BBC Asian Service	6065as	6195as	7235as	9580as
		9740as	11750as	11765as	11955as
		15280as	15360as	21660as	
0915-0945 as	UK, BBC Asian Service	6065as	6195as	7235as	9580as
		9740as	11765as	11955as	15280as
		15360as	21660as		
0915-0930	UK, BBC World Service	11680eu	13745eu	15325eu	15340eu
		17695eu			
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			
0945-1000	UK, BBC Asian Service	6195as	9740as	11750as	11765as
		15360as	21660as		
0945-1000 a	UK, BBC Asian Service	6065as	7235as	9580as	11955as
		15280as			
0945-1000 smtwhf	UK, BBC Slow Speed News	6065as	7235as	9580as	11955as
		15280as			

1000-1100	Anguilla,Caribbean Beacon	6090am			
1000-1030 s	Armenia, Voice of	15270eu			
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	6980am	7385am		
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	9825au	9835au	9875au	11820as
		11880as	15470as	15560as	17755as
		17795as	17860as		
1000-1100	Singapore, SBC Radio One	6160do			
1000-1100 vl	Solomon Islands, SIBC	5020do			
1000-1100	UK, BBC African Service	6190af	11940af	17885af	
1000-1100 as	UK, BBC African Service	15400af	17830af		
1000-1100	UK, BBC Asian Service	6195as	9740as	11750as	11765as
		15310as	15360as	17790as	21660as
1000-1100	UK, BBC World Service	9410eu	11760me	12095eu	15485eu
		15565eu	15575as	17640eu	17705af
1000-1100 as	UK, BBC World Service	15190sa			
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		
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			
1000-1025	Vietnam, Voice of	5940as	7270as	7400as	9840as
		12020as			
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	Sri Lanka, Sri Lanka BC	11835as	15120as	17850as	
1030-1055	UAE, Radio Dubai	13675eu	15395eu	21605eu	

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.

GROVE

Our Complete Buyer's Guide

January 1998

RETURN OF THE FABLED AR-8000—SEE BELOW

Save this Guide for your future product needs (punch out marked holes for binder). We carry a complete line of radio scanners, shortwave receivers, satellite communications equipment, monitoring software, antennas, books and accessories. Don't see what you need? Call us!

More Grove product information can be requested by phone, fax, ground mail, or e-mail. Please visit us on-line at **www.grove.net**.

It's Baaack! The Renowned AR-8000B!

Want the most feature-packed handheld scanner in the world? It's available again—from Grove!

With wide frequency coverage—500 kHz-1900 MHz (less cellular), 1000 memory channels, AM/FM/SSB reception, selectable tuning steps from 50 Hz-999.995 kHz. An oversized, edgelit LCD window holds 44 bold alphanumeric characters.

Autostore, RS232 control, power saver, keyboard beep defeat, and selectable-channel display blanking. Dial tunes frequencies and channels. Dual VFOs and 30-channel-per-second scan/search speed.

Each channel may be programmed for frequency, mode, audio or carrier squelch with programmable 1-99 second delay, 10-dB attenuator, step size, channel offset, and channel designator. Any channel priority sampling, LCD, S-meter/spectrum display unit!

Interchangeable NiCd/alkaline batteries (4AA NiCds and charger included); a universal external power jack for mobile use; an internal ferrite antenna for medium-wave reception; illustrated 115-page owner's manual.

ORDER SCN 27 only **$599.95**

ACCESSORIES

ACC157	Optolinx Universal Interface	$129.95
BAT 1	AA Alkaline batteries	$.79
BAT 13	Extra AA Nicad batteries	$2.75 ea
CAS 2	Genuine Leather case for AR-8000	$29.95
CTR 8	Optoelectronics Scout 3.1	$399.95
ACC156	SAC-8000 Interface Cable	$34.95
PWR 2	Desktop Charger	$59.95
SFT 2	Scancat Gold Software	$94.95

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

Judy Bob

A new year is upon us,

seemingly without warning! Happily, the anti-scanner scare that prevailed for much of 1997 seems to have dissipated, and lawful scanner listening is again a growing industry.

Shortwave, too, is enjoying a comeback as propagation conditions become more favorable while we head toward the sunspot maximum. Over the next few years, listening to international broadcasting, worldwide ship-to-shore and air--to-ground communications, military and government operations, ham radio contacts, mysterious signals, and more will improve steadily. Just check out this month's equipment bargains!

A casual glance at the Grove Buyer's Guide reveals that we have kept pace with the growing trend, and we invite you to share in our findings: good equipment at good prices, an unbeatable combination in any buyer's guide!

Bob & Judy Grove

FREE Shortwave/Scanner Books

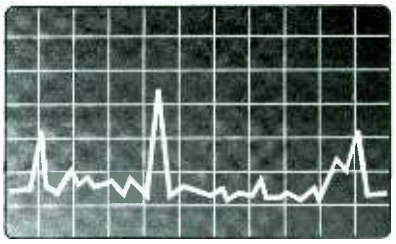
Order any shortwave receiver in this Buyer's Guide and receive FREE Bob Grove's *Shortwave Directory* (Bok 14-94), a $9.95 value. Order any scanner in this Guide and receive a FREE *Monitoring the Military* (Bok 15), also a $9.95 value.

Trade In, Trade Up!

Grove Enterprises offers liberal trade-in allowances for your used receiving equipment and accessories. When you call to place your order for anything from Grove, simply describe what you have to our operators. They will tell you what your equipment is worth, substantially lowering your cost when you order from Grove!

All trade-in equipment is carefully checked out before resale, reconditioned if necessary, and carries a 90-day performance warranty. Give Grove a call now to find out how you can participate in our trade-in program, and see Bob's Bargain Bin on the World Wide Web (**www.grove.net/hmpgbbb.html**) for a current list of our used radio equipment.

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



Superb 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**

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-controlled 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**

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 "f". **Accessories: ANT 2, ANT 7, SDU 5000 and SFT 2 beginning on page "m".**

ORDER RCV 12 only **$1895.95**

See SDU 5000 Spectrum Display and Computer control software elsewhere on this page

AR-5000 PLUS 3: A BENCHMARK

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!

PLUS PERFORMANCE

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

AR7030 PLUS

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 "f". **Accessories: ANT 2, SPK 13, ANT 24 beginning on page "m."**

ORDER RCV 17 only **$1269.95**

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

New, Improved Drake R8-B

- *Selectable Sideband Synchronous Detection*
- *Increased scanning speed*
- *1000 memory channels*

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 "f". **Accessories: ACC 43, ANT 2, ANT 24, MAN 2, SPK 2, and SPK 13 beginning on page "m".**

ORDER RCV 3 only **$1159.95**

UPS Second Day Air at Ground Rates on ALL PRODUCTS!

GROVE

Bargain-Priced JRC NRD-345

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 "f". **Accessorices: ANT 2, ANT 3, SPK 13 beginning on page "m."**

ORDER RCV 20 only **$799.95**

Drake SW8

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 "f". **Accessories: ANT 2, ANT 24, CAS 10, SPK 13, and TUN 4A beginning on page "m".**

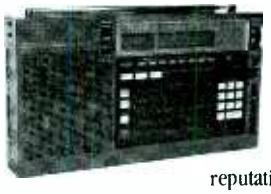
ORDER RCV 19 only **$779.95**

Tiny Sangean SR-77

This tiny (3" x 1.5" x 0.5") FM/AM radio pulls in distant stations and delivers high quality FM stereo reception to its tiny earphones (included). Deep Bass Boost. Runs on one AAA battery.

ORDER RCV 15 only **$29.95**

SONY ICF-2010



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 "f". **Accessories: ANT 3, ANT 32, BAT 1, BAT 2, SPK 13, WP04, and TUN 4A beginning on page "m."**

ORDER RCV 2 only **$349.95**

NEWLY UPDATED SONY ICF-SW7600GS

Now includes an LPI Shortwave Active Antenna and AC adaptor!

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 "f". Requires 4 AA cell batteries. **Accessories: ANT 3, ANT 2, ANT 32, BAT 1, SPK 11, and TUN 4A, beginning on page "m."**

ORDER RCV 11 only **$249.95**

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 "f".

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**

Other Grove Shortwave Receivers

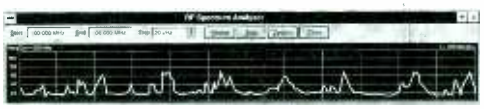
Drake				
Drake SW2	RCV-18	Tabletop 100 kHz-30 MHz, AM, synch AM, USB/LSB 50 Hz tuning, 100 memory channels	$489.95	BRK-12, ACC9, BRK-13, ANT-3, ANT-15, SPK-13, TUN-4A
Grundig				
Yacht Boy 400	RCV-22	Portable 160 kHz-30 MHz, 87.5-108 MHz, AM, FM USB/LSB 5/1 kHz tuning 40 memory channels	$199.95	ANT-3, 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-10	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

WiNRADiO WR-1000i

The receiver of your dreams on your computer screen!

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

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 (PC card must be installed in computer).. 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 "f" in this Buyer's Guide. **Accessories: TUN 4A, ANT 1, ANT 2, ANT 3, ANT 7, ANT 9, ANT 15, SPK 13, CBL 50 and CBL 100 beginning on page "m".**

ORDER RCV 16 only **$499.95**

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**

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 "f". **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**

Versatile Sangeans

Great values—with or without tape recorder!

ATS-818

ORDER RCV 7 only **$149.95**

ATS-818CS

ORDER RCV 9 only **$219.95**

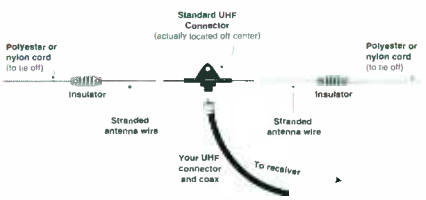
w/cassette recorder

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 "f".

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."**

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**

UPS Second Day Air at Ground Rates on ALL PRODUCTS!

GROVE

GROVE TUN-4A MINITUNER PLUS

Here's 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**

STONER-DYMEK

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, weatherproof remote amplifier/whip assembly. Includes AC power supply, 50 feet RG-58/U coax, remote amplifier, 4' stainless-steel whip, receiver-interconnect cable (RCA) for radios with screw terminals; for PL-259 or 1/8" miniplug connector, order ADPK 2 (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.

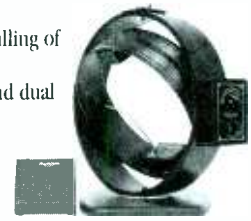
No batteries, power, or connection required; the 11", high-Q loop antenna focuses its captive signals to your radio's internal ferrite loop. If your receiver requires an external antenna, a convenient 3.5 mm (1/8") jack and plug provided.

ORDER ANT 21 only **$59.95**

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

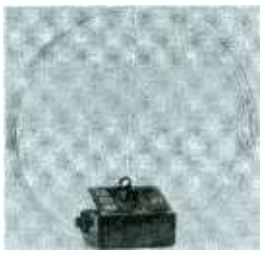
Enjoy Crystal Clear Sound!

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 **$194.95**

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**

NEW! KIWA POCKET REGENERATION MODULE adds up to 18 dB of frequency-selective gain to your Pocket Loop from 530 kHz to beyond 10 MHz! **Order ACC01, only $47.95.**

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 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-808	Sangean ATS-818CS	Sangean ATS-909	Sony ICF-SW77	Sony ICF-SW100	Sony ICF-SW2010	Sony ICF-SW7600GS	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	$249.95	$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	100 kHz-30 MHz, 87-108.118-137MHz	150kHz-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
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
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	1000 Channels	400 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	45 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	20/40		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
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 (Typical)	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	Yes	Yes	No	No	No	No		No	No	Internal prog. cassette	No	Yes	No	No	No	No
Signal Strength Ind.	Analog S-meter	LCD Bargraph	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 (typical)	0.6 uV	0.5 uV	0.5 uV	0.5 uV	0.5 uV		0.3 uV	0.3 uV								0.35 uV
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 (-6/-60dB)	3/6/15/40/110/220 kHz	2.2/4/5.3/9.5 kHz	6/4/2.3/1.8 kHz; 500 Hz	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	4/10 kHz wide, 2/6 kHz narrow	Wide/narrow AM	Wide/narrow switch 6.5 kHz AM	Wide/narrow AM			Wide 9/18 kHz Narrow 4/18 kHz		AM/SSB 6 kHz; NFM 17 kHz; WFM 280 kHz
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	
Adjustable Notch Filter	No	No	500-5000 Hz, 40 dB	No	No	No		No	No	No	No		No	No	No	
Antenna Connector	SO-239 & 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 (W"xH"xD")	8.5x3.5x10	9.5x3.5x9	13.5x5.25x13	11x4.5x7.5	11.5x5.25x13	7.75x4.62x1.75	5x1.25x7.75"	10x4x9"D	7.5x5x1.5"D	11.25x7.37x2.75	8.5x5x1.5	10.87x6.87x1.87	4.37±2.87±93	11.37x6.25x2.16	7.27x4.72x1.25	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.	AC adaptor	Manual, AC adaptor		AC adaptor, wire antenna	Tele. whip/AC adaptor	Reel ant./case/earphone/SW Guide/6AA batteries	Whip antenna, computer calbe, program disk, AC adaptor	AC acaptor	Soft pouch/stereo earphones/external antenna adaptor	AC adapt./ ext. ant adaptor/ SW Guide	AC adapt./ 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/LPI active antenna/AC adaptor	3-1/2" disk

ICOM R8500

One of the World's Very Best Scanning Receivers

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—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, 12 VDC / 120 VAC operation.

High stability crystal oscillators and multiple tuning speeds. 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. See specifications on page "l". **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 **$1999.95**

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,

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 "l".

Call for price and availability (available pending FCC approval)

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!

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 "l". **Accessories: ACC 3, ACC 4, ADPK 4, ANT 8, ANT 14, CAS 1-N, DCC 5, AND SFT 2 beginning on page "m".**

ORDER SCN 06 only **$499.95**

SP-200B Sound Enhancer

An effective, multi-functional accessory to increase the intelligibility and sound quality of voice, music, and data on **any scanner or shortwave receiver..**

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**

New ICOM PCR1000 Wide-Coverage Computer Receiver Module!

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". **Accessories: DCC 2, DCC 4, and DCC05.**

ORDER RCV 21 only **$499.95**

New TrunkTracker BC895XLT

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 "l". **Accessories: see BRK 2,m ACC 15, SFT2 and DCC 3 beginning on page "m".**

ORDER SCN 09 only **$369.95**

NOTE: Custom leather cases available from Bee Electronics for the Relm HS200, AR-8000, BC-3000, BC-220/230/235 and PRO-90, only $29.95 each! See the "Carrying Cases" category in the product listings on page "m" to find case for your particular handheld scanner.

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 "l". **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). Pre-programmed service search.

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 "l". **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 "l". **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

Relm MS 200 Mobile-Base Scanner

New!

This new, advanced scanner covers 29-54, 118-174, 406-520, and 806-960 MHz (less cellular), and provides 200 memory channels in 10 banks. High sensitivity (0.5 uV) and sharp selectivity (50 dB adjacent channel rejection) assist crowded band listening, while powerful 2 watt audio breaks through the noisiest listening environment.

Fast, 100-channel-per-second scanning/searching assures rapid signal acquisition, while PL/CTCSS and DPL/DCS squelch fine-tunes your listening requirements! Features include priority, PC programming capability, alphanumeric display, weather scan/alert, and more! AC wall adaptor, cigarette lighter cord, attachable antenna, mobile bracket, and full instructions provided at no extra charge!

ORDER SCN 15 only $279.95

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 "l". **Accessories: ANT 8, ANT 14, BAT 1, BAT 13, CAS 11, and DCC 3 beginning on page "m".**

ORDER SCN 08 only $249.95

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

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 "l". **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

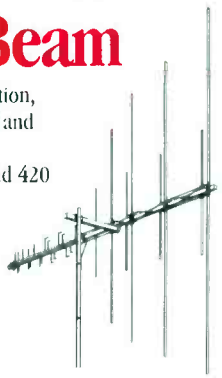
Note: Shipping charges for some full-sized outdoor antennas are different than for other items in this Buyer's Guide. Please add $11 shipping for ANT 01 and ANT 07.

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 8'11 x 5'W. **Accessory: CBL50 or CBL100.**

ORDER ANT 01 only $59.95

THE SCANTENNA

SPECIAL: Now includes 50' of coax cable plus Motorola and BNC connectors!

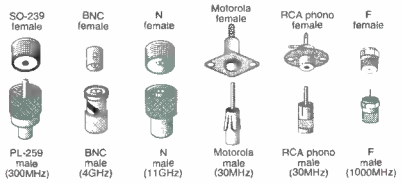
This omnidirectional scanner antenna will equal or outperform any competitor on the market, providing continuous frequency coverage from 25-1300 MHz. Public safety, civilian and military aircraft, hams, maritime, CB — anything in its frequency range! Requires TV type F connector. Approximate size 7-1/2"H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

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-$3.99 each

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 24	BNC female to PL259 male
ADP 25	RCA female to male miniplug
ADP 26	F female to F female barrel (qnty.2)
ADP 27	Banana Plug (qnty.4)
ADP 28	F female to PAL fem. Satellite700
ADP 29	3.5mm female to 2.5mm male mini plug (qnty.2)
ADP 30	Dual BNC female to BNC male T-adaptor (qnty.2)
ADP 31	BNC female to Motorola male
ADP 32	RCA female to male PL-259
ADPK 10	F female to Motorola male
ADPK 13	F male to F male 3ft.cable (qnty.3)
ADPK 14	F/Motorola cable, 3ft.(qnty.2)
ADPK 15	PL259 male to PL259 male 3ft.
ADPK 16	BNC male/ BNC male 3ft cable

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!

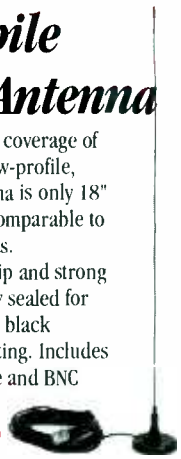
The ANT 8 now features a spring-supported base for greater flexibility—and no increase in price! Extendable from 7 to 47-1/2 inches, the ANT-8 is made of chrome-plated brass and equipped with a standard BNC base. Transmits on 45-960 MHz; receives 25-1300 MHz. Spring-base ANT-19 adjusts from 4"-21" (transmits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

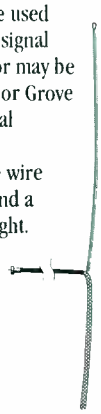
This "rubber duckie" really makes a difference on handheld scanners. The 12" Austin Condor is guaranteed to improve weak signal scanner reception—on all frequency ranges—over the original scanner antenna.

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 adaptors for PL259 (UHF) 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)

UPS Second Day Air at Ground Rates on ALL PRODUCTS!

GROVE

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/B (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

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.

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

Scancat-Gold for Windows®

Computer control your BC895XLT and ICOM R-10! 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.

Order SFT 02W, only $99.95

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

NEW: Scancat-Gold for Windows® SE Upgrade

The SE upgrade to Scancat-Gold for Windows features unlimited graphic 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 02-SE, only $59.95

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

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**

OPTOELECTRONICS CUB. Compact, lightweight, and inexpensive, the Cub is ideal for surveillance countermeasures, frequency hunting, ham, and CB. Wide frequency coverage (1 MHz - 2.8 Ghz) and advanced features (digital filtering, high-visibility LCD, frequency autocapture and hold, selectable gate times, 10 hour battery charge life. Rechargeable battery and AC charger included.

ORDER CRT 9 only **$144.95**

Multipurpose Leatherman® Pocket Tool

As handy and capable as a Swiss Army knife, the Leatherman® incorporates full-size needlenose/regular pliers, wire cutters, knife blade, ruler, can/bottle opener, large and small slot screwdrivers, Phillips screwdriver, metal/wood file/saw, awl/punch—all in a sturdy 4" stainless steel frame.

Comes with leather belt case and 25-year warranty. ORDER TOL 1 only **$39.95**

NEW! LEATHERMAN TOOL ADAPTOR makes your Leatherman a 1/4", tilt-lock, hex drive! Includes six Phillips, Robertson, Torx, and slotted bits, convenient holder, *and* a rugged, leather belt case! Only $19.95 when ordered with the TOL-1 Leatherman tool ($24.95 if ordered separately). Order TOL-2.

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

NOTE: Cellular-Capable Scanners are available only to government agencies and cellular service providers by direct inquiry. These scanners include special versions of the SCN 27 (p. "a"), RCV 12 (p. "b"), RCV 16 (p. "c"), SCN 06 (p. "g"), SCN 01 (p. "g"), and SCN 26 (p. "f").

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-2036 MHz (less cellular)	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)	CB/29.7-54/108-174/-406-512/806-956 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 Hz.1 MHz 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
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	Backlit LCD	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
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 channels	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.	40 chan./sec.	34 channels/sec.	100 ch./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	18	20	10	10	10	10	10	10	20	20	12 service bands
Channel Lockout	1000	Yes	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 channels	40 channels/sec.	300 channels/sec.	Yes, with lockouts	300 channels/sec.	Yes	w/ autostore	Yes	300 ch./sec.	300 ch.sec.	Yes
Delay	Selectable	All channels	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., any ch.	2 sec., any ch	2 sec., all channels
Clock	Clock timer	Yes	No	No	No, sleep timer	No	No	No	No	No	No	No	No	No
Audio Output (typical)	100 mW	1.2 W	180 mW	120 mW	2W	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	LCD bargraph	Analog S meter	No	LCD bargraph	No	No	No	LCD bargraph	No	No	No
Computer Interface	No	RS232C	RS232	CI-V	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 (NFM)	1 uV AM, 0.25 uV SSB, 0.35 uV NFM	0.25uV	.0.3 uV	0.45 uV	0.5 uV	0.7 uV	0.5 uV	0.5 uV	0.3 uV	0.75 uV	Unspecified	0.5 uV	0.5 uV	0.5 uV
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/-60 dB)	(-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	N/A	N/A	N/A	Unspecified	N/A	N/A	N/A
Antenna Connector	BNC	BNC	BNC	BNC	SO-239	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC
Dimensions (W"xH"xD")	2-1/4x6x1	5.5x3x7.9	6x2.75x1.5	2.25x5x1.25	11.25x4.5x8.25	7x2x7.5	2.5x6x1.5	6x2.5x1.7	2.5x6.5x1.75	10.5x3.5x7.5	10.875x3.375x7.5	7.4x2.7x1.5	10.5x3.38x7.5	5.25x1.62x7
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	12 VDC	4 AA cells or 12 VDC (adaptor/charger incl.)	Rechargeable battery, 12VDC	Rechargeable battery, 12VDC	120VAC/12 VDC	12 VDC (AC adaptor included)	6.5 VDC	12 VDC (AC adapt. incl.)	12 VDC
Accessories Incl.	Telescopic whip	Tele. whip/AC adapt./DC adaptor	AC adaptor/flex antenna/DC cord/carrying strap/belt clip	AC adaptor, flex whip, rechargeable batteries	AC acaptor	DC cord/Mobile mounting bracket	Flex antenna/AC charger-adaptor/belt clip/earphone/carrying strap	Flex antenna/belt clip/earphone/extra battery/AC charger-adaptor	Flex antenna/belt clip/earphone, extra battery/AC charger-adaptor	AC adaptor/tele. whip	Telescopic whip.	Rechargeable bat. pack/AC wall adaptor-charger/belt clip/flex antenna/earphone	AC adaptor/tele. whip	Mobile bracket, DC cord, cigarette lighter cord, AC adaptor, telescopic whip, mobile whip

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-1	REGENERATION MODULE FOR ANT-32	$47.95
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-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-15	COMPUTER INTERFACE CABLE FOR BC-895	$29.95
ACC-21	JPS ANC-4 NOISE CANCELLER 100 kHz-80 MHz	$194.95
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	$3.95
ADP-32	RCA FEMALE TO MALE PL-259, ANT-15/24	$3.95
ADPK-1	ADAPTER KIT UHF/F, FTR-6/7/8/9 PRE-5A, ATT-1	$9.95
ADPK-2	PL259 AND 1/8" MINIPLUG ADAPTOR KIT; ANT-24	$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	MOBILE HANGER FOR BELT CLIPS UP TO 1"W	$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-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
BRK-15	AOR-3000 DOUBLE RACK MOUNT	$95.95

CARRYING CASES		
CAS-1-N	ICOM R10 HEAVY-DUTY DURAS NYLON 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	$29.95
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-L	RELM HS-200 LEATHER CASE	$29.95

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-2	3-SOCKET CIGARETTE LIGHTER ADAPTOR	$12.95
DCC-3	MOBILE DC ADAPTOR (1.5,3,4.5,6,7.5,9.12 V, 800 mA)	$12.95
DCC-4	OPC-131 DC POWER CABLE FOR ICOM PCR1000	$12.95
DCC 5	CP-12 DC ADAPTOR W/ NOISE FILTER FOR ICOM R10/PCR 1000	$29.95
DCC-7	MOBILE DC ADAPTOR FOR UNIDEN BC-3000/230/235	$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	$1999.95
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-6	SERVICE MANUAL, AR-5000	$29.95
MICROPHONES		
MIC3	CLIP-ON MICROPHONE, 1/8" PLUG, 10' CORD	$4.95
PHONES		
PHN-2	MAGELLAN'S MINI-M PHONE	$4000.00
PHN-4	CALLER ID AD100	$69.95
PHN-5	O'GARA COMPACT-M SATELLITE PHONE	$4995.00
PHN-5A	O'GARA COMPACT-M SATELLITE PHONE W/ REMOTE	$5145.00
PHN-6	O'GARA MOBIL-F-ONE SATELLITE PHONE	$4495.00
PREAMPLIFIERS		
PRE-1	GRE SUPER PREAMPLIFIER (100-1000 MHz) HANDHELD	$49.95
POWER SUPPLIES		
PWR 1	PORTABLE POWER STATION	$59.95
PWR-2	PSU-101,DESKTOP STAND/CHARGER, +12VDC	$59.95
PWR-3	DAIWA POWER SUPPLY, ADJUSTABLE 9-15 V, 5 AMPS DC	$59.95
PWR-4	+12 VDC ADAPTOR, 800 MA,2.1 mm PLUG	$14.95
PWR-9	+6VDC ADAPTOR 700 mA.SONY SW-7600G	$19.95
PWR-12	AC ADAPTOR, 500mA +/- 3/4.5/6/7.5/9/12V, 5 PLUGS	$4.95
PWR-13	SAME AS WR12 BUT UL APPROVED	$9.95
PWR-15	METRO WEST PRO-CHARGE FOR BAT-9	$49.95
PWR-19	+12VDC APAPTOR ,200mA, 2.1 mm PLUG	$7.95
PWR-21	+12VDC ADAPTOR, 500 mA, 2.1 mm PLUG	$9.95
RECORDERS		
REC-2	VOICE IT POCKET RECORDER VT300 (5-MINUTE)	$69.95
ROTATORS/ANTENNA		
ROT-1	HEAVY DUTY WINEGUARD MODEL RT 1000	$59.95
SOFTWARE		
SFT-1	ICOM CS-R10 CLONING ONLY	$12.50
SFT-3	KLINGENFUSS GUIDE TO UTILITIES CD-ROM	$34.95
SPEAKERS		
SPK-2	DRAKE EXTERNAL, DRAKE R8/8A/8B	$48.95
SPK-4	RADIO SHACK PRO-X5 OPTIMUS, 30W MAX.	$45.95
SPK-6	VALOR'S CLASSIC NOISE CANCELLER	$16.95
SPK-8	RADIO SHACK PILLOW SPEAKER	$5.95
SPK-9	RADIO SHACK CLIP-ON MINI SPEAKER	$10.95
SPK-11	NAVAL HTS-3 AMPLIFIED SPEAKER	$29.95
SPK-15	VALOR'S SUN VISOR EXTENTION SPEAKER	$16.95
SPLITTERS		
SPL-1	TV/FM TWO WAY SPLITTER BOX, F FEMALE	$2.95
SPL-2	UNIVERSAL SATELLITE SCPC. ICOM R7100/8500	$64.95
SWITCHES		
SWC-1	DAIWA COAXIAL TWO-WAY SWITCH	$25.95
TRIFIELD METERS		
TST-1	TRIFIELD ELECTRIC/MAGNETIC METER	$119.95
TST-2	TRIFIELD NATURAL EM METER	$199.95
TOOLS		
TOL-1	LEATHERMAN POCKET TOOL W/LEATHER BELT CASE	$39.95
TOL-2	LEATHERMAN TOOL ADAPTOR FOR TOL-1	$24.95
WHITE PAPERS BY LARRY MAGNE		
WP-1	ICOM -R71A	$5.95
WP-2	ICOM-R9000	$5.95
WP-3	KENWOOD R-5000	$5.95
WP-4	SONY ICF-2010	$5.95
WP-6	FRG-100	$5.95
WP-7	LOWE HF-150	$5.95
WP-9	HOW TO INTERPRET SPECIFICATIONS	$5.95
WP-10	DRAKE SW8	$5.95
WP-11	OUTDOOR ANTENNAS	$5.95

BOOKS (ALL LATEST EDITIONS)

(See some of our best selling books at right)

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BOK-2V	SCANNER MOD. HANDBOOK, VOLUME II, BILL CHEEK	$17.95
BOK-3	1998 WORLD RADIO TV HANDBOOK	$24.95
BOK-4	CONFIDENTIAL FREQUENCY LIST, GEOFF HALLIGEY	$24.95
BOK-5	SCANNER & SHORTWAVE ANSWER BOOK, BOB GROVE	$12.95
BOK-6	3D OFFICIAL AERONAUT. FREQ DIR, ROBERT A. COBURN	$21.95
BOK-8	TOP SECRET REGISTRY OF U.S. GOVT. RADIO FREQUENCIES	$21.95
BOK-9	VHF MARINE RADIO SCAN. GUIDE, EVERETT L. SLOSMAN	$6.95
BOK-12-94	NAT'L. SPORTS & ENTERTAINMENT FREQ. GUIDE, BARNETT	$4.95
BOK-14-94	SHORTWAVE DIRECTORY, BOB GROVE (LOOSE LEAF)	$9.95
BINDER	BINDER FOR BOK-14	$8.95
BOK-14-94	SHORTWAVE DIRECTORY, BOB GROVE (W/BINDER)	$14.95
BOK-18	1998 PASSPORT TO WORLD BAND RADIO, LARRY MAGNE	$19.95
BOK-19	SATELLITE TV SOURCEBOOK, KEN REITZ	$3.95
BOK-21-29	POLICE CALL PLUS (SPECIFY STATE), GENE HUGHES	$12.95
BOK-30	ANTIQUE RADIOS, MARTY & SUE BUNIS	$18.95
BOK-31	RADIO'S FIRST 75 YEARS, B. ERIC RHOADS	$39.95
BOK-32	ARRL RADIO FREQUENCY INTERFERENCE HANDBOOK	$14.95
BOK-33	RADIO ON THE ROAD, WILLIAM HUTCHINGS	$14.95
BOK-34	KLINGENFUSS 97 SW FREQ. DIR., JOERG KLINGENFUSS	$36.95
BOK-35	COLLECTOR'S GUIDE TRANSISTOR RADIOS, M. & S. BUNIS	$15.95
BOK-36	THE GPS MANUAL, PRINC & APPS ,S. DYE & F. BAYLIN	$39.95
BOK-38	CRYSTAL SET PROJECTS, PHILLIP N. ANDERSON	$14.95
BOK-47	PIRATE RADIO, ANDREW YODER	$29.95
BOK-48	RAILROAD RADIO FREQUENCIES, STURM & LANDGRAF	$16.95
BOK-50	RADIO MONITORING, J. (SKIP) AREY	$19.95
BOK-51	INTERNATIONAL CALLSIGN HANDBOOK, GAYLE VAN HORN	$9.95
BOK-53-97	M-STREET JOURNAL, ROBERT UNMACHT,ED.	$48.95
BOK-54	GUIDE TO UTILITIES, JOERG KLINGENFUSS	$39.95
BOK-56	WEATHER SATELLITE HANDBOOK,RALPH TAGGART	$19.95
BOK58-98	1998 ARRL HANDBOOK	$32.00
BOK-59	SHORTWAVE RECEIVERS PAST & PRESENT, FRED OSTERMAN	$24.95
BOK-62	THE ULTIMATE SPY BOOK, KEITH MELTON	$29.95
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BOK-64	FM ATLAS, BRUCE ELVING	$14.95
BOK-65	RADIOS BY HALLICRAFTERS, CHUCK DACHIS	$29.95
BOK-69	SW RADIO LISTENER'S GUIDE, ANITA LOUISE MC CORMICK	$11.95
BOK71	PHILCO RADIO'S 1928 - 1942, MICHAEL PROSISE	$29.95
BOK-72	COMMUNICATIONS RCVRS VACUUM TUBE ERA, E. RHOADS	$19.95
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BOK-102B	ZENITH RADIO, THE EARLY YEARS, H. CONES & J. BRYANT	$29.95
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BOK-108	VISUAL DICTIONARY OF SPECIAL MIITARY FORCES	$16.95

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FREQUENCIES

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	6980am	7385am		
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			
1100-1125	Mozambique, R Maputo	11835do			
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	6205as	9450as	11655as	11820as
		11880as	12025as	12065as	15460as
		15470as	15560as	17755as	17795as
		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	
1100-1200	Switzerland, Swiss R Intl	9885as	12075as	13635as	
1100-1200	Taiwan, Voice of Asia	7445as			
1100-1200	UK, BBC African Service	6190af	11940af	15400af	17830af
		17885af	21660af		
1100-1130	UK, BBC Asian Service	7235as	9580as	9700pa	9740as
		11750as	11765as	11955as	15310as
		17790as			
1100-1130 mtwhf	UK, BBC Caribbean Report	6195ca	15220ca		
1100-1130	UK, BBC World Service	5875eu	5965na	9410eu	9825eu
		11760me	12095eu	15485eu	15565eu
		15575as	17640eu	17705af	17790sa
1100-1130 as	UK, BBC World Service	6195am	15190sa	15220am	
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		
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 mtwhfa	Vatican State, Vatican R	5883eu	9645eu	11740eu	15595va
		17550va			
1100-1125	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		
1115-1130	UK, BBC World Service	11805eu	13745eu	15325eu	15340eu
		17695eu			
1115-1130 mtwh	UK, BBC World Service	9750eu	11970eu		
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	15650na		
1130-1140	Lesotho, Radio Lesotho	4800do			
1130-1200	Myanmar, Voice of	5990do			
1130-1200	Netherlands, Radio	6045eu	7190eu		
1130-1200	South Korea, R Korea Intl	9650am			
1130-1200	UK, BBC Asian Service	6195as	7235as	9580as	9740as
		11750as	11955as	15310as	
1130-1200 as	UK, BBC Asian Service	11750as	15310as		
1130-1200	UK, BBC World Service	5965na	6195am	9410eu	11760me
		12095eu	15220am	15485eu	15565eu
		15575as	17640eu	17705af	
1130-1150 f	Vatican State, Vatican R	15595va	17550va		

SELECTED PROGRAMS

Sundays

1100 Taiwan (Voice of Asia): Pop Songs.
1100 UK, BBC London (af): News Summary. One minute news update.
1101 UK, BBC London (af): In Praise of God. See S 0230.
1130 Taiwan (Voice of Asia): News
1130 UK, BBC London (af): Play of the Week. A different radio drama program each week.
1130 USA, WWCR #1 Nashville TN: A Call to Worship. Bernie Timmerman.
1130 USA, WWCR #3 Nashville TN: The Street Preacher. See S 0430.
1145 Taiwan (Voice of Asia): Let's Learn Chinese.
1145 USA, WWCR #3 Nashville TN: The American Catholic. John Powell speaks from Chicago.

