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Grove Enterprises, Inc.

Monitoring Times™



Riding with the COWBOYS

MT's Exclusive Reports:

- ◆ **Radio UNTAC:
The UN's First Peace-Keeping Station**
- ◆ **Drugs, Spies and Number Stations**
- ◆ **The Broadcast War with Cuba**



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Cover Story

Riding High with the Cowboys

By Bennett Liles

Tune into a Dallas Cowboys game on the KVIL radio network, and you can hear the action on the field better than being there. KVIL's pioneering use of technology is brought to you by Midcom, Inc., and other networks are beginning to sit up and take notice. A sidebar story looks at two new communications systems that will have the quarterback wireless and on the air. Photo by Carol Simpson. See page 10.



Buddhist monks come to Radio UNTAC to guard the station against evil spirits. Author Jeffrey Heyman, third from right, assists the monks during the ceremony.

The Story of Radio UNTAC..... 14

By Jeffrey Heyman

This feature will remind you that the current level of activity by the United Nations is relatively recent. Jeffrey Heyman was program director for the UN's very first peace-keeping radio station. It turned out to play a very significant role in the UN's largest peace-keeping operation to date—overseeing free elections in Cambodia.

Drugs, Spies, and Number Stations 22

By Larry Van Horn

For over thirty years, radio listeners have been speculating about the purpose and source of the strings of numbers heard recited over the shortwave bands in various languages. Much has come clear in those thirty years, but *MT* staff writer Van Horn has a surprising new piece to drop into the puzzle!

OptoScan 456..... 28

By Haskell Moore

Optoelectronics is not the first to unleash the power of the Radio Shack PRO-2005/6 scanner by giving it a computer connection, but it is certainly the most user-friendly installation. This hardware/software combination was beyond the scope of a review in "What's New?" so we bring it to you as a feature.

The U.S.-Cuba Broadcast War 30

By Larry Van Horn

As Cuba was heard jamming US broadcasters, and the VOA's Radio Martí responded by increasing power and hours of broadcast, this small news item grew into an *MT* special report.

Ambitious New Technologies



The Realistic™ PRO-2035 is the replacement for the now-discontinued PRO-2006—“perhaps the most successful scanner of all time,” says Bob Grove. How does it stack up against its predecessor? Very well, according to the review on page 98.

SoftWave’s ground-breaking marriage of hardware and software makes technology once reserved for certain government organizations almost affordable for the radio hobbyist. Magne assesses this approach to short-wave listening by computer in his review on page 100.



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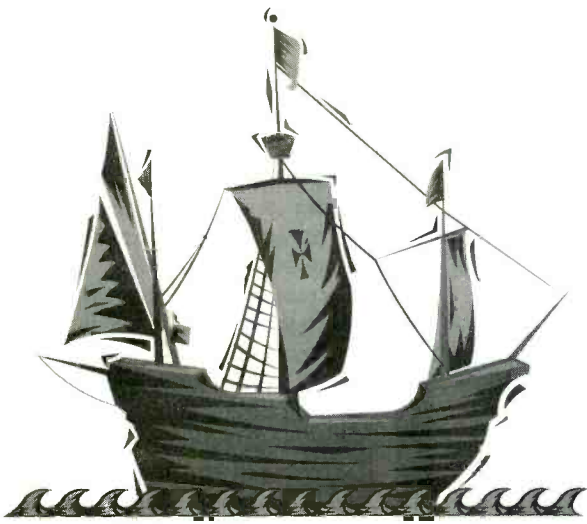
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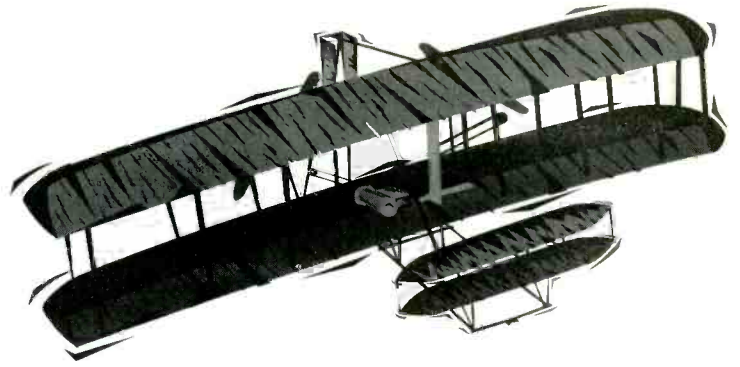
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"THE WORLD IS FLAT"



"THAT THING WILL NEVER FLY"



"THAT ANTENNA IS TOO SMALL TO WORK"

There's one in every crowd—one that pushes the limits and proves the skeptics wrong. The world sailed into a new era of discovery with Columbus. The Wright brothers propelled us into the age of air travel. AEA advances into the ranks of these distinguished pioneers with the IsoLoop 10-30 HF antenna—a 35" loop antenna with low-angle performance that is better than many full-size HF antennas.

One IsoLoop 10-30 HF pioneer offers this: "Big-gun DXers will tell you nothing *that* small can work. They will continue to tell you this after you work a couple hundred countries with it. Ignore them. In 24 months, I have worked 213 countries and confirmed 198."

The reason you get such a big performance in a small package is the efficiency of the IsoLoop 10-30 HF; it's 72% on 20m, rising to 96% on 10m. The main loop serves as an inductor, tuned with a 10,000 volt variable capacitor. Frequency range is 10 MHz to 30 MHz with continuous coverage. The unique

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Discover the world of big antenna performance in a small antenna. Call our literature request line at (800) 432-8873 and request the "Inside Story" on the IsoLoop 10-30 HF or call us direct at (206) 774-5554. For best pricing,

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Connect with us

Overcoming Hardships

Doug Chandler's picture and letter of last July inspired an informal contest which challenged readers to send in a photo and/or list of accumulated radio equipment and memorabilia. Doug, who hails from St. George, Utah, was both the inspiration for and the winner of the contest. Doug has been operating his shack under significant hardships, so it is perhaps appropriate that his prize commemorates a radio station which operated in exile during World War II. Two Dutch first-cover stamps—a prize donation from Radio Nederland—deal with Radio Oranje, and are affixed to an envelope bearing an Oranje banner made from the original rubber stamp

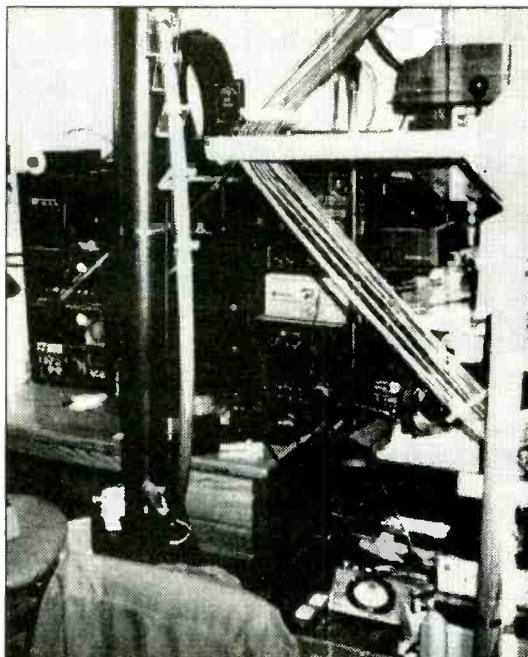
Doug says, "It should be obvious that most of my half-finished projects are still half finished. I took the pictures two days before I went to the hamfest in Flagstaff, AZ—right before I tore it apart in an attempt to simplify it and drag a bunch of it to the hamfest to sell.

I wound up in total confusion, and took nothing to Flagstaff—in fact, I wound up buying more junk! Ah, the classic symptoms of addiction..." I regret the list of equipment contained in this 10x10 room is too long to print. I hope he never has to get out of bed in a hurry!

Doug contends with a local AM transmitting tower, a 69,000 volt power line in the front yard, and power company data transmissions, not to mention the radios themselves and the interaction between antennas in his little room (no outside antennas are allowed). Doug's hopes for moving were raised when he got a job offer as a live-in caretaker—until he discovered the housing was a metal trailer!

Well, Doug, we hope the example of Radio Oranje will give you luck and hope for better days to come!

Monitoring Times wishes to thank Radio Nederland again for coming up with such a creative and meaningful gift uniquely suited to the monitoring community, and for allowing us to give them as prizes on their behalf



Doug Chandler's "prize-winning" shack.

(three were given away at last year's MT Convention). I hope they don't mind if the remaining stamped envelope is displayed on the lobby wall at Grove Enterprises as a part of radio history.

Unfinished Business

Jack Sullivan's article on "Military Low Band" mentioned the existence of a Bibliography in the text, which was inadvertently omitted. Here is his "Bibliography and Suggested Further Reading":

Directory of North American Military Aviation Communications (HF/VHF/UHF) - Second Edition. Four regional volumes list many low-band channels used by military aircraft; *Monitoring the Military*, by Darryl Symington; *Top Secret Registry* by CRB Research. All three references are carried by Grove Enterprises.

Richard Amirault of Malden, Massachusetts, in addition to writing to congratulate *Monitoring Times* on its great new look, had another clarification to the above article. He refers to the statement on subaudible tones in which Sullivan said, "Receiver squelch opens only when this tone is present on the signal being received, thus eliminating interference from non-military radio systems and other sources."

Richard says, "The first half of that statement is true; the last half is not. It is a common misconception that having a receiver squelched to a "subaudible tone" will eliminate interference from stations other than those with which you wish to communicate. *It will only stop you from hearing them. If, for*

instance, someone else is transmitting on your frequency with a stronger signal than someone transmitting the proper tone, the stronger signal will overpower the weaker signal and your receiver will remain mute. This certainly qualifies as 'interference' in my book!"

The article warranted a letter from Chief John T. Wible, of the Army Frequency Management Office, "licensing authority for Army activities throughout 46 states."

"We enjoy each issue of *MT*, and trust you will continue its high standards of readability and accuracy," says Chief Wible. He goes on to say, "As correctly noted in the article, both government and non-government frequencies in the band are used. I think it important to point out that the non-government channels are used only after formal coordination with the cognizant FCC District Office has been completed. Such coordination is dictated by agreement between the FCC and National Telecommunications and Information Administration." The extract he enclosed from the NTIA regulations manual showed the detailed guidelines the military must observe for operation on non-government frequencies.

De Bate Goes On

Who made the better vintage receiver: McMurdo or Scott? Thomas Peters of McAllen, Texas, offers: "I will provide schematics of, say, a Silver Masterpiece Five and its contemporary Scott Philharmonic so that you can judge which might be the better performer." Mike Greene of Brookeville, Maryland, maintains, "The debate over which radio is better is a matter of listener's taste. These sets were the best money could buy, offered by two exceptional men!"

Both knowledgeable gentlemen have corrections to make to the history given in August's "Radio Reflections." First, Thomas Peters says, "All evidence suggests that Masterpiece receivers were used on the Byrd expedition solely for entertainment receivers rather than for primary communications."

Second, with regard to manufacturing, Thomas Peters says that author Robertson has it reversed: "At no time during the days of McMurdo Silver, Inc., did he ever possess an RCA license, which was an absolute necessity to be a manufacturer of receivers at this time period. E.H. Scott did have the paperwork and was a manufacturer rather than a marketer like Silver. As a matter of fact, in 1932/34, McMurdo Silver not only had his radios manufactured by Howard, his mailing address was actually in the Howard plant on Belmont Avenue in Chicago!"

(Continued on page 114)



Last chance to buy

Cellular Modifiable Scanners

C COMMUNICATIONS ELECTRONICS INC.
Emergency Operations Center

New FCC Rules Mean Last Buying Opportunity for Radio Scanners

Recently, the FCC amended Parts 2 and 15 of its rules to prohibit the manufacture and importation of scanning radios capable of intercepting the 800 MHz. cellular telephone service. The Electronics Communications Privacy Act prohibits the intentional interception of cellular telephone transmissions. Supplies of scanners that are capable of being modified to receive full 800 MHz. coverage such as the Bearcat 200XLT and 2500XLT are in very short supply. If you need technical assistance or recommendations to locate a special scanner or solve a communications problem, call the Communications Electronics Inc. technical support hotline for \$2.00 per minute at 1-900-555-SCAN.

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A modification sheet with instructions to restore full 800 MHz. coverage for the Bearcat 2500XLT or Bearcat 200XLT may be ordered for \$8.00. To order any Bearcat radio product call 1-800-USA-SCAN.

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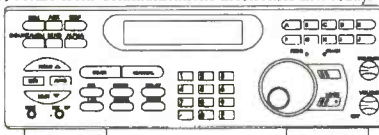
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List price \$689.95/CE price \$369.95/SPECIAL
500 Channels • 20 banks • Alphanumeric display
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The new Bearcat 8500XLT gives you pure scanning satisfaction with amazing features like Turbo Scan. This lightning-fast technology featuring a triple conversion RF system, enables Uniden's best scanner to scan and search up to 100 channels per second. Because the frequency coverage is so large, a very fast scanning system is essential to keep up with the action. Other features include VFO Control - (Variable Frequency Oscillator) which allows you to adjust the large rotary tuner to select the desired frequency or channel. Counter Display - Lets you count and record each channel while scanning. 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. You can even get an optional CTCSS Tone Board (Continuous Tone Control Squelch System) which allows the squelch to be broken during scanning only when a correct CTCSS tone is received. 20 banks - Each bank contains 25 channels, useful for storing similar frequencies in order to maintain faster scanning cycles. For maximum scanning enjoyment, order the following optional accessories: PS001 Cigarette lighter power cord for temporary operation from your vehicle's cigarette lighter \$14.95; PS002 DC power cord - enables permanent operation from your vehicle's fuse box \$14.95; MB001 Mobile mounting bracket \$14.95; BC005 CTCSS Tone Board \$54.95; EX711 External speaker with mounting bracket & 10 feet of cable with plug attached \$19.95. The BC8500XLT comes with AC adapter, telescopic antenna, owner's manual and one year limited warranty from Uniden. Order your BC8500XLT from Communications Electronics Inc. today.



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- Sangean ANT60-J portable shortwave antenna\$9.95

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Crack the Shack

Pressure against cellular-capable or even cellular-possible scanners continues to be intense. So intense, in fact, that Radio Shack has issued an urgent message to its stores ordering managers to "cease selling or displaying" the PRO-46 and PRO-23 handheld scanners. Technically, Radio Shack labels the problem as an "engineering defect," but what engineering defect warrants this kind of intensity?

The memo reads: "IMMEDIATELY!! Remove these two scanners from display. THIS IS A FEDERAL REQUIREMENT. COMPLIANCE IS MANDATORY AND VIOLATIONS ARE SUBJECT TO SEVERE PENALTIES. THERE ARE NO EXCEPTIONS, INCLUDING LAYAWAYS."

The memo also mentions that Radio Shack has stopped warehouse shipments on the PRO-2026 mobile. A late-breaking memo adds the PRO-51 to the list of scanners pulled from sale.

False Alarm

A recent proposal by Congress to amend Section 9 of Title 18 (wiretap law) has created a flurry of concern among scanner devotees. Essentially, the amendment would address the "fraudulent alteration of commercial mobile radio instruments."

Of concern to legislators, however, is not scanners; it is the growing problem of cellular telephone fraud—cloning phones for free service. Scanners are not even addressed in the proposal.

Family Radio

Radio Shack has petitioned the FCC to establish a new unlicensed, low-powered two-way radio service. The new service is to be called The Family Radio Service and it is designed to serve the day-to-day and emergency needs of families and public service organizations. Power levels will be 500 milliwatt.

So far Tandy has tested the service in Dallas/Ft. Worth and at Walt Disney World in Orlando, Florida. Operation would be on GMRS channels, including seven previously unassigned channels.

The proposal is being opposed by proponents of GMRS, on the basis that GMRS was intended to be such a personal radio service, and the licensing process helps keep it so by excluding—though not always with success—commercial use.

ATV Record Shattered

Amateur Television (ATV) operators were able to break the 2,500 mile distance limit for

the first fast scan TV contact over the Hawaii-to-mainland-USA path.

Paul Leib, KH6HME, long known for his VHF-UHF DX from Hawaii, set up his ATV equipment at Moana Loa Volcano, but waited two years before conditions were right. Leib uses a 10 watt PC Electronics transmitter and a Mirage D1010NR-ATV amp.

Early on the afternoon of July 11th, well-known Southern California ham Gordon West broke the world record ATV DX contact by receiving KH6HME's signal across a distance of 2,508 miles. (Photo by West. Reprinted from *ATVQ* magazine.) The record fell almost immediately when San Clemete's Mike Henkoski, KC6CCC, picked up the signal for catch of 2,518 miles. Transmissions were on 434 MHz.

The summer tropo duct that allowed for the record shattering reception lasted for about 4 hours.



Watch Out for March Music

The death last summer of North Korean President Kim Il-sung brought to light an unusual and often overlooked radio station. Besides its four main radio stations, North Korea also maintains a special station targeted specifically at its soldiers along the demilitarized zone with South Korea.

Transmissions begin at nightfall and continue from around 1400 until 2100 hours UTC. According to Korea watchers, the service is meant to provide solace to frontline sentries during the night. In fact, the station identifies itself as "The Broadcasting Service for the Frontline Sentry." Programs consist of songs, music and voice tracks from North Korean literary movies.

A second, less obvious, purpose of the station is to regulate the soldiers' psychological state of readiness through the choice of programming. As a result, says the BBC, "Monitoring the broadcasts may well serve as a key to grasping the situation in the country." Says another source, "When you hear them playing march music, it's time to get out of there."

It's a near-impossible catch, but try the two most recently publicized shortwave frequencies, 2625v and 3025 kHz. Frequent frequency and schedule changes heighten the challenge.

Voodoo Reporter Vanishes

In July, Radio Tropic correspondent Ernst Ocean went on the radio with a report that Haitian troops in the St. Marc area of Haiti were warding off a possible invasion by the U.S. and the return of President Aristide with voodoo ceremonies involving human sacrifice. Ernst Ocean has not been seen since.

Whether he was himself a victim or had gone into hiding was not known at the time of the report. Since the coup by anti-Aristide forces four Haitian journalists have been killed, says the Committee to Protect Journalists. A fifth has been missing for more than two years.

Cannibalized Peace

The Wakh news agency in Manama reports that Israeli peace activist Abie Nathan has donated the transmitting equipment from his now defunct Voice of Peace to the Voice of Palestine. The Voice of Peace operated from a boat, but ceased operations after a peace agreement was reached between the Palestinians and Israelis.

According to Basim Abu Samayyah, director of the Voice of Palestine, the equipment is worth some 100,000 dollars. It will be transferred to Gaza where it will be used to produce radio programs, in addition to the Jericho radio station.

Tough Deal

The Voice of America has reportedly agreed to a most unusual set of terms in exchange for use of the VOA relay facilities in Rhodes and Kavala. In addition to a payment of one million dollars a year, according to a report on Radio Netherlands, Greece will be allowed to cut off any VOA programs it deems offensive. Under the 10 year agreement, the Greek government can interrupt broadcasts if, in their words, they are "an affront to national interest." Already the Voice of Greece gets airtime on VOA transmitters as part of the arrangement. Obviously some shrewd dealmaking going on here.

Special Deal

Q: When can an RF device be operated in the United States if it doesn't have FCC equipment authorization? **A:** When a manufacturer is showing a new product at the Consumer Electronics Show (CES).

Right now, the rules permit only limited operation of non-approved products and pro-

hibits any operation of the devices. However, under a new Petition for Rulemaking initiated by the Electronic Industries Association (EIA), manufacturers will be able to show and operate new, non-type accepted devices at the EIA-sponsored CES show. Supposedly, all that would be required is "conspicuous notice" that the devices cannot be sold until it meets FCC approval.

Rock n' Roll Nightmare

There's something about this story that appeals to our sense of mischief. It's not a new story, but it sure is fun—as long as it doesn't happen to you.

Neighbors who happen to live in the immediate vicinity of WPGR-AM's three-tower array in Roxborough, Pennsylvania, are on the verge of rioting, if newspaper reports are any indication.

That's because WPGR's 50,000 watt signal is really getting out—and into every appliance in the neighborhood. Frannie Costa says she wakes up to a toaster playing the station. When you pick up a telephone, there it is. Susan Hall says that the fluorescent lights stay on, pulsing in time to the music—even when she turns off the power. Every TV show comes with two sound tracks, the show's own and, you guessed it, WPGR. Mary Ellen VanDeVort even gets the oldies station over her chandelier.

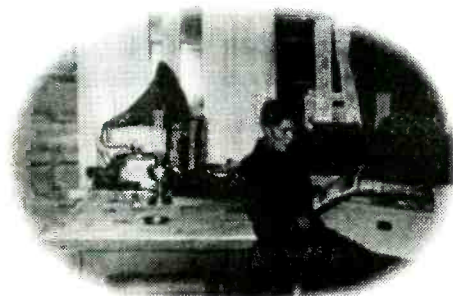
What's worse is that the station is home to an ancient Philly DJ named Jerry Blavat, a fast-talking type who calls himself "the Geator with the heater, the Boss with the hot sauce." Blavat is an acquired taste, not unlike those roadside pretzels they sell in Philly. And, needless to say, attorneys have gotten involved, along with the FCC and station officials. Still, the beat goes on.

"I don't know what the answer is," says Donna Kavash, "I just know that I can't take it anymore."

Yesterday and Today

In Finland there is a place DXers can bathe themselves in radio history while at the same time trying their hand at hooking the big DX with a state-of-the-art receiver. In the town of Lahti, one of Yleisradio's old transmitter buildings has been turned into a kind of hands-on museum. A DXer who comes to visit is invited to try his hand at DXing the old fashioned way, with a 1950s vintage Luxor Ambassador.

But how does a radio like that compare to one of today's best? Why, sit down at the next table and try a Lowe HF-150! All radios can be connected to either a 120 meter longwire or a special half-wave dipole.

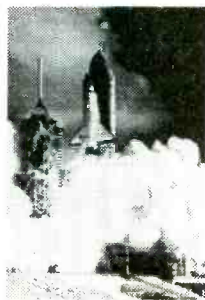


The listening shack is run by the Radio and TV Museum and the Finnish DX Association. If you're planning to visit or would like to pick up one of the museum's commemorative postcards, write to the good people of the Finnish DX Association, P.O. 454, FIN-00101 Helsinki, Finland.

Radio Shack Hits the Road

Radio Shack says that it's going to try to get closer to potential customers who travel the nation's highways. The company is reportedly setting up shop at some 100 truckstops this year. The Radio Shack Travel Centers will be located at National's "76 Auto/Truckstops." Products will include handheld and mounted CB radios, AC/DC televisions, portable and shortwave radios, scanners, walkie-talkies, flashlights, batteries, travel-related 12 volt accessories and electronic toys.

Attention, Shuttlebugs!



Put at note on your calendar to set the VCR to the Discovery Channel November 13th. Discovery is premiering a two-hour behind-the-scenes look at the Space Shuttle and the people behind it, from launch to landing, from the first female astronaut

piloting the shuttle to the person who oversees the plumbing.

The program will air Nov 13, 9-11pm (ET/PT) and midnight-2am (ET/PT), repeated Nov 19, 20, and 26th. Check local listings for times. Also watch for articles on the Space Shuttle in the Nov/Dec issue of *Satellite Times*, including an eye-witness account of a launch from *MT's* editor, Rachel Baughn.

"Communications" is written by Larry Miller from information provided by the following staff of reporters. David R. Alpert, New York, NY; Don Bishop, Overland Park, KS; David Chapchuk, Scranton, PA; Bob Coburn, Londonderry, NH; Bob Grove, Brasstown, NC;

Ken Hydeman, Xenia, OH; Bob Mills, San Diego, CA; Frank Mitchell, Gaffney, SC; Elton Palmer, Red Deer, SD; Ira Paul, Oak Park, MI; Ed Pestel, Whiterock, RI; Clem "The Antenna Man" Small, Montana; Steve Szabo, Denver, CO; and Tom White, Jenkintown, PA. Additional information came from the pages of *ATV Quarterly* (540 Oakton St., Des Plaines, Illinois 60018), *National Scanning*, *Personal Radio Exchange*, *Radio World*, and the *BBC's World Broadcast Information*.

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PHONE COLOR BOXES: As designed by phone phreakers: Plans for 15 phone color boxes - Red, Blue, Black, Silver, Cheese - more! \$29.

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CONSUMER ELECTRONICS: 2011 Crescent Dr., P. O. Drawer 537, Alamogordo, NM 88310. Voice: 505-434-0234, 505-434-1778 (8AM-8PM MST, Mon-Sat). Fax: 434-0234 (for orders only; 24-hour, 7-days/wk. If you get answering machine press "#", then "*" any time).

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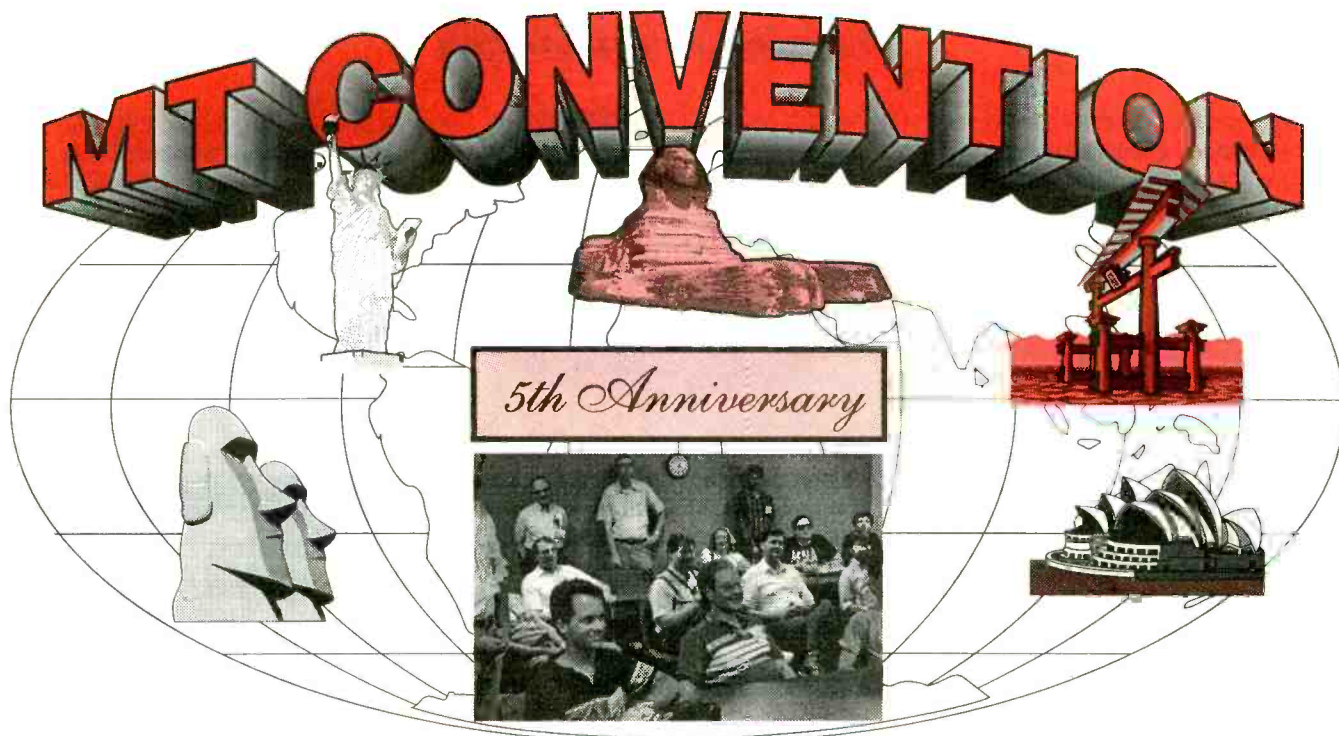
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Comes with
SW/MW loop
entire loop
not shown in
photo

An advanced indoor active antenna that rejects man-made noise and pulls in signals like a 100 foot outdoor antenna for just \$99.95! The NXL-250 accomplishes this by using a scaled-down (1 ft. dia.) faraday shielded loop, a decades-old noise fighting antenna design, adjustably mounted on an attractive metal case containing a high-gain amplifier which is tunable from 540 kHz to 30 MHz for additional interference reduction (tunable to 250 kHz with optional \$89.95 plug-in loop which also provides maximum MW sensitivity). **THIS RESULTS IN THE BEST INDOOR SHORTWAVE/MEDIUM WAVE ANTENNA YOU CAN BUY!** The NXL-250 comes with a shielded output cable terminated in an RCA phono plug, PL-259, BNC, and 1/8" phone plug adaptors available for \$2.95 each; AC adaptor: \$9.95. Add \$5.00 for shipping (\$8 Canada). Fla customers add 6% tax. Send check or MO to:

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- Join your fellow monitors at a **professional listening post** featuring the Grove SDU-100 Spectrum Display Unit and SP200 Sound Enhancer as well as other products designed to enhance your radio monitoring.
- A **two-hour international broadcasters forum**, hosted by Ian McFarland, starts off the weekend Friday evening.
- Attend any of **over 20 seminars** covering such topics as the future of shortwave broadcasting, choosing a scanner or shortwave radio, LOWFER monitoring, digital communications, spy numbers stations, surveillance, clandestine and pirate broadcasting, antenna theory, military and aero monitoring, and much, much more!
- Saturday evening's banquet will feature **international broadcaster Ian McFarland**.
- Get your scanner charged and ready for the Saturday night **"Bug Hunt"**--a convention highlight.
- Visit **Delta Airline's Communication Center** and **Delta's Maintenance and Flight Operations Division**. Tours will be conducted on Friday.
- See the **Portable Satellite System** set up for the convention.

PRELIMINARY 1994 MONITORING TIMES CONVENTION SCHEDULE

FRIDAY

8AM - 7PM Registration open
 8:45 - 4PM Tours of Delta Maintenance, Museum, Radio Room and Dispatch
 12PM - 5PM Exhibits and Listening Post open.
 7PM - 9:15 International Broadcast Forum with host IAN MC FARLAND and panelists Tom Rodgers, International Radio Satellite Corporation; Dr. Bill Prichard, W.L. Prichard Co. of Bethesda, MD; Kim Elliott, VOA/USIA; Larry Magne, Passport to Worldband Radio; Karl Miosga, Managing Director World Radio Network, London, England.

SATURDAY

8AM - 2:30 Registration open
 8:45 - 3 Exhibits open
 9AM - 9:30 Welcome by Bob Grove

9:45-10:45	Future of Satellite Broadcasting Ken Reitz	What Do Those S/W Specs Mean? Larry Magne	Federal Monitoring John Fulford	Scanning for Beginners Skip Arey
11-12	Rumblings in the Basement (Below 500kHz) Kevin Carey	Digital Monitoring Modes & Equipment Bob Evans	Antennas: Fact and Fiction Bob Grove	Shortwave for Beginners Skip Arey
3-4	TVRO, the Ideal Set-up - Ken Reitz	Pirates & More! George Zeller	Shortwave Intrigue Larry Van Horn	
4:15-5:15	Home Reception of INMARSAT John Wilson	AM/FM/TV Broadcast DXing Joe Elsenberg	Monitoring the Military Larry Van Horn	
7-9	Banquet - guest speaker IAN MC FARLAND			
9:30 - ?	Bug Hunt - John Fulford and Friends			

SUNDAY

9 - 10 AM	Aero UHF/VHF/HF Jean Baker	Weather Reception on HF FAX & SATS Jacques D'Avignon	Surveillance Techniques John Fulford
10:15-11:15	Advanced Antenna Design Dick Austin	Linking Technologies Bill Grove	All About Scanners Bob Grove
11:30-12:30	DXing the Satellite Spectrum Larry Van Horn	Radio-related Computer S/W John Catalano	Spy Number Stations John Fulford
12:45-1:15	CLOSING		

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Frequency Counters from Optoelectronics	
Sangean MS103 from Christian Science Monitor	
1 SP200 from Grove Enterprises	\$249.95
1 PR150 Preselector from Lowe	
2 ScanCat Pros from Computer Aided Tech.	\$159.90
2 CopyCats from Computer Aided Tech.	\$139.90
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Card #: _____

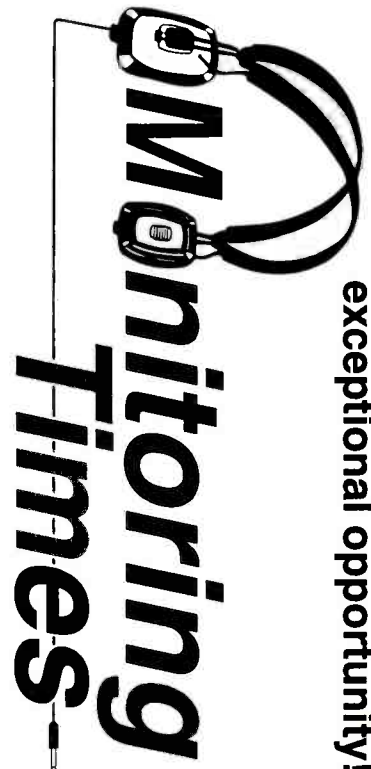
Exp. Date: _____

Signature: _____

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C O W B O Y S


When was the last time you “watched” a football game on radio? You say it loses something without the picture? Not if you’re tuned-in to any of some one hundred stations in the KVIL Dallas Cowboys Radio Network! When Midcom, Inc. of Dallas covers a Cowboys game for KVIL, the only thing you may lose is a little self-respect when the people beside you at the traffic light watch you duck on every tackle. Little do they know, a wide receiver and a linebacker have just collided in your car.

KVIL had to have full frequency response stereo coverage with the lightest, most mobile production unit available. What they got was a double barrel blast of technology and technique. This crew doesn’t have any new black boxes but it hooks up some existing ones in a remarkable way. Its six members man the office suite until the weekend. Then they head for a stadium across town or across the country, roll in their custom-modified equipment, and very soon the Cowboys bump-and-crunch party is on the air.

The technique is one borrowed from television. Long a staple of TV sports, “effects miking” is a relatively new concept in radio sports coverage. For years, radio announcers called the game while the field action made its way to your speakers through a single EV-635 mike or whatever, hung out of the pressbox. Midcom President and sound mixer, Mike Simpson, sends an effects team of four to the field with RF-linked parabolic microphones to scoop up the action. Each operator hears the program by way of a wireless IFB (interrupted fold-back) headset operating in the 450 MHz band.

The “interrupted” part is when Mike inserts his own verbal directions. Alan Stiebing and his effects team have to be aggressive. One parabol on the Dallas side of the field covers the coaches and players on the sidelines. The other three stay with the

By Bennett Liles



**THE HIGH-FLYING
DALLAS COWBOYS, THAT IS.
HERE’S HOW KVIL RADIO
COVERS THE TWO-TIME
DEFENDING SUPERBOWL
CHAMPS.**

line of scrimmage. It’s their job to get in close and move with the action while picking up the quarterback’s count calls, player grunts, groans and smashing helmets and pads. Sometimes, even a wide receiver’s footsteps can be heard. So can other things.



The Cowboys line up against the Atlanta Falcons during a 1993 game at the Georgia Dome.

“Hold on to the @\$%^&* BALL!” Dallas coach Barry Switzer shouts at a fumbling runner.

Well, it’s live radio. After a short pause, KVIL color announcer Dale Hansen says, “Now how much would you pay for a stadium seat that would let you hear that?”

It’s all beamed from the individual parabolic mikes on frequencies within TV channels 68 or 69 (see sidebar). UHF receivers in the pressbox road racks pick up the parabol signals and they are mixed into the show with the announcer mikes. An RF receiver for the referee’s VHF wireless microphone also has its place in the pressbox rack.

Why all the wireless gear? Strike speed! Mike Simpson and his crew actually ride with the Cowboys on the team charter flight. “If we had to strike (pull up) cables all over the field, we’d never get out of here in time to catch the plane,” he admits. “With RF gear, we can be out before some of the fans!”