Mondays

1100 Taiwan (Voice of Asia): Asian Culture.
1100 UK, BBC London (af): Newsdesk. See S 0400.
1100 USA, WWCR #1 Nashville TN: Truth House. Evangelistic teachings by E.C. Fultcher plus his global shortwave club.
1100 USA, WWCR #3 Nashville TN: The Mason Weaver Show. A talk radio program from the American Freedom Network.
1130 Taiwan (Voice of Asia): News
1130 UK, BBC London (af): John Peel. Tracks from newly released albums and singles from the contemporary music scene.
1145 Taiwan (Voice of Asia): Let's Learn Chinese.

Tuesdays

1100 Taiwan (Voice of Asia): Touring Asia.
1100 UK, BBC London (af): Newsdesk. See S 0400.
1100 USA, WWCR #1 Nashville TN: Truth House. See M 1100.
1100 USA, WWCR #3 Nashville TN: The Mason Weaver Show. See M 1100.
1130 Taiwan (Voice of Asia): News
1130 UK, BBC London (af): Jazzmatazz. The request program that lives up to its title.
1145 Taiwan (Voice of Asia): Let's Learn Chinese.

Wednesdays

1100 Taiwan (Voice of Asia): World of Science.
1100 UK, BBC London (af): Newsdesk. See S 0400.
1100 USA, WWCR #1 Nashville TN: Truth House. See M 1100.
1100 USA, WWCR #3 Nashville TN: The Mason Weaver Show. See M 1100.
1130 Taiwan (Voice of Asia): News
1130 UK, BBC London (af): Variable Comedy/Quiz Feature. These programs are panel quizes and other light entertainment in a format heard in America decades ago.
1145 Taiwan (Voice of Asia): Let's Learn Chinese.

Thursdays

1100 Taiwan (Voice of Asia): Variety.
1100 UK, BBC London (af): Newsdesk. See S 0400.
1100 USA, WWCR #1 Nashville TN: Truth House. See M 1100.
1100 USA, WWCR #3 Nashville TN: The Mason Weaver Show. See M 1100.
1130 Taiwan (Voice of Asia): News
1130 UK, BBC London (af): Variable Feature. See S 0615.
1145 Taiwan (Voice of Asia): Let's Learn Chinese.

Fridays

1100 Taiwan (Voice of Asia): Music Gallery.
1100 UK, BBC London (af): Newsdesk. See S 0400.
1100 USA, WWCR #1 Nashville TN: Truth House. See M 1100.
1100 USA, WWCR #3 Nashville TN: The Mason Weaver Show. See M 1100.
1130 Taiwan (Voice of Asia): News
1130 UK, BBC London (af): Andy Kershaw's World of Music. Recordings of diverse music from around the world.
1145 Taiwan (Voice of Asia): Let's Learn Chinese.
1154 Radio Netherlands: Documentary. Berlin--The Once and Future Capital (9th). See A 2354.
1154 Radio Netherlands: Documentary. Italy--Cultural Heritage (30th). See A 0054.
1154 Radio Netherlands: Documentary. Italy--Young & Old (23th). See F 2354.
1154 Radio Netherlands: Documentary. The Netherlands--Liberalism versus The Rules (16th). See F 1454.
1154 Radio Netherlands: Documentary. Time (2nd). See W 1254.

Saturdays

1100 Taiwan (Voice of Asia): Letterbox/Songs by Request.
1100 UK, BBC London (af): News Summary. See S 1100.
1100 USA, WWCR #3 Nashville TN: News from Ireland. A relay of Irish news from RTE Radio 1 in Dublin.
1101 UK, BBC London (af): Variable Feature. See S 0615.
1130 Taiwan (Voice of Asia): News
1130 UK, BBC London (af): Jive Zone. See H 1615.
1130 USA, WWCR #3 Nashville TN: The Way of Truth. Gary Dull evangelizes from Pennsylvania.
1145 Taiwan (Voice of Asia): Let's Learn Chinese.

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	6950pa	7385pa	9715as	11660as
1200-1230 vl	China, China Radio Intl	6995as	8660as	11445as	11700as
		12110as			
1200-1300	Costa Rica,RF Peace Intl	7385am	21465am		
1200-1300	Ecuador, HCJB	12005am	15115am	21455am	
1200-1300 as	Eqt Guinea, R East Africa	15186af			
1200-1300	Eqt Guinea, Radio Africa	9530as			
1200-1300	France, Radio France Intl	9810eu	11600as	11615na	13625ca
		15155eu	15195eu	15530af	15540af
		17575am			
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	6205as	7390as	9725as
		9780as	9940as	11695as	11820as
		11880as	12065as	17755as	17795as
1200-1300	Singapore,R Singapore Int	6015as	6155as		
1200-1300	South Korea, R Korea Intl	7285af			
1200-1300	Taiwan, Taipei Radio Intl	7130as	9610au		
1200-1300	UK, BBC African Service	6190af	11940af	15105af	17830af
		17885af	21640af	21660af	
1200-1300	UK, BBC Asian Service	6195as	7235as	9580as	9740as
		11750as	11955as		
1200-1300 as	UK, BBC Asian Service	11750as	15310as		
1200-1215	UK, BBC Asian Service	5975as	7135as	9605as	
1200-1300	UK, BBC World Service	5965na	6195am	9410eu	9515na
		11760me	12095eu	15220am	15485eu
		15565eu	15575as	17640eu	17705eu
1200-1300	Ukraine, R Ukraine Intl	7285na	17725au		
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		
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
1200-1300	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			
1230-1300	Bangladesh, Bangla Betar	7185as	9550as		
1230-1300	Guam, AWR/KSDA	13720as			
1230-1300	Netherlands, Radio	5975eu	6045eu		
1230-1300	South Korea, R Korea Intl	9570as	9640as	13670as	
1230-1300	Sri Lanka, Sri Lanka BC	9730as	15425as		
1230-1300	Sweden, Radio	11650na	13740na	15240na	
1230-1300	Thailand, Radio	9810as			
1230-1300	UK, BBC World Service	5875eu	9635eu	9750eu	11680eu
		11840eu	11895eu	13670eu	15225eu
		15325eu	17695eu	17715eu	
1230-1300 a	USA, Voice of America	7768eu			
1230-1300	Uzbekistan, R Tashkent	5975as	6025as	9715as	
1230-1300	Vietnam, Voice of	5940as	7270as	7400as	9840as
		12020as			
1240-1250	Greece, Voice of	11645af			
1240-1255 smtwh	UK, BBC Slow Speed News	7140me	11765af	11820me	13660af
		15180af	15555me		

Selected Programs

Sundays

1200 Canada (North-Quebec): News.
1200 UK, BBC London (af): Play of the Week (from 1130). See S 1130.
1200 USA, WWCR #1 Nashville TN: Words of Hope (Paul Bryson). Paul Bryson preaches from Georgia.
1200 USA, WWCR #3 Nashville TN: America's Jukebox Gold. Bryan McKaye spotlights the music of the 50's and 60's.
1205 Canada (North-Quebec): Fresh Air.
1215 USA, WWCR #1 Nashville TN: Ask WWCR. A mailbag program that answers listener questions about the business of shortwave and radio propagation.
1230 UK, BBC London (af): Letter from America. Alistair Cooke shares his inimitable view of contemporary American life.
1245 UK, BBC London (af): Sports Roundup. See S 0315.

Mondays

1200 UK, BBC London (af): World News. See S 0300.
1200 USA, WWCR #1 Nashville TN: World Wide Country Radio (repeat). News, weather and the best of country music.
1200 USA, WWCR #3 Nashville TN: Newswatch Magazine (M-F). David Smith compares world news to bible prophecy.
1205 UK, BBC London (af): World Business Report. See M 0905.
1215 UK, BBC London (af): Britain Today. News about Britain.
1230 UK, BBC London (af): Variable Feature. See S 0615.
1245 UK, BBC London (af): Sports Roundup. See S 0315.

Tuesdays

1200 UK, BBC London (af): World News. See S 0300.
1200 USA, WWCR #1 Nashville TN: World Wide Country Radio (repeat). See M 1200.
1205 UK, BBC London (af): World Business Report. See M 0905.
1215 UK, BBC London (af): Britain Today. See M 1215.
1230 UK, BBC London (af): Westway. The World Service's first-ever regular drama (soap opera) serial.
1230 USA, WWCR #1 Nashville TN: Words of Life. Charles Smith.
1245 UK, BBC London (af): Sports Roundup. See S 0315.
1245 USA, WWCR #1 Nashville TN: Women Who Overcome. Shirley Beaver of California offers advice for women.

Wednesdays

1200 UK, BBC London (af): World News. See S 0300.
1200 USA, WWCR #1 Nashville TN: World Wide Country Radio (repeat). See M 1200.
1205 UK, BBC London (af): World Business Report. See M 0905.
1215 UK, BBC London (af): Britain Today. See M 1215.
1230 UK, BBC London (af): Variable Feature. See S 0615.
1230 USA, WWCR #1 Nashville TN: Word of Life. Gary Allum.
1245 UK, BBC London (af): Sports Roundup. See S 0315.
1245 USA, WWCR #1 Nashville TN: Foundations of Truth. Robert Diamond.
1254 Radio Netherlands: Documentary. Berlin--The Once and Future Capital (7th). See A 2354.
1254 Radio Netherlands: Documentary. Italy--Cultural Heritage (28th). See A 0054.
1254 Radio Netherlands: Documentary. Italy--Young & Old (21th). See F 2354.
1254 Radio Netherlands: Documentary. The Netherlands--Liberalism versus The Rules (14th). See F 1454.
1254 Radio Netherlands: Documentary. Time (31st). Michele Ernsting takes a look at how an awareness of times influences our daily lives.

Thursdays

1200 UK, BBC London (af): World News. See S 0300.
1200 USA, WWCR #1 Nashville TN: World Wide Country Radio (repeat). See M 1200.
1205 UK, BBC London (af): World Business Report. See M 0905.
1215 UK, BBC London (af): Britain Today. See M 1215.
1230 UK, BBC London (af): From Our Own Correspondent. See S 0730.
1230 USA, WWCR #1 Nashville TN: Ken's Country Classics. Key Berryhill with country music from a bygone era.
1245 UK, BBC London (af): Sports Roundup. See S 0315.

Fridays

1200 UK, BBC London (af): World News. See S 0300.
1200 USA, WWCR #1 Nashville TN: World Wide Country Radio (repeat). See M 1200.
1205 UK, BBC London (af): World Business Report. See M 0905.
1215 UK, BBC London (af): Britain Today. See M 1215.
1230 UK, BBC London (af): Westway. See T 1230.
1230 USA, WWCR #1 Nashville TN: The Street Preacher. See S 0430.
1245 UK, BBC London (af): Sports Roundup. See S 0315.
1245 USA, WWCR #1 Nashville TN: First Hand. See M 0200.

Saturdays

1200 Canada (North-Quebec): World Report/Sports.
1200 UK, BBC London (af): World News. See S 0300.
1200 USA, WWCR #1 Nashville TN: USA Radio News. See S 0400.
1200 USA, WWCR #3 Nashville TN: Ken's Country Classics. See H 1230.
1205 UK, BBC London (af): World Business Report. See M 0905.
1205 USA, WWCR #1 Nashville TN: Word of Wisdom. Howard Kirkwood evangelizes from Arkansas.
1210 USA, WWCR #1 Nashville TN: The View from Europe. Harvey Thomas presents the European point of view on current events.
1215 UK, BBC London (af): A Jolly Good Show. See S 1830.
1230 USA, WWCR #3 Nashville TN: World of Radio. See M 0400.
1245 UK, BBC London (af): Football Extra. A review of the week's action and the upcoming weekend matches.
1245 USA, WWCR #1 Nashville TN: Brother Ed. Ed Skultety evangelizes from Oregon.
1255 UK, BBC London (af): Spotlight. Focus on the theater.

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, VL8T 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	7385pa	7405eu	11660pa	11980as
1300-1400	Costa Rica,RF Peace Intl	7385am	21465am		
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			
1300-1359	Poland, Polish R Warsaw	6095eu	7145eu	7270eu	9525eu
		11815eu			
1300-1356	Romania, R Romania Intl	11790eu	15105eu	15250eu	15390eu
		17735eu	17745eu		
1300-1400	Russia,Voice of Russia WS	4730as	4975as	9450as	11695as
		15460as			
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		
1300-1400	Switzerland, Swiss R Intl	7230as	7480as		
1300-1400	UK, BBC African Service	6190af	11940af	15105af	15420af
	17810af 17830af	17885af	21640af	21660af	
1300-1400	UK, BBC Asian Service	5990as	6195as	9740as	11750as
		15310as			
1300-1400	UK, BBC World Service	5965na	6195am	9410eu	9515na
		9590na	11760me	12095eu	15220am
		15485eu	15565eu	15575as	17640eu
		17705eu			
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	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	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	5975as	6025as	9715as	
1330-1355	Vietnam, Voice of	5940eu	7270eu	7400eu	9840as
		12020eu			
1335-1345	Greece, Voice of	9690na	12105eu	15175na	15630na
1345-1400	Vatican State, Vatican R	11625au	13765au		
1350-1400	South Korea, KBS-1	3930do			

Selected Programs

Sundays

1300 Belgium, R Vlaanderen Intl: Brussels Calling (daily).. Belgium's shortwave broadcasts have been reducec this season to four a day. The 1300 broadcast is the onl broadcast specifically for North America.
1300 Canada (North-Quebec): World Report/Sports.
1300 UK, BBC London (af): Newshour. A comprehensive look at the major topics of the day, plus up-to-the-minute international and British news.
1300 USA, WWCR #1 Nashville TN: Voice of Hope. Oliver Fenison.
1300 USA, WWCR #3 Nashville TN: Rock the Universe. R ch Adcock's selections of rock recordings includes some rare treats.
1305 Belgium, R Vlaanderen Intl: Radio World. Updates to international broadcasting schedules.
1311 Canada (North-Quebec): Fresh Air.
1314 Belgium, R Vlaanderen Intl: PO Box 26. Listener letters are read and answered in this mailbox program.
1330 Austria, R Austria Intl: Report from Austria. See S 0130.
1330 USA, WWCR #1 Nashville TN: Words of Hope. Eugene Brown preaches from Nashville, Tennessee.

Mondays

1300 UK, BBC London (af): Newshour. See S 1300.
1300 USA, WWCR #3 Nashville TN: USA Radio News (M-F). See S 0400.
1305 Belgium, R Vlaanderen Intl: Press Review. Stories on the front pages of the day's papers.
1306 USA, WWCR #3 Nashville TN: Daybreak USA (hour 1) (live M-F). The first hour of a morning magazine program from the USA Radio Network.
1311 Belgium, R Vlaanderen Intl: Belgium Today. Current affairs in Belgium.
1315 Belgium, R Vlaanderen Intl: The Arts. Cultural events in the news.
1315 USA, WWCR #1 Nashville TN: Roberta Reads the Word. Roberta Lightfoot.
1321 Belgium, R Vlaanderen Intl: Tourism. Take an audio tour of the sights and sounds of Belgium.
1330 Austria, R Austria Intl: Report from Austria. See S 0130.
1330 USA, WWCR #1 Nashville TN: Bread of Life Victory Hour (1). Brother Jack Meeks offers a free bible study correspondence course.
1330 USA, WWCR #1 Nashville TN: Victory Baptist Church (2/4). David Robinson preaches from Hildebrand, NC.
1345 USA, WWCR #1 Nashville TN: Walking Through the Land of Promises. Bobbie Lively evangelizes from Tennessee.

Tuesdays

1300 UK, BBC London (af): Newshour. See S 1300.
1305 Belgium, R Vlaanderen Intl: Press Review. See M 1305.
1309 Belgium, R Vlaanderen Intl: Belgium Today. See M 1311.
1316 Belgium, R Vlaanderen Intl: Focus on Europe. A report on happenings in the European Economic Community (ECC).
1320 Belgium, R Vlaanderen Intl: Sports Report. A roundup of the results of seasonal sports activities.
1330 Austria, R Austria Intl: Report from Austria. See S 0130.
1330 USA, WWCR #1 Nashville TN: World of Radio. See M 0400.

Wednesdays

1300 UK, BBC London (af): Newshour. See S 1300.
1305 Belgium, R Vlaanderen Intl: Press Review. See M 1305.
1309 Belgium, R Vlaanderen Intl: Belgium Today. See M 1311.
1316 Belgium, R Vlaanderen Intl: Living in Belgium. Belgian lifestyles and activities.
1320 Belgium, R Vlaanderen Intl: Green Society. Environmental issues facing Belgium.
1330 Austria, R Austria Intl: Report from Austria. See S 0130.
1354 Radio Netherlands: Documentary. Berlin--The Once and Future Capital (7th). See A 2354.
1354 Radio Netherlands: Documentary. Italy--Cultural Heritage (28th). See A 0054.
1354 Radio Netherlands: Documentary. Italy--Young & Old (21th). See F 2354.
1354 Radio Netherlands: Documentary. The Netherlands--Liberalism versus The Rules (14th). See F 1454.
1354 Radio Netherlands: Documentary. Time (31st). See W 1254.

Thursdays

1300 UK, BBC London (af): Newshour. See S 1300.
1305 Belgium, R Vlaanderen Intl: Press Review. See M 1305.
1309 Belgium, R Vlaanderen Intl: Belgium Today. See M 1311.
1314 Belgium, R Vlaanderen Intl: Around Town. Current happenings in Brussels and other centers of culture.
1315 USA, WWCR #1 Nashville TN: Living Waters. Spencer Tiernan evangelizes from Minnesota.
1319 Belgium, R Vlaanderen Intl: The Arts. See M 1315.
1330 Austria, R Austria Intl: Report from Austria. See S 0130.
1330 USA, WWCR #1 Nashville TN: The Big Backyard. Thirty minutes of rock music from Australia.

Fridays

1300 UK, BBC London (af): Newshour. See S 1300.
1306 Belgium, R Vlaanderen Intl: Press Review. See M 1305.
1310 Belgium, R Vlaanderen Intl: Belgium Today. See M 1311.
1315 Belgium, R Vlaanderen Intl: Economics. Interview with a person in the field of business, finance, or consumerism or a updating report.
1320 Belgium, R Vlaanderen Intl: International Report. A background report on current affairs in Europe and elsewhere.
1330 Austria, R Austria Intl: Report from Austria. See S 0130.
1330 USA, WWCR #1 Nashville TN: Battle Cry Sounding. Deborah Green evangelizes from El Paso, Texas.

Saturdays

1300 Canada (North-Quebec): World Report/Sports.
1300 UK, BBC London (af): Newshour. See S 1300.
1300 USA, WWCR #3 Nashville TN: The Extraordinary Science Radio Hour. See M 0500.
1305 Belgium, R Vlaanderen Intl: Press Review. See M 1305.
1310 Belgium, R Vlaanderen Intl: Music from Flanders. The weekly concert.
1311 Canada (North-Quebec): Good Morning Quebec.
1315 USA, WWCR #1 Nashville TN: Bible Prophecy for Today. Tom Benvenutti analyzes the news and its application to Bible prophecy.
1330 Austria, R Austria Intl: Report from Austria. See S 0130.
1330 USA, WWCR #1 Nashville TN: Battle Cry Sounding. See F 1330.

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, VL8T 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	7405na	9405na	9535as	11825as
1400-1500	Costa Rica,RF Peace Intl	7385am	21465am		
1400-1430	Czech Rep, Radio Prague	13580na	21700af		
1400-1500	Ecuador, HCJB	12005am	15115am	21455am	
1400-1500 as	Eqt Guinea, R East Africa	15186af			
1400-1500	France, Radio France Intl	7110as	12030as	17560af	
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, SBC Radio One	6155do			
1400-1500	Sri Lanka, Sri Lanka BC	9730as	15425as		
1400-1500	Switzerland, Swiss R Intl	6165eu	9535eu	9885as	12075as
		13635as			
1400-1430	Thailand, Radio	9530as			
1400-1430	Turkey, Voice of	9630as	15290as		
1400-1410 thfs	Turkmenistan, Turkmen R	5015eu			
1400-1500	UK, BBC African Service	6190af	11860af	11940af	15420af
		17830af	17885af	21470af	21490af
		21660af			
1400-1500	UK, BBC Asian Service	5990as	6195as	9740as	11750as
1400-1500	UK, BBC World Service	9410eu	9515na	9590na	12095eu
		15220na	15485eu	15565eu	15575as
		17640eu	17705eu	17840am	
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	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			
1430-1500 mtwhf	Portugal, R Portugal Intl	21515as			
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	9940au	11635au	13765au	
1455-1500	Georgia, Voice of Hope	12120as			

Selected Programs

Sundays

1400 Canada (North-Quebec): News.
1400 UK, BBC London (af): News Summary. See S 1100.
1400 USA, WWCR #1 Nashville TN: Wings of Healing. Evelyn Wyatt directs this international broadcast from Los Angeles.
1400 USA, WWCR #3 Nashville TN: Answers for Life. Gospel music and a sermon by Pastor Hoover of Wichita, Kansas.
1401 UK, BBC London (af): Variable Feature. See S 0615.
1411 Canada (North-Quebec): Sunday Morning (1st hour).
1430 USA, WWCR #1 Nashville TN: Wayne Avenue Church of God. J.C. Wilber preaches from Columbus, Ohio.

Mondays

1400 UK, BBC London (af): World News. See S 0300.
1400 USA, WWCR #1&3 Nashville TN: USA Radio News. See S 0400.
1405 UK, BBC London (af): Outlook. An up-to-the-minute mix of conversation, controversy and color from around the world.
1405 USA, WWCR #1 Nashville TN: Life Issues. John Wilke on events affecting everyday living.
1406 USA, WWCR #3 Nashville TN: Daybreak USA (hour 2) (live). The second hour of a morning magazine program from the USA Radio Network.
1415 USA, WWCR #1 Nashville TN: Spiritual Awakening. James Bean with wisdom from the scriptures.
1430 UK, BBC London (af): Variable Feature. See S 0615.
1435 USA, WWCR #1 Nashville TN: The Bright Spot Hour. Music and meditation by Harold Sightler of Greenville, South Carolina.
1459 USA, WWCR #1 Nashville TN: The Nice Jewish Boy. Jonathan Cahn.

Tuesdays

1400 UK, BBC London (af): World News. See S 0300.
1400 USA, WWCR #1&3 Nashville TN: USA Radio News. See S 0400.
1405 UK, BBC London (af): Outlook. See M 1405.
1405 USA, WWCR #1 Nashville TN: Life Issues. See M 1405.
1406 USA, WWCR #3 Nashville TN: Daybreak USA (hour 2) (live). See M 1406.
1415 USA, WWCR #1 Nashville TN: Spiritual Awakening. See M 1415.
1430 UK, BBC London (af): Multitrack Hit-List. The UK Top 20.
1435 USA, WWCR #1 Nashville TN: The Bright Spot Hour. See M 1435.
1459 USA, WWCR #1 Nashville TN: The Nice Jewish Boy. See M 1459.

Wednesdays

1400 UK, BBC London (af): World News. See S 0300.
1400 USA, WWCR #1&3 Nashville TN: USA Radio News. See S 0400.
1405 UK, BBC London (af): Outlook. See M 1405.
1405 USA, WWCR #1 Nashville TN: Life Issues. See M 1405.
1406 USA, WWCR #3 Nashville TN: Daybreak USA (hour 2) (live). See M 1406.
1415 USA, WWCR #1 Nashville TN: Spiritual Awakening. See M 1415.
1430 UK, BBC London (af): Megamix. A youth magazine series which covers new trends, entertainment, sport and other issues.
1435 USA, WWCR #1 Nashville TN: The Bright Spot Hour. See M 1435.
1459 USA, WWCR #1 Nashville TN: The Nice Jewish Boy. See M 1459.

Thursdays

1400 UK, BBC London (af): World News. See S 0300.
1400 USA, WWCR #1&3 Nashville TN: USA Radio News. See S 0400.
1405 UK, BBC London (af): Outlook. See M 1405.
1405 USA, WWCR #1 Nashville TN: Life Issues. See M 1405.
1406 USA, WWCR #3 Nashville TN: Daybreak USA (hour 2) (live). See M 1406.
1415 USA, WWCR #1 Nashville TN: Spiritual Awakening. See M 1415.
1430 UK, BBC London (af): Multitrack X-Press. New pop records, interviews, news and competitions.
1435 USA, WWCR #1 Nashville TN: The Bright Spot Hour. See M 1435.
1459 USA, WWCR #1 Nashville TN: The Nice Jewish Boy. See M 1459.

Fridays

1400 UK, BBC London (af): World News. See S 0300.
1400 USA, WWCR #1&3 Nashville TN: USA Radio News. See S 0400.
1405 UK, BBC London (af): Outlook. See M 1405.
1405 USA, WWCR #1 Nashville TN: Life Issues. See M 1405.
1406 USA, WWCR #3 Nashville TN: Daybreak USA (hour 2) (live). See M 1406.
1415 USA, WWCR #1 Nashville TN: Spiritual Awakening. See M 1415.
1430 UK, BBC London (af): Multitrack Alternative. Latest developments on the British music scene.
1435 USA, WWCR #1 Nashville TN: The Bright Spot Hour. See M 1435.
1454 Radio Netherlands: Documentary. Berlin--The Once and Future Capital (9th). See A 2354.
1454 Radio Netherlands: Documentary. Italy--Cultural Heritage (30th). See A 0054.
1454 Radio Netherlands: Documentary. Italy--Young & Old (23th). See F 2354.
1454 Radio Netherlands: Documentary. The Netherlands--Liberalism versus The Rules (16th). Michele Ernsting reviews the background of the country's liberal policies.
1454 Radio Netherlands: Documentary. Time (2nd). See W 1254.
1459 USA, WWCR #1 Nashville TN: The Nice Jewish Boy. See M 1459.

Saturdays

1400 Canada (North-Quebec): World Report/Sports.
1400 UK, BBC London (af): World News. See S 0300.
1400 USA, WWCR #3 Nashville TN: Hour of Truth. William Bonner preaches from New York City.
1405 UK, BBC London (af): Sportsworld. The weekly sports magazine.
1411 Canada (North-Quebec): Spectrum.
1430 USA, WWCR #1 Nashville TN: Hour of Reasoning. P. Mobley preaches to his congregation in Oakland, California.

Frequencies

1500-1600	Anguilla,Caribbean Beacon	11775am			
1500-1600	Australia, Radio	5995pa	6020pa	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	7405na	9785as	
1500-1600	Costa Rica,RF Peace Intl	7385am	15050am	21465am	
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	15105as			
1500-1600 a	Ireland,W Coast R Ireland	6175eu			
1500-1530	Israel, Kol Israel	9365eu	12080na		
1500-1600 fas/vl	Italy, IRRS	7120va			
1500-1600	Japan, R Japan/NHK World	7200as	7240as	9535na	9750as
		11730as	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			
1500-1600	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			
1500-1600	Russia,Voice of Russia WS	4730me	4940me	4975me	5925me
		7115af	7130me	7235me	7260eu
1500-1530	S Africa, Channel Africa	9470af	9635me	9830me	9840me
		9440af			
1500-1530	Seychelles, FEBA Radio	11600as			
1500-1600 mtwhfa	Seychelles, FEBA Radio	9810as			
1500-1600	Singapore, SBC Radio One	6155do			
1500-1600	Sri Lanka, Sri Lanka BC	9730as	15425as		
1500-1530	UK, BBC African Service	6190af	11860af	11940af	15400af
		15420af	17830af	21470af	21490af
		21660af			
1500-1600	UK, BBC Asian Service	5975as	5990as	6195as	9740as
		9815as	11750as	11780as	
1500-1600	UK, BBC World Service	5875eu	6195eu	9410eu	9515na
		9590na	12040eu	12095eu	15220na
		15485eu	15575eu	17705eu	17840am
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	9930as		
1500-1600	USA, Voice of America	6110as	6160as	7125as	7215as
		9575as	9645as	9760as	15205as
		15395as			
1500-1600	USA, WEWN Birmingham AL	9455na	11875na	15745eu	
1500-1600	USA, WGTG McCaysville GA	9400am			
1500-1600	USA, WHRI Noblesville IN	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	17760ca		
1500-1530	Vatican State, Vatican R	9940au	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			
1530-1600	UK, BBC African Service	6190af	11940af	15400af	17830af
		21470af	21660af		
1530-1545	UK, BBC Asian Service	7135as	11685as		
1545-1600 sh	Bangladesh, Bangla Betar	4880do			
1550-1600 a	Vatican State, Vatican R	9940va	11635va		

Selected Programs

Sundays

1500 Canada (North-Quebec): News.
1500 UK, BBC London (af): News Summary. See S 1100.
1500 USA, WWCR #1 Nashville TN: Foursquare Gospel Tidings. J.E. Cartier presents a half-hour of gospel music and meditation.
1500 USA, WWCR #3 Nashville TN: Church of the Harvest. Clarence McClendon preaches from Los Angeles.
1501 UK, BBC London (af): Science Feedback (5). Listeners' questions, comments and queries about World Service science programs are answered.
1501 UK, BBC London (af): Seeing Stars (1). A discussion of astronomical observations and special events for the near future.
1501 UK, BBC London (af): Soundbyte (2). Presenter Violet Berlin plays with virtual games and more on the information superhighway.
1501 UK, BBC London (af): Waveguide (4). The latest information on international broadcasting with reviews of receivers and news about reception.
1501 UK, BBC London (af): Wildtrack (3). The natural world, with emphasis on what people can see, hear, photograph or collect for themselves.
1505 Canada (North-Quebec): Sunday Morning (2nd hour).
1515 UK, BBC London (af): Variable Feature. See S 0615.
1530 UK, BBC London (af): BBC English. For learners of English.
1530 USA, WWCR #1 Nashville TN: A Temple of Jesus Christ. Cleveland Waters preaches from Philadelphia.

Mondays

1500 UK, BBC London (af): World News. See S 0300.
1500 USA, WWCR #1 Nashville TN: The Nice Jewish Boy. See M 1459.
1500 USA, WWCR #3 Nashville TN: USA Radio News. See S 0400.
1502 USA, WWCR #1 Nashville TN: The Grace Hour (live). Carl Stevens of Baltimore answers listener questions about religion.
1505 UK, BBC London (af): Focus on Africa. See S 1705.
1505 USA, WWCR #3 Nashville TN: Prescription for Health (live). A program about natural health foods and diet supplements.
1530 UK, BBC London (af): 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.
1545 UK, BBC London (af): BBC English. See S 1530.

Tuesdays

1500 UK, BBC London (af): World News. See S 0300.
1500 USA, WWCR #1 Nashville TN: The Nice Jewish Boy. See M 1459.
1500 USA, WWCR #3 Nashville TN: USA Radio News. See S 0400.
1502 USA, WWCR #1 Nashville TN: The Grace Hour (live). See M 1502.
1505 UK, BBC London (af): Focus on Africa. See S 1705.
1505 USA, WWCR #3 Nashville TN: Prescription for Health (live). See M 1505.
1530 UK, BBC London (af): BBC English. See S 1530.
1545 UK, BBC London (af): Learning Zone. See M 1530.

Wednesdays

1500 UK, BBC London (af): World News. See S 0300.
1500 USA, WWCR #1 Nashville TN: The Nice Jewish Boy. See M 1459.
1500 USA, WWCR #3 Nashville TN: USA Radio News. See S 0400.
1502 USA, WWCR #1 Nashville TN: The Grace Hour (live). See M 1502.
1505 UK, BBC London (af): Focus on Africa. See S 1705.
1505 USA, WWCR #3 Nashville TN: Prescription for Health (live). See M 1505.
1530 UK, BBC London (af): Learning Zone. See M 1530.
1545 UK, BBC London (af): Learning Zone. See M 1530.

Thursdays

1500 UK, BBC London (af): World News. See S 0300.
1500 USA, WWCR #1 Nashville TN: The Nice Jewish Boy. See M 1459.
1500 USA, WWCR #3 Nashville TN: USA Radio News. See S 0400.
1502 USA, WWCR #1 Nashville TN: The Grace Hour (live). See M 1502.
1505 UK, BBC London (af): Focus on Africa. See S 1705.
1505 USA, WWCR #3 Nashville TN: Prescription for Health (live). See M 1505.
1530 UK, BBC London (af): Learning Zone. See M 1530.
1545 UK, BBC London (af): BBC English. See S 1530.

Fridays

1500 UK, BBC London (af): World News. See S 0300.
1500 USA, WWCR #1 Nashville TN: The Nice Jewish Boy. See M 1459.
1500 USA, WWCR #3 Nashville TN: USA Radio News. See S 0400.
1502 USA, WWCR #1 Nashville TN: The Grace Hour (live). See M 1502.
1505 UK, BBC London (af): Focus on Africa. See S 1705.
1505 USA, WWCR #3 Nashville TN: Prescription for Health (live). See M 1505.
1530 UK, BBC London (af): Learning Zone. See M 1530.
1545 UK, BBC London (af): Learning Zone. See M 1530.

Saturdays

1500 Canada (North-Quebec): News.
1500 UK, BBC London (af): World News. See S 0300.
1500 USA, WWCR #1 Nashville TN: USA Radio News. See S 0400.
1500 USA, WWCR #3 Nashville TN: The Great American Polka Show. An hour of polka favorites both old and new.
1505 UK, BBC London (af): Sportsworld. See A 1405.
1505 USA, WWCR #1 Nashville TN: The Bible's Greatest Heroes. See S 0505.
1511 Canada (North-Quebec): Basic Black.

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	9620af		
1600-1700 as	Costa Rica, Adv World R	9725am	11870am	13750am	
1600-1700	Costa Rica,RF Peace Intl	7385am	15050am	21465am	
1600-1700	Ethiopia, Radio	7165af	9560af		
1600-1700	France, Radio France Intl	6175eu	9485me	11615af	11700af
		12015af	12025af	15210af	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	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	4730me	4940me	4975me	6005af
	6175af 7115af	7210af	7260af	7275af	7330af
	9470af 9505af	9585af	9635af		
1600-1625	S Africa, Channel Africa	5955af			
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			
1600-1615	Switzerland, Swiss R Intl	9885as	12075as	13635as	
1600-1638	UAE, Radio Dubai	13630au	13675eu	15395eu	21605eu
1600-1615	UK, BBC Asian Service	3915as	5975as	5990as	6195as
		7135as	9740as	11750as	
1600-1700	UK, BBC World Service	6195eu	9410eu	9515na	12095eu
		15485eu	15575eu	17705eu	17840am
1600-1700	USA, KAIJ Dallas TX	13815am			
1600-1700	USA, KTBN Salt Lk City UT	15590am			
1600-1700	USA, KWHR Naalehu HI	7560pa	9930as	17555eu	
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	11875na	13615na	15745eu	
1600-1700	USA, WGTG McCaysville GA	9400am			
1600-1700	USA, WHRI Noblesville IN	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
		17760eu	21525af	21745eu	
1600-1610 a	Vatican State, Vatican R	9940va	11635va		
1600-1625	Vietnam, Voice of	5940eu	7270eu	7400eu	9840af
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	UK, BBC African Service	6190af	11940af	15400af	15420af
		17830af	21470af	21660af	
1615-1645 as	UK, BBC African Service	11860af			
1615-1700	UK, BBC Asian Service	3915as	5975as	7135as	9510as
		9740as	11750as		
1615-1700 as	UK, BBC World Service	9515na			
1615-1630	UK, BBC World Service	6010eu	9915eu		
1630-1659 s	Canada, R Canada Intl	9640na	11855na		
1630-1700	Egypt, Radio Cairo	15255af			
1645-1700 irreg	Afghanistan, Radio	7200as			
1645-1655	Israel, Kol Israel	7465eu	9435eu	11605na	
1645-1700	Israel, Kol Israel	7465eu			
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 Canada (North-Quebec): News.
1600 UK, BBC London (af): World News. See S 0300.
1600 USA, WWCR #1 Nashville TN: Prophetic Word Program. A message of salvation from Dan Kubish of the House of Yaweh.
1600 USA, WWCR #3 Nashville TN: The Whole Truth. Anthonee Patterson conducts services from Pennsylvania.
1605 Canada (North-Quebec): Sunday Morning (3rd hour).
1615 UK, BBC London (af): Concert Hall. Classical music concerts.
1630 USA, WWCR #1 Nashville TN: Cross Roads Baptist Church. Lloyd Ferguson preaches from Lawrenceville, Georgia.

Mondays

1600 UK, BBC London (af): World News. See S 0300.
1600 USA, WWCR #1 Nashville TN: The Old Time Religion Hour. Brother Hogan will send you a Bible from Athens, Tennessee.
1600 USA, WWCR #3 Nashville TN: USA Radio News. See S 0400.
1606 USA, WWCR #3 Nashville TN: Freedom's Call (live). Bo Gritz hosts this talk radio program.
1615 UK, BBC London (af): Fast Track. The latest African sports news and action.
1615 USA, WWCR #1 Nashville TN: The Living Waters Broadcast. Father Bob Guste evangelizes from Louisiana.
1630 USA, WWCR #1 Nashville TN: The Time of Deliverance. Benjamin Smith preaches from the Time of Deliverance Evangelistic Church in Philadelphia.
1645 UK, BBC London (af): The World Today. Examines thoroughly a topical aspect of the international scene.
1645 USA, WWCR #1 Nashville TN: Wisdom from the Word. C. Milton Grannum preaches from the New Covenant Church in Philadelphia.

Tuesdays

1600 UK, BBC London (af): World News. See S 0300.
1600 USA, WWCR #1 Nashville TN: The Old Time Religion Hour. See M 1600
1600 USA, WWCR #3 Nashville TN: USA Radio News. See S 0400.
1606 USA, WWCR #3 Nashville TN: Freedom's Call (live). See M 1606.
1615 UK, BBC London (af): Money Focus. African business magazine.
1615 USA, WWCR #1 Nashville TN: The Living Waters Broadcast. See M 1615.
1630 USA, WWCR #1 Nashville TN: The Time of Deliverance. See M 1630.
1645 UK, BBC London (af): The World Today. See M 1645.
1645 USA, WWCR #1 Nashville TN: Wisdom from the Word. See M 1645.

Wednesdays

1600 UK, BBC London (af): World News. See S 0300.
1600 USA, WWCR #1 Nashville TN: The Old Time Religion Hour. See M 1600.
1600 USA, WWCR #3 Nashville TN: USA Radio News. See S 0400.
1606 USA, WWCR #3 Nashville TN: Freedom's Call (live). See M 1606.
1615 UK, BBC London (af): Talkabout Africa. Telephone conversations with BBC correspondents on late-breaking African events.
1615 USA, WWCR #1 Nashville TN: The Living Waters Broadcast. See M 1615.
1630 USA, WWCR #1 Nashville TN: The Time of Deliverance. See M 1630.
1645 UK, BBC London (af): The World Today. See M 1645.
1645 USA, WWCR #1 Nashville TN: Wisdom from the Word. See M 1645.

Thursdays

1600 UK, BBC London (af): World News. See S 0300.
1600 USA, WWCR #1 Nashville TN: The Old Time Religion Hour. See M 1600.
1600 USA, WWCR #3 Nashville TN: USA Radio News. See S 0400.
1606 USA, WWCR #3 Nashville TN: Freedom's Call (live). See M 1606.
1615 UK, BBC London (af): Jive Zone. Get in the groove with all the latest sounds on the Afro music scene.
1615 USA, WWCR #1 Nashville TN: The Living Waters Broadcast. See M 1615.
1630 USA, WWCR #1 Nashville TN: The Time of Deliverance. See M 1630.
1645 UK, BBC London (af): The World Today. See M 1645.
1645 USA, WWCR #1 Nashville TN: Wisdom from the Word. See M 1645.

Fridays

1600 UK, BBC London (af): World News. See S 0300.
1600 USA, WWCR #1 Nashville TN: The Old Time Religion Hour. See M 1600.
1600 USA, WWCR #3 Nashville TN: USA Radio News. See S 0400.
1606 USA, WWCR #3 Nashville TN: Freedom's Call (live). See M 1606.
1615 UK, BBC London (af): African Perspective. See S 0630.
1615 USA, WWCR #1 Nashville TN: The Living Waters Broadcast. See M 1615.
1630 USA, WWCR #1 Nashville TN: The Time of Deliverance. See M 1630.
1645 UK, BBC London (af): The World Today. See M 1645.
1645 USA, WWCR #1 Nashville TN: Wisdom from the Word. See M 1645.

Saturdays

1600 Canada (North-Quebec): News.
1600 UK, BBC London (af): World News. See S 0300.
1600 USA, WWCR #1 Nashville TN: Let the Bible Speak. James Hickey with a program from New Testament Christianity in Oklahoma.
1600 USA, WWCR #3 Nashville TN: USA Radio News. See S 0400.
1605 USA, WWCR #3 Nashville TN: The Golden Age of Radio Theater. See S 0405.
1611 Canada (North-Quebec): Double Exposure.
1615 UK, BBC London (af): Sportsworld. See A 1405.
1615 USA, WWCR #1 Nashville TN: Eternal Good News. Germaine Lockwood of the Congregation of Messiah in Oklahoma teaches from the Old Testament.
1630 USA, WWCR #1 Nashville TN: The Showers of Blessings Broadcast. Ed McAbee sermonizes before a live congregation.
1645 USA, WWCR #1 Nashville TN: Words of Hope. See S 1330.

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	7150af	7200af	7405af	9570af
1700-1800	Costa Rica,RF Peace Intl	15050am	21465am		
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	9485af	9655af	11615af	12015af
		12025af			
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			
1700-1756	Romania, R Romania Intl	7195eu	9690eu	11790eu	11940eu
		15105eu			
1700-1800	Russia,Voice of Russia WS	4920af	5940eu	5965eu	6130eu
		6175af	7115af	7125eu	7175af
		7180eu	7185af	7210af	7260af
		7275af	7305af	7330af	7355af
		9560af	9585af	9765af	9880eu
	9890eu	12065me	15400eu		
1700-1730	S Africa, Channel Africa	15240af			
1700-1730	Slovakia, AWR Europe	7325as	9450af		
1700-1800	Swaziland, Trans World R	9500af			
1700-1800	UK, BBC African Service	6005af	6190af	9630af	11940af
		15400af	15420af	17830af	
1700-1745	UK, BBC Asian Service	3915as	5975as	7135as	9510as
		9740as	11750as		
1700-1800	UK, BBC World Service	3955eu	6095me	6180eu	6195eu
		7210eu	9410eu	9530eu	12095eu
		15485eu	17840na		
1700-1800	USA, KAIJ Dallas TX	13815am			
1700-1800	USA, KTBN Salt Lk City UT	15590am			
1700-1800	USA, KWHR Naalehu HI	7560pa	9930as		
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	11955as	12005as	12050as
		15120as	15255as		
1700-1800	USA, WEWN Birmingham AL	11875na	13615na	15745eu	
1700-1800	USA, WGTG McCaysville GA	9400am			
1700-1800	USA, WHRI Noblesville IN	13760am	15105am		
1700-1800	USA, WINB Red Lion PA	13790af			
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	17555eu	21745eu
1700-1730	Vatican State, Vatican R	5883eu	7250eu	9645eu	11810va
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	11730me	11890me	15190me	
1730-1800	Slovakia, R Slovakia Intl	5915eu	6055eu	7345eu	
1730-1745 mtwh	Swaziland, Trans World R	3200af			
1730-1745	UK, BBC African Service	3390af	6070af	9510af	
1730-1800	Vatican State, Vatican R	11625af	15570af	17550af	
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			
1745-1800	UK, BBC Asian Service	5975as	9510as	9740as	11750as
1755-1800	Georgia, Voice of Hope	9310eu			
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	21465am		
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	Greece, Voice of	7450eu	9420eu	15485na	17705sa
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			
1800-1900	North Korea, R Pyongyang	6575eu	9345eu	11700am	13760am
1800-1900 vl	Papua New Guinea, NBC	4890do			
1800-1900 vl	Philippines, R Pilipinas	11730me	11890me	15190me	
1800-1859	Poland, Polish R Warsaw	6000eu	6095eu	7285eu	
1800-1900	Russia,Voice of Russia WS	6130eu	7115af	7175af	7180eu
		7210va	7260af	7275af	7305af
		7440af			
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	UK, BBC African Service	3255af	6005af	6190af	9630af
		15400af	15420af	17830af	
1800-1830	UK, BBC Asian Service	5975as	9510as	9740as	
1800-1815	UK, BBC Asian Service	6065as	7200as	9605as	
1800-1900	UK, BBC World Service	3955eu	6095me	6180eu	6195eu
		9410eu	12095eu	17840na	
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		
1800-1900	USA, Voice of America	6035af	6040af	9760eu	11920af
		11975af	13710af	15410af	15580af
1800-1900	USA, WEWN Birmingham AL	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	13790af			
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		
1800-1825	Vietnam, Voice of	5940eu	7270eu	7400eu	9840eu
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			
1830-1835	Somalia, Radio Mogadishu	6732do			
1830-1900 mtwfha	Sweden, Radio	6065eu			
1830-1900 s	Sweden, Radio	9645eu			
1830-1900	UK, BBC Asian Service	9740pa			
1830-1845 m w	UK, BBC World Service	6050eu	7325eu	9685eu	
1830-1900 as	USA, Voice of America	7150af	9845af	15445af	
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			

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		
1900-2000	Costa Rica,RF Peace Intl	15050am	21465am		
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	
1900-1910	Greece, Voice of	7480eu	9380eu		
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			
1900-2000	North Korea, R Pyongyang	4405af	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	11730me	11890me	15190me	
1900-2000	Russia,Voice of Russia WS	4920eu	5940eu	5965eu	7180eu
		7210af	7255af	7275af	7305af
		7325af	7440eu	7490eu	9440af
		9585af	9890eu		
1900-2000 vl	Solomon Islands, SIBC	5020do			
1900-2000	South Korea, R Korea Intl	5975as	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	6175eu	9535eu		
1900-2000	UK, BBC African Service	3255af	6005af	6190af	9630af
		11835af	11880af	15105af	15400af
		17830af	17885af		
1900-2000	UK, BBC Asian Service	9740pa			
1900-2000 s	UK, BBC Asian Service	5975me			
1900-2000	Uk, BBC World Service	3955eu	6180eu	6195eu	9410eu
		12095eu			
1900-2000	UK, BBC World Service	5975me	6150eu	7210eu	
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	
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	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	13790af			
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			
1900-1925	Vietnam, Voice of	5940eu	7270eu	7400eu	9840eu
		12020eu			
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			
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	Slovakia, R Slovakia Intl	5915eu	6055eu	7345eu	
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			
1959-2000 a	New Zealand, R NZ Intl	11735pa			

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	6950eu	7160af	7170af	7175af
		9440af	9635af	9920eu	9935eu
2000-2100	Costa Rica,RF Peace Intl	15050am	21465am		
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		
2000-2100	Guatemala, Adv World R	5980am			
2000-2030	Hungary, Radio Budapest	3975eu	9840eu		
2000-2100	Indonesia, Voice of	9525as	11785as		
2000-2030	Iran, VOIRI	7160eu	7260eu	9022eu	
2000-2025	Israel, Kol Israel	7465na	9365na	9435eu	15640au
2000-2100 vl	Italy, IRRS	3985va			
2000-2100 vl	Kenya, Kenya Broadc Corp	4885do	4935do	6150do	
2000-2100	Kuwait, Radio	11990eu			
2000-2030 a	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			
2000-2100	Russia,Voice of Russia WS	4920eu	5940eu	5965eu	7180eu
		7305af	7325af	7440eu	7490af
		9440af	9585af	9820eu	9890eu
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	UK, BBC African Service	3255af	6005af	6190af	9630af
		11835af	15400af	17830af	
2000-2100	UK, BBC Asian Service	5975pa	9740pa		
2000-2100	UK, BBC World Service	3955eu	6180eu	6195eu	7325eu
		9410eu	11750sa	12095eu	
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	11875na	13615am	17695eu	
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	15565eu	17845af	21525af	
2000-2010	Vatican State, Vatican R	7365af	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		
2015-2030	Namibia, NBC	3270do	3290do		
2025-2045	Italy, RAI Intl	7125eu	9685af	11840as	
2030-2100	Cuba, Radio Havana	13600eu			
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	9535eu			
2030-2100 as	USA, Voice of America	4950af			
2030-2055	Vietnam, Voice of	5940eu	7270eu	7400eu	9840eu
		12020eu			
2045-2100	India, All India Radio	7150au	7410eu	9650eu	9910au
		9950eu	11620eu	11715au	
2050-2100	Vatican State, Vatican R	4005eu	5883eu	7250eu	9645eu
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	7180af	9535af		
2100-2200	China, China Radio Intl	6950eu	9635eu	9920eu		
2100-2200	Costa Rica,RF Peace Intl	15050am	21465am			
2100-2104	Croatia, Croatian Radio	9590af				
2100-2130	Cuba, Radio Havana	13600eu				
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		
2100-2200	North Korea, R Pyongyang	6575eu	9345eu	11700am	13760am	
2100-2200 vl	Papua New Guinea, NBC	4890do				
2100-2129	Poland, Polish R Warsaw	6035eu	6095eu	7285eu		
2100-2130 mtwhf	Portugal, R Portugal Intl	7110eu	9780eu	9815eu		
2100-2156	Romania, R Romania Intl	5955eu	5990eu	6105eu	6175eu	
		7195eu	9570eu			
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	15575eu				
2100-2130	South Korea, R Korea Intl	3970eu	6480eu			
2100-2130	Switzerland, Swiss R Intl	6165eu	7410eu			
2100-2200	Syria, Radio Damascus	12085na	13610au			
2100-2110	Uganda, Radio	4976do				
2100-2200	UK, BBC African Service	6005af	6190af	11835af		
2100-2200	UK, BBC Asian Service	3915as	5965as	5975pa	6120as	
		6195as	9740pa			
2100-2200	UK, BBC World Service	3955eu	5975am	6180eu	6195eu	
		7325eu	9410eu	11750sa		
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	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	13760am			
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	15565eu	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				
2115-2145	Armenia, Voice of	4810eu	9965eu			
2115-2200	Egypt, Radio Cairo	9900eu				
2115-2130 mtwhf	UK, BBC Caribbean Report	5975ca	15390ca	17715ca		
2115-2130 as	UK, BBC World Service	5975am				
2130-2200	Australia, Radio	7240pa	9435as	9660pa	11695as	
		12080pa	13755pa	17795pa		
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			
2130-2135 mtwhf	Latvia, Radio	5935eu				
2130-2200	Malawi, MBC	3380do				
2130-2200 as	Sweden, Radio	6065eu	9655eu			
2130-2200	Turkey, Voice of	7200eu				
2130-2145 t f	UK, BBC Calling Falklands	11680sa				
2130-2200	UK, BBC World Service	5875eu	6050eu	9850eu		
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	7105me	9540as			
2145-2200 a	Greece, Voice of	9420au	11645au			

2200 UTC

2200-2230	Albania, R Tirana Intl	6025eu	7135eu		
2200-2300	Anguilla,Caribbean Beacon	6090am			
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	7170eu			
2200-2230	China, China Radio Intl	3985eu			
2200-2300	Costa Rica,RF Peace Intl	7385am	15050am	21465am	
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	5965eu	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	Spain, R Exterior Espana	6125eu	11775af		
2200-2205	Syria, Radio Damascus	12085na	13610au		
2200-2300	Taiwan, Taipei Radio Intl	5810eu	9985eu		
2200-2230	Turkey, Voice of	7200eu			
2200-2300	UK, BBC African Service	11835af			
2200-2300	UK, BBC Asian Service	5905as	5965as	6195as	7110as
		11955as			
2200-2300	UK, BBC World Service	3955eu	5975am	6110am	6175na
	7325eu 9410eu	9560am	9590na	9660as	9825am
	9915sa 11750sa	11765am	12080pa	15390am	
2200-2300	Ukraine, R Ukraine Intl	5905eu	5915eu	5940eu	6020eu
		6085eu	7150na	7205eu	
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	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	11950ca			
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	11580af	15565eu		
2200-2300 vl	Zambia, R Zambia/ZNBC 1	4910do			
2230-2255	Austria, R Austria Intl	5945eu	6155eu	13730af	
2230-2300	Cuba, Radio Havana	6000na			
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	9420au	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	

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	21465am	
2300-2330	Cuba, Radio Havana	6000na			
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	3560na	4405na	11335na	11700na
		13760na	15130na		
2300-0000 vl	Papua New Guinea, NBC	9675do			
2300-2356	Romania, R Romania Intl	5955eu	6105eu	7195eu	9570na
		11830na			
2300-0000	Russia,Voice of Russia WS	5940na	7105na	7125na	7180na
2300-0000	Singapore, SBC Radio One	6160do			
2300-0000 vl	Solomon Islands, SIBC	5020do			
2300-0000	Turkey, Voice of	6135eu	9655eu		
2300-0000	UK, BBC Asian Service	3915as	5965as	6035as	6195as
		7110as	9580as	11945as	11955as
2300-0000	UK, BBC World Service	3955eu	5875am	5975am	6110am
		6175na	6195eu	9590na	9825am
		9915sa	11750sa	11765am	
2300-0000	USA, KAIJ Dallas TX	13815am			
2300-0000	USA, KTBN Salt Lk City UT	15590am			
2300-0000	USA, KWHR Naalehu HI	7560pa	17555pa		
2300-0000	USA, Monitor Radio Intl	7510eu			
2300-0000	USA, Voice of America	7215as	9770as	9890as	11760as
		15185as	15290as	15305as	17735as
		17820as			
2300-0000	USA, WEWN Birmingham AL	5825eu	13615na		
2300-0000	USA, WGTG McCaysville GA	9400am			
2300-0000	USA, WHRI Noblesville IN	5745am	9495am		
2300-0000	USA, WINB Red Lion PA	11950ca			
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	7305au	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	Netherlands, Radio	6020na	6165na		
2330-2355	Vietnam, Voice of	5940af	7270af	7400af	9840af
		12020af			
2335-2345	Greece, Voice of	9395sa	9425sa	11595sa	11710sa
2335-2345	Sierra Leone, SLBS	3316do			
2345-0000 mtwhf	UK, BBC Asian Service	3915as			

Selected Programs

Sundays

2300 Canada (North-Quebec): The World This Weekend.
2300 Canada, RCI Montreal: The World This Weekend. Half-hour of up-to-the-minute news and business reports, a feature documentary, arts and entertainment stories with Michael Crabb, sports with Dzintars Cers, and a news quiz.
2300 USA, WWCR #1 Nashville TN: A Brighter Day. Jane Rogowski evangelizes from Maryland.
2300 USA, WWCR #3 Nashville TN: Ham Radio and More (live). See S 0600.
2315 USA, WWCR #1 Nashville TN: The Illuminated Word. C.M. Hunt preaches.
2330 Canada, RCI Montreal: Sound Advice. Rick Phillips presents the CBC weekly guide to the world of classical music and recordings (90 minutes).
2330 USA, WWCR #1 Nashville TN: Church of the Lord Jesus Christ. Shelton Rapha preaches from Philadelphia.

Mondays

2300 Canada (North-Quebec): The World at Six.
2300 Canada, RCI Montreal: The World at Six. CBC radio's major newscast of the day, presenting the important stories in depth and in context.
2300 USA, WWCR #1 Nashville TN: Sweet Liberty (live). Jackie Patru host this talk radio program.
2300 USA, WWCR #3 Nashville TN: Let's Talk Health (live). Kurt Donsbach, a holistic practioner, answers listeners' medical questions.
2330 Canada (North-Quebec): As It Happens.
2330 Canada, RCI Montreal: As It Happens. Mary Lou Finlay and Barbara Budd host this daily phone-in show that introduces listeners to the newsmakers of the day and people whose stories might otherwise not be told.

Tuesdays

2300 Canada (North-Quebec): The World at Six.
2300 Canada, RCI Montreal: The World at Six. See M 2300.
2300 USA, WWCR #1 Nashville TN: Sweet Liberty (live). See M 2300.
2300 USA, WWCR #3 Nashville TN: Let's Talk Health (live). See M 2300.
2330 Canada (North-Quebec): As It Happens.
2330 Canada, RCI Montreal: As It Happens. See M 2330.

Wednesdays

2300 Canada (North-Quebec): The World at Six.
2300 Canada, RCI Montreal: The World at Six. See M 2300.
2300 USA, WWCR #1 Nashville TN: Sweet Liberty (live). See M 2300.
2300 USA, WWCR #3 Nashville TN: Let's Talk Health (live). See M 2300.
2330 Canada (North-Quebec): As It Happens.
2330 Canada, RCI Montreal: As It Happens. See M 2330.

Thursdays

2300 Canada (North-Quebec): The World at Six.
2300 Canada, RCI Montreal: The World at Six. See M 2300.
2300 USA, WWCR #1 Nashville TN: Sweet Liberty (live). See M 2300.
2300 USA, WWCR #3 Nashville TN: Let's Talk Health (live). See M 2300.
2330 Canada (North-Quebec): As It Happens.
2330 Canada, RCI Montreal: As It Happens. See M 2330.

Fridays

2300 Canada (North-Quebec): The World at Six.
2300 Canada, RCI Montreal: The World at Six. See M 2300.
2300 USA, WWCR #1 Nashville TN: Equal Time (live). Richard Cook.
2300 USA, WWCR #3 Nashville TN: Let's Talk Health (live). See M 2300.
2330 Canada (North-Quebec): As It Happens.
2330 Canada, RCI Montreal: As It Happens. See M 2330.
2354 Radio Netherlands: Documentary. Berlin--The Once and Future Capital (9th). See A 2354.
2354 Radio Netherlands: Documentary. Italy--Cultural Heritage (30th). See A 0054
2354 Radio Netherlands: Documentary. Italy--Young & Old (23th). Louise Williams examines Italy's social problem of too many people who are under 15 and over 65.
2354 Radio Netherlands: Documentary. The Netherlands--Liberalism versus The Rules (16th). See F 1454.
2354 Radio Netherlands: Documentary. Time (2nd). See W 1254.

Saturdays

2300 Canada, RCI Montreal: The World This Weekend. See S 2300.
2300 USA, WWCR #3 Nashville TN: UPI News. The latest news from the UPI Radio News Network.
2305 USA, WWCR #3 Nashville TN: Health Quest (live). Dan Junker tells how to retain or redeem your health.
2330 Canada, RCI Montreal: The Mystery Project. A half-hour series of detective mystery dramas created by Canadian writers.
2330 USA, WWCR #1 Nashville TN: British Israel World Federation. Douglas Nesbitt of Toronto preaches from the Old Testament.
2345 USA, WWCR #1 Nashville TN: Calvary Radio Hour. Franklin Zuill of Bermuda evangelizes.

Hauser's Highlights
ISRAEL: Kol Israel

W97 English:
0500-0515 9435, 7465, 17540
1100-1135 15650, 15640
1500-1530 12080, 9365
1645-1700 11605, 9435, 7465
2000-2025 9435, 9365, 7465, 15640
(Doni Rosenzweig, *World of Radio)*
Hebrew, relaying Network B:
2215-0359 7495
0359-0659 9390, 7395
0659-0759 v17545, 15615
0759-0859 v17545, 15615 plus 11585
Sat only
0859-0959 17545, 15615
0959-1159 17545, 17540, 15615, 11585
1159-1459 15615, 11590
1459-1559 11590, 7495
1559-1659 15615, 11590
1859-2059 7495 (and 11585 to 1959)
2059-2215 15640, 7495
Arabic, relaying Network D:
0400-0630 9815, 5915
0630-1130 15480, 5915
1130-1300 5915
1300-2230 15480, 9815, 5915
(BBCM)

JANUARY — DIVERSITY RECEPTION

By Jacques d'Avignon
monitor@rac.ca

OPTIMUM WORKING FREQUENCIES (MHz)

For the Period 15 January to 14 February 1998 Flux=102 SSN=51

Predictions prepared using ASAPS for Windows®

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.

Space diversity: As the signal is broken up into many components, it has been proven that the fading does not occur simultaneously at all points at the same time. Antennas separated by a minimum of 10 wavelengths will receive two distinct signals from the distant source. So you would want to have a set of antennas separated by ten times the lowest wavelength that you wish to receive. For example, if you are interested in the tropical band of 4.8 MHz, your two antennas would have to be separated by 10 x 60 meters or 600 meters (2,000 feet)!

Unless you own a big ranch, the chances are slim that this method will be very useful to you. In the early days (1930s) of transatlantic telephone, which used HF frequencies, this method was much in vogue. The antennas were long rhombic antennas aimed very accurately to the transmitter site. The signal from each antenna was fed into a discrete receiver and the audio outputs were combined to give a very steady output to the phone line.

Frequency diversity assumes that the station is transmitting the same signal on more than one frequency, which is normally the case for the broadcasters and the larger utility stations. This requires a separate receiver for each frequency, but the antenna can be the same as long as there is a good antenna splitter to isolate the input of each receiver from each other.

There are two methods to extract a good audio signal from such an arrangement. In one case the audio signals are fed into an amplifier circuit that checks the level of each signal and sends the best one to the output. The other method uses special receivers where the Automatic Gain Control (AGC) circuits of the receivers are tied together and the receiver showing the lowest signal strength is automatically muted. Eddystone in the UK made such receivers and I have used them commercially for frequency diversity or polarization diversity.

Frequency diversity reception has a major drawback when used for RTTY or FAX reception: the arrival time of each signal is not the same on all frequencies, so your weather maps or photos are illegible. In the case of RTTY, you run into synchronization problems and you have a very poor copy unless one frequency remains dominant during the reception period.

Polarization diversity uses two antennas feeding one or two receivers. It is then possible to use only one frequency and avoid some of the problems described in frequency diversity. Feeding one receiver from two antennas can be done fairly easily; no special equipment is required if you just want to play around and try this system with one receiver.

There are many combinations of the above methods still in use today: space/frequency, frequency/polarization, space/polarization diversity systems, etc. If you have the property and several receivers to play around with, by all means set yourself up for the next broadcast of Buru-Buru!

For ordinary listeners, I recommend experimenting with polarization diversity and one receiver. The balancing act required when using more than one receiver can turn your hair gray in no time. Meanwhile, we have a few months of good DX before summer's static crashes, so enjoy!

SKIP AREY, N2EI
tjarey@mosquito.com

Scanning Beyond the Ordinary

VHF/UHF scanning is a fascinating aspect of the radio hobby. You can use your scanning receiver to learn a great deal about the world around your neighborhood or other people's neighborhoods when traveling. Modern scanners can hold hundreds of frequencies and perform dozens of functions to manipulate them in useful ways. Yet all too many folks take these modern radio wonders and simply program in the same twenty or so local public service frequencies that they would have entered twenty years ago into a primitive pre-microprocessor, possibly crystal-controlled scanner.

Truth be known, these folks are probably the bread and butter of the scanner industry. But remember, if you're reading this magazine, you are *not* simply a scanner owner: you are a radio monitor. You are willing to use your scanner to go well beyond that handful of local police, fire and EMS frequencies to discover more about the world around you. Of course there is no end to the excitement you may hear on the public service frequencies, but there are many other exciting places that your scanner can take you. Figuring out what might be scannable takes a little work, but that is half the fun.

First Go to the Maps

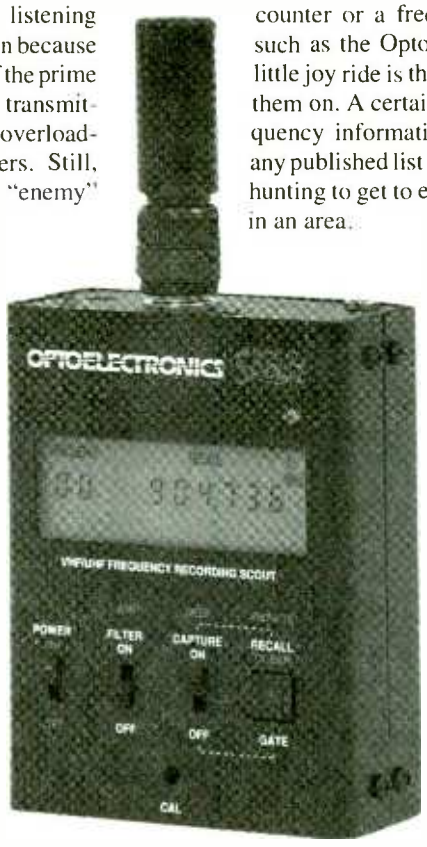
One thing I always suggest to scannists is to take a good look at the best map you can find for the 30 or so miles around your scanning post. If possible look beyond those maps you can buy in gas stations and convenience stores. A good place to start is the local public library or township offices. You want to get a good idea of what kind of things you may be able to scan beyond the more common public safety stuff.

I like to make note of information about railroads, large and small airports, hospitals, malls, industrial parks and their relationship to major highways and population centers. Also, make note of any government controlled land areas and military bases. These places might suggest some possible monitoring opportunities.

I also like to check out the topography, making note of the high points. These hills could represent possible improved listening locations as well as logical places to scout for existing tower facilities serving the region. I mention these "improved" listening locations with a bit of caution because these days more and more of the prime sites are taken up by paging transmitters which can often create overloading problems with scanners. Still, knowing the location of the "enemy" is important.

But back to the map. I also note the location and nature of waterways, especially the navigable ones. Keep track of harbors, docks and marinas as sources of scannable activity. Also, in relation to waterways, a good topographical map will also give you a notion of the area's flood plane. Knowing where the high water and high ground are can be essential scanning information.

Another discovery I made recently while checking out a map at a seashore police station (No, I wasn't in handcuffs at the time) was a series of well marked hurricane evacuation routes. It's probably reasonable to assume that emergency routes for other weather and geologically related natural disasters exist in most areas of the country plagued by such things.



The Optoelectronics Scout is an ideal tool to "cruise" for new frequencies

Just Like Back in High School

The next thing to do is take a cruise in the car. On this ride you want to get an idea about any businesses or activities that might be making use of radio. Everything from fast food stands, to hotels, to hardware and home needs "superstores" should come under your scrutiny. Malls, hospitals and larger stores are especially good points of interest in that they are likely to have large enough security and maintenance operations to require radio support.

You will also want to cruise by the points of interest you noted on your map search to check out what might be radio-active in these places. If you have access to a frequency counter or a frequency storage device such as the Optoelectronics Scout, this little joy ride is the time and place to turn them on. A certain amount of useful frequency information may not appear in any published list so you have to do a little hunting to get to everything you can hear in an area.

If you're not particularly shy, you can add an additional step at this point. If your cruise has turned up any Radio Shack stores, electronic supply stores, or major truck stops, you might want to ask if they have any information on local frequencies of interest. Being a gregarious person by nature, I have also been known to walk right up to radio users and ask them what frequencies they are using. Now, I have to admit that some basic common sense is essential. For instance, that DEA agent in the bulletproof vest going through that vacant building with his drug sniffing dog may not really be in the mood to answer your questions.