Of course, there is a down side to RF in remote production and that is interference. Everybody and his cousin are using wireless mikes, IFB’s and intercoms now. It seems the only ones who weren’t wireless at the Cowboys-Falcons game I attended were the coaches! Somebody has to keep track of it all; Mike’s traffic cop of the airwaves is Jay Wallace. His RF coordinator role can be a real hair-puller.

“Actually, frequency coordination is impossible,” he says. “You never know who is going to show up somewhere in the stadium, right before the game and turn on something that’s on one of your channels.” Jay has to be ready to react and find a new channel quickly. With an RF analyzer, you would be able to watch a mini forest of spikes grow up just before game time. Any scanner buff out in the parking lot could have a mobile feast, switching from referees, to sideline interviews, to smashing helmets.

For even greater setup speed, the



Catching the blimp on radar? No, just calibrating parabolic mikes before the game.

Midcom crew has modified their gear to be modular. One bundled line comes out of the British-made, Amek B-2 mixer and connects to all the right sources with a few multi-pin connectors. All the announcer mikes and headset gear can be set up or put away in a matter of minutes.

During the game, color announcer Dale Hansen teams up with spotter Peggy Sham, with Brad Sham on play-by-play. Producer Kristi Scales stays in contact with Dallas. For the next few hours, grunting players and smacking pads beam up from the field on UHF and flash back to Dallas in CD-quality stereo. After the game, things fold up fast. The announce team leaves quickly to avoid being packed up with the gear.

Getting the signal back home

The second high tech trick in Simpson's bag is the way he gets all this back to Dallas. Their signal hasn't always had smooth sailing. Mike remembers their satellite days.

"Every time a blimp circled into our up-link path, its instruments would go nuts and our signal would fade," he mused. "We were lucky with the thunderstorms and our KU band beam." They could have had problems there, too. Along came the ISDN idea and "Look ma, no satellite."

ISDN (Integrated Services Digital Network) has been around for a while but its use for radio remote back-haul (getting the live program back to the station) is relatively new. Midcom is charting the waters for this technique with the help of Adtran, a Huntsville, Alabama, company. Accustomed to supplying the corporate world with teleconferencing and other business communications gear, Adtran has targeted broadcast remote production as a new market for its

digital communication systems and has provided Midcom with four of its Sony ISU-128 terminal adapters. These interface the 128 Kbit/sec digital signal with the ISDN transmission line.

The two analog audio lines are fed into a Corporate Computer Systems codec which digitizes and inverse-multiplexes them into one signal. This is fed into the terminal adapter. ISDN transmission offers a high quality stereo send and receive signal on the same line. If one channel is lost, instead of dropping the call, the codec divides the remaining signal and switches to about 8.5

kHz audio response in both directions. The most obvious effect on the program is a slight reduction of high frequency response.

To demonstrate, Mike Simpson stepped up to the board and A-B switched between the signal going out and the same stereo signal coming back from Dallas. Only the slight delay of the return signal distinguished it from the mixer's CD-quality output!

ISDN circuits for temporary use are still hard to come by in some areas and in some cities where Midcom's crew covers the Cowboys' football games, special installation has to be arranged around two weeks in advance. Also, installation and service fees vary widely from state to state. Once hooked up, however, it certainly seems to beat blimp and storm fades and it sure tops lugging an uplink around.

Blimp Frequencies

Blimp Frequencies	
Airport/landing site	123.050
	123.200
	123.250
Goodyear Public Relations	132.000
Blimp & ground crew	151.620
	151.625
Goodyear Aerospace net	153.320
Remote to law enforcement	167.5625
	460.025
Goodyear Aerospace net	460.050
	462.225
Remote to law enforcement	465.025
Operations/sports event	465.9125
	465.9375
	465.9625

There are several forms of digital service now available, but whether it is Switched-56, DDS, ISDN or any other, land-line digital is catching on in broadcasting radio remotes. CBS Radio has ordered several digital units and they are already in use at the White House on President Clinton's Saturday morning radio program. Costs are coming down. From the time the Cowboys played their regular season game in Atlanta and the day they returned to town for the Super Bowl, ISDN rates dropped by more than seventy percent!

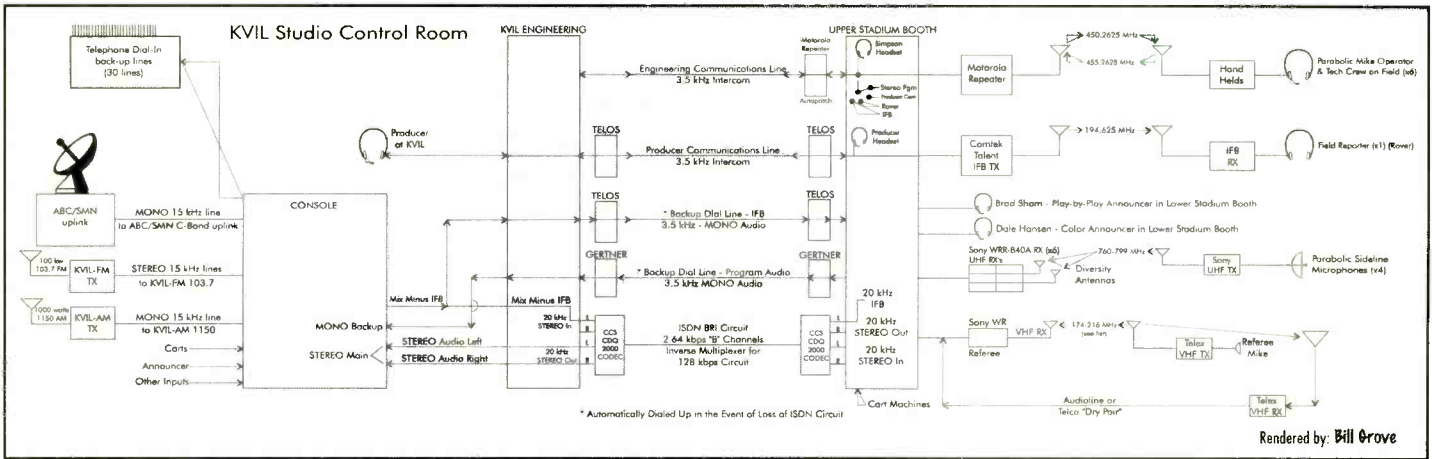
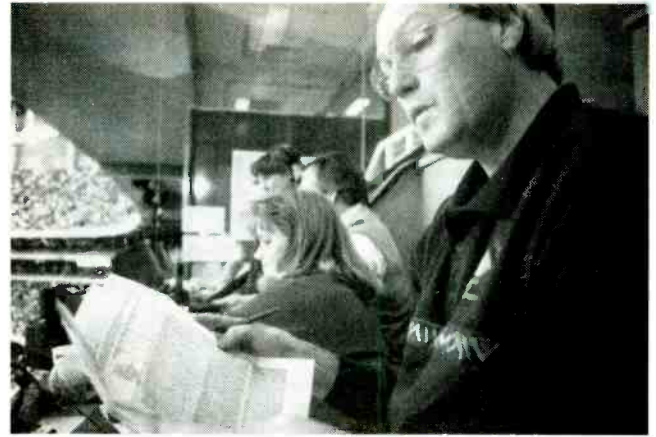
RF "effects microphones" and land-line digital backhaul have enabled the Midcom crew to ride with the Cowboys, and to bring listeners into the action as well. The next time you're listening to a Cowboys football game on KVIL or any station in the Dallas Cowboys Radio Network and you hear a wide receiver's footsteps crash into a panting cornerback, keep your helmet on!



Parabolic mike in hand, Alan Stieberg zeroes in on the field generals during the game.



At left, Mike Simpson at the mixer, during the game. The on-air team, shown at right, includes (from foreground) Dale Hansen, color; Peggy Sham, spotter; Brad Sham, play-by-play; and Kristie Scales, producer. Diagram below shows the complexity of the KVIL studio control room.



Dallas Cowboys Broadcast Related Frequencies

Midcom typically uses 5 freqs from a group of 11 of the frequencies allocated to TV channels 68 and 69. The other networks share the remaining six freqs. Some new equipment being used by the Fox networks this year, however, may be using mikes in the 5-6 MHz range.

NFL Referee Wireless Mikes

Atlanta	174.4	Washington,	
Dallas,		Minneapolis, Seattle	184.4
New Orleans	175.0	San Francisco	185.4
Chicago	180.6	Cleveland, Miami,	
Kansas City	183.0	San Diego	187.8
Pittsburgh	184.0	Indianapolis	194.0
		Buffalo, Denver	195.8

Parabolic mikes

Ch	Freq
05	794.625
12	801.500
14	795.750
16	802.000
25	797.125
30	803.750
37	804.625
40	805.000
41	799.125
42	805.250
47	799.875

Dallas Cowboys Radio Affiliates Outside Texas

New Mexico		Other			
Albuquerque	KKOB	770 AM	Newark, DE	WNRK	1260 AM
Farmington	KWYK	94.9 FM	Honolulu, HI	KGU	760 AM
Gallup	KYVA	1230 AM	Ulysses, KS	KFXK	106.7 AM
Roswell	KBIM	94.9 FM		KVLY	1420 AM
Louisiana			Clinton, MI	WSLI	930 AM
Shreveport	KFLO	1300 AM	Joplin, MO	KWAS	1230 AM
Monroe	KMLB	1440 AM	Las Vegas, NV	KENO	1460 AM
Arkansas			Erwin, TN	WXIS	103.9 FM
Crossett	KAGH	104.9 AM/FM	Scranton, PA	WILK	980 AM
Ft Smith	KKUZ	940 AM	Va Beach, VA	WGH	1310 AM
Little Rock	KBIS	1010 AM	Spokane, WA	KTRW	970 AM
			Martinsburg, WV	WRNR	740 AM

Wireless IFB Headsets 450.2625

Going after the Quarterback!

Bob Ferguson

For years monitors have wondered if football teams used radio to call in the plays. This season, two new technologies will have the quarterback wired, transmitting, and receiving.

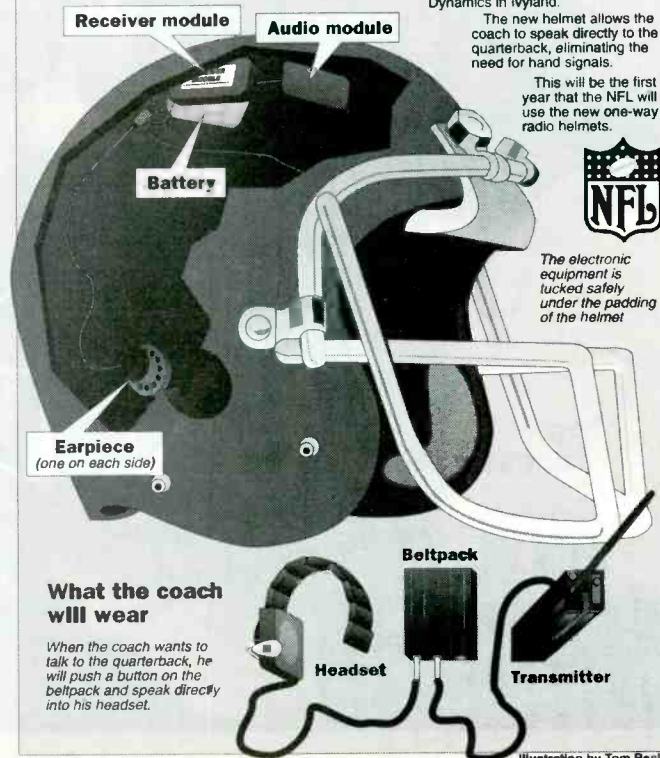
The first new technology, which was tested in the NFL pre-season and previously used in World League of American Football (WLAF) games, is called the Helmet Radio, manufactured by Control Dynamics of Ivyland, Pennsylvania. This is a communication system that will enable the coaches on the sideline to transmit plays and other information directly to the quarterback in the huddle. The receiving system consists of two flat electronic modules and a small battery pack implanted beneath the padding in the quarterback's helmet. Add in the two small speakers mounted near the helmet's earholes and the whole system weighs about 7 ounces. The transmitting system is wired into the coach's headset system and can be activated through a switch on a belt-pack.

How does it work? According to the NFL league office, a coach on the sideline will call a play into the headset he is wearing. The signal will travel through a "cutoff unit" in the pressbox where it is then transmitted to the QB's helmet. The device may be used until the play clock has run down to 15 seconds, at which time the cutoff unit disables the system. In this way, the unit may only be used to call in plays to the QB, but it will not be able to call in instructions or warnings to the QB during a play.

Want to listen in? So would all of the opposing teams! In order to prevent cheating, the signals will be scrambled using Digital Voice Processing with 268 million available codes. Each team will be assigned its own unique encryption code.

This is not the first time that plays will be transmitted by radio to an NFL quarterback. This past August, during a pre-season Monday Night Football broadcast, Frank Gifford recalled when Paul Brown, the legendary coach of the Cleveland Browns, tried to use

High-tech helmets



radio to transmit plays to his quarterback. The Browns used a radio link between Paul Brown and his quarterback to call the plays against Gifford's New York Giants team in a game in the late 1950's.

Paul Brown, a coach known for his thoroughness, licensed his transmitter and registered the frequencies with the Federal Communications Commission (FCC). The NY Giants obtained the frequencies from the FCC, and with the help of former Browns players now with the Giants, were able to intercept all the plays in the first half of the game and hold the Browns scoreless through the first half. In the second half, however, the radio link failed, and the Browns' reverted to more traditional methods of calling in their plays. With the Giants no longer able to intercept the Browns' offensive plays, the Browns went on to win the game.

The Roar of the Crowd

Another new technology was tested during the 1994 pre-season, which will hopefully be ready for the 1995 season—the Audibilizer. Have you ever seen a football game where the

quarterback, no matter how loud he yells, isn't able to call out the plays at the line of scrimmage because the noise is too loud? The Audibilizer is designed to solve that problem.

The Audibilizer, invented by Randall May of Randall May International, Inc., Huntington Beach, California, is basically a complex wireless microphone that is connected to sideline speaker systems. The four units of the speaker system, called "ground clusters," will be placed on both sides of the field at the 15 yard lines.

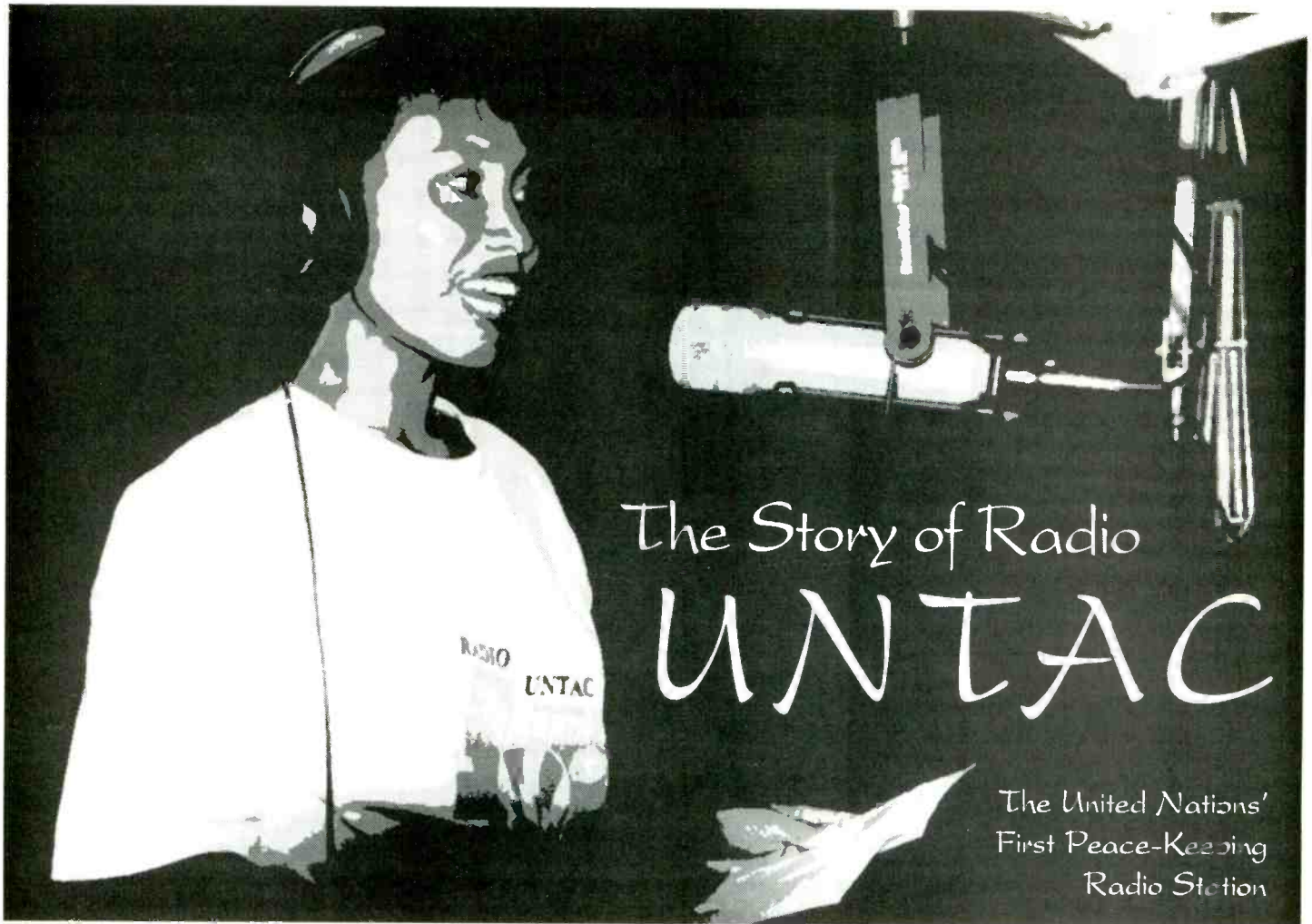
If a quarterback is having trouble being heard by the rest of his players, he will be able to activate the system through a switch mounted near his chinstrap. A tube called a voice ligature will then pick up the quarterback's voice and deliver it to the Audibilizer transmitter implanted safely in the QB's shoulder pads. The transmitter sends the signal to a "command center" and voice processors which feed into the speakers on the 15 yard lines.