Always remember to be as polite as if you've been invited to your rich aunt's house for tea, and if the answer is "NO" don't press the issue. Nobody is under any obligation to give up their frequencies to you. Remember that it can be a very weird world out there, so be very, very careful if you employ this technique.

Now that you have done your homework on the streets, its time to hit the books. Many frequency resources can be found in the advertising sections of *MT*. Books, lists, and CD-ROMs loaded down with thousands of frequencies are just about everywhere. The Internet is also a growing source of information about scannable things.

The mistake many beginners make is to

begin their monitoring with the frequency resource of their choice, looking up the area and dutifully plugging in the dozens of frequencies that they think will be useful. The inherent problem with this technique is that any frequency resource is only as timely as the day it was produced. It doesn't know that the local mall changed security contracts and a new outfit using new frequencies is in place. It can't account for changes and improvements to local radio systems (such as a "trunked" system) until the next update is published. It is also possible, using a completely up-to-date frequency resource, that you may be wasting several channels to stuff that is licensed by the FCC but not currently in use.

Why have your scanner waste any percentage of its channels or its scan time skipping over unused frequencies? I know of a local business that carries more than twenty licenses on the FCC database but due to current business problems only has two trucks on the road. Tuning the all of the assigned frequencies would be a waste of effort. This is why I recommend doing a bit of research before you choose what frequencies to listen to.

Hey Kids, What Time Is It?

When you begin to monitor things outside the public safety world, you have to also be attuned to the likely times that these signals will begin to hop. Many business frequencies are most active from 9 to 5 while other businesses will operate two or three eight-hour shifts showing peak activity at shift changes. Many department stores and malls run a twelve or thirteen-hour day, often running extended hours for sales and holiday seasons.

If you really want to hear some interesting monitoring, look for operations that use radio after hours for security or maintenance. For example, if you live near an amusement park, the hours immediately before opening or after closing are often the most active times for interesting scanning.

You will also want to keep an eye out for seasonal scanning opportunities. In my area, every October about twenty "Halloween Haunted Hayrides" spring up for local enjoyment. I've scanned them all and found them to be quite interesting. Most of these operations evolve as the month goes by, becoming better organized. Also, things happen that weren't in the script or the training lectures.

We've also just come through another Christmas season and I have had tons of fun following the local shopping malls' security operations as they are pushed to the limits by crowds well above normal. Last year at one of the local malls, a group of hired security were moving in one direction tracking down a heavy duty shoplifter while a group of local police were moving up the mall in the other direction trying to locate a kid who was calling "911" from all of the mall's pay phones. Essentially they got in the way of each other's operation, and listening to them sorting out the confusion was amazing scanning.

Who Says Print is Dead?

If you plan to monitor activities outside of the public safety bands, you will want to keep an eye on local newspapers. As I mentioned above, noting extended business hours can lead to additional scanning opportunities you may not have considered. Newspapers also chronicle activities where large groups of people may be gathering for any one of dozens of activities such as parades, political rallies, town celebrations, or sporting events. It's pretty safe to say that any time a group of more than a hundred people are together, somebody is likely to be using radio to manage that activity.

I live near a major city where large group activities occur with great regularity. The local major newspapers often give pre-activity information that is essential to effective scanning. For example, a published parade route listing street names and movement times can help a scannist to follow the action. This summer I was able to make sense out of the radio activities surrounding a major bicycle race as it ran through the city streets largely because of the "recon" information that the newspaper provided.

Now there was a scanning event! In addition to common public safety there were frequencies for race coordination, television coverage, local radio station "on-site" feeds, individual bike team support units including the motorcycles and "sag wagons" that followed behind the pack. ... Not to mention the radio operations of the various event sponsors as they organized everything over the days leading up to the event.

There's No Business like Business

Monitoring businesses that make use of radio can be every bit as much fun as following the public safety systems. I may have mentioned before that one of my most intriguing local scanning opportunities involves a moderately large local hardware concern that uses "itinerant" frequency handi-talkies to stay in touch with each other throughout the store. I have spent hours following this operation.

In addition to the fascinating aspect of trying to keep a complex business running, there are the internal "soap opera" aspects that get played out in radio conversations. I have heard of other monitors who follow particular business interests because they provide great entertainment. One example of this is a scannist who loves to track cement delivery trucks. Now, on the surface of things this may seem as much fun as watching concrete dry. However, many problems can come about by deliveries not making schedule or not being of the right quantity. In such cases, concrete drying at the wrong time and in the wrong amount can generate a great deal of stress and quick action heard clearly over the radio.

Perhaps the motto here would be "never reject a frequency out of hand" because you think it may be boring. Take the time to give things an honest listen and you may be surprised at what piques your interest. As I've always said in this column, great scanning is where you find it. Doing a bit of homework before you sit down to serious listening will always pay off. Have fun, folks!

ASK BOB

ANSWERS TO YOUR RADIO QUESTIONS

Bob Grove, WAP4YQ
bgrove@grove.net

Q. *After reading the BC3000XLT scanner keyboard tricks (MT, Aug. '97) I decided to try some tricks of my own. By holding down the two arrow keys, then turning the radio on, "rd 00 00" was displayed. When I pressed the DELAY key, "Edt" came up; and when I pressed WX, "rd 00 45" was displayed. By pressing either arrow key, or any of the numeric keys, the displayed letters and numerals change. Does anyone know what all this means? (Cliff Shouldis, White River, SD)*

A. Yes. It means that there isn't much to do in South Dakota in the wintertime! Any of our readers wish to try some of these self-destruct commands to see what happens?

Q. *My radio receiver shows a record out jack with an output listed as 775 mV @ 1000 ohms. Does this mean that if I use 50 ohm coax, I will have an impedance mismatch? (Scott Wilson, Salinas, CA)*

A. This is an excellent question and shows how we take audio impedance matching for granted. While a shielded patch cord has much lower impedance than 1000 ohms (probably around 20-70 ohms), at audio frequencies such a mismatch is inconsequential. Instead, choose a cable that has low capacitance (to avoid high frequency rolloff) and good shielding (to avoid electrical noise pickup). It is at higher radio frequencies that impedance mismatches become lossy, especially in long cable lengths. Most short audio cables exhibit the low capacitance, but many have inadequate shielding. This shows up when audio cables are substituted for coaxial cable at radio frequencies.

A good rule of thumb to remember is that coax is always good at audio, but audio cables are never good at RF!

Q. *In an electrical system, for example my headlights, what part of the current is "used up?" (Mark Burns, Terra Haute, IN)*

A. In nature, nothing is really "used up," but the question of efficiency comes into play. We might define efficiency as the percentage of energy input which provides the desired output. Heat is usually the wasteful byproduct (unless it's in a heater!).

In the case of your headlights, it would be desirable for 100% of the electrical energy to result in cold, visible light, but we know that the light is produced by heating the filament, and that is part of the waste.

The same number of electrons moving into the filament come out the other end, but if it takes more energy (the "push" of the voltage), with a substantial amount of that energy being dissipated as heat, then the efficiency is lower.

The whole efficiency concept can go back to the effort to produce the voltage and resultant current by the car's engine (and its efficiency), the wiring, the efficiency of the alternator as it rotates on its bearings producing the current—as well as heat in the bearings, and so on.

Q. *I am seeing more and more ads for 1- to 14- channel walkie-talkies in the "Family Radio Service." What is the FRS? Do I need a license? Judging from the frequencies, don't these devices cause interference with the General Mobile Radio*

Bob's Tip of the Month

Those Pesky Pest Controls

Recently we asked our readers whether they have had any experience with ultrasonic pest repellers. Larry Young, a licensed pest control advisor from Ventura, California, had this to say:

"Ultrasonic pest devices do not work. Some states outlaw their sale (Colorado), other states say buyer beware (California). Insects do not have ears, and their vibrissae, setae, and cerci are for the detection of food and air movement, not sound. Crickets have the closest to ears: tympanum.

"Sonic and ultrasonics will work on rodents until the rodent becomes accustomed, about a week or less. The Japanese are currently testing a sonic device in the USA on rodents only, the 'CATS Wave' by CATS of Japan & North Hollywood, CA."

Lew Bishop, a pest control technician, agrees: "I haven't seen any evidence that they do anything but use up electricity. As far as repelling insects, forget it; the amount of energy needed to force a rodent or insect from your home would also force you and your pets from the house. Better off buying a tube of caulk to seal the holes and a trap or two to catch that sneaky one that found a way in."

Thanks, Larry and Lew, for your informed input.

More on Shortwave Tribute Music

■ In a recent column, we discussed why certain pieces of music would be played in honor of the death of a celebrated individual. Longtime *MT* reader Maryanne Kehoe had additional insight. During a trip to the BBC, she noted a library of black binders in the announcer's booth. Querying the announcer, she learned that these were on-air procedures to be invoked upon the death of a member of the Royal Family. Specific music titles were not given, but the directives about the type of music (somber and respectful) were clear.

Service (GMRS)? (Robert Brock, Phoenix, AZ)

A. The Family Radio Service (FRS) was a successful merchandising invention of Radio Shack. It established a low-interference, low-power, two-way radio system for families and businesses as an alternative to CB, ham radio, GMRS, and business radio. Many other companies, including Midland, Alinco, and other well-known, two-way manufacturers, are in the fray.

No license is required since the hand-held units operate at less than 100 milliwatts of power, and the antennas are not removable for attaching range-extending external antennas. The frequencies are, indeed, interspersed among those of the GMRS, a fact that caused that industry to oppose the formation of the service from the start. But we've heard no report of such interference in this first year that the products have been on the market.

MT's new column, "and More," covers this service and other legal, unlicensed two-way communications. Jock Elliott (lightkeeper@sprintmail.com) would be happy to answer further questions regarding FRS and GMRS.

***Q.** I've often heard the term "from DC to daylight" referring to extremely-wide-frequency-coverage receivers. Just what are the frequencies of daylight? (Bob Fraser, Cohasset, MA)*

A. The tiny wavelengths of visible light range from 710 (red) to 400 (blue) nanometers, roughly corresponding to 422-750 million megahertz (422-750,000,000 MHz, or 422-750,000 GHz).

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**

Kevin Carey, WB2QMY
KCarey@mdsroc.com

Lowfer Update

Each winter, I like to report on what changes have taken place in the 160-190 kHz (1750 meter) experimenter's band. Winter is a great time to explore this band because noise levels are down, propagation is enhanced, and most of us have a bit more time to spend at the dials.

For those not familiar with the experimenter's band, it is available for unlicensed operation in the U.S. under the following conditions: 1) Maximum transmitter input must not exceed one watt, 2) The antenna length must not exceed 50 feet/15 meters (including the feedline). 3) Out-of-band emissions must be suppressed at least 20 dB. Virtually any transmission mode can be used as long as these rules are followed.

Canadian stations are also eligible to use the band under nearly identical conditions. Industry Canada's regulations RSS-210, paragraph 6.2.2 (a) cover this in detail and are available on the web at **http://strategis.ic.gc.ca/SSI/sf/rss210.pdf**. A paper copy of the regulations may also be requested from Industry Canada.

The experimenters on the 160-190 kHz band call themselves LOWFERS—a term coined in the 1970's by the late Ken Cornell. It stands for "Low Frequency Experimental Radio Station."

Hearing a Lowfer

Pulling in your first lowfer can be a considerable challenge. Since these stations operate under severely restricted conditions, you'll need to do everything possible to make up the difference at the receiving end.

• A good antenna is the most crucial ingredient to success. Forget using the typical random length wire unless you live in a rural setting with no interference sources nearby. Wire antennas usually act as "noise collectors" in residential areas. You'll do much better with a high performance antenna intended for LF work, such as a loop or active antenna.

Past columns have discussed many suitable antenna designs, both commercial and homebrew. Reprints are still available for the easy-to-build Homespun Loop (September 1992 *MT*.) See the front of the magazine for reprint information.

• It's important to use a narrow bandwidth setting on your receiver (1 kHz or less) for best results. This limits the effects of adjacent signals and allows you to focus on the desired signal.

• Headphones are also a must. They will help you block out surrounding noise and let you focus on the signal at hand. Get the best pair you can afford with respect to audio fidelity and comfort.

• Tune slowly! It's easy to tune right past a weak signal without realizing it was there. Try sifting through the band in small increments, and pausing every few hundred Hertz to listen for signals that might fade in and out.

What to Listen For

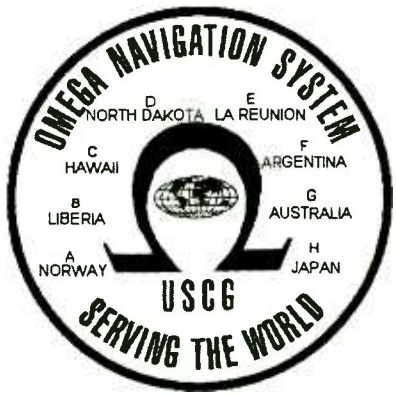
Most Lowfer operations are conducted beacon style, with a station repeatedly sending its ID and QSL information in slow Morse Code. The code is usually so slow, in fact, that you can jot down the dots and dashes and look them up on a code chart, if necessary.

Table 1 shows a list of selected stations believed to be active at this writing. This information was obtained from *The Lowdown*, the journal of the Longwave Club of America (LWCA). For more information on the LWCA, write club headquarters at 45 Wildflower Road, Dept. MT, Levittown, PA 19057. You can also visit their web site at **http://members.aol.com/lwcanews/index.html**.

Lowfers have a great track record for acknowledging reception of their stations. Many have special QSL cards printed up for this purpose, and these are highly prized among most DXers. Should you hear a station that does not announce a mailing address, drop me a line with the details of your reception and I will try to furnish this information.

TABLE 1: Selected Lowfer Listings (Winter '98)

FREQ.	ID	LOCATION
177.900	MPK	Chittenango, NY
178.600	ZWI	Baldwinsville, NY
181.167	IZJ	San Gabriel, CA
181.620	RL	Herndon, VA
182.518	NR	Riverside, CA
183.500	PLI	Burbank, CA
183.544	MEL	San Jose, CA
185.000	RED	Wausa, FL
184.320	RI	Rifton, NY
184.320	IA	Marion, IN
184.480	TEXAS	Haslet, TX
185.900	3SCO	Scarborough, ONT
186.100	3GOATS	Talent, OR
186.375	BA	Lancaster, IL
186.750	LEK	Aitkin, MN
187.500	YD	White City, FL
189.360	TH	Colt's Neck, NJ
189.500	ABC	Hilton Head Is., SC
189.950	OK	Davenport, OK



Logo from the now-obsolete OMEGA navigation system (10-14 kHz). The system was shut down on Sept. 30, 1997, after more than 26 years of service.

Advanced Modes

While CW is still the predominant mode, some Lowfers are experimenting with voice (AM and SSB), as well as various data modes. The most popular scheme for Lowfer data transmission is BPSK (Binary Phase-Shift Keying). This allows copying signals on a personal computer even in the presence of weak signals or interference. Some amazing distances have been covered with this mode.

If you'd like to learn more about BPSK and other advanced techniques, I suggest reviewing back issues of the *Lowdown* for numerous articles on the subject. The LWCA Homepage mentioned earlier also has excellent coverage of these topics.

Want to be a Lowfer?

With the decline in commercial services using the longwaves, it may be up to us to make our own signals! Many circuits for Lowfer transmitters have been published over the years. The December '96 issue of *MT* contained a circuit for such a transmitter that can be easily homebrewed for LF or MF operation. (See *DeMaw's Workbench*, Page 102.)

If there is enough interest, I would consider doing a construction series in this column for a basic CW transmitter. This could be either a kit, or a strictly homebrew design. Please write to me with your thoughts on this topic.

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George Zeller
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Berkeley Pirate Wins Another Battle With FCC

Stephen Dunifer's veteran micropirate Radio Free Berkeley has won another court battle in its ongoing fight with the FCC. In a November 12 decision, US District Court Judge Claudia Wilken rejected the government's request for an injunction prohibiting Dunifer from operating his California FM pirate station. Wilken previously denied an FCC request for a similar injunction in 1995. The 1997 ruling rejected a government claim that the District Court had no jurisdiction in the matter, citing precedent in a 1994 Arizona micropirate case, Dougan vs FCC.

WRYT - One of dozens of new 1997 pirates

Wilken did not rule on the question of whether the FCC's ban on low power FM broadcasting in the United States is unconstitutional. She ordered attorneys for both Dunifer and the FCC to file briefs on this issue. Thus, litigation will certainly continue in this high profile case for some time to come. Attorneys for Dunifer expressed pleasure at the Wilken ruling, saying that her ruling "suggests the likely unconstitutionality of the entire regulatory structure underlying the FCC's ban on low power radio." They claimed that "the real pirates of the airwaves" are "billionaire commercial interests" such as General Electric, Westinghouse, and the Disney Corporation that have substantial ownership interests in commercial United States radio broadcasting stations.

This case has turned into a landmark legal battle that will have significant impact on literally hundreds of micropirate operators who operate without FCC licenses across the USA. Dunifer says that Wilken's ruling will permit his station to operate for at least another year. As further developments ensue, you'll read about them here.

■ Winter is Europirate Season

The long nights and cold temperatures of winter make this the ideal time for North American DXers to chase pirate stations broadcasting from Europe. Propagation on the low bands is better than it is during the summer, and static levels diminish considerably. Europirate reception can be some of the best pure DX that there is in the field of shortwave broadcasting.

Veteran *MT* reporter Ross Comeau of Andover, Massachusetts, provides an example. He bagged United Christian Broadcasters, an Irish station that carries religious programs, at 0200 UTC on 6200 kHz. The 3900-4000 kHz and 6200-6400 kHz regions are commonly used by European unlicensed stations. If you're trying to duplicate Ross' feat, sunset on UTC Saturdays and sunrise on UTC Sundays normally provides the best propagation. Particularly for those living in eastern North America, now is a good time to tune through the Europirate bands.

■ Interval Signals

Dozens of times a year we receive loggings of North American pirate station **WLIS,** where Jack Boggan plays interval signal tunes from licensed shortwave broadcasters. If you can't find WLIS on the pirate bands and want to get your fill of interval signals anyway, NASWA's Al Quaglieri reports that he has updated his excellent shortwave interval signal internet web page. You can hear dozens of IS tunes over the internet via the **http://www.albany.net/~alcue/** URL.

■ SRI Transmitter Closing

Although the item does not involve unlicensed radio broadcasting that we normally cover in this column, I ran across some news during a recent vacation in Switzerland. While I toured the 250 kW Swiss Radio International transmitter in Schwarzenberg, audible nightly in English at 0100 UTC on 6135 and 9885 kHz, engineer Roland Anderau informed me that the Swiss government was closing down the transmitter in early 1998. Other SRI transmitter sites within Switzerland, including the one in Lenk, are also biting the dust.

Complaints from neighbors and real estate issues, similar to the situation that closed the former Voice of America site in Bethany, Ohio, have caused the Swiss government to make this decision. Swiss Radio will continue their shortwave service, but the broadcasts will be carried via relays in countries such as French Guiana. So, if you need a QSL from Switzerland, now is the time to send in the reception report.

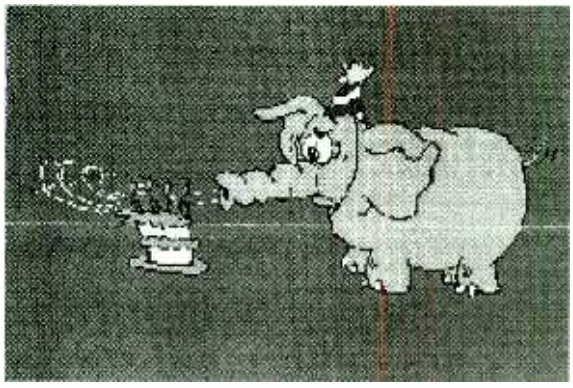
■ What We Are Hearing

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.

Anonymous Radio- 6955 at 0300. Their name sounds covert, but their shows are mainly mainstream rock music. Addr: None. (Harold Frodge, Midland, MI)
Cat in the Hat Radio- 6955 at 1915. As the station name implies, Dr. Seuss material makes up a significant portion of their programming. Sometimes they identify themselves with CITH call letters. Addr: Providence. (Don Pearce, Queens, NY; Lee Silvi, Mentor, OH; Joel Altre-Kerber, Buffalo, NY; William Hassig, Mt. Prospect, IL; Frodge)
He Man Radio- 6955 at 2130. He Man is back with his parodies of manly behavior; at least we *think* that the shows are parodies. Addr: Blue Ridge Summit. (Altre-Kerber; Frodge; Hassig; Silvi)
Jerry Rigged Radio- 6959 at 2045. Their shows primarily consist of rock music and comedy material, with some talk about the current pirate scene. Addr: Providence. (Michael Prindle, New

Suffolk, NY)
KCHZ- 6955 at 0345. Rich and Talea liked their show, hosted by Yukon Jack, despite the drifty transmitter that they have used. Addr: None. (Rich and Talea Jurrens, Katy, TX)
KFOB- 6955 at 2215. Some pirates (such as this one) are best heard in western North America. I've never seen a log on this one from a receiver east of the Rocky Mountains. Addr: None. (Patrick Nobel, OR)
KSSR- 6955 at 2315. Colonel Billy Bob uses a classic rock format on this new addition to the pirate scene. Addr: None, reports go to the FRN web site at **http://www.frn.net/** on the internet. (Bill McClintock, Minneapolis, MN)
La Voz de Mundano Tiempo- 6955 at 2130. This world beat pirate has quickly issued QSLs, as we see here. Harold got one of them. Addr: Belfast. (Frodge)
Mystery Radio- 6955 at 0200. "The Shadow" specializes in elaborate electronic and new age instrumental music, so the sound of this station is distinctive. Addr: Stoneham. (Jim Franke, Bartlett, IL; Basil Shelley, Blythe, CA; Frodge; Jurrens; Prindle)
One Voice Radio- 6955 at 2300. Their announcer Joe always features advocacy for health issues, including references to medical journals that justify his recommended behaviors and diets. Addr: Belfast. (Kevin Nauta, Grand Rapids, MI; Niel Wolfish, Toronto, Ontario)
Radio 26th of October- 11092.5 at 1750. This year's special St. Helena broadcast attracted a clever pre-transmission pirate once again. "Jonathan Marx" announced a takeover of Radio St. Helena by the Euro-Terrorist Alliance, sponsored by Club Moha-Med. Addr: None. (Prindle)
Radio Azteca- 6955 at 2245. Bram Stoker has produced more parodies of DXers and DXing than any other pirate in history. His elaborate productions are always entertaining. Addr: Belfast. (Shawn Axelrod, Winnipeg, Manitoba; Altre-Kerber; Frodge; Jurrens; Shelley)
Radio Eclipse- 6955 at 0015. Steve Mann announced in November that his station was making its last broadcast, but that he would return to the pirate bands with a different station name. Keep your eyes open. Addr: Providence. (Bill Wilkins, Springfield, MO; John Arendt, Oswego, IL; Randy Ruger, North Hollywood, CA; Dick Pearce, Brattleboro, VT; Ray Carmen, Canton, OH; Altre-Kerber; Axelrod; Frodge; Hassig; Jurrens; Nauta; Don Pearce; Prindle; Shelley)
Radio Free Euphoria- 6955 at 2100. Maharishi Hashishi Ali Ganja plugs (what else?) marijuana consumption with music and verbal advocacy. Addr: Belfast. (Hassig; Prindle)
Radio Free Speech- 6955 at 1600. Bill O. Rights tends to produce shows pegged to holidays, so his Halloween and Election Day shows differed from his Thanksgiving and Christmas broadcasts. Addr: Belfast. (David Krause, Eastlake, OH; Comeau; Hassig; Prindle; Wolfish)
Radio Eurogeek- 6955 at 0200. They tend to appear around St. Helena day each year, and this November was no exception. Programming is a clever parody of clandestine broadcasters. Addr: Providence. (Gary Neal, Sugar Land, TX; Silvi)
Radio Metallica Worldwide- 6955v at 0015. Dr. Tornado and Señor El Niño remain quite active with a whopping 10,000 watt transmitter from a boat off the Atlantic Coast. Despite their nearly constant slight frequency drift, this powerhouse is probably the most widely heard North American pirate and history. Look for rock music and off the wall discussions in their programming. Addr: Blue Ridge Summit. (Gene O'Brien, Union, NJ; Greg Majewski, Oakdale, CT; Howard Espravnik, Gallatin, TN; Altre-Kerber; Hassig; Jurrens; Dick Pearce; Don Pearce; Prindle; Ruger; Shelley; Wolfish)



The "Party Elephant" at Mundano Tiempo

Radio Nonsense- 6955 at 0015. Joe Mama's reincarnation on this station has been consistently active with rock music, comedy, and novelty parody tunes. Addr: Belfast. (Brad Pollack, Baltimore, MD; Altre-Kerber; Axelrod; Comeau; Jurrens; Majewski; Nauta; Prindle; Shelley)
Radio One- 6955 at 0200. This slick rock oldies broadcaster is the original "numbered" pirate. Addr: Belfast. (Hassig; Jurrens)
Radio USA- 6955 at 0100. Mr. Blue Sky, Joe King, and the rest of their characters have been around the pirate scene for two decades, so their elaborate original comedy and "drama" productions have a strong DX flavor. Addr: Belfast. (Altre-Kerber; Axelrod; Espravnik; Hassig; Dick Pearce; Shelley; Wilkins)
Radio Tellus- 6955 at 2315. As with many pirates, rock music and commentary are the staples on this one, with the announcer's slogan of "Oh, yeah!" Addr: Providence. (Majewski; Ruger)
Radio Tornado Worldwide- 6955 at 0600. The powerhouse presence of Radio Metallica has stimulated numerous parodies. This one is the most widely heard. Note the late time of day, which allowed propagation to the west coast. Addr: None, verifies logs in *The ACE*. (Ruger)
RFM- 6955 at 1815. Also known as Radio Free Massachusetts, and operated by H. V. Short, this veteran pirate is active again. Addr: Belfast. (Altre-Kerber; Frodge; Hassig; McClintock; Don Pearce; Silvi)
Take it Easy Radio- 6955 at 0645. At first they played mainly Eagles music, but a general rock format is evolving at the station. Addr: Belfast. (Altre-Kerber; Frodge; Hassig; Krause; McClintock; Shelley; Silvi; Wolfish)
The Crooked Man- 6955 at 2145. This may be the strangest pirate that has consistently appeared on shortwave for many years. The operator fell out of the Hindenberg and landed on his head, causing his stream of consciousness "logic." Addr: None. (Frodge)
TIE Radio- 6955 at 0515. Not much is known about this new pirate, which appears to operate from a western North America location. Addr: Unknown. (Majewski; Ruger)
Voice of the Long Run- 6955 at 1415. Not much is known yet about this new operation, but if they are around for the long run, this may change. So far they seem to have a relationship with Radio Eclipse. Addr: Unknown. (Altre-Kerber; Frodge)
The New Voice of the Purple Pumpkin- 6955 at 2200. This year's Halloween edition of the Purple Pumpkin was an entertaining review of the history of various pirates who have used this name over the years. Addr: Unfortunately none. (Prindle)
Voice of the Runaway Maharishi- 6955 at 1945. The Maharishi on this station seems curiously like the Maharishi on Radio Free Euphoria. Addr: Belfast. (Frodge; Wolfish)
Voice of Shortwave Radio- 6955 at 0000. Lately this one has been playing old radio dramas, such as H. G. Wells' *War of the Worlds*. Th's famous bit of radio history is popular among p rates. Addr: Blue Ridge Summit. (Wolfish)
WARR- 6955 at 0115. Captain No Beard is not as active as he was a year ago, but he still programs marijuana advocacy through rock music. Addr: Belfast. (Axelrod; Espravnik; Neal)
WDRR- 6955 at 1700. J. J. Tiger's slogan, "Rock and Roll Radio," describes his programming with precision. Addr: Belfast. (Altre-Kerber; Don Pearce; Prindle)
Witch City Radio- 6955 at 1300. Normally their Halloween material from Salem, MA, appears around October 31, but they were heard at other times in 1997 as well. Addr: Belfast. (Frodge; Don Pearce)
WLIS- 6955 at 2300. It's a simple theme: Jack Boggan plays shortwave broadcast station interval signals as hit tunes. The format is entertaining to DXers, so Jack has produced broadcasts like this for many years. Addr: Blue Ridge Summit. (Majewski; Nauta; Wolfish)
WMFQ- 6955 at 1630. This one's rock music alternates with ID's by a chorus of men, who plug the pirate QSL process. Addr: Providence. (Altre-Kerber; Silvi)
WMPR- 6955 at 0000. The male and female announcers at this techno "dance music" station remain mysterious. Despite relatively frequent activity and improving signals lately, they still have no means to contact their listeners. Addr: None. (Altre-Kerber; Jurrens; Hassig; Krause; Prindle; Shelley; Silvi; Wolfish)
WRAY- 6955 at 2245. The call letters are a pun on the name of the rock group Link Wray, which is featured on the shows. Addr: Wellsville. (Altre-Kerber)
WREC- 6955 at 2300. P. J. Sparx normally operates multiple times every month, so his elaborate rock and comedy programming is widely heard. P. J. specializes in novelty tunes recorded to the music of well known rock songs. Addr: Belfast. (Altre-Kerber; Frodge; Hassig; Jurrens; Krause; Dick Pearce; Don Pearce; Prindle; Ruger; Shelley)
WRYT- 6955 at 0800. As we see this month, QSLs are materializing from this new rock music pirate. Addr: Belfast. (Frodge; Hassig; Jurrens; Majewski; Prindle)
WSRR- 6955 at 2230. Solid Rock Radio, a veteran rap and soul music pirate, has been using these identifying call letters for a couple of years now. Addr: Belfast. (Altre-Kerber; Frodge; Nauta; Majewski; Don Pearce; Prindle; Wolfish)

Ike Kerschner, N3IK

Antenna Face-Off: Quad vs. Yagi

The controversy over the quad versus Yagi has spurred me to delve into the question deeper by running some experiments. The results have been fairly definitive, in my opinion, but others may wish to conduct their own experiments.

I chose two meters on which to conduct my experiments due to the fact that antennas for this band are easy to handle. Initially I constructed a two-element quad (driven element/reflector) and a two-element Yagi with the same element configuration, both horizontally polarized. Both antennas were mounted five feet above the roof of the house (about 23 feet above ground) and separated by about 20 feet horizontally.

Results favored the quad as a distance (DX) antenna. The quad was far better on fluttery (QSB) signals than the Yagi, and frequently signals that could not be copied at all on the Yagi were solid copy on the quad.

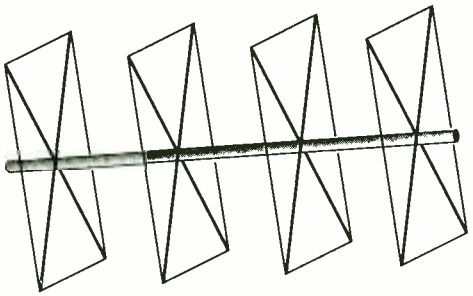
The next step was to switch locations between the two antennas. Results were exactly the same. The Yagi had a better f/b (front to back) ratio and f/s (front to side) ratio than the quad. Varying the distance between the driven element and the reflector of the quad did improve the front to side ratio, but front to back on the quad was still not impressive.

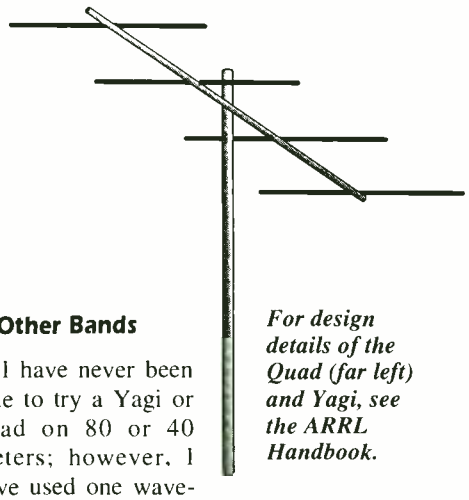
In an effort to improve DX performance and f/b and f/s ratio, a four element quad was constructed using information provided in the *ARRL Antenna Handbook*. A four-element Yagi was also built and installed at the same location. Forward gain seemed about equal and f/b was improved on the four element quad and appeared nearly equal to the Yagi. Again both antennas were installed with horizontal polarization.

Switching between antennas during DX contacts resulted in signals often dropping markedly when the Yagi was in use and improving with the quad. Most noticeable was the improvement in readability of fading signals when using the quad.

However, during normal conditions (i.e., no tropo or other DX propagation) both four element antennas seemed equal in performance. With the two element antennas, the quad had a reliable normal range that was at least 10 to 15 percent greater than the Yagi, in my "guesstimation."

In all cases the test antennas were adjusted for best match at 144.2 MHz, and initially spacing was set for maximum forward gain (the spacing was changed as mentioned to improve f/b on the quad). Changing the spacing on the quad did not seem to alter its ability to outperform the Yagi in range.





For design details of the Quad (far left) and Yagi, see the ARRL Handbook.

As a final test, both four-element antennas were mounted on my tower: The Yagi was mounted at 55 feet and the quad was four feet lower. Range improved dramatically on both antennas but the quad continued to outperform the Yagi.

An interesting side-note is that with the quad I was able to work vertically polarized FM signals that were not audible at all using the Yagi. This result seems to indicate the quad does have some polarization in both planes which would be one explanation of the improved performance when working tropo DX with the quad.

HF Quad/Yagi Tests

For several years I had a three element, tri-band Yagi at 60 feet, and a 10 and 15 meter quad that was 40 feet high at the center. The antennas were about 45 feet apart. On DX signals both antennas were usually equal in performance. The quad did better on long path signals about 20 percent of the time.

While running low power (five watts or less) the quad usually seemed to provide better signals when band conditions were marginal. However, when 10 or 15 meters were open I found it impossible to tell the difference between the two antennas.

The kind of testing I did was not exactly what could be called scientific! However, I feel comfortable with my choice of the Quad for all-around best antenna in the quad/Yagi debate. At VHF I feel the quad is truly the superior antenna! On HF the quad proved superior often enough that I would prefer it to a Yagi.

Other Bands

I have never been able to try a Yagi or quad on 80 or 40 meters; however, I have used one wavelength quad loops on these bands (and I am presently constructing a two-element fixed quad for 40). In theory the quad has some gain over a dipole; the gain varies depending on the shape of the loop. On both 40 and 80 the loop is far less susceptible to electrical noise than a dipole or other horizontal antenna.