The transmitter's signal will be modulated for 25 seconds after the QB activates the system. The received signal will be sent to the speakers on the sideline only until the time the ball is snapped. At that time the command center will interrupt the signal's transmission to the sideline speakers. The radio hobbyist, however, may be able to overhear a few choice remarks in the remaining seconds between the snap of the ball and the automatic 25 second cut-off.

The transmitter carried by the quarterback is a small 150 milliwatt FM transmitter imbedded in the QB's shoulder pads. Each quarterback will be assigned his own unique frequency. For their own reasons, the NFL has asked that the frequencies be kept confidential. I have been told, however, that the transmitters will operate in the "600 to 900 MHz" ranges. Considering that the QB's transmitter is always sending an unmodulated carrier, it should not take too long to find and identify the frequency of each QB in a game.

The NFL has now brought their quarterbacks into the wireless 1990's. Will it help them win? Well, at a promotional event, Buffalo Bills' Quarterback Jim Kelly exchanged helmets with Indy 500 winner Al Unser Jr., and he couldn't help but notice all of the wires and electronic gadgets. Jim was quoted as saying "Maybe we could win a Super Bowl if we had all those things in my helmet."

Well, Jim, maybe this year you will have your chance.



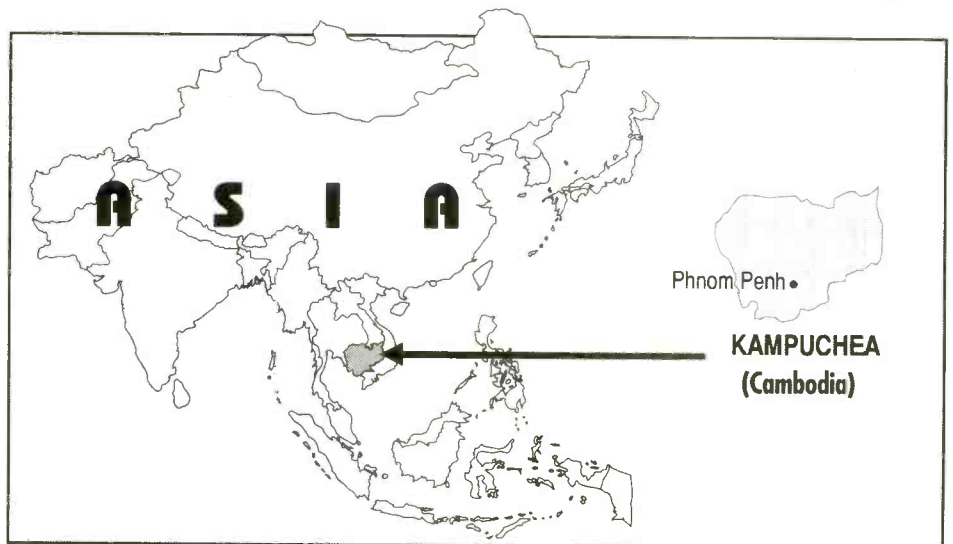
By Jeffrey Heyman

"Beni mon bprahm samseb bpruek. Bpro-jia-jooun, nis ong-kah sah-hah bpro-jia-jiat vityu kampuchea, vityu untac." Every morning, exactly ten seconds after the 1000 Hz test tone finished, the almost childlike voice of Kim Kol Thida, 35-year-old mother of three, made this announcement. "It is 5:30 am. Ladies and Gentlemen, this is the radio station of the United Nations in Cambodia, Radio UNTAC."

For the first time in its forty-five year history of peace-keeping operations, the United Nations used a radio station as a means to further the peace process. The UN's radio station in Phnom Penh was a vital element in the success of the Cambodia mission. The station taught democracy and human rights—strange concepts to many in the country. It allowed equal access to the twenty political parties vying for power. It brought the historic election results to millions of determined, but terrified Cambodians, allowing no

party to spin the election results in its favor. Possibly the station's greatest legacy might be that it was able to convince scores of soldiers in the murderous Khmer Rouge to lay down their arms and to join the new unified government in working toward peace and away from war.

Cambodia was a country destroyed by some of the most ferocious bombing the world has known, misguided utopian theories which resulted in the death or disappearance of as many as one third of the country's population, and a seemingly endless civil war. An ambitious United Nations-brokered plan for peace



in Cambodia was agreed upon on October 23, 1991, after a decade of negotiations.

Among the factions involved in the Cambodian civil war who signed the agreement was the Khmer Rouge, who still held the Cambodian seat at the General Assembly. The "Paris Agreement" invited the Security Council to establish the United Nations Transitional Authority in Cambodia (UNTAC) which began its operations in the country in March 1992. The Supreme National Council—a governing body made up of four Cambodian parties, and chaired by Prince Norodom Sihanouk—delegated to the UN "all powers necessary" to ensure the implementation of the Paris Agreement.

UNTAC was charged with organizing and conducting free and fair elections, overseeing matters relating to human rights, military disarmament and the withdrawal of all foreign forces, civil administration, the repatriation of refugees, and the rehabilitation of the country's nonexistent infrastructure. It was a mammoth project, the largest and most difficult of the United Nations' thirty-three peace-keeping operations to date. The mission consisted of more than 16,000 military personnel, over 3,600 civilian police monitors, and 2,500 civilian personnel from over forty-five countries. Tens of thousands of local staff and United Nations Volunteers were recruited as well. Fifty-five peace-keepers died in the effort.

Word of Mouth — by Radio

The Information and Education Division, under which Radio UNTAC operated, was engaged in informing Cambodians about the Paris Agreement and UNTAC's mandate in the country. "Info/Ed," as it was known, was headed by a former diplomat and Cambodia expert, Timothy Carney. People throughout Cambodia, after nearly 20 years of fighting, were either unaware of the peace efforts, were skeptical about the international community's motives or doubted that the democratic process could be undertaken in the country. Info/Ed produced audio-visual material, including colorful posters and banners in Khmer, as well as limited television programming. But it was radio that became the medium by which UNTAC got its message about the peace process out to the people of Cambodia.

Radio UNTAC started in near obscurity on November 9, 1992. Beginning with four 30-minute Khmer language programs a



The morning program team in Broadcast Studio 2: (from right) program director, Jeffrey Heyman; announcer Kim Kolthida; technicians, Roy Neaphally and Chamroun. Photo courtesy of the United Nations.

week, over the next year the station grew enormously in stature, credibility and popularity. Those first simple programs, which included basic primers on the democratic process, were taped using crude techniques. The tapes were then driven across 25 kilometers of dusty road each day to a Phillips 120 kW transmitter at the government's Steung Meanchey radio facility outside Phnom Penh for broadcast.

Soon the Info/Ed production facility was to become a full-fledged station. Just over \$3 million were spent to construct studios, outfit "news rooms," and undertake the difficult task of installing rural transmitters. These

containerized transmitting units, along with generators and diesel fuel bladders, were brought in by helicopter to remote, often malaria-ridden areas. At least one site had to be cleared of land mines before work on the radial antennae system could be started.

In February 1993, the half-hour programs were expanded to 90-minutes each. In April Radio UNTAC moved from its single improvised studio to a new, custom-outfitted former hotel in a largely residential district of Phnom Penh. The equipment in the six studios was impressive: mixing boards, advanced reel-to-reel units, digital audio tape machines, sophisticated cartridge, cassette and CD players. It had become a real radio station. Now, instead of by land cruiser, programming was to be sent by microwave relay or satellite to transmitter sites. The frequency of 918 kHz came alive.

Shortly after its move to the "Radio Complex," Radio UNTAC started to broadcast live. These may have been the first live broadcasts the people of Cambodia had ever heard. The live programs started with three 3-hour segments aired during peak listening periods to 97% of the country via a nation-wide network of medium-wave transmitters at Phnom Penh, and the provincial towns of Sihanoukville, Siem Reap and Stung Treng. The pro-



Most of the more than 50 international and local staff of Radio UNTAC in front of the Radio Complex. Photo courtesy of the United Nations.

gram quality improved vastly, but the station's message to the Cambodian people remained clear and simple: "Your Vote is Secret."

Radio Counters Terrorism

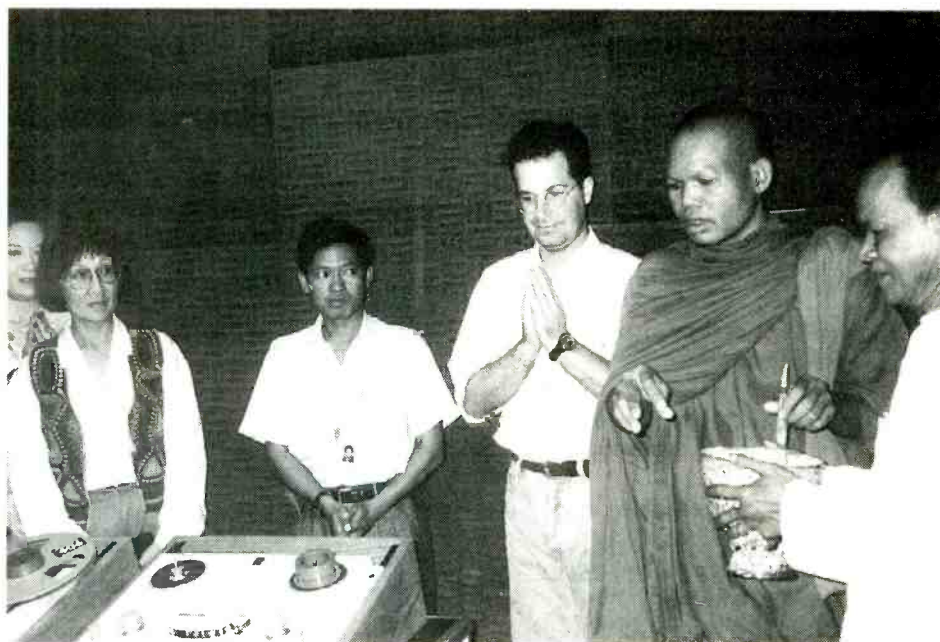
The Khmer Rouge, who had bowed to pressure from China and Thailand and surprised the world by agreeing to make peace with the Vietnamese-installed regime, decided to withdraw from the peace process. They refused to disarm, as mandated by the Paris Agreement, and vowed to disrupt the election scheduled for May 1993. In a series of attacks around the country, the Khmer Rouge seemed to proceed with its plan. On the north shore of the Tonle Sap, Cambodia's great lake, a nighttime attack in March on a fishing village populated with ethnic Vietnamese left thirty-three dead, including ten children. Radio UNTAC immediately sent one of its reporters—a French woman who spoke Khmer—to give a first-hand report of the tragic massacre.

On May 3, the Khmer Rouge captured the airport and the town center of Siem Reap. This symbolic target was the gateway to the famous temples of Angkor Wat, a major tourist attraction and Cambodia's spiritual heart. With mortar rounds still being lobbed at the city, one fearless Radio UNTAC producer volunteered to go to the provincial capital. She was one of the first journalists to enter the city and was greeted warmly by the local population. The town's people encouraged her to file reports telling Cambodians everywhere that Siem Reap would not be intimidated by the attack: they would vote no matter what the Khmer Rouge threw at them.

Just days before the election, the Khmer Rouge struck again—this time on Vietnamese targets in Phnom Penh. Fearing widespread violence, the United Nations began to evacuate dependents of UN agencies. In spite of the Khmer Rouge actions, it was decided that the UN-supervised elections would be held as scheduled.

On May 12, eleven days before the first day of voting, Radio UNTAC started an ambitious daily schedule of fifteen hours of live broadcasting. Programming ran from 5:30 am to 8:30 pm. Suddenly, it seemed, Radio UNTAC became a vital part of everyday Cambodian life. Its signature opening and closing theme music became a familiar, almost soothing sound in virtually every market-place, every food stall, every house in the country.

True, there was not much domestic competition. The few Cambodian newspapers that existed were published out of Phnom Penh, and most were controlled directly or indirectly by the government. There was also



Buddhist monks come to Radio UNTAC to guard the station against evil spirits. The author (third from right), as head of the studios, assisted the monks during the ceremony. Photo by the author.

the government-run radio and television network which broadcast to various parts of the country on a sporadic schedule. Several factions had weak radio stations. The Royalist Party ran a 24-hour FM station from Prince Ranariddh's bedroom. It could only be heard in a few neighborhoods around Phnom Penh, however. The Khmer Rouge's clandestine radio station, which transmitted on short-wave from somewhere near the Thai border, could occasionally be heard in the capital.

With a range of programs that included everything from serious informational productions to traditional and popular music shows, and with a reliability exemplified by exact, on-the-hour time announcements, Radio UNTAC drew an ever-growing and loyal audience. Most people in Cambodia could not afford radios. Groups would gather together in the market place to listen to Radio UNTAC tapes which had been copied by the thousands and distributed across the country.

Nearly a half-million portable radios, and countless batteries, were donated by the Japanese government and several Japanese companies. Soon \$3 radios started to flood the markets. They were snapped up nearly as quickly as they arrived. In spite of the fact that the average income of Cambodians was less than \$20 a month, one could see the tiny red radios pressed against the ears of merchants, soldiers, cyclo-pousse drivers, and government functionaries everywhere.

A Multi-Cultural Staff and Audience

According to UNTAC estimates, the sta-

tion enjoyed an audience of 6 to 9 million daily listeners even though the population of Cambodia is estimated at just over 7 million. Although all its programming was in Khmer, letters were received from Japan, India, Singapore, Burma, Thailand, Laos, and Vietnam.

The station was headed by a tough, but fair-minded newspaper woman from Singapore, Zhou Mei. The internationally recruited staff was made up of a mixed group of former diplomats, one experienced radio journalist, a newspaper reporter, a sociologist, a former private investigator, several United Nations New York staff on their first mission, a recording studio engineer, two contract radio "mercenaries," a formally out-of-work sound man, and several others who had made their way to Cambodia for one reason or another. The nationalities present at the station included French, British, German, Russian, American, Somali, Senegalese, Tanzanian, Japanese, and Australian.

The local Cambodian staff had various backgrounds and various stories. Many did not like to talk about what had happened while the Khmer Rouge were in power. They called those years the "Pol Pot time," after the leader of the guerrilla faction. Those who did talk said little. There was the news reader who had been a monk for 18 years; an announcer who had supervised a rice production plant; several former dancers and singers, like Kim Kol Thida, the early morning announcer; radio technicians trained by Russians and Vietnamese advisors but unfamiliar with new equipment; a film producer; men and women

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from refugee camps on the Thai border; and a former hotel bellboy.

The editorial team was made up of six international and nine local radio producers. English was the language that bridged the barriers between the various nationalities at the station. Eight translators were in charge of the time-consuming task of translating many of the programs, features, and news from English into Khmer language scripts. These scripts were scrutinized by international Khmer-speaking supervisors to ensure that no political bias had crept into them. Thirteen radio technicians were responsible for recording programs and engineering the live broadcasts. The voices of the eight announcers and presenters heard live everyday became familiar to millions all across Cambodia.

Responsive Programming

Early on, the international staff produced news and political features, including several dialogue-style programs. Using theatrical scripting and folk themes found in Cambodian literature, these programs sought to make the idea of electoral process familiar to people in all parts of the country. The Khmer staff produced programs about culture, economy, society, health, education, agriculture, women's issues and industry.

One of the most popular features at Radio UNTAC became the *Letters from Listeners* program, which was broadcast daily. Listeners were invited to send in their comments and their questions about any issue concerning UNTAC, the democratic process, and what could be expected to happen after the election. Soon the station was swamped with letters.

People asked how to vote. "Should I tell my boss or my husband who I will vote for?"



Local staff members sort through the hundreds of letters received at the radio complex during the course of a single day. Photo by the author.



Some of the over 25 members of the Ghanaian Battalion (Ghanbatt), the United Nations troops who provided 24-hour military guard at Radio UNTAC, in front of the Radio Complex in Phnom Penh. Photo courtesy of the United Nations.

"What if I'm offered money or a ride to the polls?" These questions were asked over and over again.

"Your vote is secret, don't tell anyone who you vote for. Take the money, take the ride, and vote for who you want," was Radio UNTAC's answer. People were sometimes instructed to lie. In numerous cases, lying saved the lives of many people who were threatened with violence as a means of influencing their vote. Info/Ed's strategy was to advocate lying in order to further democracy.

Among the letters, thousands of appeals arrived seeking the whereabouts of displaced family members. Several families were reunited in emotionally dramatic scenes in the station's reception area. Monks sent messages of peace. Many of the religious and lay persons who participated in a three-week peace walk used Radio UNTAC to notify worried family members of their safe arrival in the capital on the eve of the election.

Radio UNTAC received from 350 to 1,100 letters every day. This is remarkable considering Cambodia had a barely functioning postal system at the time. The steady flow of letters was delivered to the Radio Complex by people of all ages and of all political allegiances who were

undeterred by the machine gun nest, barbed wire and sandbags that protected the station. They arrived in such numbers to deposit their requests and wishes, a traffic controller had to be hired. UN personnel from distant provinces had bags of letters with them whenever they returned to Phnom Penh.

A Threat to the Status Quo

Like people from every country, Cambodians love music. Because of Pol Pot's Year Zero theories, which involved the destruction of all modern conveniences and cultural icons, they had been deprived of music for many years. Song requests by the thousands were received at Radio UNTAC. Many requests included dedications and messages for relatives in distant villages and towns. The governmental authorities, however, saw these dedications as a corruption of Khmer culture. On several occasions, saying that Radio UNTAC was destroying families, the then-prime minister Hun Sen called for the station to cease its broadcasts. The government's goal, one could readily see, had less to do with cultural identity than with its own political survival.

With the success of the *Letters* program in mind, Radio UNTAC began a live telephone call-in program, a "first" in Cambodian broadcast history. As a complement to the *Letters* broadcasts, the program emphasized unity and tolerance, with the added promise that musical dedications would be aired immediately. On the program's first day, the station

received over 85 calls in three hours—extraordinary, given that almost no one had access to telephones. Within a month, however, a monsoon lightning strike put the station's telephone equipment and the call-in program out of service, to the dismay of listeners, but to the relief of the government.

In all of its programs, the radio station explained the work of UNTAC. One of the biggest concerns in the country then, as it still is, was the tens of millions of active land mines planted across the country. The Radio UNTAC produced eleven *Mine Awareness* programs, which were later used for field training courses. Thirty-minute Radio UNTAC programs were also broadcast during prime time over the popular Khmer-language short-wave service of VOA.

One of Radio UNTAC's top priorities was to provide unbiased support for the political campaign. In doing so, Radio UNTAC offered a daily program, *Equal Access, Equal Time*, for the political parties to express their views to the public. Members of the twenty parties either came to record a five-minute message or provided the station with a tape outlining their particular platform. All were searched upon arriving at the complex, and many weapons had to be left with the military guards. Radio UNTAC was the only free tribune for the twenty political parties during the election campaign. The program provided something of a counter-balance to the two main political parties which each had their own radio station and other media outlets.

The Countdown Begins

During the actual elections, May 23-28, Radio UNTAC sent its reporters and producers to nearly every corner of Cambodia. Young production assistants from France and Somalia volunteered to go to areas of the country deemed "hot spots"—places that could come under fire at any point. Transported to the provinces by helicopter, all those in the field were issued helmets and flak jackets.

It was from these reports (some presented live) that people were reassured the voting was going well nationwide. Many people, fearing Khmer Rouge attacks, were terrified of going to vote. Those field reports convinced countless people that it was safe to go out and vote. Radio UNTAC has been credited by diplomats and the international media with contributing to the astounding, near-90% turnout of Cambodian voters.

The station also offered live broadcasts of the election results from UNTAC Headquarters in Phnom Penh. Logistically difficult, these broadcasts brought the Cambodian

people the results as they were being announced at the noon and 7:00 pm press briefings each day. Radio UNTAC simultaneously translated into Khmer the words and figures that the mission's spokesman, Eric Falt, announced, feeding it to the station via a cellular telephone link.

Everyone in the country was glued to the radio—farming families in outlying villages as much as political officials headquartered in colonial-era villas in Phnom Penh. All relied on Radio UNTAC's live broadcasts to provide them with the election results. These live broadcasts ensured that no party, especially those that monopolized the country's media outlets, could claim an edge over another party or announce themselves falsely as the victor.

When it learned that the first tabulations had its party, the Cambodian People's Party (CPP), behind, the government grew angry at Radio UNTAC's live reports. Hun Sen, at least by one eye-witness account, shot all three radios in his offices with a pistol when he heard the first reports. Shortly thereafter, threats deemed credible to "blow up" the station, as well as overt demands that it go off the air, were received. Other intelligence indicated that a government attack on the station might take place just prior to the second night's live election results coverage.

Tensions rose, as reports were received of "tanks" being ordered to surround the station. The Radio Complex had around-the-clock UN military protection, but more than fifty reinforcements from the Ghanaian Battalion were called in. They took up positions around the station, sealing off a two-square block area with tank traps, truck-mounted heavy machine guns and anti-tank weapons.

Defiantly, the station extended its broadcast for an additional hour the first night of the threat. In a dramatic appeal, Yasushi Akashi, the Special Representative of the Secretary-General, intervened. He issued a strongly worded statement, read over the air, that the United Nations and its radio sta-

tion would not be intimidated. A hasty meeting between a government army commander and a United Nations battalion leader was held on the street in front of the station. However, the tense encounter produced no assurances. In the end, a tank and two armored personnel carriers were seen near the complex, but no attack came.

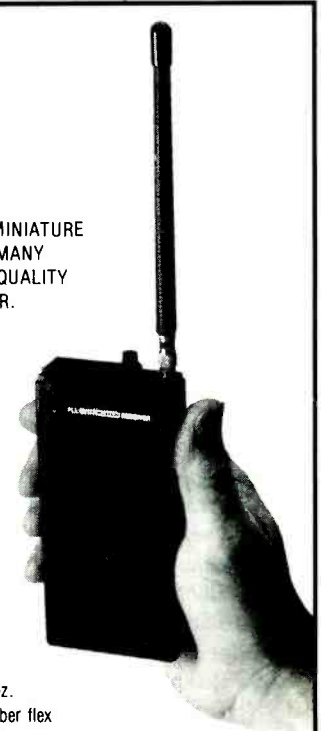
Throughout this two-day period of anxiety, none of Radio UNTAC's broadcasts were curtailed, even though prime minister continued his campaign to stop the station from broadcasting. He proclaimed that the live election reports were "inflaming" the Cambodian people and that he could no longer protect the station from a popular uprising against it.

"There was a great demand to demonstrate against Radio UNTAC at its station, but," the leader bragged, "it was prevented." Ominously he continued, "Now if Radio UNTAC wants to become like gasoline pouring on the fire, please go ahead." It was hard to tell to what demonstration the prime minister referred, since people remained glued to their radios as election results continued to be broadcast. Villages and city streets were nearly deserted during the twice daily live broadcasts.

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Young and tired of fighting, at the coronation ceremony of King Sihanouk, some of the nearly 2,000 Khmer Rouge troops who defected to the newly-unified Cambodian army after the elections and establishment of the country's new constitution, hold a portrait of the King. In interrogations after their defections, many of these troops said that Radio UNTAC very much influenced them to leave the Khmer Rouge.

Mission Accomplished

Voting had been carried out in all twenty-one provinces in Cambodia. Despite heavy monsoon rains, threats of violence and banditry, people cast their ballots at 1400 fixed polling stations, or through the 200 mobile polling teams operating in remote areas of the country. Stories were told of people without limbs struggling along for miles in order to vote, of Khmer Rouge soldiers arriving at polling stations without their standard-issue AK-47s and B-40 rocket launchers to cast their secret ballots. Security, provided by UN military and civilian police components, was tight at polling stations. With the exception of a few minor incidents, the only security problem at the polls was how to accommodate the overwhelming crowds of excited voters.

A total of 4,267,192 Cambodians cast their ballots. That figure represented 89.5% of registered voters in the country. The Special Representative of the Secretary-General, Yasushi Akashi, declared the election free and fair. The Cambodian people had voted in overwhelming numbers for peace, resulting in an unlikely coalition government. The Royalist Party, *Front uni national pour un Cambodge independant, neutre, pacifique et cooperatif* (known by the French acronym FUNCINPEC), led by Prince Norodom Sihanouk's son Prince Ranariddh, won 45.4% of the vote. The Hun Sen government's Cambodian People's Party took 38.2%. Two other parties split the remaining vote.

After a period of royal family spats, "constitutional coups," and secessionist "autonomous zones," the country settled down to the

business of hammering out a secure future. The historic opening session of the constituent assembly, in June 1993, was brought live into the homes and fishing boats of Cambodia by Radio UNTAC.

Impassioned speeches by various Khmer leaders were broadcast as they debated the country's future, finally agreeing on a constitutional monarchy to guide Cambodia along a path to peace. Prince Ranariddh and Hun Sen, long-time bitter enemies, became co-prime ministers. People throughout Cambodia, no matter who or where they were, felt that they were participating in the country's new democracy. And through Radio UNTAC they were.

After the success of the election, news and information broadcasts became Radio UNTAC's stop priority. At the beginning of July 1993, a daily 30-minute live news program, *Cambodia at Six*, brought people national and international news, special reports, and interviews with important newsmakers. Major stories were broken by the program, several of which were picked up by wire services.

Radio UNTAC had built a deserved reputation for reliability and accuracy and became the voice of reason for

all Cambodians. Assessments by UNTAC Information Officers in the field verified its importance. "In every location visited," reported one officer from the central province of Kompong Cham, "people are listening intently to Radio UNTAC." Another officer in the southern province of Takeo wrote that she had heard the station playing "everywhere" she went, and that people thanked UNTAC for bringing them "unbiased and neutral reporting."

One UN official summed up her findings: "Radio UNTAC became the most listened to and trusted source of information in Cambodia. ... The call-in/write-in song dedication programs are the most successful, and the announcers have become famous throughout the country. People respect and appreciate the fact that the UN, through Radio UNTAC, tries to provide them information on which to form their own opinions."

An Unexpected Audience

It was not just ordinary citizens, however, who were listening. One UNTAC Information Officer visited the town of Sok Sann, near the Khmer Rouge headquarters. This officer found that even Khmer Rouge personnel of all ranks listened to Radio UNTAC. A Khmer Rouge soldier told the officer, "We listen to Radio UNTAC because it is the only radio in Cambodia which broadcasts true news." This information was greeted with astonishment at the station. The station's campaign for impartiality had indeed paid off and had been more successful than anyone imagined.

By the middle of September 1993, over 1,500 (possibly as many as 2,000) Khmer Rouge soldiers and officers defected to the new unified Cambodian army. One Khmer Rouge commander, one of 500 men who



A Khmer radio producer (standing) oversees two voice-over presenters's work on a health program.

defected, when asked what made him surrender simply replied, "Tired of fighting; listened to situation on UNTAC Radio."

Other Khmer Rouge soldiers in the village of Sok Sann said they listened to Radio UNTAC every day, although civilians and soldiers alike in Khmer Rouge-controlled zones were ordered to only listen to Khmer Rouge radio. Two Khmer Rouge Commanders told the UN military component that listening to Radio UNTAC greatly influenced their decisions to defect with their men. They said that they realized the elections were free and fair and that peace was returning to Cambodia.

British journalist William Shawcross (author of *Sideshow: Kissinger, Nixon and the Destruction of Cambodia*, published by Simon and Schuster) summed up the role of Information and Education in the peace process: "The experience in Cambodia proves that radio can be crucial to a peace-keeping operation."

Several Khmer Rouge generals, who decided to join the new national army, stated that they were expecting to receive orders to destroy polling stations around the country. When an UNTAC military interrogator asked one of the generals what the Khmer Rouge did during the election, he answered, "We all stayed home and listened to Radio UNTAC!" One of the generals said that they did not attack any polling places because they knew they were not strong enough.

There may have been another factor, however.

Fly in the Ointment?

According to the UNTAC force commander, Lieut.-Gen. John Sanderson, Khmer Rouge clandestine radio broadcasts were sometimes used to send messages to personnel in the field. Quoting unidentified sources, newspapers reaching Phnom Penh from Bangkok in early May reported that "800 Khmer Rouge agents" were in the capital awaiting instructions to attack. Indeed, the Khmer Rouge seemed to have been planning something. But no attack materialized. A story appeared much later which may explain why the Khmer Rouge never did "disrupt the elections," as they had vehemently vowed to do.

In its September 1993 issue, the French-language journal *Le Mekong* led its front page with a story reporting that some UNTAC personnel had themselves been involved in a clandestine operation. Reuters wire service picked up the story and detailed how "three international staff from the UN's Education and Information division" jammed Khmer Rouge radio to "thwart attempts by the guer-

rillas to disrupt the elections." The finger was pointed at Radio UNTAC more directly when the *Bangkok Post* ran a story headlined "UN JAMMED KR RADIO TO SAVE ELECTIONS" under a photograph of two Radio UNTAC reporters standing in front of "the station's heavily-fortified offices."

Interestingly, an internal UNTAC memorandum to the Special Representative dated May 27, 1993, stated that "as early as 0640 local time 23 May, someone has been jamming [Khmer Rouge] shortwave broadcasts." The memo's writer strongly advised that the situation be left to the "existing administrative structures." In October, the BBC World Service reported that over 100 Khmer Rouge "secret agents" who had been working undercover in Phnom Penh had decided to give themselves up.

Whatever the truth behind the jamming story may be, one thing remains clear: as stated in a September 1993 military summary, "Radio UNTAC had direct input into the decision-making process of high-ranking Khmer Rouge cadre who opted to leave the battle field." After years of armed struggle, it was radio that convinced some within the Khmer Rouge to work towards peace and the reunification of Cambodia.

A Lesson for Future Peace-Keepers?

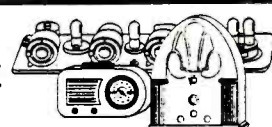
Never before had a radio station been used in a United Nations peace-keeping operation. Nor would anyone at the United Nations have imagined, when radio was conceived as part of the Cambodian peace-keeping mission, that it would have been as successful as Radio UNTAC.

The story of the radio station is an optimistic lesson for future peace-keeping missions. Its success, however, must also be credited to the people of Cambodia who listened with tolerance and decided for themselves what was right. In spite of Khmer Rouge threats and horrific memories, they went out to vote their dreams for a peaceful future. The United Nations mandate in Cambodia—one that seemed nearly impossible at times—was completed when the democratically elected constituent assembly adopted a constitution.

Radio UNTAC, for all that it did to further the peace process and to heal the wounds of a country so torn by conflict, went off the air on September 22, 1993, the day before Norodom Sihanouk was crowned King.

Jeffrey Heyman is a consultant specializing in information-related matters.

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Drugs, Spies, and Number Stations

By Larry Van Horn

It has been over three decades since the first shortwave listener, listening sleepily to his radio late at night, was puzzled awake by one of the mysterious transmissions now commonly called “numbers” or “spy number” stations.

For some, the eerie, mechanical female voice that speaks strings of seemingly meaningless numbers, has become a nightly companion. Like the smile of an attractive woman across the barroom floor, the transmission tantalizes, but when approached, she becomes maddingly elusive.

These broadcasts can be heard all over the shortwave radio spectrum on even the cheapest of shortwave radios. Like the beckoning beauty in the bar, they make no effort to hide

themselves. Number stations have powerful transmitters and speak in a variety of languages. Turn your back for a minute, however, and they are gone, fading into the low lights and smoky atmosphere.

So who is this mystery female, where is she transmitting from, and what is she doing there? For over thirty years, the answers to these questions and the stations themselves have remained one of the greatest mysteries of the shortwave radio spectrum.

False Leads

Over the years there has been an avalanche of possibilities about number stations put forth by the monitoring community, and each one seems more improbable than its predecessor. One theory pointed the finger at



international bank accounting figures. The numbers supposedly contained information on private citizen's bank account records. Unfortunately for this explanation, international banks carry out their communications exclusively via telephone fax, telex and computer links. Shortwave radio has never been used.

The military has long been suspected by number buffs as the source for the broadcasts. While it is true that during the Vietnam War number transmissions increased tenfold, these broadcasts were intended for CIA-backed U.S. Special Forces in Cambodia, not regular U.S. troops. Regular monitors of military communications in the shortwave spectrum know that the military already uses a variety of encrypted RTTY/voice message traffic employing more efficient modes than AM to pass their classified traffic worldwide.

The international stock markets have been fingered as a possibility. Presumably, the numbers were, as in the bank account scenario, account figures and trading prices. One U.S. listener even claimed he could prove a link between cocoa bean prices and number broadcasts!

In the realm of the totally ridiculous was the story that numbers were tied in with a secret research facility involved in the search for extraterrestrial intelligence. It was claimed that the numbers were high powered radio beacons that were intended to guide passing UFO's to the planet Earth. Need I say more?

My personal favorite was one that was sent to me only a couple of years ago. A gentleman who lived in Indianapolis claimed that every time a United Parcel Service (UPS) aircraft took off from his local airport, he noted an increase in the signal strength of the number stations he was monitoring at the



Site A is closing and will be consolidated with the three other sites of the Warrenton Training Center. (Photo courtesy of Lawrence Emerson, Faquier Citizen)

time. His theory, therefore: *UPS* is responsible for the worldwide number stations networks to pass information on cargo arrival and departure!

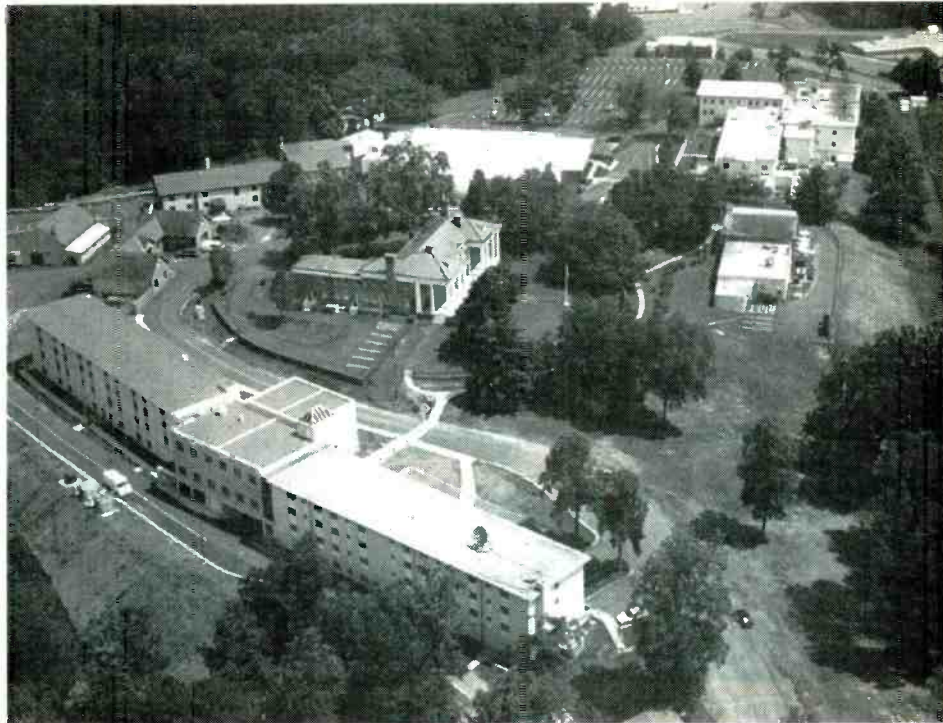
The projected possibilities have run the gamut over the last few years, but the general consensus of monitors worldwide is far more sinister than any of the theories yet mentioned. The most widely held belief is that number station transmissions are communications from the world of espionage, and the broadcasts are intended for "James Bond 007" agents in the field.