The only testing I have done of a quad loop versus horizontal antenna is between three different antennas: a 40 meter dipole (inverted vee configuration) at 50 feet, two half waves in phase (3dB gain, in theory), and a loop on 40 meters. The top of my diamond loop was 45 feet above ground and the phased array was 45 feet on one end and about 55 on the other. All three antennas were aimed west.

Signal reports from the West Coast and DX were a mixed bag between the loop and phased array, the only real improvement being the ability to hear better with the loop through QRN; the dipole was a loser, as DX stations could frequently not even hear me. Switching feed from horizontal to vertical on the quad did show improvement when working long haul DX, but signal reports from ZL and VK were never that different to draw a solid conclusion.

As a clincher, the quad is fairly easy to put up and requires far less space than other gain antennas on the lower bands.

I hope this information provides a bit of insight into the Yagi/quad question and perhaps helps the decision-making process for some of the newer hams.

Keep the cards and letters coming. Best wishes to one and all for a Happy and Prosperous 1998.

Jock Elliott, KB2GOM
lightkeeper@sprintmail.com

Family Radio Service – the Next CB?

When the Federal Communications Commission created the Family Radio Service last year, for the first time the general public could use the quiet UHF FM band for personal communications at no charge.

The Commission set aside 14 channels for use by the FRS:

Ch.	MHz	Ch.	MHz
1	462.5625	8	467.5625
2	462.5875	9	467.5875
3	462.6125	10	467.6125
4	462.6375	11	467.6375
5	462.6625	12	467.6625
6	462.6875	13	467.6875
7	462.7125	14	467.7125

The first seven FRS channels are the same as the so-called "splinter" channels from the General Mobile Radio Service (GMRS). That means FRS and GMRS share these channels, and it also means that people with FRS and GMRS radios can talk to each other on these frequencies.

Stringent standards were established for FRS radios: handi-talkies with a maximum of one-half watt transmit power, measured at the antenna. In addition, the antenna must be an integral part of the FRS unit, so that it would be impossible to attach an external antenna that offered more gain and the potential of more interference. The FCC rules also specify an allowable frequency variation of 0.00025 percent, a maximum frequency deviation of 2.5 kHz and an audio frequency response of 3.125 kHz

For those who want reliable short-range communications over distances of 1-2 miles, FRS is a very attractive choice. The FRS frequencies are virtually immune to skip, and pocket-sized FRS radios, operating in FM mode, offer crystal clear communications.

Do they work? You bet! My wife and I have used FRS handi-talkies to stay in touch with another couple at an amusement park, to keep in touch around the neighborhood, and to maintain contact between cars while taking a trip. These diminutive transceivers are ideal for communications while hunting, fishing, camping, bicycling or even organizing any kind of group event.

Recently, I tested a pair of FRS radios from Midland Consumer Radio that I liked very much. Each Midland 75-510 FRS radio measures 4 3/4"H x 2 1/2"W x 1 1/4" D and weighs about a pound. The loudspeaker can generate half a watt of audio, which is quite loud for a radio that can fit in your shirt pocket.

On top of the radio, there is a non-removable flexible antenna and a rubber flap which you can lift to plug in an optional speaker-microphone. The on/off volume knob is also located on top of the unit, where it cannot be turned on by accident.

On the front of the 75-510 is a liquid crystal display with large channel numbers, plus indicators for BUSY (receiving), ON AIR (transmitting), CTCSS (Continuous Tone Coded Squelch System), low battery, LOCK, and SCAN. Just below the LCD are two buttons for changing channels up and down and for skipping channels and locking out channels during scanning. Also on the front of the radio is a button that activates the scanning feature and activates the CTCSS codes. A fourth button is used to lock the radio on a particular channel and to activate the backlight for the liquid crystal display.

Midland 75-510 FRS radio.

On one side of the 75-510 is a push-to-talk button, the top half of which is used to activate the MONITOR function. The 75-510 comes complete with four NiCad rechargeable batteries, and on the other side of the radio is a port for plugging in a charger, which is also included with the radio.

In addition to 14 FRS channels, the 75-510 also has 38 so-called CTCSS "privacy" codes. When activated, these codes mute the receiver at all times except when the proper tone code is received. So, if you don't want to hear other transmissions, have all the people in your group activate the same CTCSS code, and all other conversations will be locked out.

But note well: the codes do not render your transmissions private. Also worth noting: when a CTCSS code is activated, it applies to all 14 channels of the radio. And, of course, to hear each other, you must all use both the same CTCSS code and the same FRS channel.

What really set these Midland FRS radios apart is their performance. The audio coming out of the speaker is loud when you need it loud. The receiver is crisp and clear, and the transmitter delivers more range — about 1/4 mile more — than some competitive FRS units I have tested.

Finally, these radios just sip power. Pop a fresh set of Alkaline AAs in the battery pack, and you've got over 100 hours of stand-by power. The suggested retail price of the Midland 75-510 FRS radio is $199.95 each, but discounters are likely to have them for $130-140 a piece. For more information, phone Midland at 816/241-8500, or visit their web site: **www.midlandradio.com**.

So, to answer the question: for reliable, skip-free communications over short ranges, I think FRS could easily become the next CB. And I can heartily recommend the Midland 75-510 as a great way to take advantage of the Family Radio Service.

Dan Veeneman
dan@decode.com

PCS Takes Shape in 1998

The global satellite constellation Iridium took another step forward on November 8th with the launch of five additional satellites from Vandenberg Air Force Base in California. As of this writing 39 space vehicles are in orbit, although Motorola Satellite Communications reports that one of the previously launched satellites experienced an attitude control problem and is not expected to be included in the operational constellation. Since each of the six orbital planes envisioned by Iridium planners will contain a spare, this loss should not delay commercial service rollout scheduled for the third quarter of 1998.

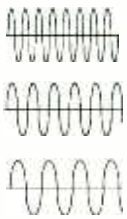
The Iridium satellite telephone network will operate using a slightly modified Global System for Mobiles (GSM) standard, incorporating their 1600 MHz transceiver into a multiband GSM handset. Customers will use the handset over 900, 1800, and 1900 MHz GSM terrestrial networks, switching to the Iridium satellites when no such local system is available. Subscribers will contract with their local GSM carrier to automatically roam on the Iridium system, which is expected to cost in the range of $3 per minute.

Globalstar, another satellite-based voice service provider, announced their first launch is now scheduled for February of 1998, eight weeks later than previously expected. The postponement is apparently to allow additional time for testing and rehearsals of the ground equipment that will provide tracking, telemetry, and control (TT&C) for the 56 low earth orbit (LEO) satellites.

Little LEOs

While Iridium and other voice service Big LEO satellite systems gather headlines, they may soon be sharing the spotlight with their less expensive counterparts. Termed Non-Voice Non-Geosynchronous (NVNG) systems by the Federal Communications Commission, these Little LEOs utilize constellations of smaller, less costly satellites to provide low speed, low volume digital wireless links. Using small, inexpensive user terminals, little LEOs are poised to provide such services as vehicle tracking, two-way data messaging and electronic mail, routine and emergency position location, remote environmental monitoring, and security warnings.

Doppler Frequency Shift



Satellite moving toward receiver
Apparent frequency is higher

Satellite directly overhead
No frequency shift

Satellite moving away from receiver
Apparent frequency is lower

A Report and Order released by the FCC in October specifies a number of operational rules and frequencies for five Little LEO systems, all of which will transmit and receive on VHF and UHF frequencies. Of the five, Orbcomm and VITA are already licensed and operating, Orbcomm with two satellites in orbit and VITA with one launched last September. Three newer entrants, LEO One, Final Analysis, and E-Sat, are preparing for construction and launch.

All five will share the same slice of spectrum, 148 MHz to 150 MHz for the uplink (Earth to space) as well as 137 MHz to 138 MHz and 400 MHz to 401 MHz for the downlink (space to Earth). This band of frequencies is already fairly crowded, with National Oceanic and Atmospheric Administration (NOAA) and Department of Defense (DoD) weather satellites transmitting in the 137 MHz and 400 MHz bands, respectively. Russian and French satellites also use this part of the spectrum, adding to complexity of frequency coordination.

Because geosynchronous satellites orbit 22,000 miles above the Earth and make one rotation every 24 hours, they appear to be stationary in the sky, "hanging" above a particular spot. Low earth orbiting satellites operate much closer to the earth, at altitudes from a few hundred to several thousand miles and complete an orbit many times each day. Because these satellites are moving so quickly, spectrum allocations must also take into account an effect called Doppler, which is the apparent change of transmitted frequency due to the motion of the satellite. A stationary receiver listening to a satellite moving overhead will experience a change in frequency, higher as the satellite approaches and lower as the satellite moves away. Doppler for a single beam from a Little LEO is expected to be on the order of 5 to 10 kHz, requiring a shift up or down in receiver tuning depending on the location of the receiver and the motion of the satellite.

A comprehensive plan proposed by the participants and ordered by the FCC distributes the available spectrum among each Little LEO and requires each operator to avoid interfering with the transmissions of government satellites. Accurate orbital locations and movement information ("ephemeris" data) will be collected and processed to predict their coverage areas ("footprints" in satellite parlance) up to week in advance, and where overlaps occur the Little LEO satellite must change operating frequencies or not transmit at all. In addition, to insure a failure will not create havoc, each satellite must have a fail-safe mechanism by which it will cease transmitting if a "reset" signal is not received from the ground every 72 hours.

New FCC Commissioners

There's been a changing of the guard at the Federal Communications Commission. Four of the five Commissioners are new as of November, when William Kennard, Harold Furchtgott-Roth, Michael Powell, and Gloria Tristani were confirmed by the Senate. Susan Ness is the only Commissioner staying on. The new Chairman, Mr. Kennard, had previously served as FCC General Counsel, and worked as a communications lawyer before coming to the FCC in 1993. He is seen as less confrontational and more of a consensus-builder than his often-controversial predecessor Reed Hundt. The other Commissioners

TABLE 1: Little Low Earth Orbit (LEO) systems

SYSTEM	SATELLITES (Planned)	MODULATION METHOD	EXPECTED COST ($ millions)
E-Sat	6	CDMA	50
Final Analysis	26	FDMA/TDMA	250
LEO One	48	FDMA/TDMA	250
Orbcomm	28	FDMA/TDMA	350
VITA	2	FDMA/TDMA	10

come from other parts of the government with varied backgrounds in economics and law.

Local Multipoint Distribution Service

The largest spectrum auction in the history of the FCC is scheduled for December 1997, where 986 licenses covering 1.3 GHz of spectrum will be sold to the highest bidder for use under the moniker Local Multipoint Distribution Service (LMDS). Two blocks of spectrum in each of the nation's 493 Basic Trading Areas (BTAs) will be auctioned, with a 150 MHz block available to all bidders and a 1150 MHz block available to all except in-region cable television and local telephone companies. Because of radio signal characteristics at these frequencies, the services offered by licensees will be fixed rather than mobile, and are expected to include interactive video, high speed Internet access, and two-way voice telephony.

LMDS pioneer CellularVision has been running a one-way video service for several years, transmitting more than 40 cable-quality analog channels to customers in the Brighton Beach, New York, area, but future services will most likely be interactive and fully digital. Internet access, for instance, is expected to be a marketing winner with transfer speeds approaching 1.5 gigabits per second, orders of magnitude faster than ordinary dial-up modems. Thousands of voice channels can fit in the LMDS blocks, providing an alternative to the local telephone company.

LMDS transmitters are generally line of sight, with a typical range of 4 to 6 miles. Development of low-cost equipment that operates in the 28 to 30 GHz band will take some time, leading most analysts to believe that initial license winners will focus on business customers, supplying wireless voice and Internet access to corporate locations that can afford relatively high-cost transceivers. As performance improves and hardware costs drop, LMDS should gradually reach residential consumers.

Because the wireless signals bypass the local infrastructure of cable television and telephone companies, the FCC expects LMDS to eventually become a competitor to these local monopolies, driving down prices and increasing the variety and quality of services.

TABLE 2: Local Multipoint Distribution Service License Blocks

A Block	27.5 to 28.35 GHz 29.1 to 29.25 GHz 31.075 to 31.225 GHz	1150 MHz
B Block	31.0 to 31.075 GHz 31.225 to 31.3 GHz	150 MHz

Pentium Bugs

Another interesting bug has been discovered that affects the operation of certain Intel Pentium microprocessors. Several years ago it was reported that early generation Pentium chips suffered from a double precision division problem in the floating point arithmetic unit, where serious errors, although unlikely, could occur. More recently the Pentium Pro was shown to occasionally fail to correctly report a float-to-integer conversion overflow, again creating the possibility of incorrect answers. Other "deviations from published specifications," as Intel refers to such bugs, are usually listed in an errata for each microprocessor.

This latest bug, nicknamed the "Pentium F0 Bug," causes Intel Pentium and Pentium MMX microprocessors to "hang," or stop functioning until reset, when executing the instruction F00FC7C8, regardless of the operating system. This bug does not appear in compatible chips manufactured by Advanced Micro Devices (AMD) or Cyrix. It also does not appear to affect Pentium II or Pentium Pro microprocessors, and does not affect earlier generations of processors such as the 80486.

Microprocessor operations are controlled by microcode, a special form of software that directs the internal operation of the chip. With modern chips growing in complexity and sophistication, testing the microcode is extremely difficult. Microcode with hard-to-detect faults, perhaps triggered by specific but unusual code sequences, may remain undetected for long periods of time but leave computer systems vulnerable to unexpected results, or worse.

This particular instruction should only occur in programs deliberately created to exploit the bug, and will not exist in commercial software such as spreadsheets and word processors. Many Internet service providers use Pentium-based equipment, and any service that allows a user to run their own programs would be vulnerable to the following program, regardless of the operating system or other software on the computer:

Intel processors are in more than 80% of the world's personal computers, and Intel ships almost 100 million chips each year. Last July Intel revealed that the microcode in Pentium Pro and Pentium II chips can be upgraded, presumably to correct such defects. Although not available to end users, such microcode patches offer the possibility of repairing flaws and limitations without the need to replace any hardware.

As more receivers and radio equipment are controlled by microprocessors of various types, how many unexpected "features" will surface and how will they affect the operation of the device?

That's all for this month. Comments, questions, and Pentium horror stories can be sent to dan@decode.com. More information is also available at the *PCS Front Line* web site, http://www.grove.net/~dan. Until next month, happy monitoring!

Jean Baker, KIN9DD

Glossary of Aeronautical Terminology

Welcome aboard and a Happy New Year to everyone! To start the year out right, we have a glossary of aviation terminology that you may want to copy for the wall in your monitoring post.

The North American P-51 Mustang "Moonbeam McSwine" on display

Affirmative - Yes

ARINC - Aeronautical Radio, Inc. A company that provides air-ground radio services among others.

ARTCC - Air Route Traffic Control Center

ATC - Air Traffic Control

ATC Clears - Used to relay an ATC clearance when given by other than an air traffic controller. You will hear an ARINC radio operator say this when relaying a clearance from ATC to a flight heor she is working.

Company Traffic - Term used by ATC to advise converging traffic that they both work for the same company.

Charlie-Charlie - Used by pilots more on the HF bands than on VHF, in the same context as 'affirmative.'

ELT - Emergency Locator Transmitter. This piece of equipment produces a signal when activated (usually, but not always, by a crash) which is transmitted on the international distress frequencies of 121.500, 243.0 and/or 406.025 MHz.

Heavy - Aircraft capable of takeoff weights of 300,000 pounds or more, whether or not they are operating at this weight at during a particular phase of flight. Aircraft belonging to this class include the 747, L10-11, C-10, some airbuses, DC-10, and others.

Flight Level - Flight altitude of an aircraft which is based upon barometric pressure and expressed in the form of a 3-digit number. For instance, flight level 330 would indicate that an aircraft is flying at thirty-three thousand feet.

High Frequency - Aeronautical communications are found on the high frequency bands, in most cases but not all, between 2 and 22 MHz, inclusive. Transmissions on these frequencies are in upper sideband mode.

Hold - A predetermined maneuver which keeps aircraft within a specified airspace while awaiting further clearance from ATC.

Hot Area - Designated airspace over an active military operations area (**MOA**) up to a predetermined flight level which civilian aircraft must not penetrate.

Knot - A unit of speed. One nautical mile is equal to 6,076.12 feet. A statute mile is equal to 5,280 feet. You will hear pilots expressing their airspeed in knots.

Mode - Letter or number which is assigned to a specific pulse spacing of radio signals transmitting or received by a ground interrogator or airborne transponder components of the air traffic control radar system. Civilian aircraft use mode C while military aircraft use mode 4. A transponder is necessary for altitude reporting figures on the radar screen of air traffic control facilities and other related functions.

Negative - No.

NORDO - The literal translation is "no radio." Controllers will use this expression when they are referring to an aircraft whom they are trying to contact and the pilot (for one reason or another) is not answering them.

Roger - This word means I have received your transmission and is also used to mean I hear you. Technically, it is supposed to mean "I have received all of your last transmission."

SELCAL - A four-tone selective calling device used by aeronautical enroute ground stations (such as ARINC) to contact a flight which has a SELCAL receiving unit on board. Aero enroute ground station personnel use SELCAL to contact a flight on both VHF and HF frequencies. While primarily utilized by civilian aircraft, many military and business aircraft now utilize the system also.

Separation - The spacing of aircraft both horizontally and vertically to achieve safe and orderly movement during flight, takeoffs, and landings.

Target - Indicator shown on an air traffic controller's radarscope resulting from a primary return on a radar beacon reply.

UHF - Ultra-High Frequency. Used in this sense, it refers to the portion of the spectrum used for military aviation communications from 225 to 400 megahertz.

VHF - These initials stand for Very High Frequency. Aero band communications in the VHF range run from 108.000 through 137.000 MHz. If you hear a pilot asking for a Victor frequency, chances are he's a military pilot requesting a frequency in the VHF band from ATC instead of a UHF counterpart.

■ Readers Corner

Bob Retzler (PA) asked for frequencies for Philadelphia and Pittsburgh:

Philadelphia: ATIS - 133.400; Approach - 123.800, 126.600, 126.850, 127.350, 128.400; Departure - 119.750, 124.350; Clearance Delivery - 118.850; Ground - 121.900; Tower - 118.500; PD - 453.450; ARINC - 460.775; USAirways - 151.835, 460.700.

Pittsburgh - ATIS - 127.25 (A), 135.900 (D); Approach - 123.950, 124.150; Departure - 118.700, 119.350, 124.750, 127.950; Ground - 121.900; Tower - 119.100, 128.300; Clearance - 126.750; PD - 453.825; Maintenance - 453.925; USAirways - 129.050, 130.050, 130.500, 131.050, 460.700, 460.825, 460.850.

James Conner (MN) shares these **Minneapolis** freqs with us:

ATIS - 120.800, 135.350; Approach - 119.300 (N/E), 126.950 (S/W); Departure - 120.000 (N/E), 124.700 (S/W), Clearance - 133.200; Ground - 121.8 (N), 121.900 (S); Tower - 123.950, 126.700; American - 130.250, 130.500, 460.775; Northwest - 129.300, 129.925, 131.125, 131.900, 460.700, 460.800, 460.850, 460.875; United - 129.500, 460.725, 460.875; PD - 460.475; Fire - 153.850, 153.860, 154.205, 154.295.

■ Something New in the Skies!

For those of us who like magazines which feature warbirds, there's a new one available called *Flight Journal*, subtitled "Exploring the Aviation Adventure." The price is reasonable — $3.95 per copy, or $19.95 for a year's subscription, published bimonthly. Write to Flight Journal, Air Age, Inc., 100 East Ridge, Ridgefield, CT 06877-4606 for more information. This writer thinks it's the best of its kind available today!

John Fulford, WA4VPY
email: JOHNF0413@aol.com

The White House is Learning...

In November, we had the honor of the visit of the President of the United States in our fair city. President Clinton flew into Palm Beach International Airport aboard Air Force 1 and proceeded throughout the county on a fund raising trip. He also went to visit the children at the Middle School in Jupiter, Florida—the visit he had to cancel when he fell and hurt his leg while down here last year.

Security was tight throughout the county and at the above school. The Secret Service had a command post set up at the school, at the golf course where he played a few holes, and at a private residence in Boca Raton where he attended a Democratic Party fund raising dinner.

Since I work in Boca Raton about five miles from the site of the dinner engagement, I set up my monitoring location in my building located on the university property by the Boca Raton airport. Being on one of the top floors, I had a good monitoring location.

Several days before the arrival I started hearing Secret Service mobiles on 165.375 MHz doing site checks and route checks in the clear. A couple of days before the arrival the paging transmitter on 167.025 MHz was set up by the White Hose Communications Agency. As the time of arrival grew closer, the volume of paging transmissions increased.

The day prior to the arrival all of the main Secret Service channels were active with radio activity. These included 165.375, 166.5125, and 164.8875 MHz.

The day of the arrival I was able to monitor Air Force 1 as the pilot contacted the approach at Palm Beach International Airport on 119.1. *At no time* during the arrival or departure of the aircraft did I hear any traffic on the Echo/Foxtrot channels. This is, of course, the channel of 415.7 MHz where the plane talks down to one of the AT&T land sites and the site talks back up to the plane on 407.85 MHz. This experience agrees with the FedCom email reports I have been receiving that this circuit has all but dried up, with traffic going to satellite communications.

When the President arrived, all of the traffic became encrypted and very little was gained from this source. Don't despair, however: as I mentioned in a previous column, the local police helicopter provided a play-by-play description of where the President was, what he was doing, and what the future plans were. This was monitored by several listeners in the Palm Beach area including Lokutus in Jupiter, who provided me with the additional information that one of the local television stations (WPEC-TV Channel 12) had their traffic helicopter flying almost tandem with the Sheriff's helicopter.

The sheriff's helicopter kept me informed on 159.15 MHz and the WPEC helicopter kept me informed on 153.11 MHz. Who needed the Secret Service? I had more than enough listening here.

■ Traveling with the President

This brings up another interesting observation. The *very loud* wideband FM signal usually accompanying Air Force 1 was not heard this trip. This signal seems to come and go, probably depending on the condition of the satellite circuits (my guess). It has been heard in the early part of November centered on 359.95 MHz over the midwest during one of the Presidential visits. Numerous single sideband subcarriers were detected. Good listening.

As this is being written, the President is visiting Los Angeles and southern California. All of the above channels are active including 164.8 MHz. The President was in Las Vegas prior to this. All of the same channels were active there as well.

One of our contributors, Ken Windyka of Springfield, Massachusetts, provided us with a monitoring report from that area. It seems the President was in that part of the country recently, arriving at Westover Air Force Base. The above channels were used there (notice a pattern forming?) along with the base security channels. Robert also provided these intercepts from Springfield:

US Post Office Bulk Mail Center--162.225, 172.300 MHz simplex
FBI--167.3625, 167,5625, 167.6125 MHz
Veteran's Administration Hospital at Northampton, Paging--173.7125 MHz
Government Building Security -Federal Protective Service--417.2 Rptr out
Unknown simplex activity --167.125 MHz

■ Reader Intercepts

While we are discussing federal buildings and their security, the New **Carlton Federal Building** just outside of Washington, D.C., uses the following frequencies:

412.225	security rptr output
464.500	construction crew
415.200	Federal Protective Service
409.200	loading dock traffic

Thanks to Charlie Wilkinson for these submissions.

While up in the Washington area, if you ever visit **Arlington National Cemetery**, be sure to monitor 165.1875 MHz. The p/l tone is 156.7 Hz. This is the operations and maintenance frequency for the cemetery.

Matthew W. Sadler has been busy monitoring in the **Chattanooga, Tennessee**, area and provides us with the Postal Service frequencies for that area. They are:

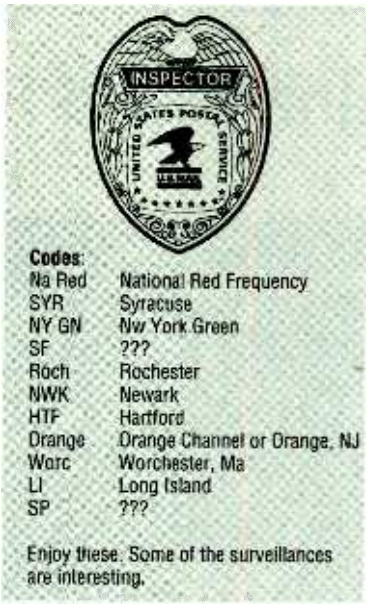
Service	Freq	Call	Notes
Vehicle ops	162.5875 simplex	KQX978	sprvsrs.
Vehicle ops	170.400 rptr out// 166.975 rptr in	KPS774	sprvsrs rptr
Main plant	168.000 simplex	KPS744	main plant svrs low power simplex
Postal insp.	169.850 rptr out// 169.000 rptr input		
Postal insp.	170.175 simplex		
P.O. Sec. Pol.	418.300 rptr out// 416.775 rptr in		

This radio system is apparently used by the postal service for their trucks that run between the post offices and the general mail facilities. The p/l tone on the radios is 203.5 Hz.

■ Postal Inspector System

As previously addressed in a prior column, hamfests (amateur radio flea markets) are a great place to pick up equipment and obtain federal frequencies. One reader, who wishes to remain anonymous, recently acquired a US Postal Inspector radio which had been sold at surplus. Here is the frequency breakdown for the entire northeast United States, and probably elsewhere.

Chan	Tx	Rx	TxPL	RxPL
1-Na Red	407.775	414.750	82.5	82.5
2-Na Red	414.750	414.750	82.5	82.5
3-Syr Rpt	407.725	415.050	82.5	82.5
4-Syr Sim	415.050	415.050	82.5	82.5
5-NY Gn Rpt	408.050	416.225	82.5	82.5
6-Mule Sim	414.750	414.750	none	none
7-SF Rpt	416.775	418.300	82.5	82.5
8-SF Sim	418.300	418.300	82.5	82.5
9-Roch Rpt	407.775	414.750	114.8	114.8
10-Roch Sim	414.750	414.750	114.8	114.8
11-Buf/Al Rpt	407.725	415.050	114.8	114.8
12-Buf/Al Sim	415.050	415.050	114.8	114.8
13-NY Yel Rpt	409.375	413.700	82.5	82.5
14-NWK NJ	407.725	415.050	107.2	107.2
15-HTF CT	407.725	415.050	91.5	91.5
16-TS1148RD	407.775	407.775	114.8	114.8
17-TS825RD	407.775	407.775	82.5	82.5
18-TS1148BU	407.775	407.775	114.8	114.8
19-TS825BU	407.775	407.775	82.5	82.5
20-Orange Rpt	414.750	407.725	82.5	82.5
21-Orange Sim	407.725	407.725	82.5	82.5
22-SF/I	416.775	416.775	82.5	none
23-WORC MA	407.725	415.050	74.4	74.4
24-LI/SP MA	407.725	415.050	91.5	91.5
25-NJ South	407.725	415.050	74.4	74.4



Codes:

Na Red	National Red Frequency
SYR	Syracuse
NY GN	Nw York Green
SF	???
Roch	Rochester
NWK	Newark
HTF	Hartford
Orange	Orange Channel or Orange, NJ
Worc	Worchester, Ma
LI	Long Island
SP	???

Enjoy these. Some of the surveillances are interesting.

■ Department of Energy

Also obtained at a recent midwest hamfest was a handie talkie with the following channels:

Department of Energy - Brookhaven National Labs

Ch.1	164.225	p/l 77.0 Hz
Ch.2	164.375	p/l 77.0 Hz

Our monitor in Arco, Iowa, Mr. Rick Michaels, provided the following frequencies of the activity he monitors coming from the **Department of Energy//Idaho National Engineering and Environmental Laboratory** (DOE/INEEL).

Frequency	Use
148.430	U.S. Naval Security
163.300	U.S. Navy Avionics Center
163.325	DOE Misc
163.4625	DOE Misc
163.5125	DOE Security Net
164.225	DOE Paging
164.375	DOE Misc
167.8625	DOE Security Ops
168.450	DOE Security
169.025	DOE Net L-Site Opns
171.3125	DOE Net E-Fire Alarms
172.475	DOE Net C-Site Opns
173.5625	DOE Net F-Site Opns
173.6375	DOE Net D-Site Ops
173.7125	DOE Net G-Bus Depot
406.225	INEEL Security Net
406.375	DOE Security
406.500	INEEL Security-Secondary Ops
410.800	INEEL Security Portables-Net 2
411.025	DOE Net A-Security
411.200	INEEL Security Portables-Net 3
413.850	INEEL Security Net
413.950	DOE MISC
415.475	DOE District - Area Ops
415.750	DOE Security Alarms Net
415.950	DOE Alarms Net
416.400	INEEL Base-Safety Ops
417.550	DOE Drill - All Call Areawide
417.750	DOE//INEEL-Site Ops
418.350	DOE Drill - All Call Areawide
432.425*	INEEL Security Portables - Net 1
436.2125*	DOE Fire Net - Central Facilities Area
438.950*	DOE Paging Ops

Here are some other INEEL frequencies with unknown usage:

163.175	163.325	163.8375	164.175
164.250	164.325	164.400	164.4625
164.525	164.575	164.700	164.775
164.8437	164.9625	165.7125	167.825
167.925	171.200	171.2625	171.425
171.950	413.800		

■ FBI and other anomalies

Here are some FBI frequencies from that part of the country also submitted by Rick Michaels:

Idaho Falls, Idaho

375.0000*	SWAT special ops
167.7375	ops

Pocatello, Idaho

163.9375	Primary opns
167.6125	Tactical

Twin Falls, Idaho

163.9125	ops Rptr

Salt Lake City, Utah

162.6375	Rptr out	Ch.1
167.7375	Rptr input to above	
163.9875	Simplex	Ch. 2
167.5625	Simplex	Ch. 4

* As you are reading all this, I can just see some of you with that glint in your eye, thinking, "Aha, I caught our FedFiles guru with bad frequencies!" Some of the above frequencies are not in the federal band, but are in the amateur radio part of the spectrum. Specifically, the frequencies of 438.950, 432.425, and 436.2125 MHz are in the 70 cm amateur band.

All I can say is, it's improbable, but it's also not impossible. I could tell you stories ...

Also bear in mind there is always a possibility you are hearing an image. Bearcat and Uniden double-conversion scanners are particularly prone to such behavior. To check it out, multiply the intermediate frequency (IF) of your scanner by two and add it to or subtract it from the frequency you are hearing. If either of those exercises puts the resulting frequency into the assigned range for federal communications, it's probably an image. If you punch in that frequency and you do hear the same communications, you've clinched it.

Also note that although the Idaho frequencies listed above are not allocated to the federal government in the U.S., they are used by Canada. Is there a legitimate Canadian user?

The moral is, don't be afraid to look in out of-the-way places—within reason. Check those itinerant frequencies in the business band. The U.S. Marshall's Office used to operate simplex in the Ft. Lauderdale/Miami on 153.550 MHz. Check those unused paging channels. You just never know what you might find.

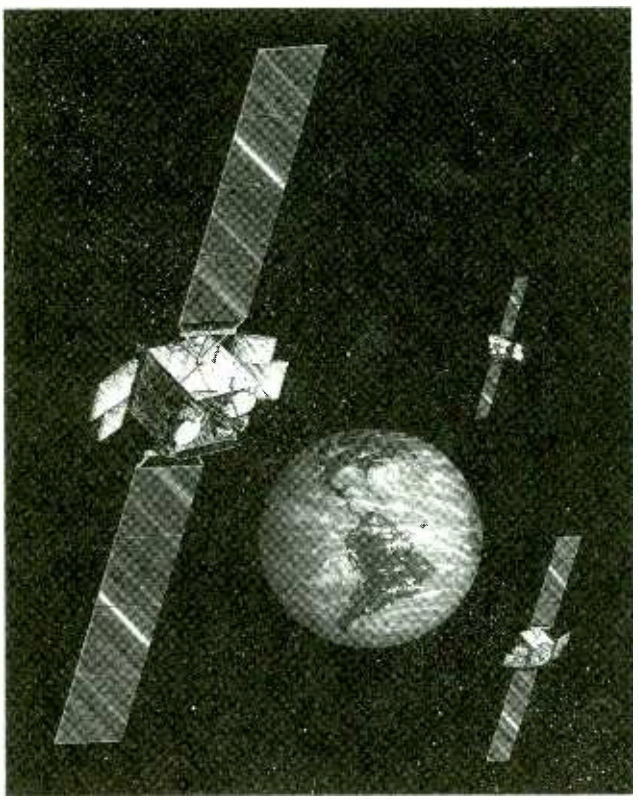
Ken Reitz, KS4ZR
e-mail: ks4zr@compuserve.com

Panamsat 5 Flies

Various commercial enterprises, from network news organizations to government agencies to educational institutions to unrelated corporate ventures, use satellites every day in the pursuit of their business. Sometimes they need only an hour, sometimes a day, and sometimes they require an entire transponder on standby 24 hours a day year 'round.

Those of us with C/Ku-band satellite systems run into these transmissions all the time and they make interesting watching or listening. Unlike the "cable neighborhood" (C1, C4, C3, G1, and G5) which is nearly 100 percent oriented to cable programming, workhorse satellites such as Galaxy 4 and SBS 6 are industry oriented. They transmit network feeds, sports back hauls, and offer transponder time by the hour or month.

In addition, there are many satellites outside the usual "view" of most satellite TV viewers. These are the satellites over the Atlantic whose work is to provide a space link for everything from international news back hauls to Direct To Home (DTH) broadcasts. These satellites usually have very broad continental beams making them weaker than our own domestic satellites. They are often transmitted with a circular polarity, as opposed to our own linear vertical and horizontal polarity. They may also be transmitted in another video format such as PAL, used in England and much of Europe. Our own NTSC standard has trouble displaying these images.



A veritable constellation of Hughes-built PanAmSats orbit the Earth, constituting the first privately operated global communications system.