Numerous individuals over the years have queried various U.S. government agencies using the Freedom of Information Act (FOIA) for information on number station broadcasts. The Central Intelligence Agency (CIA), National Security Agency (NSA), Department of State, Federal Communications Commission (FCC), and even the International Telecommunications Union (ITU) in Geneva, to mention a few, have all routinely denied any knowledge of such transmissions. However, other inquirers have been told that the information they have requested "may be classified." Such contradictions are commonplace when dealing with the world of number broadcasts.

To complicate an already contradictory picture of the numbers world, one only has to look as far as the NSA. This agency has a worldwide network of monitoring stations to listen in on every possible type and mode of communication, yet they claim to not even know that these shortwave powerhouses even exist. Let's get real, folks!

Unveiling the Mystery

Despite the denials, slowly—ever-so-slowly—the ladies with the mechanical voices have been giving up their secrets. Back in 1984, *Monitoring Times* revealed for the first



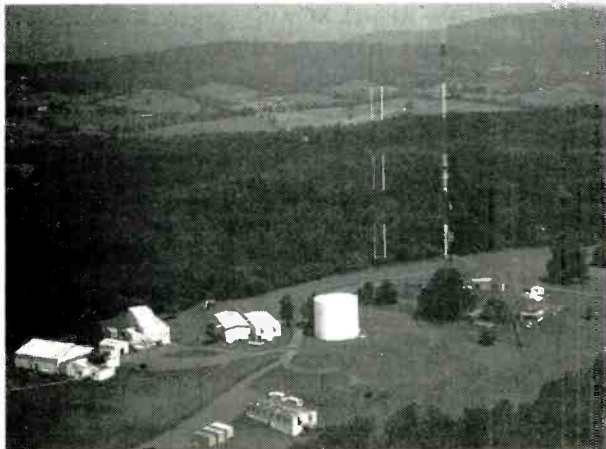
Buildings comprise the majority of Site B, the largest of the sites. Antennas below, left, are also located on the grounds of this station. (Photos courtesy of Lawrence Emerson, Faquier Citizen)


time that at least one of these stations was transmitting from the United States. The transmitter broadcasting 4-digit numbers in Spanish on 9074 kHz was discovered in Warrenton, Virginia (See *Monitoring Times*, April, 1984).

Another 4-digit Spanish number site transmitting on 4670 kHz was discovered along the Florida space coast as disclosed in the June 1988 issue of *MT*. In each of these cases, the number stations were operating under U.S. government auspices on U.S. government land.

Back in January of this year, I received an unmarked, plain white envelope with some HF frequency information inside. The letter was sent anonymously, but it was quite obvious from what was written that this individual was very knowledgeable.

Most of the frequencies mentioned in the letter used the upper or lower sideband modes. Two of the frequencies on this list grabbed my immediate attention: 5812 kHz AM and 6840 kHz AM. These frequencies were identified as "Intel" channels Echo and Golf. Most number buffs will recognize these two frequen-





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Sites C and D of the Warrenton Training Center are the source of State Dept. station KKN50 and also of the 4-digit Spanish spy/drug intelligence number broadcasts. Site D is shown above.

cies as Spanish female 4-digit number channels. But, here's the kicker: the list of frequencies was identified as coming from the CIA Counter Narcotics Center (CNC) in Langley, Virginia.

The Language/Number Type is a Clue

In June of 1988, *Monitoring Times* presented an interview with Mario Casagrande, a former US/Cuban double agent which originally appeared in the October 10, 1987, issue of the highly respected Italian weekly *Europeo*. It has long been assumed, based on this interview, that Casagrande received his spy messages via English female 4-digit number stations from the CIA. Therefore, we can assume that the mission of the English female 4-digit numbers is to pass operations information to CIA spies in the field, at least in this hemisphere.

English 3/2-digit number stations have been literally DF'ed (located using direction-finding techniques) to sites all around the globe. In the book *The CIA and the Cult of Intelligence*, co-written with John Marks, Victor Marchetti states that: "The office of communications (CIA) maintains facilities for secret communications between CIA headquarters and the hundreds of stations and bases overseas." These stations and bases that Marchetti refers to are usually at US Embassies and Consulates.

CIA personnel are known to utilize State Department facilities as covers for their operations abroad. It can therefore be assumed that 3/2-digit number broadcasts would be worldwide in scope, requiring numerous transmitters from various sites scattered around the globe. The 3/2-digit numbers appear to satisfy this profile, much as the KKN50-type stations do for the State Department's Diplomatic Telecommunications Service.

On the other hand, the new evidence on the 5810 and 6840 kHz transmissions implies that the mission of the Spanish female 4-digit number broadcasts on the aforementioned frequencies is to pass intelligence information to drug agents in Latin America. The fact that these signals are weak to all other areas of the world except North and South America lends support to the assumption that Latin America is the target area.

Only one location has ever been associated with the 5812 and 6840 kHz Spanish 4-digit female broadcast transmissions: Sites C and D at the Warrenton Training Center in Virginia.

Intrigue Under Our Noses

Shrouded in secrecy, this 43-year-old government training center includes 715 acres (three sites) in Fauquier County and a 200 acre antenna field in Culpepper County, Virginia. In a recent newspaper story in the

Fauquier Citizen by Lawrence Emerson, a local congressman's aid confirmed that Site A will be closing and will be consolidated with the other three sites. Which agency provided this confirmation? The CIA.

"We're a closed and classified facility," Bettina M. McWhirt, an Army spokeswoman at the training center, said when asked about agencies using the training center. She described it as "a communications and training support facility...The U.S. Army serves as the executive agent."

Several government agencies have been reportedly associated with the training center: the CIA, NSA, National Communications System (NCS, run by the Defense Information Systems Agency, DISA, the former Defense Communications Agency), and the State Department. Broadcasts from station KKN50, which is registered to the State Department (probably part of the State Department's Diplomatic Telecommunication Service), were tracked down to Warrenton Training Center sites C and D in 1984.

Warrenton Training Center site A is 32.71 acres, and is located along Springs Road (Route 802) and Route 744. It consists of a headquarters and other buildings. Site B is on View Tree Mountain along route 690 (Ben Wallace Road) northwest of Warrenton. This 349.11 acre site contains primarily buildings, and is the largest of the four training center sites. Site C is located a few miles north of Culpepper, Virginia, on Route 651; it is 332.45 acres in size and is bristling with antennas. The fourth parcel, Site D, is made up of 200 acres located on Route 669. Like site C, it, too, has a large antenna farm. The KKN50 and the 4-digit Spanish spy/drug intel number broadcasts originate from sites C and D.

Putting the Pieces Together

Shortly after I received the information on the spy number station/drug intel connection, the Aldrich M. Ames spy story broke in the news media. Ames and his wife, Rosario, were arrested in February of 1994 for spying for the Russians. I was very surprised to learn that Ames had been working in the Langley Counter Narcotics Center. Not only did it confirm the existence of the CIA's CNC, but I wondered what information Ames had passed to his Soviet handlers regarding the U.S. number stations. Did Ames tell them how the number stations were being used to pass intelligence to field operatives?

The Ames case is generally considered the most serious intelligence breach in U.S. history and has given critics new impetus to

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SIGNAL BAR GRAPH	NO	YES	YES	YES
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the post-Cold war pressure to cut the CIA's budget, change its focus or even eliminate it entirely.

In comments clearly directed at those who question the value of the CIA's work, CIA director R. James Woolsey described a wide range of missions that justify keeping a robust CIA. These include detecting the illicit transfer of nuclear arms technologies, combating terrorism and drug trafficking, and monitoring economic developments in strategically important nations such as Russia and China. Spanish 4-digit number stations give us electronic evidence that the CIA is indeed one of the many players in the U.S. war on drugs.

More Than One Can Play

The CIA isn't the only intelligence agency in this hemisphere that uses number broadcasts to pass information to field agents; the Cuban intelligence agency, DGI, is also a big player in the numbers scene. The bulk of the Spanish female 5-digit number stations broadcasts have been DF'ed to the island of Cuba (Bauta) since their inception. With one exception (contrary to other radio publication reports), these broadcasts have never been DF'ed to any location other than Cuba. That exception occurred in 1989, when a 5-digit Spanish number broadcast was DF'ed to a location inside Nicaragua. The station was transmitting on 6577 kHz—a frequency authorized as Major World Air Route aeronautical frequency—and the broadcast was causing severe interference to legitimate users.

In August of this year, Miami Fox TV affiliate WWSN-TV channel 7 broadcast an exclusive two part report on the "Spies Amongst Us." In part one of the broadcast, reporter Pat Frasier conducted an interview with an alleged Cuban DGI double agent, Francisco Avila. Avila entered this country during the Cuban Mauriel boat lift in 1980.

In the course of this broadcast, Avila showed Frasier how he received his spy instructions from Havana, via a Spanish female 5-digit number broadcast. Avila demonstrated by sitting in front of his shortwave receiver copying cryptic numbers. He then showed how, using a one-time pad, he translated the cipher message into a plain text message. Avila stated that he usually received his messages on Tuesday evenings at 9 pm Eastern. If he missed that broadcast for any reason, a backup broadcast was automatically repeated for him on the following Thursday.

The content of the messages varied, according to Avila. By monitoring certain numbers during the broadcast (a particular number in a part of the message sequence was

either odd or even) he could tell whether the message needed to be decoded or was a dummy. Valid messages would include any new schedule/frequency information that Avila needed to continue receiving instructions from his Cuban handlers.

Avila stated that during the time he was an active agent for the DGI there were 15 DGI officers in this country that handled 5 to 6 operatives each. This statement would help explain the large number of 5-digit Spanish numbers on such a wide variety of frequencies and times, as reported by number buffs in this country.

A Toast to the New Player In the Numbers Game

I am sure that this is not the final chapter that will be written on number station broadcasts. Now that the cold war is apparently over, much more will probably be learned in the years ahead.

Still, I cannot recall anyone ever suggesting anything that would remotely link number broadcasts to counter narcotic activity in the general hobby press. Among all the thousands of words that have been written on the subject, among all the speculation about a myriad other uses, there has been nothing written on narcotics, not even a hint—even from people who could have been "in the

know." The recent Ames/CNC revelations should have provided some clue. Instead, the counter narcotic connection is rendered conspicuous by its absence.

Why the silence all these years, when everything else has been openly discussed and speculated on? Maybe this blackout is the true mystery of the number broadcasts.

And now, it's time for Cynthia in Langley to strut across the barroom and bring me a Tecate ... adios amigos.

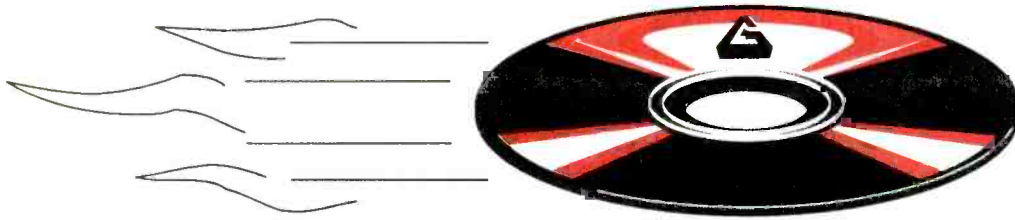
The author would like to thank the many people who contributed to this story including: Todd Dokey, Jeff Haverlah, Lawrence Emerson, Bill Weber, John Fulford, Pat Frasier, Alice Jacobs, Cobra and several others who wish to remain anonymous. More information on this story will be presented at the 5th annual Monitoring Times convention at a special numbers forum that will be hosted by John Fulford and the author in Atlanta, Georgia. Additional information on other utility station networks mentioned in this story will be presented at the author's other two forums in Atlanta during the convention.

For a greater appreciation of the sheer variety of frequency groupings, the author recommends the Grove Shortwave Directory, available from Grove Enterprises.



A glimpse of Station C antennas from behind the chain link fence. The photo has been manipulated for impact.

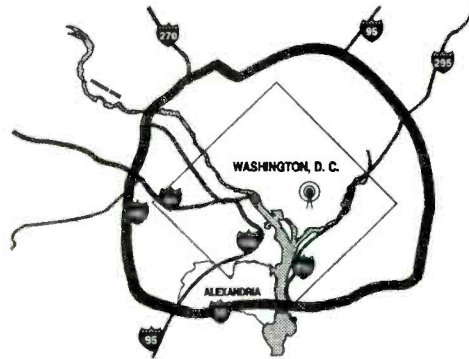
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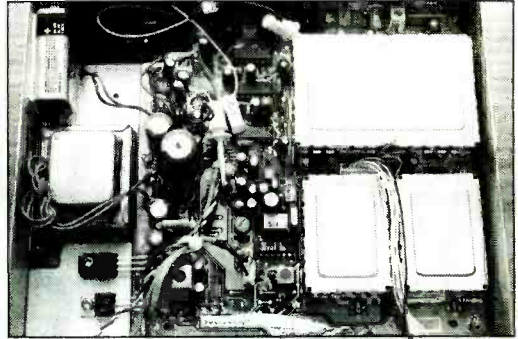
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Product Review

OptoScan 456 From Optoelectronics



Connector clips, using no soldering, make the installation a relative snap.

By Haskell L. Moore, KB5WIX

The Radio Shack PRO-2006 is one of the most popular scanners ever manufactured, and for good reason. It has many great features, along with excellent sensitivity and selectivity. Those living in RF-congested urban areas will appreciate the fact that it is highly impervious to intermod. With its four hundred channel memory broken into ten storage banks and ten separate monitor banks, the radio has everything. Well, almost everything. If you flip it around and look on the back, you'll find that Radio Shack forgot the serial port! That's right; what is touted as the most popular scanner on the market today has no factory installed computer interface.

There have been a lot of theories why Radio Shack didn't include a serial port on the PRO-2005 and PRO-2006, but they all seem to have cost as the common denominator. With such an obvious shortcoming in an otherwise excellent radio, several third party vendors moved in to fill the void. It is now

possible to retrofit the PRO-2006 with one of several computer interfaces. The latest comer, and perhaps one of the most user-friendly, is the OptoScan456™ from Optoelectronics.

Long known for their high-quality frequency counters and counter-surveillance equipment, Optoelectronics has produced an impressive computer interface for the Realistic PRO-2005 and PRO-2006 scanners. Coupled with an OEM version of ScanStar™ computer interface software (called OptoScan™), and listed at \$299, it looks like a combination that may be the answer to many scanning enthusiast's dreams.

The interface board itself is of the high quality you'd expect for Optoelectronics. It supports both the RS-232 (serial) interface and the ICOM CI-V interface. With a bit of extraordinary ingenuity, the engineers designed the board to fit in a vacant spot under the scanner's main circuit board. Installation involves removing the main circuit board and installing the OS456 next to the PLL assembly. Then, after running the wires and making the connections, the main circuit board goes back in over the OS456. Amazingly, all of

this is accomplished with absolutely no soldering or drilling!

Optoelectronics originally distributed the OS456 with an installation video. But it seems most customers preferred written instructions, so they have discontinued the video in lieu of a conventional installation manual.

Considering that the installation of the OS456 involves yanking most of the innards

out of the scanner, it really isn't that bad. The manual, though containing a few typographical errors and inconsistencies, is very detailed and straight-forward. Most people to whom I talked seem to have completed their installation easily in less than an evening.

But like any new product of this complexity, there have been a few minor glitches. The board is a pretty tight fit, and there may be some difficulty getting the main circuit board back in place without a small battle. Also, after the serial port assembly was fitted on the back of the case, the cover never did quite fit right. There is still a slight gap between the top cover and the front of the scanner. However, the problem is strictly cosmetic, and hardly noticeable.

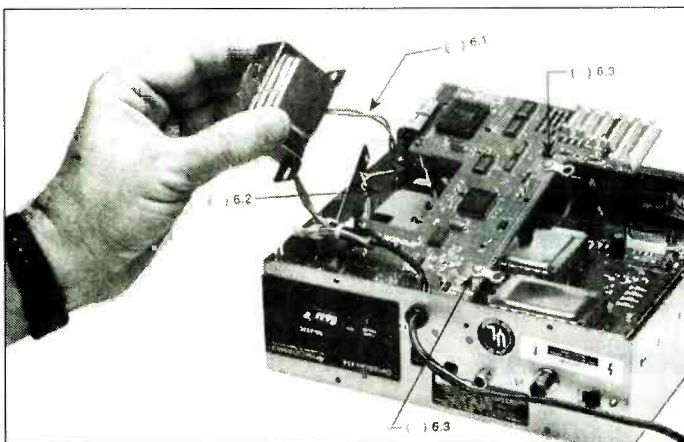
Optoelectronics reports that most installation problems have revolved around the numerous connectors not being properly seated. The technical support department advises that it is time well spent to double-check each cable connection before reassembling the radio. As an added precaution, you may use a small, pointed object like a straight pin to seat each individual connection.

The other common problem is related to the tape recorder control feature. This useful function allows the OS456 to control an external tape recorder via a sub-miniature jack. Unfortunately, several owners of the OS456 have experienced a problem with improper operation of the tape controller. The good news is that a fix for the problem has been devised, and is available by calling Technical Support at (305) 771-2050.

Software Mastery

As part of the introductory offer, Optoelectronics is providing the OptoScan software free with the purchase of the OS456.

Though the OptoScan software has many excellent features, it also has a distinct per-



The manual is generally very detailed, well-illustrated and straight-forward.

sonality all its own. As usual, I would have saved myself several hours had I taken time to print out and read the manual first. But the appeal of playing with such a great new toy was just more than I could bear! However, once I took the time to go through the relatively small, concise manual (which must be printed from within the program), a lot of things about how the program “flowed” began to make more sense.

Unlike the old saying “you can’t get there from here,” with the OptoScan software, “you can get there from anywhere.” By making extensive use of function keys, you can navigate quickly from one screen to another with just a few keystrokes. The real trick is learning to use those function keys; sometimes in conjunction with an ALT or CNTL key.