THE PANAMSAT FLEET

Satellite Location
(degrees East or West) Coverage

PAS-1 (C-band) 45 W Europe, N. America, S.America
PAS-2 (C/Ku-band)168 E Oceania, Pacific Rim, Australia, New Zealand, China
PAS-3r* (C/Ku-band) 43 W Europe, C. America, N. America, S. America, Africa
PAS-4 (C/Ku-band) 68.5 W E. Africa, E. Asia, India, E. Europe, N.E. Asia
PAS-5 (C/Ku-band) 58 W Europe, N. America, S. America
PAS-6 (Ku-band) 43 W S. & C. Americas
PAS-7 (C/Ku-band) to be launched 1998
*r *indicates replacement satellite as original was lost*

As if this weren't discouraging enough, most satellite systems are installed with 18" or 24" actuator arms which do not allow enough travel for most viewers to be able to see these satellites. A 36" arm or horizon-to-horizon actuator is the preferred way to view these satellites, but, if you're a little adventurous and don't mind playing around with your dish, you can still explore the Atlantic birds even with an 18" arm (more on this later).

Searching for PAS-5

It pays to routinely search the entire Clarke Belt from as far to the east and you can see to as far to the west as you can push your dish. This is often the way to find out when new satellites have been successfully turned on. This happened to me this past October. While cruising the orbital slots east of Galaxy 6 (at 74 degrees our easternmost domestic broadcast satellite), I happened to notice faint sync bars in the video and stopped the dish. By making various adjustments with the actuator, polarotor, and video tuning, it appeared that channel 23 had color bars and ID with the words "Welcome to PAS-5." This was pretty exciting because this satellite, PanAmSat 5, had been launched just six weeks earlier and apparently achieved successful geostationary orbit.

PAS-5 is a Hughes HS 601 HP satellite featuring 24 C-band and 24 Ku-band transponders which include spot beam capability. Spot beaming makes it possible to steer the transmitted downlink to a particular geographic region on Earth. In addition to being able to "narrowcast" to specific regions, spot beaming also concentrates the transmitted signal which results in much higher receive levels at downlink sites. This usually means that smaller dishes can be used for reception.

The PanAmSat Story

Based in Greenwich, Connecticut, PanAmSat operates 16 satellites and employs more than 400 people in seven uplink sites and eight offices on five continents. PanAmSat was founded in 1984 and launched its first satellite, PAS-1 (see chart 1), four years later. It's still in service. Now operating over the Atlantic, Pacific, and Indian oceans, PanAmSat is an important satellite link for virtually all international news organizations and an emerging giant in the Direct To Home (DTH) satellite TV market.

In 1996 PanAmSat and Hughes Electronics merged their considerable satellite resources to become the top international service provider. With assets at over $6 billion and revenue last year over $700 million, PanAmSat's strategies appear to be paying off. One gets the feeling that there are even better things to come. With aggressive positioning in the new market for DTH satellite TV in Latin America, PanAmSat could have a most impressive revenue stream for the next 10 to 15 years.

PanAmSat is no stranger in service to Latin

LATIN AMERICAN CHANNEL LINE-UP FOR PAS-5

- HBO Ole
- Animal Planet
- Associated Press Television
- CBS Telenoticias
- ESPN International
- Eurochampions
- MGM Gold Brazil
- Television Nacional de Chile
- Universidad Catolica de Television
- Mujer International, Fashion and Bravo
- The Weather Channel Latin America

America. In 1989 CNN became PanAmSat's first customer, broadcasting news to the Americas. Now, in addition to the services listed above (see chart 2), PAS-5 will be home to Sky Latin America's DTH service to Mexico. Sky Latin America, using 12 Ku-band transponders onboard PAS-5, is a consortium comprised of News Corp. (FOX etc.), Grupo Televisa, Organizacoes Globo, and Tele-Communications International, Inc. — all major players in Latin American television programming.

PAS-6, which was launched just weeks before PAS-5, features 36 Ku-band only transponders and is entirely given over to Sky Latin America, the DTH service for all of Latin America.

Tuning In

Viewing PAS-5 or any of the other satellites east of Galaxy 6 is easy if you have a 36" actuator arm or a horizon-to-horizon mount. Either will allow the dish to "look" as far to the east as your immediate surroundings permit. And there's the next problem: Most C-band installations are made with the only concern being how well the Clarke Belt from G6 to C1 is seen (basically from due south to due west). If you have obstacles in the way, don't despair, there may still be enough signal coming through to provide adequate viewing. Still, the more interesting satellites are quite a ways down on the horizon. You may have to consider doing a little tree trimming.

Even if you have an 18" actuator arm you can still view the Atlantic birds. First, you'll need a friend willing to be a human actuator arm while you make adjustments on your dish. Next, you'll need to turn the dish to C1. This will cause the arm to fully retract. Take a felt marker and mark both sides of the actuator arm clamp. Now, have your friend support the dish while you loosen the clamp which holds the outer sleeve of the actuator arm still while the inner sleeve turns the dish.

CAUTION: When you loosen this clamp the whole weight of the dish will want to drop down. That's why you have your friend there to support it. If you have a fiberglass dish you may need two friends. I've done this by myself using a cement block under the dish to assure it doesn't fall down and bend the rim.

Next, gently shove the arm up through the clamp about two feet. This will cause the whole dish to move east as if driven by the motor. Your friend can assist by gently raising the edge of the dish up as you push from the actuator arm. Tighten the clamp. Your receiver is convinced that the dish is still pointed at F1, but in reality it's somewhere around Galaxy 6.

If you go back into the house and move the dish east or west you'll soon discover just where you are. Don't use the menu to position the dish as the receiver still thinks it's looking at C1. Instead, use the East or West buttons on the receiver to move the dish east from where it is. Do it slowly until you come to a satellite you recognize. G6 is easy: Just look for the ubiquitous Dr. Scott on channel 19.

Move the dish slowly east, stopping every 10 counts to run through the channels. Switch to the Ku-band and run through those channels as well. To help locate unknown satellites, it's useful to know how many actuator counts per degree of travel your dish uses. For instance, if your receiver indicates that Galaxy 1 is at 1016 counts (as seen on the on-screen display) and that F3 is 1000 counts, that indicates that there are 16 counts between the two satellites. Since we know that G1 and F3 are separated by 2 degrees, we know that your receiver travels 8 counts for each degree.

Therefore, if your dish is on G6, which we know is at 74 degrees, and you're trying to find PAS-5 at 58 degrees, you must move the dish 16 degrees east to find PAS-5. Since we know that your dish travels 8 counts per degree, you must move your dish 128 counts. It should be right there! Keep in mind that every receiver/dish combination may have a different counting method, so do the math on your own dish.

To return your dish to normal operations retract the arm by pressing the west button until the arm is fully retracted. Once again, have your friend stand by to support the dish. Loosen the clamp again and let the actuator arm slide through the clamp until it is exactly between the two marks you made earlier. It's just that simple.

Make it a practice to periodically return to these easternmost satellites. You will be amazed at what you'll find. Don't forget to tune around the SCPC frequencies, too. On PAS-5 I found a Spanish language charismatic Catholic FM radio station on channel 3 SCPC. There might be considerably more in the future.

Rules For Watching

While it's perfectly legal to watch, or listen, to unencrypted, in-the-clear, satellite transmissions, many are not intended for reception by the general public. And so, it's prudent to issue a few reminders about viewing or listening to these broadcasts. Sometimes you'll see color bars with lettering across them listing phone numbers. Sometimes they read: "Trouble? Call etc., etc." or "Questions or comments call etc., etc." or "E-mail etc.,etc., with your comments."

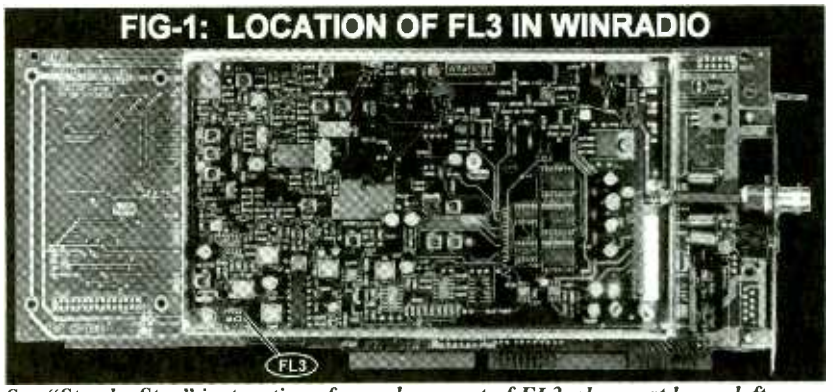
This does not mean you. This number is for affiliate stations or other interested parties related to the transmission. They are not interested in hearing that you are watching. In fact, they may be alarmed to know that you are watching. Many corporations or others unfamiliar with satellite broadcasting never imagine that their broadcast may be viewed by anyone bored enough to tune in.

Often, during interactive broadcasts, a toll-free number will be displayed at the bottom of the screen so that participants may join in the discussion. Again, this is not C-SPAN. They do not want the participation of satellite TV hobbyists. Leave them alone. If you are interested in the program, watch, but don't participate.

Bill Cheek
email: bcheek@san.rr.com

Upgrading WiNRADiO: Selectivity

This fourth and last (for a while) of a series of enhancements for the WiNRADiO wide-spectrum receiver improves the AM/SSB/CW adjacent channel rejection (selectivity). My Sept-97 column has instructions for safe and complete disassembly of the WiNRADiO receiver. The Oct-Dec columns present the first three WiNRADiO modifications; one to reduce crossover distortion; one to improve receiver sensitivity; and one to reduce phase noise in the PLL circuits. Also, my Nov-97 column shows where to tap the NFM and WFM discriminators, and AM and SSB detectors (baseband audio outputs) if decoding data interests you. Save these columns for posterity or order reprints or back issues if you don't have them!



See "Step by Step" instructions for replacement of FL3, shown at lower left.

■ Before You Begin.....

The newest WiNRADiO cards probably don't need these first four mods—they've already been made by the company! There are two ways to tell. The easiest is to check the bar code label on the board for a six-digit number with a prefix "W1CHx"— for example W1CHR002027. These cards probably don't need the mods. Earlier cards that have a different prefix or a five digit bar code number without a prefix (for example, *05678*), probably will benefit from the mods.

The surest way to tell is to examine your WiNRADiO card and follow the description for my first two mods (Oct-Nov 97). If there is already a component on the pads for D24(2) and if there are parts in the spots for R47, R48, and C76, then the factory has already brought your board up to the latest specs, and you need do nothing up to this point other than perhaps tap the Discriminator for baseband audio output if you are inclined to do any data decoding. (See my Nov-97 column.)

■ Overview.....

This WiNRADiO mod isn't complicated. We just remove and replace one component, the 455 kHz ceramic IF filter, with the same type but different specs. This modification enhances AM/SSB/CW and is especially pertinent for shortwave reception below 30 MHz where congestion is much more of an issue than in the VHF and UHF bands.

WiNRADiO's stock ceramic IF filter, FL3, has the part number LTW33-455HT or CFW455H, either of which has a 6 kHz bandwidth (±3 kHz) as a compromise of cost versus good DC-to-daylight performance. The recommended replacement for this filter carries the part number CFW455I and has a 4 kHz bandwidth (±2 kHz).

■ An Excursion into the Theoretical

One reason why super broad coverage receivers are usually costly is the special design attention that's generally required of each band, from VLF through UHF. The less the attention, the lower the cost and the greater the compromise. Six kHz is a compromise — not much of an issue for mostly aeronautical comms on VHF and UHF, but it's a trifle too wide for the crowded shortwave bands.

Receiver selectivity has long been a major issue for shortwave receivers, and a non-issue for scanners. In fact, VHF-UHF receivers used to be better off if they weren't too selective because frequency stability/accuracy and FM deviation (modulation) were not the exacting sciences that they are today.

Not so long ago VHF and UHF transmitters might well have been off frequency by a considerable margin without anyone really noticing. In a fleet of mobiles, any one transmitter was as apt to be +7 kHz from assigned center frequency as another at -7 kHz. That 14 kHz difference would have spelled poor communications for highly selective receivers. Excessive FM deviation, no automatic level controls, and rigid regulatory frequency assignments (*a la* frequency coordination) also conspired to make selectivity unimportant for VHF-UHF receivers.

There is no such thing as "overmodulation" in FM transmitters as there is with AM. The more FM deviation, the wider the frequency swing. There is no natural limit to the swing of FM. However, clipping and distortion result when that swing exceeds the passband of the receiver's IF filter. Greater FM deviation means more "loudness," so the rule of thumb used to be to deviate the signal as much as possible. The common solution for frequency errors and excessive FM deviation was low-selectivity receivers. That tradition persists even though advanced technology and laws now make these factors fairly moot.

Even to this day, scanners are typically not very selective in the NFM mode, usually set by a 15 kHz IF filter. But again, there is no need of selectivity, thanks to tight frequency assignments, regulated band plans, and strictly line-of-sight coverage areas. Scanners with AM mode for aeronautical coverage sometimes have a second narrower IF filter in the AM circuit just to improve the selectivity preferred by that mode.

Selectivity is probably more important than sensitivity for shortwave; whereas it's the other way around for VHF-UHF. Trouble is, WiNRADiO is more than just a scanner and more than just a shortwave receiver.

■ Back to WiNRADiO

With this perspective in mind, WiNRADiO was designed to be a quality compromise for relatively complete coverage from 500 kHz to

1300 MHz. While the designers could have integrated multiple switched IF filters to cover the many contingencies, this would have increased the complexity of the hardware and software and, obviously, increased the price.

The original 6 kHz IF filter was a fair compromise for DC-to-daylight, but 4 kHz is much better for the shortwave bands. WiNRADiO's NFM section doesn't use the FL3 IF filter, so whatever we do to it won't affect the quality of most VHF-UHF signals. We are free to experiment with the selectivity of the AM IF strip without affecting NFM and WFM performance.

■ Doing It

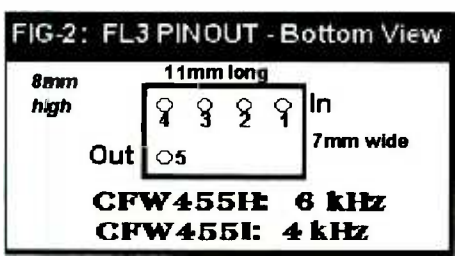
This hack is in the 3rd IF amplifier area of the receiver. The stock and replacement IF filters have five pins, one IN, one OUT, and three grounds. Figure 2 shows the pinout from the bottom view. The only trick here is to find the right replacement filter in terms of physical and performance specifications. Physical size is important because WiNRADiO doesn't offer a lot of "real estate" on which to hang a bunch of extravagant extras. Ideally your replacement filter will go right in where the old one comes out.

■ Step by Step

Refer to Figs 1 and 2, and follow these five steps:

1. Disassemble WiNRADiO per instructions in my Sept-97 column.
2. Locate FL3 (see Fig-1) in the lower left corner of the shielded compartment.
3. On the normally unseen (back or bottom) side of the smaller WiNRADiO daughterboard, unsolder the five pins of FL3. Use solder braid and/or a vacuum desoldering tool. Carefully remove FL3.
4. Solder the replacement FL3 onto the newly vacated pads.
5. Check all your work; ensure that solder blobs don't touch other pads or components. Reassemble the unit.

That's it for the IF selectivity improvement. It makes an appreciable difference in the quality of reception when AM, SSB, or CW signals compete for favor in a few kilohertz, typically below 30 MHz.



Kits of parts for the first four WiNRADiO mods are available for those who can't meet the 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. 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 mail.

The 4 kHz IF filter is included in the kits I supply, but if you want to go it on your own, the following suppliers are good starting points.

Murata Electronics North America,Inc.
2200 Lake Park Drive Smyrna, GA 30080-7604, U.S.A.
Phone:1-770-436-1300 Fax:1-770-436-3030
sp_ec@murata.co.jp
http://www.iijnet.or.jp/murata/

Kiwa Electronics
612 South 14th Avenue
Yakima, WA 98902 USA
509-453-5492
800-398-1146
kiwa@wolfenet.com
http://www.wolfe.net/~kiwa/

■ 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.

■ Network Communications Update

Last month I spoke briefly of the high-speed network access technologies coming down the pike. I touched upon ADSL (Asynchronous Digital Subscriber Line), saying that it was still in R&D and that the telcos wouldn't be going anywhere with it for a while. I erred on the conservative side.

It seems that US West in Phoenix, Arizona, is about to debut a watered-down version of ADSL. Three speeds of their MegaBits service will be offered: MegaHome at 192-kbps, MegaOffice at 320-kbps, and MegaBusiness at 704-kbps. Internet connectivity is a low-cost optional extra available under all three plans, basic prices of which vary from $40-$125/mo, depending.

I said MegaBits was watered-down because ADSL is reputed to be good for up to 10-Mbps. I don't know why the US West MegaBits packages are so much slower, but perhaps the concept really isn't proven yet. Anyway, the keynote here is that ADSL operates over plain old telephone service (POTS) lines, and if US West implements the service, you can bet other telcos will follow suit. Now may be the time to pester your local telco for news of imminent ADSL. While you're at it, check with your CATV company for information on cable modem service and when it will be implemented in your area.

Given the cost of ADSL service and the present slower speeds, I'll submit that cable modem service is still, by far, the better deal.....if you have a choice. If you don't have a choice, then you can take some comfort in the MegaBits service, because it's at least three times faster than the fastest conventional modem, seven times faster than the average analog modem, and 50% faster than ISDN at its best.

Speed of networking makes a difference in both the quality and the quantity of information and power at your fingertips out there on the Internet. For example, you might consider a 10-MegaByte file as "sour grapes" because it takes too long (1-hr/up) to download by conventional modem. If you could download it in 18-sec like I do, then it might not be so "sour." In other words, barn doors might open to you with a high-speed connection to the Internet, in contrast to the mere "peepholes" offered by conventional network access. Food for thought until next month.

Do stay warm!

E-mail: bcheek@san.rr.com
WWW: http:// 204.210.11.126
FTP: ftp://204.210.11.126
FAX: (619) 578-9247 anytime
Postal: PO Box 262478, San Diego, CA 92196-2478

John Catalano, PhD
j_catalano@conknet.com

RecAlling a Month I'd Rather Forget

Well, it's been a long time since we've talked—at least that's how it feels. I've been busy trying RecAll with various windows based monitoring programs as I promised. After literally days of work (much of the time pulling what little hair I have left, out), I can now feel satisfied that my results are consistent enough to be reliable. What are they? Okay, you asked for it ...

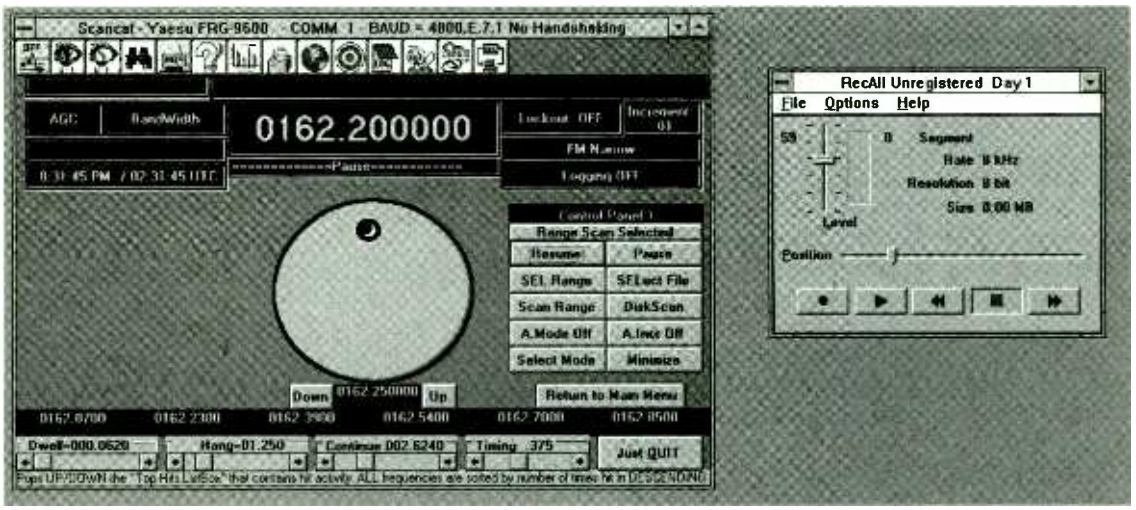


FIGURE 1: *RecAll and ScanCat-Gold for Windows Trying to Work Together*

A Quick Refresher

The last time we spoke I introduced a program called RecAll, which does a great job at recording and date/time stamping audio intercepts from a scanner. In this role with a standalone scanner, RecAll is, in my opinion, unbeatable (and still is). I've used it with Realistic, Regency, AOR, and Uniden scanners with excellent results. Similar results were obtained even with inexpensive portable VHF radios, which of course have a squelched audio output.

RecAll uses a PC, sound card input, and a connection between the sound card and the radio's earphone output. For some radios the recorder output worked fine, leaving the speaker on to monitor the intercepts. In each of these applications the computer was only used to run the Windows based RecAll program. All frequency scanning information came from inside the scanner, with no computer control.

I have never used an under-$200 logging device which was so easy to use and gave such consistently excellent results. Professional loggers are as good or better, but cost $500 and up. RecAll costs $15 and works on most inexpensive PCs.

But then, last month, I posed the question, "... how will it (RecAll) work with computer control and logging programs?" I wish I had *never* brought up the question!

The Cruel (Windows) Reality

So that the majority of you could identify and benefit directly from my findings, I decided to perform these tests in Windows 3.1 and on a Pentium 100 MHz with 32 Meg of RAM. From our past discussions you'll remember that RecAll also has a Windows 95 version. As I loaded the 3.1 version I decided to first try it with ScanCat's new ScanCat-Gold for Windows - SE version 7.014.

First I started RecAll and set up its recorder turn-on threshold. Then, returning to the Program Manager, I started ScanCat which was connected to my FRG-9600 via the serial port for frequency, mode and signal-present control. (See Figure 1.) Everything seemed to go fine for about ten minutes. As ScanCat tuned the FRG and the squelch was broken by a signal, RecAll appeared to "turn-on" and record the reception.

Looks Are Deceiving

After a few minutes I decided to play back the results. And then the fun began. First, I couldn't put ScanCat into a Pause mode without it popping back out into scan. After about ten clicks on the Pause button it seemed to hold. But clicking on RecAll's playback button brought my ears a chopped up mess of what sounded like two-second bits of random audio. Then the screen froze, requiring the three finger salute (*Alt-Ctrl-Del*) to get back control. But that was only the beginning.

I knew ScanCat worked well on its own and so did RecAll. Therefore, I reasoned it must have been the interaction of the two. So I decided to try again; but started ScanCat first.

The results were better. No lock-up. But RecAll now appeared to start recording a few seconds after the signal was detected. Again the RecAll playback was badly chopped. I reduced the sampling rate using RecAll's option menu. The audio lost fidelity but the chopping was gone. After many hours of trying various combinations of the programs' parameters, disaster struck.

Goodbye Mother (board)

I'm still not sure what the cause was. Loose cable? Antenna switching? Common ground loop? All I know is that the serial port on my Pentium motherboard, which was controlling the FRG, went south, bought the farm, caught the smoking hole ... died. After hours of testing cables, interfaces, switch boxes, radios, and even software memory configura-

tions, all results pointed to a blown serial port chip on the motherboard. There are old lessons to be relearned here. We will talk about them later, I promise.

Since I use one serial (com) port for my TNC/digital decoders outputs and one for receiver control, I need two serial ports. Therefore, I disabled the defective on-board serial port and plugged in a serial port card to use as the receiver control port. This got me up and running and I returned to the job of testing.

Repeatable Results?

During the course of the next week I tried to run RecAll with SWL Manager, Scan*Star, ScanCat, and a number of other Window control programs. The interactions ranged from mild to severe. At the mild end, SWL Manager operated very well with no or little effect on its, or RecAll's operation. The problem is that since SWL Manager was never intended for use with a scanner it has no provisions for control of the scanning process via signal detection. (Perhaps this is a clue to our problems.)

At the moderate problem position the two programs interacted in such a way that affected all timing elements of the controlling programs. Delay times varied depending on what mode RecAll was in. Command buttons did not operate immediately when pressed.

End of Test!

With seemingly a mind of its own, the results changed unpredictably during my days of testing. I varied just about every software parameter available on each program trying to find a workable combination. For a few hours I fooled myself into believing it was working reliably. But then two things happened to knock me back to reality. First the screen froze and I tried everything (hardware and software) to revive it. Upon re-booting my system I discovered that the "new" serial port was acting suspiciously like the deceased one. All testing ended when this was confirmed — another blown serial port! This month it cost me dearly to write the column.

No, These *ARE* Fine Programs

Remember all the hype we heard when Windows 3.1 was introduced about it being capable of "multi-tasking" (their word, not mine)? Well, we just put Windows' 3.1 multitasking to the test and found it to be a marketing concept with very limited capability. Oh, what a surprise!

Each of these receiver database/control programs, on their own, operate as advertised and are cornerstones of today's monitoring. Likewise, RecAll is unsurpassed in its operation, usefulness, and economy when used with a stand-alone, not computer-controlled, scanner. From the results observed with SWL Manager, RecAll may be useful with programs that do not detect signal presence — or at least, not via the serial port. What is very clear is the Windows 3.1 fragile programming environment and lack of real multi-tasking capability.

The contact info I gave for RecAll last month was rather sparse: here are more details. You may download or order RecAll from developer Sagebrush Systems' website at **www.sagebrush.com/~sells/recall.htm**. For those not on the internet, the postal address is P.O. Box 3094, Corrales, NM 87048; fax 713-524-6398.

... and the Hardware Damage?

Many years ago when companies were first designing radio/computer interfaces, the industry had a Commandment: "Thou shalt not connect a radio DIRECTLY to an external computer."

Why? Well, multiple levels of voltages exist in sophisticated equipment. Some are referenced to common grounds and some are not. Connecting what appears to be "ground" on one piece to another piece of equipment's ground may actually induce voltage on the ground line. Even if this occurs electrically, the results may not be immediately disastrous. But it can be a ticking time bomb.

So how do you get signals from one to the other? The answer is "light." A photocoupler is used in professional equipment instead of a hardwired connection, and it also provides better computer noise isolation. This is also a common method in bio-medical patient connections where ground loops can really ruin a patient's day.

All of the under $120 interfaces that I have tested do *not* have photoisolation. Instead, they use the power from the serial port to power themselves, thus not requiring any power source. Convenient? Yes, but just asking for problems like a blown motherboard and serial port card.

Maybe it's Time to go Back

I built my first radio/computer interface decades ago and used photocouplers and a separate interface power source. But in the past two years I have also been lured by the simplicity and reduced wires solution of the non-isolated, computer-powered interfaces. I'm ready to dust off my old interface and throw this new junk away.

The problem may also lie in poorly designed connectors/adapters. A while back I complained that the Yaesu adapter provided with Computer Aided Technology's interface left connections bare and, therefore, could be shorted together putting voltage on the data lines. I was using this very connector when these serial ports were destroyed.

Was it the cause? I'm not sure. But if you are using any adapter/connector where the metal connections can be shorted together, coat it with silicon rubber (RTV or similar) to be sure. Perhaps I should have listened to my own advice. Now it's coated.

Next Time - ICOM IC-PCR1000

We have already begun putting ICOM's new computer controlled receiver through its paces. Its price and performance look very inviting. Check the next few issues for our findings and opinions. Now, if my serial ports and my wallet will just hold out ...

Bob Evans
revans@astrol.magic.ca

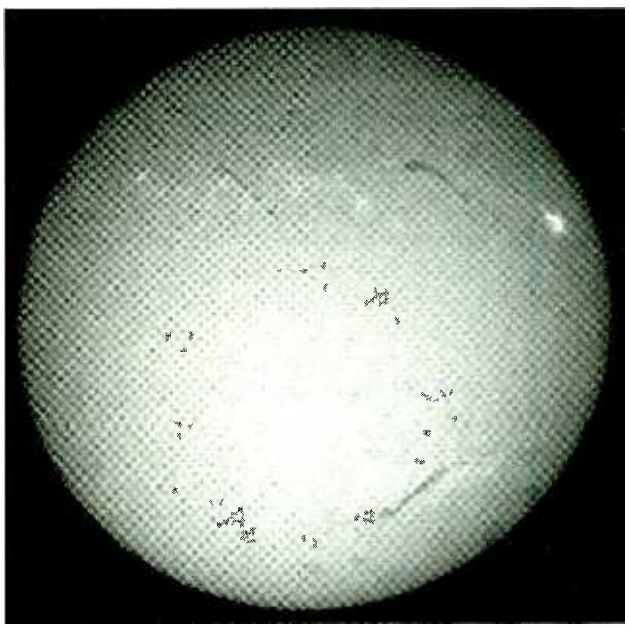
A Flare for Monitoring

How to Forecast Favorable Propagation Conditions

Our first column of the New Year focuses on the mechanics of radiowave propagation and a simple method for determining monitoring conditions for your location.

Before we outline a method for predicting propagation, let's start with a short review. As you know, a region exists in the Earth's upper atmosphere that consists of several electrified layers. These layers, collectively known as the ionosphere, are capable of bending (*refracting* is the correct term) high frequency radio waves and returning them back to Earth over great distances.

The ionosphere is formed by ultraviolet radiation from the sun and the intensity of this radiation changes radically with time of day, geographical location and several other factors.



The amount of solar radiation striking the ionosphere varies hourly (day-night), by season (position of the Earth's orbit relative to the sun), and according to the latitude of the monitor (the radiation is more intense at the equator). In addition, the sun itself is subject to an approximate 11 year sunspot activity cycle, with year-to-year variations in solar activity. The number of sunspots has a profound effect on the amount of solar radiation that strikes the ionosphere.

■ Sunspots

Sunspots are stormy areas on the sun's surface which produce considerable ultraviolet radiation. The real energy source comes from the bright regions near and around the sunspots called *plage* (French for "beach"). Generally speaking, when the sun's surface is covered with a great number of spots, the ionosphere is electrically strong and shortwave radio conditions are usually good. When the number of spots diminish, conditions become poorer.

The sun revolves on its own axis in a period of 27 days. Chances are, if conditions are good one day because of sunspot activity, they will also be good 27 days later, when the sun shows its same face. Many sunspots take several months to fade.

■ Solar Cycle

Rudolph Wolf, a physicist and first Director of the Swiss Federal Observatory was the first to devise a formula for arriving at the sunspot number. His formula remains in use today, the value of which is often referred to as the Wolf number. Wolf also was responsible for the discovery of the 11 year solar cycle.

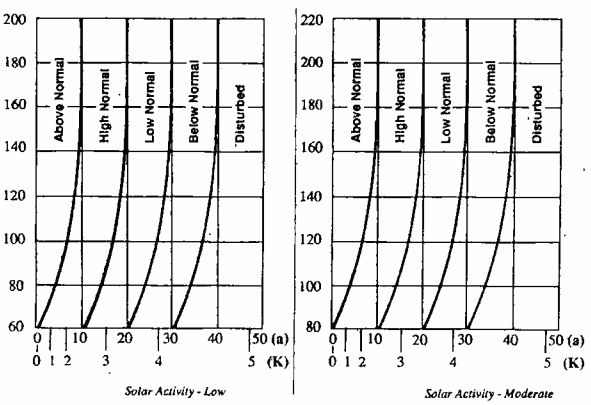
Accurate records of solar cycles have been kept since 1848. The last cycle, Cycle 22, began during September of 1986 and rose sharply during 1988. Cycle 22 was one of the strongest that has been recorded in the last 140 years. Several scientists believe that Cycle 23 began this year, while others hold that we are still in the waning stages of Cycle 22.

The maximum to-date for Cycle 22 occurred on January 16, 1989, when the solar flux rose to a new high value of 299.

In summary, to predict HF radio propagation conditions, we must consider the following factors:

- Season of the year
- Time of day or night
- Latitude of your listening post
- Activity of the 11 year solar cycle
- 27 day rotation period of the sun
- Current solar terrestrial conditions

At first glance, the task of predicting favorable propagation conditions seems to be as slim as picking the winning numbers in a lottery.



■ WWV Forecasts

The National Bureau of Standards radio station WWV located at Fort Collins, Colorado, broadcasts radio propagation forecasts on frequencies of 2.5, 5, 10, 15 and 20 megahertz. WWVH (Hawaii) also broadcasts on the same frequencies.

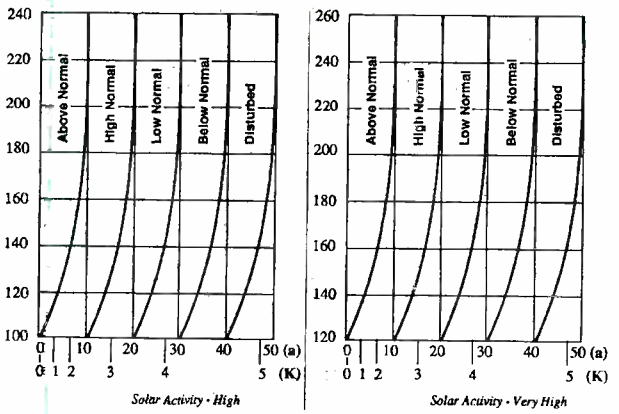
■ Geophysical Alerts

Current geophysical alerts (Geoalerts) are broadcast in voice from WWV at 18 minutes after the hour and from WWVH at 45 minutes after the hour. The messages are less than 45 seconds in length and are updated every three hours (typically at 0000, 0300, 0600, 0900, 1200, 1500, 1800, and 2100 UTC). Hourly updates are made when necessary.

Part A of the message gives the solar-terrestrial indices for the day: specifically the 1700 UTC solar flux from Ottawa, Canada, at 2800 MHz, the estimated A-index for Boulder, Colo., and the current Boulder K-index.

Part B gives the solar-terrestrial conditions for the previous 24 hours.

Part C gives optional information on current conditions that may exist (that is, major flares, proton or polar cap absorption [PCA]



events, or stratwarm conditions).

Part D gives the expected conditions for the next 24 hours. For example:

- A) "Solar-terrestrial indices for 26 October follow: Solar flux 173 and estimated Boulder A-index 20; repeat: Solar flux one-seven-three and estimated Boulder A-index two-zero. The Boulder K-index at 1800 UTC on 26 October was four; Repeat: four."
- B) "Solar-terrestrial conditions for the last 24 hours follow: Solar activity was high. Geomagnetic field was unsettled to active.
- C) "A major flare occurred at 1648 UTC on 26 October. A satellite proton event and PCA are in progress."
- D) "The forecast for the next 24 hours follows: Solar activity will be moderate to high. The geomagnetic field will be active."