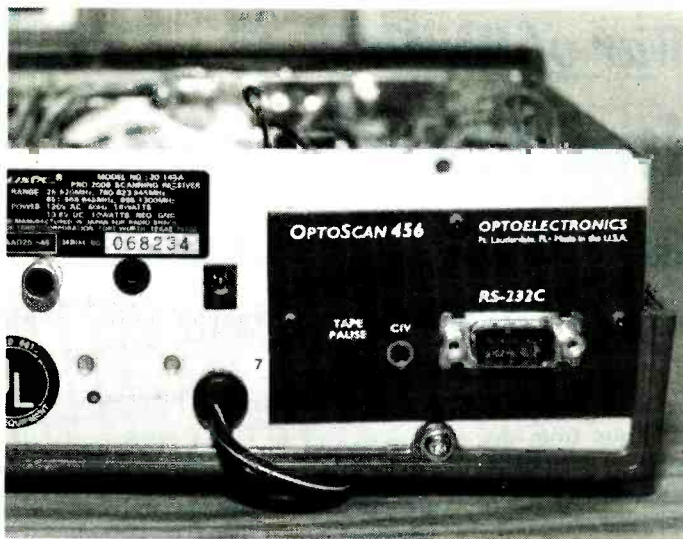
With the combination of hardware and software, the potential of what you can do with your scanner is almost unlimited. In addition to being able to control the scanner from a PC, a great number of functions have been added, including the ability to decode CTCSS sub-audible tones, DCS codes, and DTMF tones. They’ve even added a digital signal strength indicator.

For those of you lucky enough to already have an OS456, I strongly recommend that you download the latest version of the OptoScan software (3.40 as of this writing) from the ScanStar BBS (see article end). First, several bugs in the previous release have been fixed (one of which could make your frequency group file look like it had been run through a Cuisinart). In addition to the bug fixes, a feature-rich “Sound Squelch” option has just been added. The upgrades are free for at least the first ninety days, courtesy of Sam Dunham, author of the software.

Like the unmodified scanner, the OptoScan software provides both search and scan options. The big difference, of course, is the logging capabilities the computer provides. In the search mode, the frequency, time of last reception, number of hits, mode (AM, FM, FM Wide), signal strength, and any tones or codes are logged.

When activating the search mode via the OptoScan software, you must specify a low and a high frequency range for the search. But unlike the limited capabilities of the scanner, you can specify practically any frequency step desired. You can also set the search to limit the time on a particular frequency, which is handy when you are searching a range where a lot of activity occurs on just a few channels.

If you think the search mode is something, wait ‘til you see what the scan mode can do! With OptoScan, the old 400 channel, 10 bank



Your PRO-2006 isn't complete without an RS-232 port installed.

limitation is gone; you can now configure the banks in an almost limitless combination. In this mode, you can also specify a sixteen-character description as you enter the frequency. So now when the scanner hits an active channel, a quick glance at the computer monitor will show the frequency, description, and other pertinent information.

You may also set up one of four audio alarms to trigger when a selected frequency becomes active. This is a great tool when trying to catch the action on a given frequency, but don't want to baby-sit the scanner. It is equally easy to set the display to one of thirteen colors for a specific frequency, including several blinking attention-getters. Also, the tape recorder controller can be activated on a channel-by-channel basis.

Unlike the search mode, which writes only to a flat log file, the scan mode permanently stores all the applicable information about activity on every channel. The activity count (number of hits), accumulated air time, and the date and time of last activity are also recorded. There's even a sub-category for each frequency where the DTMF digits and timestamp are recorded. Reportedly, there are even some commercial repeater operators who have used this function to track their customers' airtime usage.

The search and scan mode both support the aforementioned sound squelch. This feature not only commands the scanner to resume when a quiet channel is found (like birdies and dead carriers), but can also be set to lock quiet frequencies out of the scan list. You can even specify the signal strength as a criteria to exclude very strong or weak signals from the search.

The Next Step Up

Finally, if you think the OptoScan software is awesome, you'll be blown away by the ScanStar Professional version. One of its most notable features is a built-in spectrum analyzer. On the monitor, signal strength is shown as vertical “spikes” while the frequency is plotted horizontally. Though not a spectrum analyzer in the true sense (it scans the specified frequency range and performs the plot over several

seconds), it still serves essentially the same function.

Another powerful feature, known as FlexScan™, allows the radio to perform a mix of up to twenty searches and scans, along with the ability to designate the timeslice for each. There's even a search and store mode where frequencies found in a search are saved for future scanning. The ScanStar Professional software is not included with the OS456, but may be ordered separately.

If you would like a demo version of OptoScan or ScanStar Professional, they may be downloaded from the ScanStar BBS at (408) 258-6462. Set your 2400 to 9600 baud modem for N81 and log on as “guest.” If you would like to check out the software but don't have a scanner with an interface, a “simulated” receiver within the software may be used instead. ScanCat software also supports OptoScan. A demo version is now included in the package, we are told.

Due to the overwhelming popularity of the Radio Shack PRO-2005 and PRO-2006 scanners, many modifications and add-ons have been created over the years. But given the power and flexibility of this latest hardware/software combination, the OptoScan 456 will be mighty hard to beat!

OptoElectronics, 5821 NE 14 Avenue, Fort Lauderdale, FL 33334; 800-327-5912 or 305-771-2050; V-Communications, ScanStar, 4320 Stevens Ck Blvd, Suite 275, San Jose, CA 95129; 408-296-4224, 408-258-6462 BBS. OptoScan is carried by Grove Enterprises (800-438-8155 or 704-837-9200) for \$279.95 plus \$7 shipping. ScanStar Pro is also available through Grove.

War of Words

The United States-Cuba Broadcast War Heats Up

A Late-Breaking Report by Larry Van Horn, MT staff writer

As thousands of Cuban refugees flood into the Florida straits from the beaches of Cuba, the United States and Cuban governments have squared off, not on the battlefield, but in a war of the radio waves.

Radio Martí, the official U.S. government sponsored radio broadcast service to Cuba, has boosted its AM (medium wave) broadcast signal from 50,000 watts to 100,000 watts. Normally broadcasting to the entire island of Cuba via its powerful transmitter on 1180 kHz AM, Martí has also added seven new shortwave frequencies directed toward Cuba.

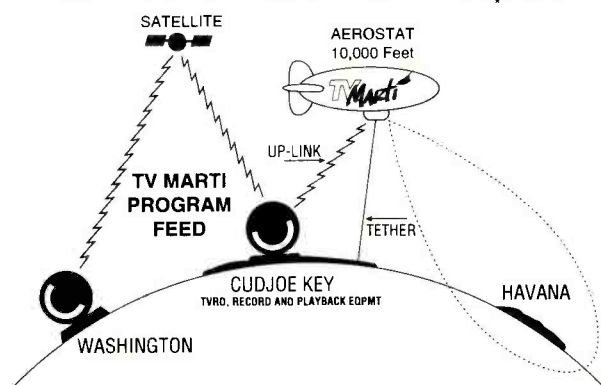
Dr. Rolando Bonachea, Director of Radio Martí, stated, "This recent Radio Martí broadcast initiative will enhance our accessibility to our audience in Cuba. With this expanded shortwave broadcast schedule, the Cuban people will have more opportunities to listen to the message of freedom, democracy and human rights which Radio Martí provides."

The new Radio Martí shortwave schedule is as follows:

Times (UTC)

0000-0200	9525 and 11910 kHz
0200-0300	6120 and 9525 kHz
0300-0600	" "
0600-1200	6030 kHz
1200-1400	9615 and 11730 kHz
1400-1900	11740 kHz
1900-2300	11930 kHz
2300-2400	9525 and 11950 kHz

TV Martí Aerostat-Based Broadcast System



Targeting Television

TV Martí, the official U.S. government television broadcast service to Cuba, has also expanded its broadcast schedule past 1000 UTC and redirected its signal from central Havana to the Cuban town of Cojimar, just east of Havana. This initiative was taken as part of a recent decision to broadcast TV Martí from 0730 to 1300 UTC, rather than the prior 0730 to 1000 UTC broadcast.

Satellite dish owners will find the daily feed of TV Martí broadcast service via satellite on Intelsat 601 at 27.5 degrees west on transponder 14. The TV station transmits to Cuba from an Aerostat balloon, 10000 feet in altitude from the Florida Keys (Cudjoe Key) on TV channel 13.

This television broadcast expansion features extended newscasts and an increase in documentaries, informative programs and special messages, testimonies, and public service announcements.

TV Martí's signal redirection is part of a strategy intended to avert potential jamming by the Cuban government. The TV signal will continue to be redirected as necessary.

Both Radio and TV Martí's programming is placing particular emphasis on information about the dangers of attempting to cross the Florida straits and the U.S. policy of taking any Cuban migrants who are rescued on the Florida straits to the Guantanamo Naval Base.

Censorship by Jamming

All of these new broadcasting initiatives are in response to one thing: the jamming of all sorts of radio and television broadcasts by the Cuban government. Shortly after President Clinton's announcement regarding the new Cuban immigration policy, the shortwave radio spectrum was filled with jamming from the island of Cuba. Clandestine as

TABLE 1

HRJA-Tegucigalpa, Honduras

(All programs transmitted on 15675 kHz)

La Voz del Veterano	0000-0100 Mon
Radiografía de la Transición	0000-0030 Tue-Sun
Rumbo a la Libertad	0030-0130 Wed-Sun
La Voz del Educador Cubano Libre	1900-2000 Tue/Fri
Radio Roquero	2100-2130 Sat
Radiografía de la Transición	2230-2300 Daily
Un Solo Pueblo	2300-2330 Thu/Sun
Pueblo Libre	2330-0000 Mon-Wed/Fri/Sat

WHRI-Noblesville, IN

La Voz de la Fundación	0000-0500 Tue-Sun	9495
La Voz de Alpha 66	0800-0900 Mon-Fri	7355
.....	2300-0000 Mon-Fri	9495

WRMI-Miami, FL

(All programs transmitted on 9955 kHz)

La Voz de la Fundación	0200-0500 Tue-Sun
.....	1100-1400 Mon-Sat

WRNO-New Orleans, LA

La Voz de Cuba 21	0000-0030 Monday	7355
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well as legitimate U.S. shortwave broadcasters have suffered some of the most severe jamming heard since the end of the cold war.

The 31 meter shortwave band seems to have been particularly hard hit by this battle of the airwaves. In the area above 9900 kHz, broadcasters such as Radio Miami International on 9955 kHz have been bombarded with bubble and sweeper type jammers from Havana. Two well known anti-Castro clandestine stations—Radio Caiman on 9965 kHz and La Voz del CID on 9941.65 kHz, both broadcasting from Guatemala—have been targets of Fidel's jamming.

At the bottom of the 31 meter band, WHRI-Noblesville, Indiana, and Radio Martí, broadcasting from Florida on 9525, have also suffered severe jamming by Castro's high powered transmitters. Even WRNO in New Orleans, Louisiana, has had its 7355 kHz signal jammed on Sunday evenings. The common thread among all the broadcasters is the anti-Castro programming they carry during their broadcast schedules.

Table 1 gives a brief synopsis of some of the anti-Castro broadcasts currently being carried on shortwave broadcast stations. (All broadcasts are in Spanish.)

In late July, the Federal Communications Commission (FCC) did pull the plug on one Cuban clandestine broadcaster that was transmitting from Puerto Rico. The station identified itself as "Frente Nacional Cubano" and transmitted on 7020 kHz with more than 1,000 watts. The station was located on a farm near Salinas, Puerto Rico. The FCC levied no fines, nor was any broadcast equipment seized.

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Grab Touch-Tone numbers right off the air, phone or tape. A simple hook-up to any radio speaker or phone line is all that is required to instantly decipher touch-tone phone numbers or codes. A 256 digit memory stores decoded numbers and keeps its memory even in the event of power loss. An 8 digit LED display allows you to scroll through the memory bank to examine numbers. To make it easy to pick out number groups or codes, a "dash" is inserted between sets of digits that were decoded more than 2 seconds apart. A "central-office" quality crystal controlled decoder is used allowing rapid and reliable detection of numbers at up to 20 digits per second! For a professionally finished look, add our matching case set. Start cracking those secret codes tomorrow with the Tone Grabber!

TG-1 Tone Grabber kit	\$99.95
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TG-1WT Fully assembled TG-1 and case	\$149.95

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Tap into the world of commercial-free music and data that is carried over many standard FM broadcast radio stations. Decoder hooks to the demodulator of FM radio and tunes the 50-100kHz SCA subcarrier band. Many radios have a demod output, but if your radio doesn't, it's easy to locate, or use our FR-1 FM receiver kit which is a

complete FM radio with a demod jack built-in. These "hidden" subcarriers carry lots of neat programming-from stock quotes to news to music, from rock to easy listening-all commercial free. Hear what you have been missing with the SCA-1.

SCA-1 Decoder kit	\$24.95
CSCA Matching case set	\$14.95
FR-1 FM receiver kit	\$19.95
CRR Matching case for FR-1	\$14.95

SCANNER CONVERTER

Tune in on the 800-950 MHz action using your existing scanner. Frequencies are converted with crystal referenced stability to the 400-550 MHz range. Instructions are even included on building high performance 900 MHz antennas. Well designed circuit features extensive filtering and convenient on-off/bypass switch. Easy one hour assembly or available fully assembled. Add our matching case set for a professional look.

SCN-1 Scanner converter kit	\$49.95
CSCN Matching case set	\$14.95
SCN-1WT Assembled SCN-1 and case	\$89.95

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Descramble most scramble systems heard on your scanner radio or set up your own scrambled communication system over the phone or radio. Latest 3rd generation IC is used for fantastic audio quality-equivalent to over 30 op-amps and mixers! Crystal controlled for crystal clear sound with a built-in 2 watt audio amp for direct radio hook-up. For scramble systems, each user has a unit for full duplex operation. Communicate in privacy with the SS-70. Add our case set for a fine professional finish.

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CSSD Matching case set	\$14.95
SS-70WT Fully assembled SS-70 and case set	\$79.95



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W9GR DSP Filter	\$299.95
12V DC Power Supply	\$11.95

BROADBAND PREAMP

Ever wish you could "perk up" your counter to read really weak signals? Or, how about boosting that cable TV signal to drive sets throughout the house, or maybe preamping the TV antenna to pull in that blacked out football game. And, if you're into small broadcasting, boost your transmitter power up to 100 mW! The PR-2 broadband preamp is the answer to all those needs as well as many others. You can use the PR-2 anywhere a high gain, low noise, high power amp is called for: digging out those weak shortwave signals or putting new life into that scanner radio-especially at 800 MHz. The PR-2 has a high power compression point, meaning that it does not overload easily-in fact many folks use it for boosting the power on their FM-10A stereo transmitters. Newly designed microwave MMIC chips from NEC in Japan enable the PR-2 to have gain all the way up to 2 GHz, although we only spec it to 1 GHz-believe it or not, the connector lead length is the limiting factor! Customers tell us the PR-2 outperforms professional lab units by the "big boys" that go for hundreds more. The PR-2 is the ideal general purpose amp you'll wonder how you got along without.

PR-2 Specifications: Gain: 25dB, Noise Figure: 2.5 dB, Input/Output Impedance: 50-75 ohms. Compression point: +18 dBm

PR-2 Broadband Preamp, Fully Wired and Tested	\$59.95
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STEREO TRANSMITTER

Run your own Stereo FM radio station! Transmits a stable signal in the 88-108 MHz FM broadcast band up to 1 mile. Detailed manual provides helpful info on FCC regs, antenna ideas and range to expect. Latest design features adjustable line level inputs, pre-emphasis and crystal controlled subcarrier. Connects to any CD or tape player, mike mixer or radio. Includes free tuning tool too! For a pro look add our matching case set with on-board whip antenna.

FM-10A Stereo transmitter kit	\$34.95
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Cramped for space? Get longwire performance with this desktop antenna. Properly designed unit has dual HF and VHF circuitry and built-in whip antenna, as well as external jack. RF gain control and 9V operation makes unit ideal for SWLs, traveling hams or scanner buffs who need hotter reception. The matching case and knob set gives the unit a hundred dollar look!



AA-7 Kit	\$24.95
CAA Matching case & knobset	\$14.95

AIRCRAFT RECEIVER

Tune into the exciting world of aviation. Listen to the airlines, big business corporate jets, hot-shot military pilots, local private pilots, control towers, approach and departure radar control and other interesting and fascinating air-band communications. You'll hear planes up to a hundred miles away as well as all local traffic. The AR-1 features smooth varactor tuning of the entire air band from 118 to 136 MHz, effective AGC, superheterodyne circuitry, squelch, convenient 9 volt operations and plenty of speaker volume. Don't forget to add our matching case and knob set for a fine looking project you'll love to show. Our detailed instruction manual makes the AR-1 an ideal introduction to two life-long, fascinating hobbies at once-electronics and aviation! See *Kit Planes* magazine (January 1991) or *Popular Electronics* (January 1993) for excellent product reviews of the AR-1.

AR-1 Aircraft Receiver Kit	\$29.95
C-AR Case and Knobset for AR-1	\$14.95

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Locate hidden or unknown transmitters fast. The Foxhound direction finder connects to the antenna and speaker jack on any radio receiver, AM or FM from 1 MHz to 1 GHz. The antenna (a pair of dipole telescopic whips) is rotated until the Null meter shows a minimum. A pair of LEDs indicate to turn Left or Right. The Foxhound is ideal to use with a walkie-talkie, if you wish to transmit, go ahead, a build-in T/R switch senses any transmitted RF and switches itself out of circuit while you talk. It doesn't get any easier than this! We provide all parts except for a few feet of 1/2 inch PVC pipe available at any hardware store for a dollar or two. Add our matching case set for a complete finished unit. Be the one with the answers, win those transmitter hunts and track down those jammers, you'll do it all with your Foxhound.