Solar Flux

The sun is the source of radio frequency radiation. The flux of solar radio noise at the Earth's surface is monitored at a number of worldwide observatories. The Algonquin Radio Observatory located near Ottawa, Ontario, Canada correlates data for a frequency of 2685 MHz at 1700 UTC daily. Increased solar activity (sun spots and solar flares) results in a greater solar flux value. The relationship between solar flux (SF) and daily sunspot count (R) is expressed in the following linear equation:

$$SF = 63.7 + 0.73R + 0.0009R^2 \text{ (squared)}$$

Solar Flux values broadcast by WWV apply to the previous day. Generally speaking, the higher the solar flux value, the better conditions will be for radio propagation. During low activity periods of the 11 year solar cycle, the solar flux value rarely exceeds 100. For example, for most of 1987 and early 1988, the solar flux value fluctuated between 60 and 80.

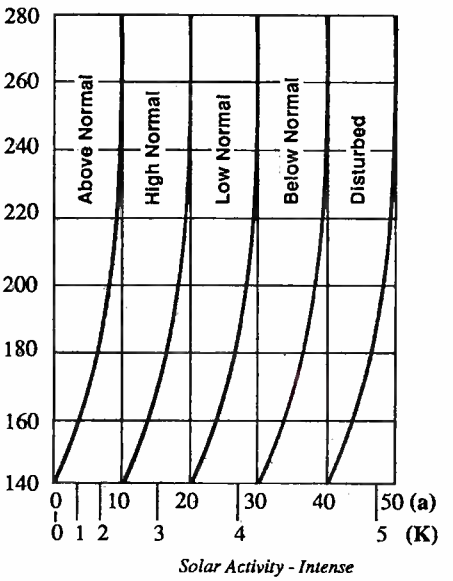
Equivalent Range "a" Index

Solar flux alone does not provide us with a fool-proof means of predicting propagation conditions. To be useful in making reliable short-term forecasts, a measure of the current effects produced by solar particle radiation (electrons and protons) is required. The Equivalent Range "a" Index (simply referred to as the "a" Index) is designed to measure solar particle radiation by its magnetic effects.

Higher index values (greater influx of solar particles) usually result in weaker radio signals and greater fading. An a Index value of 10 or under usually indicates a quiet ionosphere (little magnetic storm activity), while a value greater than 30 indicates disturbed ionospheric conditions.

On March 6, 1989, a massive sunspot region, identified as #5395, appeared on the sun's visible disc and immediately triggered one the strongest solar flares ever recorded. Rated at the strength of X15, the energy of this flare was equivalent to a 100 million megaton nuclear bomb. Other X type flares followed over the next few days. On Monday, March 13, the space shuttle, *Discovery*, was launched amidst the worst geomagnetic storm of the current solar cycle. Even WWV was inaudible. By Wednesday, the 15th, the a Index average reported by WWV was 248.

Values given for the a Index by WWV are also averages for the previous day.



Boulder K Index

The K Index is a measure of solar particle radiation that is determined every three hours by the NOAA Observatory at Boulder, Colorado. The K Index uses a single digit to express geomagnetic activity and is related to the a Index as shown below.

K Index	0	1	2	3	4	5	6	7	8	9
a Index	0	3	7	15	27	48	80	140	240	400

The Boulder K Index provides the shortwave monitor with the best measure of geomagnetic activity. Values of 4 and under generally indicate favorable listening conditions.

Using Propagation Charts

The phase of solar activity is directly related to the current value of the smoothed sunspot number. Since this value is not readily available to the shortwave monitor, the propagation charts are based on the current solar flux value which is easily obtained from WWV broadcasts. The margin of error using this method is negligible as far as predicting conditions.

The relationship between solar flux and solar phase is shown below. The figures in parentheses show the centered value.

Solar Flux	Solar Phase	
Under 85	(74)	Low
85 to 110	(97)	Moderate
110 to 138	(124)	High
138 to 167	(152)	Very High
Over 167		Intense

Use the following steps to determine the quality of listening conditions.

1) Obtain the solar flux, and K Index value from the WWV broadcast at 18 minutes past the hour.
2) Use the tables to determine the current solar phase based on the solar flux value. Determine which propagation chart to use based on the solar phase you have chosen.
3) Locate the solar flux value on the left-hand side of the chart.
4) Find the current K Index value at the bottom of the chart.
5) Draw an imaginary line joining these x/y axes. Read the forecasted condition description you have found.

Generally speaking, conditions from Above Normal to Below Normal are suitable for most listening. When conditions are Disturbed, the listening is usually not worthwhile; however, some bands may have unusual openings for short periods of time.

Well, that about wraps it up for this month's column. The next column will focus on the digital modes and stations that remain active in 1998.

Optoelectronics MicroCounter Frequency Counter

By Haskell Moore, KB5WIX

For years, the frequency counter has been one of the scanning enthusiast's main tools. You can compile all of the lists you want, consult all of the databases available, but nothing compares to being able to get a real-time reading of the signal as it is being transmitted.

Using a conventional frequency counter is not something which can easily be done inconspicuously. My favorite, the venerable Optoelectronics M1 counter at nearly five inches tall and three inches wide, did not lend itself to surreptitious operation. No matter where I went, pulling out a frequency counter in a public place always got a lot of unwanted attention; especially from security personnel or the police!

However, Optoelectronics has introduced a counter that offers excellent performance, but draws no more attention than an average digital pager. Additionally, it is fast, accurate and extremely easy to use.

The MicroCounter frequency counter was designed to fit inside a conventional 2.8 x 1.9 x 1.1 inch digital pager case. The only noticeable difference (and you really have to look hard to see it) is a small, 2.5mm sub-mini jack on the side which is used for the external antenna.

Though the MicroCounter is small in size, the components and workmanship are of the same high quality I've come to expect from Optoelectronics. The 12 digit, 0.165 inch display is clear and sharp with excellent contrast, so that it may be viewed at the waist level without removing the counter from the belt. The standard pager case, though not remarkable in itself, appears sturdy with well-fitted seams.

The MicroCounter runs on a conventional "AA" battery which is advertised to last from ten to twelve hours, though in actual operation mine lasted about fifteen hours. When the battery voltage drops to the point where operation becomes unreliable, a low battery warning is shown on the display.

Internally, the MicroCounter contains features found in frequency counters costing many times its price. It utilizes a two-stage preamplifier for excellent sensitivity

and a 10 MHz time base for accuracy. The MicroCounter even employs the same patented digital filter system used in their more sophisticated counters to reduce false readings. When in the capture mode, once a signal passes the digital filter, it is automatically stored in one of three memories.

The written specifications indicate sensitivity at < 5 mV at 150 MHz—on par with full-size frequency counters. My informal tests agreed.

Using the MicroCounter

Since the MicroCounter has no internal antenna, range without an external antenna is extremely limited. In my tests, I found that I had to be within six feet to trigger the counter when using a four-watt UHF HT transmitting at 449.750 MHz. However, a small (five inches in length), flexible antenna is available for the MicroCounter for only $9.00. When I added the external antenna and repeated the test, the effective range of the counter went up to 110 feet! In my opinion, this makes the antenna a must-have in all but very strong RF environments.

Additionally, since the antenna connector used is a simple sub-mini jack, it is relatively easy to make custom antennas for your own specialized applications. For example, if you wished to construct an antenna specifically designed for low frequency work, just solder a small, flexible piece of wire to the center conductor of a sub-mini jack and you're ready to go. And by utilizing a very thin piece of coax (I used a piece that came with a cell phone antenna), you can fashion an external antenna connector for use with your own external antennas.

Operation of the MicroCounter is simple and straightforward. When switched on, the unit displays the ambient frequency in megahertz with three digits to the right of the decimal. Depressing either of the function buttons on the front of the counter increases the resolution to four or five digits to the right of the decimal.

The three-position slide switch is used to control the mode of operation of the MicroCounter. When in the lowest position, the unit is switched off. In the uppermost position, the unit is on and in the counter mode. Depressing the slide switch inward once engages the digital filter. Depressing the slide switch twice puts the unit in capture mode. By moving the slide switch to the center position, captured frequencies in one of the three memories may be reviewed by depressing the slide switch. Depressing both function buttons and turning the unit on clears all three memories.

In actual operation, I found the MicroCounter to be very easy to use, especially in places where a frequency counter would not have been welcome. Sensitivity and accuracy was more than acceptable when the TMC-100 antenna was used. It is lightweight, unobtrusive and very stealthy. Even if you don't need a counter in a discreet package, the MicroCounter is still an excellent product in a very small package! And given the list price of only $99.00, it should be a top-priority item for every ham and scanner enthusiast.

The MicroCounter frequency counter is available from Optoelectronics, 5821 NE 14th Avenue, Ft. Lauderdale, FL 33334. They can be reached at 800-327-5912 or 954-771-2050.

WHAT'S NEW?

TELL THEM YOU SAW IT IN MONITORING TIMES

RELM Introduces Mobile Scanners

RELM Communications—heir of the Regency Electronics name—has added a line of mobile, multi-band scanners to its recently introduced handheld scanners. The MS-180 and MS-200 cover 12 bands including aircraft, government, 2 meter ham, high band, UHF, T band, and 800 MHz (less cellular). Other features include a fast scan of about 100 channels per second, priority scan, birdie lockout, weather search, LCD backlit display, and memory lock.

Both mobiles are equipped with a BNC antenna connector, line out with audio, and external speaker jack, and come supplied with A/C adapter, DC power cord, telescopic antenna, and mobile mount.

The MS-200 carries additional features of 200 memory channels in 10 banks (as opposed to the MS-180's 100 channels in 10 banks), built-in PL/CTCSS and DPL/DCS decoding, plus a weather alert. Alphanumeric display is also possible with optional computer programming software.

You can order the MS-200 from Grove Enterprises for $279.95 by calling 800-438-8155. Or you may call RELM Communications at 407-953-7953 to find the dealer nearest you.

Future Scanning by Computer

Future Scanning Systems has announced an upgrade to RadioMax—their Windows-based receiver-control software. Some standard features of RadioMax are user-scalable, high-resolution, spectrum analysis in real time; locked channels, signal level and hit history. RadioMax supports full disk logging, tape recorder control, audio generation of hit frequency and times, and "slide" tuning.

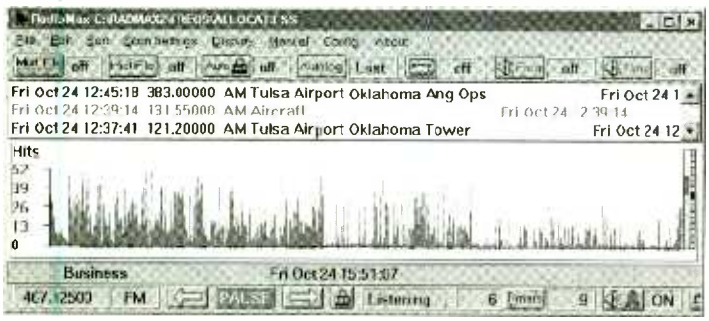
The software now supports a number of frequency database formats, such as Betty Bearcat and Mr Scanner files, as well as standard ASCII files of up to 5 million records per file! Faster, high-resolution graphics and ten user-programmable audio alarms are also part of the upgrade.

RadioMax has added the Uniden BC896XLT TrunkTracker to the list of radios it supports, which include AOR, Drake, Icom, OptoElectronics, Lowe, Kenwood, and Uniden.

All this is available at a reduced price of $45, which includes shipping in the U.S. A functional evaluation version of the software is available on the Internet at:

www.futurescanning.com.

To discover whether your radio is supported, what kind of interface is required, etc., you may contact Future Scanning Systems at 918-335-3318, e-mail *info@futurescanning.com* or write 6105 SE Nowata Road, Bartlesville, OK 74006.



1998 Police Call

Still the leading scanner frequency directory, the new, annual edition of the "scanner user's bible"—*Police Call* by Gene Hughes—contains regional scanner listings for 18 categories of two-way users including law enforcement, fire, medical/emergency, public safety, public utilities, transportation, sports, education, entertainment, and more. Appendices provide a consolidated frequency cross-reference, radio codes, FCC allocation tables, maps, and a glossary of terms.

Each volume is $12.95 from Grove Enterprises; specify state(s) you wish to order when you call 800-438-8155.

Tune in to Mother Earth

If articles such as our June cover story on lightning have made you curious about the noises produced in the Earth's atmosphere, you may be interested to know you don't have to build your own radio in order to hear these unique signals. The WR3E VLF receiver was designed by Steve McGreevy, foremost expert in the "natural radio" field, and is now available from Grove Enterprises as well.

Used in a natural setting away from power lines, this little handheld box can bring you the early morning sounds of the "dawn chorus," or aurora over the poles, or lightning strokes from the other side of the hemisphere. The WR3E has a whip antenna plus a simple on/off switch and volume control. A three-position selective filter switch helps to screen out unwanted manmade noise for better "earth" reception.

For more information on natural radio, see the cover story in the November/December edition of *Satellite Times*. (The single issue is $4.50 from Grove Enterprises.) The WR3E from Grove is $139.95; call 800-438-8155 for more information or to order.

Transmitter Documentation Resource

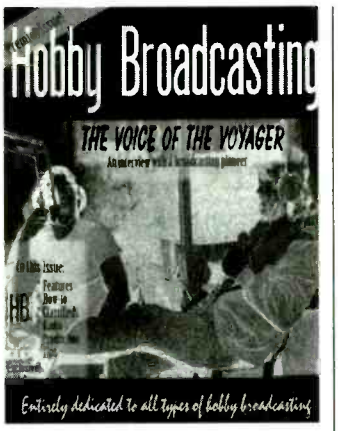
We've mentioned several times the booklet entitled *Transmitter Documentation Project*, a labor of love by Ludo Maes. The project has evolved into a major resource now that it's on the Internet. In addition to links to shortwave station websites, it includes a virtual museum of transmitters no longer manufactured but still in use around the world, as well as information on the

evolving digital broadcast systems.

Want to get into or out of broadcasting? Looking to buy or sell airtime? Want to buy or sell secondhand broadcast equipment? Need contact information for shortwave broadcast equipment manufacturers? The site also serves as a clearing house and resource center to put buyers, sellers, and broadcasters in touch with each other. Go to **www.ping.be/tdp**. And, yes, you can order the booklet from the site, too.

Hobby Broadcasting

Interest in broadcasting is definitely picking up. A recently-received press release points out that while the traditional broadcasting monoliths jockey to retain their control over the market, computer technology and miniaturization has made broadcasting both inexpensive and feasible. In fact, "most major cities contain at least a dozen different low-power FM stations, hundreds of bitcasters are now on the internet, and the low cost of video and com-



puter equipment is making high-quality community-access TV programs feasible."

Hobby Broadcasting is a start-up magazine designed to address the evolution of "personal broadcasting"—radio and TV broadcasting on AM, FM, shortwave, and the Internet. Noted author Andrew Yoder is editor of the quarterly magazine which will have a subscription price of $12 in the U.S. Expected to run around 36 pages in size, the first issue will include a feature on current trends in FM microbroadcasting, a radio production primer, music reviews, classifieds, and more. Send checks or enquiries to Cabinet Communications, P.O. Box 642, Mont Alto, PA 17237, *ayoder@cvn.net.*

Practical RF Design Manual

Over the decades, the late and highly respected technical writer, Doug DeMaw, W1FB, has written countless articles, books, features, and columns in virtually every hobby radio publication including *MT*. MFJ Enterprises has reprinted DeMaw's *Practical Rf Design Manual* 1980s collection which includes transmitter and receiver fundamentals, amplifiers, mixers, oscillators, detectors, frequency generation, AGC systems, filters, and other subsystems. Well illustrated with schematics and graphs of bipolar and FET circuitry.

$19.95 from MFJ Enterprises, PO Box 494, Mississippi State, MS 39762; ph. 601-323-5869.

Hobby Supplier

ECONN General Merchandise and Electronics is a new hobby specialty shop in Connecticut that can help with a number of needs in the radio hobby, from custom-made notch filters to purchasing the latest trunk tracking scanner. Radio, antennas, coax, adapters, traps, splitters, and amateur radio supplies are in their inventory.

Need to notch out one or multiple interfering FM, VHF or UHF, cellular or paging signals? Need to eliminate a particular cable channel from the home? Filters for 50-450 MHz are available for $39 - $47. Contact the folks at Econn, 624 West Main Street, Suite 60, Norwich, CT 06360 or call 860-823-1230.

Shortwave Numbers Stations CD

The shortwave spectrum is full of mystery and intrigue. Most listeners of the HF spectrum will agree that is the reason why they listen to shortwave—you never know what you may tune in. Topping the list of shortwave mysteries are spy numbers stations. Considering their open operation, these stations have retained a remarkably close guard on their secrets for nearly 40 years, baffling the best of the shortwave radio hobbyists.

Almost every intelligence agency uses number stations, including the UK MI6, the US CIA, Russian KGB, the Israeli Mossad, the Cuban DGI and more. If a country has an intelligence agency, it is likely running a numbers operation on shortwave with their own set of operatives in the field getting instructions on a regular basis.

Oddly, a majority of the general public—in spite of its taste for espionage stories—has never heard a broadcast from a spy numbers stations. Now for the first time, a complete collection of numbers station broadcast types are available on compact disc. The Conus Project was collated from the personal archives of monitors from all over the world. This project took three years to complete. The Conus Project has available for sale a quadruple compact disc set featuring 150 different recordings combined with an 80 page perfect bound booklet. Every known numbers station is represented in this unique offering (which may be illegal to own in some jurisdictions).

You will find the accompanying booklet informative and the CD intriguing. If you have followed numbers stations over the years, read Havana Moon or Larry Van Horn's columns here in *Monitoring Times*, or have just heard your first numbers transmission and want to learn more, the Conet Project's *Recordings of Shortwave Numbers Stations* is a must for the reference shelf.

For more information contact: THESE Records, 112 Brook Drive, London SE11 4TQ UK. Telephone 44+171+587+5349 or fax 44+171+582+5278. Internet users can check out their worldwide website for more information at: **http://wwwibmpcug.co.uk/~irdial/conet.htm**.

The four CD set costs £27.50 plus £3.00 airmail postage and packing to the United States and Visa, Master Card and Access credit cards are accepted.

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

Sony ICF-SW12 Travel Portable/Clock

In the rarified air of shortwave monitoring, it is easy to lose sight of which are the dogs, which are the puppies, and which are the tails.

Three basic markets for shortwave

Take a poll of *MT* readers, for example, and you'll find that favorite shortwave receivers include such digitally synthesized gems as the Sony ICF-2010 and various recent models from Drake and Japan Radio. In the sassy American economy, hundreds of dollars for a specialty rig is no big deal. But while the aficionado market for $300-plus radios is large in dollars and profitability, relatively few units—several tens of thousands in a good year, fewer recently—are sold annually.

But go to Africa or Asia, where sales of shortwave radios are brisk, and nearly every model is a "blind-tuned" single-conversion analog portable. They're cheap by our standards, sometimes under the equivalent of $10. But even then, they are a serious purchase for people whose annual income is only in the hundreds of dollars. In these parts of the world, unit sales are high, but dollar volume and profits are relatively modest.

But there's a third market, international travelers, which is catered to by receiver manufacturers, and for good reason. Buyers in this category are unusually prosperous, yet have little idea of what's what with shortwave. As a result, they tend to be satisfied paying good money for something that is merely small, novel, and shows time in a multinational display.

Similar to Grundig portable

The Grundig Traveller II, for example, is a multi-country world clock with a dreadful analog world band radio. Because of its inferior performance, few *MT* readers would consider it, and its price—$89.99 from J&R Music World, for example—puts it beyond the reach of folks in developing countries. Yet, for years the analog Traveller II has been a brisk seller among globetrotters.

Sony now has something similar in the $90 model ICF-SW12, which is even smaller than Grundig's offering and weighs only half a pound, including batteries. Using a clamshell design, like a laptop PC on Fen-Phen, it supposedly can display local time in 24-hour

digital format for anywhere in the world—and there's even a selector for savings (summer) time.

Time nominally provided for entire world

All you do is set the clock to UTC (Coordinated Universal Time), then anytime thereafter you can move a digital cursor to the correct time slot relative to UTC; minus five hours, say, for New York. If it's appropriate, press the key for DST/summer time, which unfortunately is not individually programmable by time zone.

But as with virtually all such devices, there are significant limitations. To begin with, you need keen eyesight to line up the desired city with the cursor stop points. Even then, for those parts of the world where the time shift is in fractions of an hour (parts of Australia, for example, are UTC +9:30 and +10:30), the displayed time is incorrect—although this is usually indicated in fine print painted on the upper portion of the clamshell, allowing you to do a mental calculation. Another glitch is that it treats UTC and UK time as one and the same, which during the summer they aren't, so during the summer one or the other will read incorrectly. Too, the time shown for Portugal is off by an hour, as that country changed its standard after the 'SW12 was designed.

As for summer settings, within a given time zone some countries may be using it, whereas others aren't, so certain readings will be off by an hour unless you know which countries are on summer time and which aren't, such as by looking them up in *Passport to World Band Radio*. Too, summer in the Southern Hemisphere is during "our" winter and *vice versa*, further complicating matters unless you first thumb through *Passport*.

In all fairness to Sony, Seiko, and others who attempt to provide around-the-world time on digital clocks, this is something that needs to be done country-by-country, and even then there are changes. At *Passport*, for example, one editor spends many a moment just keeping up with alterations to time standards in each country. Given all these national time hurdles, the SW12's worldwide clock does a reasonable job, especially during the winter, and is uncomplicated to use.

The clock is powered by a separate CR2025 lithium battery having an extremely long life. This means that if the radio's two "AA" cells run down—they're good for about 30 hours, depending on volume—the clock doesn't have to be reset. The clock also comes with an alarm, but this merely activates a buzzer, not the radio. However, there is a procrastination switch to silence the buzzer for nine extra minutes of Z's.

Good world band coverage, but other bands incomplete

Obviously, a radio targeted to globetrotters should have thorough coverage of broadcasting bands used in various parts of the world. Here, the SW12 falls short, although no more so than many other analog portables.

For example, it covers the usual FM band from 87.5-108 MHz. But this misses the many FM stations in Japan, Russia, and Eastern Europe which operate below 87.5 MHz. Too, mediumwave AM coverage is only from 530-1610 kHz, falling well shy of the 1700 kHz upper limit of the newly expanded AM band in the United States. There is no coverage of longwave, either, which is used for broadcasts in and near Europe.

When it's closed...

Fortunately, shortwave coverage is better. The SW12 captures stations within the 60, 49, 41, 31, 25, 22, 19, 16 and 13 meter bands, missing only a small number of out-of-band broadcasts at the low ends of 49 and 31 meters. However, the bandspreaded

dial is so coarse that you're hard pressed to tell whether you are hearing, say, 7335 kHz or 7375 kHz. On the high ends of the AM and FM bands, the dial readout is even worse. Perhaps because the dial is of such marginal utility compared to the clock readout, the radio's illumination is only for the clock.

■ Pedestrian performance, but improvement over Grundig equivalent

Performance, although far from sterling, is a cut above what you might expect. Sensitivity to weak signals is reasonably good on all bands, and selectivity, although broad, is usually adequate for listening to major stations. Although the speaker is small and FM audio is grating and tinny, audio quality on shortwave is quite acceptable. However, image rejection is poor, resulting in a plethora of variable-pitch whistles and *dih-dah* sounds intruding from transmissions 900 kHz higher.

The Sony ICF-SW12 is clearly better than Grundig's Traveller II analog equivalent, although Grundig is currently in the process of digitalizing its Traveller line. Still, Sony's offering is unlikely to endear itself to shortwave-savvy *MT* readers.

But that's not where it is aimed. For its target market, the clamshell design—along with a handy clock, $90 cost, and reasonable radio performance—make it attractive to casual SWLs wanting to keep in touch with events while away from home.

• New active antenna from Sony •

A major problem with world band portables is that they tend to perform best outdoors—away from signal-absorbing walls and potentially noisy electrical wiring and TV cabling. So indoor listeners are often forced to choose between mediocre reception in their favorite chair, or scrunching next to a window for proper reception.

Even then, sensitivity to weak signals is often lacking. Most active (amplified) antennas don't work properly with portables, and those intended for portables invariably come up short.

Now, Sony has come to the rescue with a surprisingly good active antenna for portables, the new AN-LP1, $79.95 at Universal Radio. It also comes bundled with the widely sold Sony ICF-SW7600GS (under $270) and ICF-SW1000TS radio/timer/recorder (under $550). (Where *does* Sony come up with these model designations, which sound like parts numbers for Infiniti pistons?)

Sony's new AN LP1 active antenna. The antenna disk is shown at left, and the amplifier module is shown below.

It uses a small amplifier module powered by two "AA" cells, along with a separate collapsible loop antenna element. These are connected by over a dozen feet of cable which can be reeled back into the amplifier module, like a tape measure. The amplifier, in turn, connects to any shortwave portable through its external-antenna socket or by being clipped onto the smallest element of its telescopic antenna.

A big plus is that Sony's antenna includes a nine-step (4/5/6/7/10/12/14/16/20 MHz) preselector to improve front-end selectivity. This is potentially an effective means to get around the tendency of active antennas to produce spurious signal interference.

■ Best performer we've tested

Our tests show that the AN-LP1 really does the trick, boosting signal strength enough to make a real difference at times. And the range selector is used not just to get maximum gain but, when needed with low-quality receivers, to do the opposite by allowing you to to use a contiguous setting, like an upscale attenuator, to eliminate overloading from in-band powerhouse signals.

Overloading? Yes, but only on the dinkiest of receivers, such as the Sony ICF-SW10 and ICF-SW12 tested this month—although on these the AN-LP1's preselector function sometimes also reduces interference from image signals. On better models, there's precious little overloading, at least with signals in North America. As for the antenna circuitry itself introducing cross-modulation, it is surprisingly resistant to this great bane of active antennas.

On some models we found the antenna's powerful circuitry picking up traces of digital hash being emitted by the receiver itself—fundamentally the result of imperfect receiver shielding, but which wouldn't be a problem were the antenna's non-element components fully shielded. Perhaps for this reason, the manufacturer recommends it not be used with the Sony ICF-SW77. With the revered Sony ICF-2010, however, only a bit of digital hash comes through.

In all, Sony's new AN-LP1 is a serious active antenna for portables—better than anything else like it we've tested to date, and worth every penny. Although we didn't have a chance to test it with a Drake SW8, whose telescopic antenna needs some *oomph* to overcome circuit hiss, it may be a godsend for that and other portatops, as well.

• Pricey new Japan Radio receiver due out soon •

The E.T.A. for the forthcoming Japan Radio NRD-545 is now reported to be late February or early March, with a price possibly around $2,100—somewhat higher than expected, given that JRC's own literature indicates that the '545 is less costly to manufacture than the '535. As of late 1997, the '535 was selling for $1,200 in the basic version, $1,700 in the "D" version and $1,995 in the exotic "SE" version from Denver's Sherwood Engineering.

For fans of JRC quality who like their audio "as God intended," and not digitally processed, there reportedly are plenty of '535 and '535D units in JRC's New York and Tokyo warehouses, and the fidelity-enhanced Sherwood version continues to be available. Get 'em while you can!

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.

Bob Parnass, AJ9S

Test Equipment Bargains for Scanner Servicing

Collecting and repairing scanners go hand in hand. Most of the 1970 and 1980-era preowned scanners I've bought required some fixing, despite reassurances from hamfest sellers. As a consequence, collecting good test equipment has become another past time.

I classify test equipment in a three tier hierarchy:

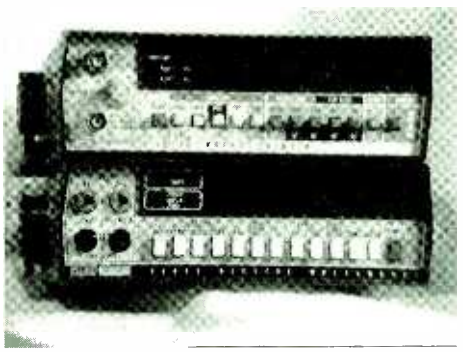
1. Lab grade test equipment can be accurately calibrated and used for precise measurement and is most expensive. I use this caliber of equipment in preparing product reviews. Example brands are HP (Hewlett-Packard), Tektronix, Fluke, Boonton, AIL, etc.
2. Service grade test equipment is suitable for repairing and maintaining radio equipment and is used by professional technicians in the repair industry. It is fairly rugged and dependable. Common brand names include Simpson, Triplett, VIZ, B&K, Measurements Corp., and Sencore.
3. Hobby grade test instruments are least expensive and often built from kits. They usually lack the stability, accuracy, and reliability of their service and lab grade counterparts.

After 30 years of amassing test equipment, I recommend you avoid collecting hobby grade test equipment. At one point, I spent almost as much time repairing my low quality test equipment as I did repairing radios.

Two exceptions to this maxim are the Heath 2240 Digital LC Bridge and Heath IM-2420 512 MHz frequency counter — excellent values which I've used heavily. Heath no longer makes test equipment, so look for them at hamfests. The LC bridge is great for finding bad electrolytic capacitors, the components most likely to fail in scanners. My IM-2420 counter has an ovenized time base and is more sensitive than some of my HP and Fluke counters.

■ Multimeters

The most basic repair tool is an analog multimeter, like a high impedance VOM. I use a solid state VIZ (ex-RCA) WV-510A Master VoltOhmist. The analog meter movement is well suited for monitoring changes in voltage during receiver alignment.



Fluke 1912A counter and 8600A DMM bought for $40 and $15 at hamfests.

I have several DMMs (digital multimeters), most obtained at hamfests. Digital meters are helpful in measuring transistor biasing voltages. My favorite is the handheld Fluke 87. I use larger bench-style Fluke DMMs, too, especially for monitoring two different voltages simultaneously.

■ Regulated DC Power Supply

I usually troubleshoot base scanners using an external low voltage DC power supply to avoid a 117 VAC shock hazard. A 12 VDC, 2A regulated supply is sufficient to power most scanners. Adjustable current limiting is especially valuable because you can limit the current to a safe value in the event of a short circuit. You can build or buy a suitable bench power supply at considerable savings.

Keep your eyes open for metered B&K power supplies. I've found them reliable and a good value when purchased used. The B&K 1601 is one of my favorites. It sold new for several hundred dollars, but I've seen them for as low as $50 used.

■ Audio Amplifier

A small, battery operated audio amplifier with high input impedance is handy for scanner repair. When servicing a scanner which acts outwardly normal but there's no sound coming from its speaker, I bypass the scanner's audio amplifier by connecting an outboard audio amplifier to the scanner's volume control.

Homebuilt audio amplifier connects to scanner's volume control.

I built an audio amplifier (see photo), but you can buy one from Radio Shack for $12 (#277-1008). If you don't own an amplifier, you can easily exploit the amplifier in a transistor radio or tape player. Feed audio to the upper contact on the volume potentiometer and connect ground to the other outer contact. This is a high impedance circuit, so use a shielded cable to avoid hum pickup and a series capacitor to block DC.

■ Signal Generators

Your cadre of scanner repair tools should include at least one VHF signal generator. A stable VHF signal generator will probably be the most expensive instrument on your workbench, with the exception of an oscilloscope, should you be lucky enough to have one.

Hamfests are littered with inexpensive Heathkit and EICO signal generators, but they aren't stable enough for scanner repair work at VHF frequencies. Only during the past three years have I seen good, used VHF signal generators sold at hamfest prices. Military base closings, factory shutdowns, and an industry transition to synthesized service monitors account for their increasing hamfest presence.

Measurements Corp. was perhaps best known for their rugged RF signal generators sold under the Measurements and Motorola names. They made both AM and FM modulated signal generators, with the FM generators being more useful for scanner servicing. The older Measurements generators, like the model 80 and 560, used vacuum tubes.

Military versions of these generators, like the AN/URM26A, are common at hamfests. I bought one for $15 but had to replace a tube and rewind some of the broken coils. These generators employ a device known as a barreter to measure the signal output level. Barreters are

FM RF signal generator. This solid state McGraw-Edison 803A sold for $200 at a hamfest.

fragile, so it's not surprising that my "hamfest special" had a blown barreter. A signal generator with a blown barreter is still very useful if it generates a stable RF signal, though you won't know how much.

Measurement Corp. eventually became the Edison division of McGraw-Edison and produced the 800 series signal generators in the early 1970s. This updated design is almost entirely solid state and includes an FM modulator. Models 800A, 801A, 802A, and 803A are identical except for frequency coverage. I grabbed an 803A for $200 and an 802A for $80 at local hamfests.

Be sure to use a 50 ohm impedance matching pad when connecting the generator to your scanner's antenna jack. These pads were usually furnished with the generators when new but pad and generator are often separated by the time they reach the hamfest table.

A programmable timer can keep your NiCds from overcharging.

Before getting a decent RF signal generator, I generated signals through improvisation and met with varying degrees of success. I used local oscillator radiation from older working Bearcat BC-250s and BC-300s. They generate signals at 10.8 or 10.85 MHz above or below their display frequency, depending on the band and model. I've also serviced radios by listening to on-air signals, e.g., NOAA Weather stations, through an adjustable attenuator.

A fixed frequency, crystal controlled oscillator works great for aligning and servicing IF stages. I found battery operated 10.7 MHz Motorola and 455 kHz GE oscillators at hamfests for under $10 (see photos). You can build your own oscillator, but it should have an adjustable output level.

Other Handy Test Instruments

The king of all test instruments is the oscilloscope. Though not absolutely necessary, I've found a scope to be the most powerful tool for troubleshooting squelch and logic circuits. A 15 MHz scope is sufficient for servicing older scanners.

Factory closings and a move to digital storage scopes have produced an abundance of used, lab quality Tektronix and HP scopes. They are now available at hamfests with prices starting at about $300. Replacement parts, especially the CRT, are expensive and somewhat difficult to find, so make sure any scope you consider is in good condition. It should have a bright CRT without patterns burned into the screen.

One aspect of scanner servicing is verifying that the scanner's local oscillator is generating a signal on the proper frequency. I use receivers as test instruments to listen for local oscillator radiation. The ICOM IC-R7000, 7100, and 8500, are especially well suited to this task due to their product detectors, stability, and wide frequency coverage. I own several frequency counters, but none of them comes close to a receiver for sensitivity.

I've used a B&K 520 transistor/FET tester dozens of times to find bad transistors. Connect its three test leads to the transistor leads, pull a lever, and the 520 will identify emitter, base, and collector and indicate if there's a defect. The B&K 520 is still a current product and sells for hundreds of dollars. Used 520s sell for $25 - $100 at hamfests and I've bought three in the past few years.

I've found used test equipment to be a better bargain than most used scanners and ham radios. Buy what you can afford, preferably used service or lab grade instruments, then trade up later.

Recharging Tip

It's easy to overcharge your scanner's NiCd battery pack. Just plug in the charger, walk away, and then forget to unplug it for a few days.

You can connect the charger to a lamp timer to charge the pack for 16 hours. If you use an unmodified timer, but forget that you left it on, the timer will cycle on and off every 24 hours and overcharge your battery.

Modify an inexpensive lamp timer and prevent this scenario. All you have to do is obtain a single event timer which uses removable "on" and "off" pegs (e.g., Radio Shack #63-862 or equivalent). Remove all the pegs. Place a single "off" peg at the 12 midnight position. Use a gummed label or felt tip pen to mark the dial 16 hours earlier — at the 8 AM position.

To charge your battery for 16 hours, rotate the dial to the 16 hour mark you made, then turn on the timer's power switch. The beauty of this setup is that the timer will remain on for 16 hours. then turn itself off and stay off until you intervene.

Crystal controlled 10.7 MHz and 455 kHz oscillators, good for IF troubleshooting.

TRACKING THE TRUNKS

Larry VanHorn
tracker@grove.net

Tracking the DFW Area Trunks

Longtime *MT* reader Lindsay Blanton <trunking@hotmail.com> checks in this month with an impressive profile of several Dallas-Ft. Worth, Texas, area trunking systems. In this month's column we will look at the trunking systems for Carollton, Grand Prairie, Lewisville, and Denton County, Texas.

You will find the profiles below and much more at Lindsay's web site at URL: **http://web2.airmail.net/lblant1**

City of Grand Prairie Public Safety Trunking System
System ID: 2515
Connect Tone: 105.88 Hz
Type: Motorola Type II

Frequencies: 856.9625 857.9625* 858.9625* 859.9625* 860.9625* 868.2375 868.5125 868.7625 868.9625
[* Denotes Data Channel]

Uniden Talk Group IDs	Motorola Hex Idents	Talk Group Description
48	003	Police Channel-2
80	005	Police Info
208	0D0	Public Works Ops
272	011	Police CID
496	01F	Fire 1
656	029	EMS 1
688	02B	Public Works Ops
720	02D	Public Works Ops
752	02F	Public Works Water Dept
816	033	Public Works Streets
880	037	Police Channel-1
944	03B	Animal Control
976	03D	Public Works Ops
1008	03F	Public Works Ops
1040	041	Airport Operations
1072	043	Public Works Ops
1104	045	Police Talk 1
1136	047	Police Talk 2
1168	049	EMS 2
1456	05B	Police Jail Ops

Note: Grand Prairie Fire is simulcast dispatched on 482.9625 MHz.

City of Lewisville Public Safety Trunking System
Also includes the cities of Coppell, Flower Mound, Grapevine, and Highland Village
System ID: 0728
Connect Tone: 105.88 Hz
Type: Motorola Type I/IIi Hybrid

The fleetmap for the Trunk Tracker for this system is user defined using the parameters below:

Block	Size	Motorola
B0	S0	--
B1	S0	--
B2	S0	--
B3	S0	--
B4	S3	C
B5	S4	D
B6	S4	D
B7	S4	D

Frequencies: 854.4375 855.2125 856.2125 856.9375* 857.9375 858.2125* 858.9375 859.2125* 860.2125*
[* Denotes Data Channel]

Uniden Talk Group IDs	Motorola Hex Idents	Talk Group Description
5632	160	Coppell Fire F-1
5888	170	Coppell Fire F-2
6912	1B0	Coppell Police 1
7168	1C0	Coppell Police 2
7424	1D0	Coppell Police 3
7680	1E0	Coppell Police 4
7936	1F0	Coppell Police 5
24656	605	Grapevine Fire Dispatch
24688	607	Grapevine Fire F-1
24720	609	Grapevine Fire F-2
24816	60F	Grapevine Police F-1
24848	611	Grapevine Police F-2
24912	615	Grapevine Police CID
24624	603	Grapevine Festival 1
404-1		Flower Mound Police Channel-1
404-2		Flower Mound Police Channel-2
404-3		Flower Mound Police Channel-3
404-4		Flower Mound Police Channel-4
406-1		Flower Mound Police Mobile Data Terminals (MDTs)
406-2		Flower Mound Police Mobile Data Terminals (MDTs)
404-5		Flower Mound Fire Channel-1
404-6		Flower Mound Fire Channel-2
404-7		Flower Mound Fire Channel-3
500-1		Lewisville Public Works Sewer Ops
500-2		Lewisville Public Works Water Ops
500-3		Lewisville Public Works
500-4		Lewisville Public Works
500-5		Lewisville Public Works
600-1		Lewisville Police F-1
600-2		Lewisville Police F-2
600-3		Lewisville Police F-3
600-4		Lewisville Police F-4
600-10		Lewisville Animal Control
700-1		Lewisville Fire-1
700-2		Lewisville Fire-2
700-3		Lewisville Fire-3
700-4		Lewisville Fire-4 (Alarm Fires)
700-5		Lewisville Fire-5
700-6		Lewisville Fire-6

Denton County Trunked Radio System
System ID: 1037
Connect Tone: 105.88 Hz
Type: Motorola Type II

Frequencies: 856.2875 857.2875* 858.2875* 859.2875* 860.2875* [* Denotes Data Channel]

Uniden Talk Group IDs	Motorola Hex Idents	Talk Group Description
48	003	Denton County Sheriff Dispatch
112	007	Denton County Sheriff TAC-1
400		Unidentified Talk Group
432		Unidentified Police Talk Group
496	01F	Denton County to All Cities Car to Car
592	025	Denton County to All Cities PD Dispatch
7632	1DD	Denton County Sheriff Prison
7664		Unidentified Talk Group Maintenance
7696	1E1	Denton County Sheriff Prison
8240	203	County Fire Department F-1 Dispatch
8272	205	County Fire Department F-2
8304	207	County Fire Department F-3 (Roanoke)
8368	20B	County Fire Department F-5 (Argyle)
8272	205	Trophy Club Fire Department
8336	209	Justin Fire Department
8432	20F	Ponder Fire Department
8400	20D	Double Oak Fire Department
8464	211	Krum Fire Department
8496	213	Sanger Fire Department
8528	215	Little Elm Fire Department
8592	219	Pilot Point Fire Department
8624	21B	Mayhill/Cripple Creek Fire Dept.
8656	21D	County Fire Department SB1
8688	21F	County Fire Department SB2
12552		County Fire Department F-1 Dispatch Patch ??
16432		Unidentified Police Talk Group
16688	413	Texas Department of Public Safety Channel (State Troopers)
24176	5E7	The Colony Police Department Dispatch F-1
24208	5E9	The Colony Police Department Dispatch F-2
24336	5F1	The Colony Fire Department Dispatch
24592	601	Roanoke Police Department Dispatch
24816	60F	Sanger Police Department Dispatch
12848		County Wide Public Works–Trash/Electric Operations
25168	625	Corinth Police Department Dispatch

City of Carollton Public Safety Trunking System
Also includes the cities of Addison and Farmers Branch
System ID: 1201
Connect Tone: 105.88
Type: Motorola Type I

The fleetmap for the Trunk Tracker for this system is user defined using the parameters below:

Block	Size	Motorola
B0	S0	--
B1	S4	D
B2	S4	D
B3	S4	D
B4	S0	--
B5	S11	K
B6	S0	--
B7	S0	--

Frequencies: 856.2626 856.7625 857.2625 857.7625 858.2625 858.7625 859.2625 859.7625 860.2625 860.7625

Thanks to Mitch Savage <mitch1@airmail.net> for helping me to figure out some info on this system.

Uniden Talk Group IDs	Talk Group Description
100-1	Carrollton A Dispatch
100-2	Carrollton B Info
100-3	Carrollton C CID
100-4	Carrollton D
100-5	Carrollton E Talk
100-6	Carrollton F
100-7	Carrollton G Supervisor/TAC
100-8	Carrollton H Police Department Special
100-9	Carrollton I Police Department Special
100-10	Carrollton J Police Department Special
100-11	Carrollton K Police Department Special
200-1	Carrollton Public Works
200-4	Carrollton Streets Department
200-7	Carrollton Public Works
200-10	Carrollton Public Works/Special Events
300-1	Carrollton FIRE/EMS Dispatch 1
300-2	Carrollton FIRE/EMS TAC 2
300-3	Carrollton FIRE/EMS TAC 3
300-10	Carrollton EMS to Trinity Medical Center
300-11	Carrollton EMS to RHD Hospital
300-12	Carrollton EMS to Bitel Medical
500-1	Addison Police Department F-1
500-2	Addison Police Department F-2
500-3	Addison Police Department F-3
500-4	Addison Police Department F-4 Special Events
500-5	Addison Fire Dispatch Channel-1
500-6	Addison Fire Operations
501-1	Farmers Branch Police Department A
501-2	Farmers Branch Police Department B Talk
501-3	Farmers Branch Police Department C Talk
501-7	Farmers Branch EMS/FD Dispatch
501-8	Farmers Branch EMS/FD TAC2

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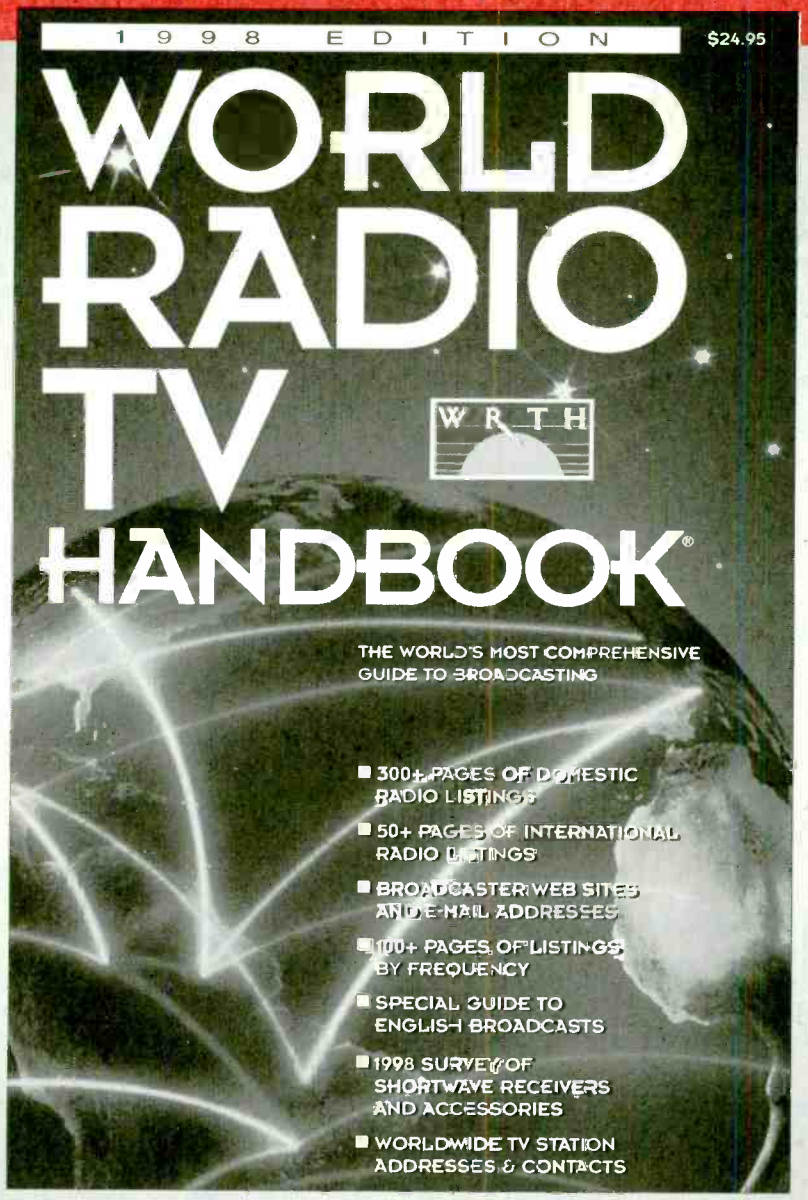

Edited by Andrew G. Sennitt

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Clem Small, KR6A

Antenna Faults and How to Find Them

Antennas are pretty hardy devices usually, but they do occasionally develop malfunctions (or "faults" as our British friends call them). Let's take a look at some of the basic ideas of antenna faultfinding.

When the antenna doesn't work at all

Suppose that you connect an antenna to a receiver known to be working well, and yet you can receive no signals. The first test to perform is a visual inspection of the antenna. If it is an antenna which you have just assembled, check to see that it is correctly constructed. If it is an antenna that has been working previously, then look for broken or loose connections, cracked or broken insulators or conductors, and anything else that appears to be a potential problem. A common fault is antenna connectors which either are not completely seated in place, or just don't fit together properly. Also check the antenna's feedline to see that its connectors are solidly attached to the cable.

If an antenna is mounted very low to the ground or near metal buildings or other obstructions its reception may be reduced. A good antenna poorly mounted may create the impression that something is wrong with the antenna when the problem is really with the antenna site.

On the other hand, there are actually times when a working receiver connected to a well-sited, properly-functioning antenna will be unable to receive any signals because there are no signals to receive on that band at that particular time! Of course, one way to check whether there are signals on the band of interest is to try a second receiver and antenna known to function on that band. It's also a good idea to learn the basics of signal propagation so you will know when signals are likely to be received on the bands which interest you.

If the receiver is designed for HF, MF, or other band lower in frequency you can usually receive some atmospheric noise even when there are no manmade signals on the band. A good way to test for this noise reception turn the receiver's RF and AF gain controls fully on, and then rapidly connect the antenna to, and disconnect it from the receiver antenna-input connector. If you hear noise while the antenna is connected, but none when the antenna is disconnected then the antenna is receiving atmospheric noise or other electrical interference. In such cases the antenna should receive manmade signals when they are present.

There is usually little or no atmospheric noise at frequencies above the HF band, and so the connect-disconnect test is not useful on these bands. The noise which you hear when you turn off the squelch of receivers tuned to VHF or higher frequencies is noise generated within the receiver itself. To test antennas for simple reception at VHF and higher frequencies we need some kind of manmade signal to receive, and if there are no signals on the band we must wait until there are some.

If we perform the tests suggested earlier, and still find that very little or no signal is received on an antenna at times when signals are known to be present on the band for which it was designed then there is some fault with the antenna. We should then proceed to the following tests.

Testing a faulty antenna

When we suspect that an antenna is not functioning as it should we can often find the problem by use of a technique called "continuity testing." Continuity testing lets us determine whether or not a circuit is capable of conducting electorial current. The ohmmeter function found on many electrical test meters makes an excellent continuity tester for checking antennas. Usually the lowest scale on the ohmmeter is the best to use.

A circuit for a simple, home-built continuity tester is shown in fig. 1A. When there is sufficient conduction of electrical current between the two test prods of the tester, the bulb will light, indicating continuity. Thus we can test for continuity between the wires or metal tubing of which our antenna is made.

Look at the antenna of fig. 1B. Using a continuity tester we should find continuity (conduction) between points A, B, and C. We should also find continuity between points D,

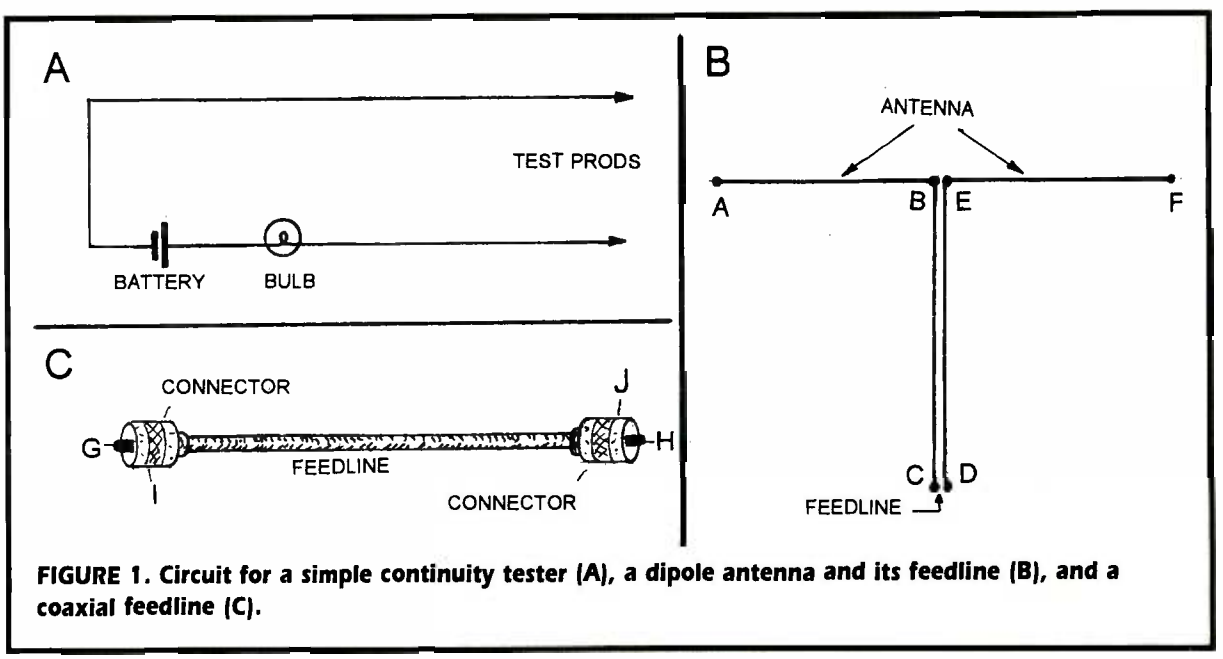


FIGURE 1. Circuit for a simple continuity tester (A), a dipole antenna and its feedline (B), and a coaxial feedline (C).

E, and F. On the other hand, there should be no continuity from any of the points A, B, or C to any of the points D, E, or F. For the feedline shown in fig. 1C there should be continuity between points G and H, and between I and J. There should be no continuity from points G or H to points I or J.

Intermittent problems can sometimes be found by wiggling the cable or antenna as continuity is being tested. For this "wiggle test" you should clip the prods to the points being tested. Continuity should not be affected by the wiggling.

From looking at the antenna test procedure above you can see that the general rule is that we should have continuity between any points that are supposed to be electrically connected to one another, and no continuity between points that are not supposed to be connected to one another electrically. Use the wiring diagram of your antenna to determine which part is connected to what, or determine this by inspecting the antenna's conductors. But check them for continuity as well as looking at them: sometimes conductors which appear to be well connected to one another actually do not have continuity between them.

And so there are two kinds of faults to look for by continuity testing. Open circuits (no continuity between conductors where there should be continuity), and short circuits (continuity between conductors which should have no continuity). Finding these faults and correcting them is often all that is needed to fix an ailing antenna.

Yet to come

Next month we will discuss checking an antenna's SWR, when it is worthwhile to do it, and how it may be done.

RADIO RIDDLES

Last Month:

I said "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?"

Well, one type of sleeve dipole is a vertical antenna with a quarterwave whip extending above a quarterwave section of tubing (the sleeve). The antenna is fed by a 72-ohm coaxial cable running up through the sleeve with the coax center conductor connected to the whip, and the coax shield connected to the sleeve. This antenna is also called the "hypodermic-needle antenna" for obvious reasons!

The other sleeve antenna consists of an ordinary halfwave dipole with a second halfwave dipole run parallel to it, and separated from it by a few inches. The dipoles are not connected together. This is a multiband antenna with the longer dipole resonant on one frequency, and the smaller parasitic element resonant at a higher frequency.

This Month:

There's one "test antenna" that we always carry with us. Technicians often use this test antenna as a quick means to check whether a receiver is functioning or not. It is an extremely simple test. What is that test antenna and how do we use it?

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, 73

LETTERS TO THE EDITOR

NEWS AND VIEWS FROM OUR READERS

Compiled by Rachel Baughn, Editor

Cooperation Pays

As the radio hobby breathes a corporate sigh of relief with the amendment of HR2369, we can congratulate each other on the excellent results of cooperation. Although it wasn't a formally coordinated effort, manufacturers, hobbyists, publications, volunteer groups, radio amateurs, etc. each pitched in to help lobby in the area of their greatest influence and expertise.

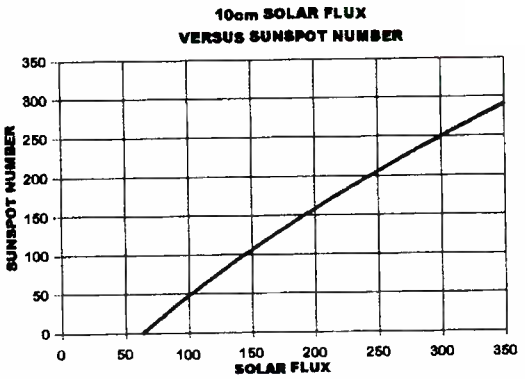
It goes to show the power of grassroots, and what can be accomplished when people refuse to give in to apathy.

We at *Monitoring Times* know firsthand how important you readers are to our survival. We know that the only advertisement which can be guaranteed to show increased subscriptions is the testimony of our subscribers: The majority of our customer source codes read "WOM—word of mouth." That means you, spreading the word.

The majority of our regular advertisers remain so because they know they get an excellent response for their advertising dollar from *MT* subscribers.

In this coming year we look to you again to keep those news clippings coming in, keep sending us potential advertisers or tips on new products, and write to encourage your favorite department writers or send in your own manuscript masterpieces. While you're at it, why not renew your own subscription into the year 2000? Do your part to keep the hobby alive!

—Rachel Baughn, editor



Seeing Spots

In this issue, Bob Evans provides a formula in Digital Digest which expresses the relationship between sun spot number and the solar flux. Here is a graphic representation of the same principle, submitted by propagation columnist Jacques d'Avignon.

Monitoring Milestones

"I recently recalled two milestones in my 'monitoring' career: Hearing Harry Truman announce the end of World War II by shortwave in Glace Bay, Nova Scotia, in August 1945, and watching my first TV show just 10 months later on a homebrew TV set.

"In April 1946, my parents gave me a Hallicrafters S-22R Skyrider receiver for my Bar Mitzvah, so my roots in shortwave listening go back over 50 years.

"About five years ago, I stumbled on to *Monitoring Times*. It rekindled my interest in shortwave listening. Through one of your advertisers I bought an RF-B45 Panasonic receiver. I found I enjoyed very much getting my news direct from the UK, Holland, New Zealand, Israel... It became a casual hobby.

"Early last year I had an eye operation. The recovery period was many weeks and for a good part of that period I was forbidden to read. After about a week I turned on my shortwave receiver. It was a godsend. I listened to the BBC for hours.

"Gradually, I extended the scope of my listening — Cuba, Sweden, the Vatican, Australia, all were set into the Panasonic's memory buttons. I had to stumble into the stations, since I couldn't read the great station listings in *MT*. Gradually I figured out which bands were 'hot' during the times I was able to listen, and so improved the number of interesting 'catches' I made. Thanks again to *MT* for reintroducing me to shortwave listening. I guess it's like riding a bike; you never forget how."

— Morton Lurie, Raleigh, NC

Voice of Russia

"I enjoyed reading the article in the November issue of *MT* on the visit of Bruce Atchison to the Voice of Russia. I have had the privilege to visit Moscow nine times and every time I have made it a point to visit VOR and the Letters Department in particular.

"It was nice to read of the warm hospitality that Bruce received on his visit—as I once told Olga Troshina, I think one of the things that Russia is famous for is its warm hospitality, no matter if you visit someone in their home or place of business.

"One more suggestion for anyone thinking of visiting VOR: August is considered the 'traditional' vacation month in Russia, and many of the staff members take their vacations during that time and are not at the station for the whole month of August. So if there is a specific staff member that you would like to meet during that month, write far in advance to make sure they will be there!"

— Maryanne Kehoe, Atlanta, Georgia

Notes from the North

"First let me say your magazine is an excellent journal. I always find it enjoyable and informative. I do have a few comments and general observations for you.

"All Canadian Radio Shacks sell the same scanners as the US stores; therefore you can not buy a scanner capable of receiving cell calls, even though our laws do not restrict us, yet.

"I have also been interested for years in atmospheric phenomena and the recent information on natural radio has been quite fascinating for me. I have looked at several of the sites mentioned in your columns and I built two of the natural radio designs. Of the two, I like the McGreevy receiver the best. It only needs one 9V battery. It also seems to have a lower noise level than the John H. Davis opamp design. So far I have not heard any whistlers with my receiver, but I have heard some 'tweaks'—they sound like the weapons from the *Star Wars* Movies.

— Tom Hagen, Rochester, Michigan

(Grove Enterprises is now carrying McGreevy's receiver, for those who don't want to build it—see *What's New?*—ed)

The Effect of RF on Intoximeters

In last July's *Ask Bob* column there was a question concerning RF (radio frequency) interference to intoximeters. Here's some "hands on" experience from "an old retired cop."

"Back in the mid 1980's, the police department I worked for received one of the first Intoxilyzer machines in New Mexico. The instrument worked on infrared mass spectroscopy. Not long after we put it in service, we got a bulletin from the state warning us that using HT's in the vicinity of the instrument

during a test could cause incorrect readings. They gave some distance as being safe (seems like it was ten feet). We immediately issued a directive prohibiting HT's from even being turned on in the booking area.

"Well, cops being cops, one of the other supervisors and I conducted our own tests. We ran these while using known standard test BA samples. The readings ran from .00 to .90 (about three times the lethal level). The actual standard was .10. The interference continued out to a distance of about 10 feet (so they were right on there).

"Several months later, the state recalled all the machines and did an RF fix which was supposed to prevent any interference. Our testing found that the erratic readings were still there during HT use, but disappeared at about four feet.

"We decided to see what they had done to 'cure' the problem. A quick check 'under the hood' disclosed that some tech had actually wrapped the circuit board with a layer of aluminum window screen and grounded the screen to the metal cabinet. We never did cancel the order prohibiting HT use around the machine.

"We also tested later versions of the machine and found they were still vulnerable, especially at very close range. It appears the interference caused the problems not with the actual physical testing of the breath sample, but with the electronic circuitry processing the data.

"I really enjoy *MT*, and have for years. Keep up the good work."

— Jim Morrison, KM5BS, Hobbs, NM

Marconi, Maritime, and CW

Our articles on Marconi's stations in the November 1997 issue received a number of letters. One of the most unexpected came from Thomas Risher.

"I read with much interest Leon Fletcher's article on 'Marconi's California Stations.' You see, at one time in my life *I worked and lived in the 'hotel' on the Marshall property.* From about 1965 to the early 1980s the Marshall receiving station was owned by Synanon Foundation. In 1975 I worked in Synanon's food service operation and lived at the hotel. I was allowed to live in the loft, where the five windows peek through the roof as seen in the photo on page 18. At night the building took on an eeriness. While I lay on my bunk I felt like I was on a ship at sea. There was a gentle swaying that I never could explain.

"Synanon residents were very much aware that the property was built for Marconi. What I heard was that RCA bought the Marshall property in 1919 as a way of luring Marconi to come and live there. He may have visited but he never lived there.

"Fletcher writes that the view from the veranda is magnificent. It is. But the view from the loft was extraordinary. You could see all of Tomales Bay in both directions and out over to Point Reyes National Seashore. The whole area is one of the most beautiful in all of California. Fletcher writes that the building is now used for storage. What a shame, it deserves to be lived in."

— Thomas Risher, Whittier, California

"Excellent article in the November issue. I was able to monitor almost all of the stations listed in Figure 1 (The Globe Wireless CW Network). Am a CW buff and real interested in maritime traffic of all kinds. Hope more articles on this subject will follow."

— Don Driver KA9CRF, Valparaiso, IN

"Wow! Not one but two of my favorite maritime stations (KPH and KFS) covered by knowledgeable authors and in the same issue of *MT*. How lucky can a feller get? I have been listening to these two stations since the WW-2 era. While serving in the US Navy I copied press from both of them at sea in the South Pacific.

"You have a great magazine chock full of interesting articles. Keep it up!"

— Gerald Johnson KE0KI, Ozark, Missouri

Taking the Code Test

After reading Arthur Lee's December article on taking the Morse code test, one reader from the Washington, DC area, was encouraged to give it a try. He discovered that VE teams are apparently allowed a lot of latitude in how code tests are conducted. They may or may not have multiple choice answers to the questions, may or may not allow abbreviations in the answer, and may or may not allow the candidate to copy dits and dahs.

Puzzled, he made several calls to determine what the policy is: In essence, the FCC deferred to the ARRL, and the ARRL deferred to the local examiners. His advice: Avoid the embarrassment of being told "we don't do it that way here," and check ahead of time to discover the local practice!

We should note, while we're on the subject, that almost all of the hamfests we list or that appear on the ARRL club calendar hold license testing at that same time and location. However, in nearly all cases you *must* contact the club several days ahead of time to let them know which test you will be sitting for, and there will usually be a small VE fee due at the time of the test. ... Good luck!

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CLOSING COMMENTS

By Bob Grove, Publisher

The Internet Changes the Face of Politics

Just a year ago, it was politics as usual in Washington. A House subcommittee was formed, heavily biased in favor of an influential contributor, the Cellular Telecommunications Industry Association (CTIA); nearly two dozen Congressional recipients of campaign donations from that industry assembled to hear the wishes of that industry. It quickly became clear that the abusive proceeding evolved from the widely publicized, and politically embarrassing, Newt Gingrich cellular telephone call intercept; it was intended to punish scanner listeners, manufacturers, and dealers. But they hadn't counted on the Internet.

Within minutes of the conclusion of the televised hearing, incensed viewers were on the Net, briefing one another on the sham they had just witnessed on C-Span, a clearly contrived Cell-PAC special event. By the following morning, thousands of e-mails, fax messages, and postal letters were barraging the subcommittee offices, stymieing normal operations. Clearly, it was no longer business as usual, at least not in those offices.

The politicians discovered that they were accountable, that their electorate really were watching what they were doing and expected better of their representatives than this transparent sellout. The voters were mad.

But had our elected officials learned anything by the outpouring of protests? Within months, two Bills were proposed (HR1964 and HR2369), reflecting the original wishes of the CTIA, while exhibiting considerable ignorance of the radio spectrum and its users. Again, the Internet responded to the poorly-drafted documents. Shortly thereafter, another official news release promised a better Bill. See this month's Scanning column by Rich Barnett concerning the revised version of HR2369.

The new Bill is, indeed, considerably improved. It offers to protect communications which are entitled to privacy, while permitting normal scanner listening. While minor problematical areas still remain, we are close to a workable document.

I would like to take this opportunity to thank the countless thousands of responsible citizens who took an activist role, letting your legislators know exactly how you felt about unfair legislation. The list seems endless, with kudos to Rich Barnett, John Coker, Capitol Hill Monitors, the editorial staffs of *Popular Communications* and *Monitoring Times*, the American Radio Relay League (ARRL), Uniden Corporation, Tandy Corporation, and countless more, many of whom wish to remain anonymous. I would also like to thank the enlightened Congressional members who examined objectively all sides of the argument and acted with integrity, motivated by their wisdom, not their wallets.

Finally, I would like to acknowledge the role played by a newcomer to the field of representative government, the Internet, without which the rapid ground swell of opposition to preferential legislation could not have occurred. Representative of the many contributors to this effort were Peter Laws and the Scan-L list, and David Sharp NF2G's Scanning Pages.

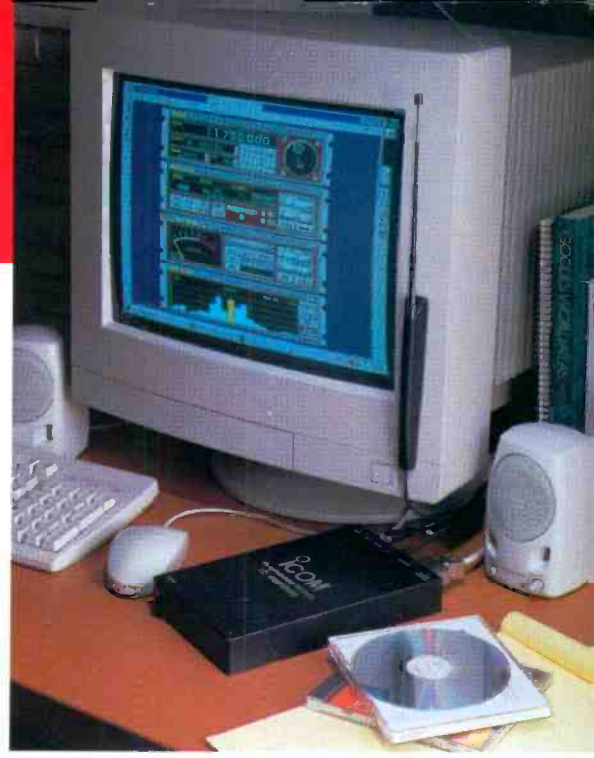
■ Get involved

We all learned an important lesson last year: Our voice *is* heard in Washington, and timing is important. By unifying in popular support or opposition, the voice of the American people makes a difference. Write, phone, fax, or e-mail your Congressional representative when an issue arises you feel strongly about. Support an activist group. Stand up and be counted.

Probably the most respected, quoted, and successful citizen's lobby in Washington is Common Cause. Their promotion of responsible government and opposition to special interests is legend. Their nonpartisan fight for campaign reform, the banning of soft money, tax equality, line item veto, fair medical costs, opposing big industry credits, and countless other major issues affecting our democracy are supported by contributions and activities by common Americans, you and me.

Join me in supporting Common Cause; write to them at 1250 Connecticut Avenue, NW, Washington, DC 20036, and learn how your contribution will work for *you!* And yes, they're on the Internet, too, at **www.commoncause.org/**

ICOM Leads the Way with New PC Ready Scanners and Receivers



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Uses "AA" Alkalines or Ni-Cds!

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Select ICOM options required, depending on PC control or cloning task desired

IC-R10

Catch More Listening Excitement on the Go!

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