DF-1 Foxhound direction finder kit	\$59.95
CDF Matching case set for DF-1	\$14.95
FHT-1 SlyFox Foxhunt transmitter kit	\$129.95
FHID-1 Voice ID option	\$29.95
CFHT Heavy duty metal case set for FHT-1	\$29.95



SHORTWAVE CONVERTER

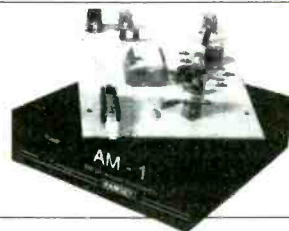
The SC-1 converter brings the sounds of the world right into your car radio or home stereo (set to AM broadcast band). Front panel push switches let you choose easily between regular AM radio and the shortwave bands. An additional switch allows the selection of any two bands of interest, each 1 MHz wide. Set one range for daytime frequencies and one for nighttime when propagation is different, choose any two frequencies between 3 and 22 MHz. Frequencies are tuned on your AM radio, making it easy to log stations or set presets. A built-in antenna switch automatically switches the existing AM antenna to either the radio or converter, making hook-up easy and fast. As with many of our kits, a handsome matching case and knob set is available to put the finishing touches on your kit.

SC-1 Shortwave Converter Kit	\$27.95
CSC Matching Case and Knob Set	\$14.95

AM BROADCAST TRANSMITTER

High quality, true AM broadcast band transmitter is designed exactly like the big commercial rigs. Power of 100 mW, legal range of up to 1/4 mile. Accepts line level inputs from tape and CD players and mike mixers, tunable 550-1750 kHz. Complete manual explains circuitry, help with FCC regs and even antenna ideas. Be your own Rush Limbaugh or Rick Dees with the AM-1! Add our case set for a true station look.

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CAM Matching case set	\$14.95



SHORTWAVE RECEIVER

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SR-1 Shortwave Radio Kit	\$29.95
CSR Case and Knob Set	\$14.95

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Nightwatch — Who is it?

Gerbrand Diebels (editor of Holland's *SC-MAC Airlift* magazine) and your editor have a question for Utility World readers. What unit of the USAF is using the callsign "Nightwatch" and also the "Nightwatch" number units such as Nightwatch 01, 02, 03 and 04?

Recently, Gerbrand heard two aircraft (Megaphone and Abdicate) working "Flash" message traffic (RTTY) with the Croughton Air Base Global HF System (GHFS) station, that was being relayed to Nightwatch on another frequency. This was happening on 13247.0 and 18218.0 kHz. (*Military monitors should make note of that 18 MHz frequency.*) Later in the day, these two aircraft worked Nightwatch on 11255.0 using lower side band (LSB).

In recent months I have had numerous reports of this callsign series, and one thing is becoming obvious: although this callsign is a tactical callsign, it is static in nature and is being heard on a regular basis by military monitors in both North America and Europe.

My personal belief is that these Nightwatch callsigns are part of the U.S. Strategic Command's (USSTRATCOM) airborne command post system. Since the disestablishment of Strategic Air Command (SAC), the old SAC system of U.S. Air Force flying command posts has slowly evolved into a new system that reflects the major players in USSTRATCOM—the Air Force and Navy. This new command system consists of USAF aircraft and U.S. Navy E-6 TACAMO—Take Charge and Move Out—aircraft.

The Nightwatch callsign was first heard on STRATCOM channels in March of this year. Since then, they have been heard on a variety of STRATCOM frequencies. Our conclusions: Nightwatch 01/02/03/04 are probably aircraft and Nightwatch is a ground station.

Most of the theories regarding the identity of these callsigns have revolved around the E-4B code name "Nightwatch"—National Emergency Airborne Command Post (NEACP) aircraft attached to the 1st ACCS based at Offutt AFB, NE. However, given the limited amount of flying that the E-4Bs are currently doing, I don't think that these callsigns represent the E-4B fleet of four aircraft. Here is my best guess regarding this series of callsigns:

Nightwatch: USSTRATCOM Headquarters, Offutt AFB, NE

This station always appears to be the Net Control Station (NCS) of the STRATCOM nets on which they have been heard. The callsign has been reported on the following frequencies: 2035.0, 4742.0, 5700.0, 6730.0, 6735.0, 6812.0, 9017.0, 9023.0, 9057.0, 11226.0, 11243.0, 11255.0, 11408.0, 13217.0, and 18218.0.

Nightwatch 01: STRATCOM ABNCP (AirBorNe Command Post)

This is probably one of the many USAF EC-135 aircraft from the 2nd ACCS based at Offutt. This aircraft, in the old SAC system, used to be identified as one of the Post Attack Command Control System (PACCS) aircraft. The Nightwatch 01 callsign has been heard on a variety of frequencies including: 6730.0, 7330.0, 9017.0, 10493.0, 10588.0, 11176.0, 11226.0, 11243.0, 11408.0, 13211.0, 13217.0, 15038.0, 15048 and 18023.0.

Nightwatch 02: TACAMO LANT (Atlantic)

This is probably one of the U.S. Navy E-6 TACAMO aircraft. This aircraft used to be the USCINCLANT (U.S. Commander-in-Chief, Atlantic) command post aircraft in the old Joint Chiefs of Staff (JCS) airborne command post

system; the callsign has been heard on the following frequencies: 6730.0, 9017.0, 11176.0, 11226.0, 11243.0 and 11408.0.

Nightwatch 03: TACAMO Central (European based command post)

Probably another U.S. Navy E-6 TACAMO aircraft (previously USCINCEUR-U.S. Commander-in-Chief, Europe command post). Nightwatch 03 has been heard on the following frequencies: 8993.0, 10493.0, 10588.0, 11176.0, 11243.0, 11957.0 and 15048.0.

Nightwatch 04: NEACP or "Nightwatch" aircraft

This callsign could be assigned to any one of the four E-4B NEACP aircraft. The Nightwatch callsign is probably assigned to this type of aircraft while it is airborne and performing its command and control mission for USSTRATCOM. This callsign has been reported on only one frequency thus far: 11226.0 kHz.

If anyone has anything they would like to add to this discussion, you can address your comments to the address in the masthead or via the Grove BBS.

Military Operations Around the World

I recently received a nice fax from our friends at *Stichting SC-MAC*, a Dutch utility listening magazine. In the September edition of this column *SC-MAC* provided some interesting information on communications related to the civil war in Bosnia-Herzegovina. *SC-MAC* returns this month to fill in *MT's* Utility World readers on military activity being heard at hot spots throughout the world.

Rwanda

Rwanda relief flights are now in full operation. Flights into Goma and Kigali are using the callsign "Reach ### RW" and their tankers "Reach ### T" (the numbers used by the tankers correspond with the numbers used by the airlift receiving aircraft). The coordination of these refueling operations is done on 6750.0 kHz and occasionally on 11218.0 kHz. Information such as rendezvous times, flight levels and air refueling UHF frequencies are passed on these frequencies.

There are several HF frequencies being used at the Goma airport, but only 4472.0 kHz has been confirmed. Their UHF frequency is 313.800 MHz and 138.700 MHz has been noted on VHF.

Haiti

In Europe, several HF frequencies have been heard, used by ships and aircraft enforcing the Haitian blockade: 4090.0, 4735.0, 6735.0, 6815.6, 8967.0, and 12382.7 kHz.

Northern Iraq

Thanks to a Cable News Network (CNN) news item on Operation Provide Comfort, *SC-MAC* has been able to learn the identity of the following callsigns:

'*Cougar*' is the callsign of the USAF E-3B Airborne Warning and Control System (AWACS) aircraft operating from the Incirlik Air

Base in Turkey monitoring the 'No-Fly' zone over northern Iraq (Operation Provide Comfort).

'Duke' is the common callsign used by the commander US Army Europe (USAEUR) on board the AWACS flights. Sometimes you can hear 'Cougar' requesting phone patches on GHFS frequencies on behalf of 'Duke'. Normally 'Duke' is used by USAEUR operations in Heidelberg or the aircraft on which he is flying.

'Maddog' is a command post (CP) at Incirlik and 'Chevy Ops' is the operations department of the AWACS detachment from the 552nd AWACS squadron, home based at Tinker AFB, Oklahoma.

The frequencies used by 'Maddog' and 'Chevy Ops' are 8173.0 and 11117.0 kHz. I would like to thank SC-MAC for updating us on these trouble spots and their associated communications.

Europe Mystic Star Frequencies

Gerbrand Diebels in his recent fax also noted some different Mystic Star designators being heard in Europe as which differ from those we have been hearing stateside. Some of the designators we noted in the August issue are different from those logged by SC-MAC members during recent visits by members of the President's administration to Europe. These designators and frequencies have been compiled from reports by several monitors in Europe, who also made the identification of the designators. As far as we know they are correct.

F-030	6756.0	F-327	18716.0
F-090	6716.0	F-452	8077.0
F-102	11118.0	F-453	8053.0
F-205	8040.0	F-752	11058.0
F-311	8042.0		

MT Utility World regular reporter Jeff Haverlah in Houston, Texas, also passed along a couple of new Mystic Star designators and frequencies via the Grove BBS Utility World message conference. These should be added to the list we presented in the August Utility World column.

F-251	13217.0
F-500	8989.0

Thanks to SC-MAC and Jeff for keeping all our lists up to date on the ever-changing Mystic Star system designators.

New, Recommended Books

Ferrell's Confidential Frequency List, 9th edition by Geoff Halligey, commonly called the *CFL*, takes up where the 8th edition left off, and with increased accuracy. The author really worked hard to purge the older listings that were characteristic of earlier editions of the *CFL*. Even though some obsolete listings can still be found, it really doesn't diminish the usefulness of this excellent reference book.

The format of the *CFL* is pretty straightforward. You will find listings of stations by frequency from 1602 to 29713.5 kHz. The listings cover all types of utility stations heard on the air today. A real plus with this edition is the rework of the digital mode listings to accurately reflect the newer modes in use by utility stations.

I have found over the years that keeping up with utility station

changes is a tough business. No one—and I do mean no one—can be 100% accurate in a publication covering such a dynamic, diverse field as utility listening. At best, an author can only give the reader a snapshot of what the utility picture was at the time the publication went to press. Mr. Halligey has done an excellent job of stopping the motion for one moment in time, and has given the radio hobbyist a good directory to aid in identifying the usual, the unusual and the bizarre in the utility bands. I use it in my shack each and every time I sit down for a listening session at my receiver.

The book retails for \$22.95 plus shipping from the publisher (Listening In, P.O. Box 123, Park Ridge, NJ 07656) or from Grove Enterprises.

Another new book, by MT's own Robert Evans, is called *The Worldwide Aeronautical Communications Frequency Directory*, 2nd Edition. The first edition of this book has become a standard reference for aeronautical listening over the last few years. I have been recommending it to beginners, especially, and this new edition will continue to top my list of "must haves" in the utility listener's library.

There is so much material in this new edition, it is hard to do the book justice in the short space allotted to this column. Jean Baker's "Plane Talk" describes this great book in more detail. Needless to say, Evans has updated everything and included a lot of unique material. The by-frequency listing now has over 2,000 frequencies representing every aspect of aircraft monitoring from civil to military aviation. The *Worldwide Aeronautical Communications Frequency Directory* is available from Grove Enterprises and retails for \$19.95 plus shipping.

Utility World Pot Luck

Here are some interesting frequencies for this month's grab bag of intriguing catches and mysteries.

- 1711.0 Some weird data pulses, resembling packet bursts, are being heard here in North America during the evening hours; they are apparently coming from the Gulf of Mexico. At this point it is unknown what these pulses are.
- 5492.0 'Airbridge' frequency for Sarajevo airport in Bosnia. One callsign, 'Reddog,' is a USAF station (possible aircraft?) that monitors air routes into and out of the airport. The UN on the ground at Sarajevo uses the callsign 'Airbridge'.
- 6230.0 Used by the USAF Forward Air Control units in Germany. Callsigns heard include: Binary, Jerryman, Jerryman Base, Shouter and Shouter Base. Some of the USAF-Europe control and reporting post callsigns: Maroon, Morpha, Galley and Biform. Other frequencies used include: 4789.0, 4830.0, 5440.0 and 8085.0. On these frequencies you can hear the Forward Air Controllers brief missions, and mentions of aircraft callsigns, coordinates, and UHF frequencies.
- 6230.0 Matt Anderson in Richmond, KY, has identified a previously listed pot luck unknown heard on 6230.0. One intercept noted here had Raider working Raider Base in USB. Matt said he immediately recognized the callsigns as belonging to the Marine Corps aviation squadron, VMGR-352 in El Toro, CA. They fly the KC-130 tanker aircraft. Nice selection of a HF frequency, guys. Semper-Fi.
- 6734.0 Boulmer is the Royal Navy sector operations, control, and reporting center for the northern United Kingdom. Neatishead covers the south. On HF these stations practice coordination with ships, but sometimes you can hear Royal Air Force (RAF) aircraft, NATO AWACS, and RAF Nimrod aircraft. Other frequencies used by Boulmer and Neatishead for off-shore coordination include:
2838.0 3026.0 3039.0 3046.0 3112.0 3116.0 3117.0 3126.0 3435.0 3467.0 3499.0 3882.0 3885.0 3893.0 3916.0 3935.0 3939.0 4463.0 4464.0 4484.0 4707.0 4709.0 4710.0 4711.0 4717.0 4719.0 4730.0 4731.0 4739.0 4749.0 4763.0 4822.0 4845.0 5014.0 5095.0 5130.0 5287.0 5447.0 5450.0 5462.0 5470.0 5654.0 5685.0 5686.0 5690.0 5717.0 5721.0 5729.0 5747.0 6681.0 6686.0 6690.0 6693.0 6697.0 6725.0 6851.0 6755.0 6757.0 6760.0 6765.0 6879.0 6897.0 6898.0 6898.0 8997.0 9014.0 9022.0 10194.0 10210.0 11172.0 11178.0 11212.0 13205.0 13234.0 18013.0

Abbreviations used in this column

AM	Amplitude Modulation	ID	Identification
ARQ	Synchronous transmission and automatic repetition teleprinter	LDOC	Long Distance Operational Control
ARQ-E3	Single channel ARQ teleprinter system	Mars	Military Affiliate Radio System
ARQ-M2	Multiplex teleprinter system with two data channels	Meteo	Meteorology
CAMSLANT	Communications Area Master Station, Atlantic	MFA	Ministry of Foreign Affairs
CAMSPAC	Communications Area Master Station, Pacific	m/v	Motor Vessel
Comm(s)	Communication(s)	Packet	Digital mode based on AX-25 computer protocol
CQ	General call for any station	PIAB	Presse- und Informationsamt der Bundesregierung
CW	Continuous Wave (Morse Code)	POL-ARQ	Polish diplomatic ARQ teleprinter system
DECCA	70-130 kHz CW radionavigation system	RTTY	Radioteletype
EAM	Emergency Action Message	SAM	Special Air Mission
ETA	Estimated Time of Arrival	SELCAL	Selective calling
FEC	Forward error correction teleprinter system	SWED-ARQ	Adaptive Swedish diplomatic simplex ARQ teleprinter system
FEC-A	One-way traffic FEC teleprinter system	SITOR-A	Simplex teleprinting over radio, Mode A
HF	High Frequency	Unid	Unidentified
IAG	Institute of Applied Geophysics	U.S.	United States
		USAF	U.S. Air Force
		USB	Upper Side Band
		XINHUA	New China News Agency

All frequencies in kilohertz (kHz), all times in UTC. All voice transmissions in English unless otherwise noted.

50.000 OMA-Time signal station Prague, Czech Republic, with time signals and CW ID at 0658. (Ary Boender-The Netherlands)

60.000 MSF-Time signal station Rugby, England, with time signals and CW ID at 0645. (Boender-Neth)

70.458 DECCA stations Holland chain (Gilze-Rijen, Neth; Heiloo, Neth; Sas Van Gent, Neth and Thorpeness, England) with data pulses at 0703. Also at 0705 noted the DECCA Frisian chain (Finsterwolde, Neth; Heiloo, Neth; Hoyer, Denmark and Zeven, Germany) with data pulses. (Boender-Neth)

75.000 HBG-Time signal station Prangins, Switzerland, with time signals at 0646. (Boender-Neth)

77.500 DCF77-Time signal station Mainflingen, Germany, with time signals at 0647. (Boender-Neth)

84.550 DECCA stations in Holland chain with pulse signals at 0707. (Boender-Neth)

85.720 DECCA stations in Frisian chain with pulse signals at 0709. (Boender-Neth)

112.733 DECCA stations in Holland chain with pulse signals at 0714. (Boender-Neth)

114.293 DECCA stations in Frisian chain with pulse signals at 0716. (Boender-Neth)

115.552 DECCA stations in Holland chain with pulse signals at 0719. (Boender-Neth)

126.825 DECCA stations in Holland chain with pulse signals at 0722. (Boender-Neth)

128.580 DECCA stations in Holland chain with pulse signals at 0726. (Boender-Neth)

129.100 DCF49-BMPT Bonn, Germany, with data pulses at 0725. (Boender-Neth)

1794.0 SPO-Szczecin Radio, Poland, with navigation warning in USB at 0029. (Boender-Neth)

1905.0 SAB-Goteborg Radio, Sweden, with SITOR-A selcal for YEFE at 0032. (Boender-Neth)

4015.0 AE1USA-USAF MARS Heidelberg, Germany, working AE1ZWA and AE1KRN using packet at 2255. (Boender-Neth)

4426.0 U.S. Coast Guard CAMSPAC San Francisco working X4F in USB at 0450. (Gordon Levine-Anaheim, CA) NMN-CAMSLANT Chesapeake working VB (helo 9918 tail number) about victim's condition in USB at 0120. (Arnal Cook-Clarksville, TN) *Welcome back Arnal, uh-LT, whatever. Hope civilian life agreeing with you-Larry, The Chief.*

4592.0 Test Pattern, Joyous, Joyous Alpha, and others setting up net using authentications in USB at 1330. (Larry Van Horn-Brasstown, NC)

4601.0 Unid stations NWSY and ROU4 working HTWM in CW at 2133. (Boender-Neth)

4602.0 Irish military stations CVVE, CVVR and XVQV working A using SITOR-A at 2142. (Boender-Neth)

4735.0 U.S. Navy FT network noted here in USB at 2357. (Jeff Haverlah-Houston, TX)

4742.0 Nightwatch working MacDill in USB at 0355. "We're going to shut down HF data for the night...Sorry about the problems tonight." (David Howden-Lancaster, PA)

5293.0 U.S. Navy 'FT' net with 14 plus players. FT had bad ping pong problems, requested stations to switch to Pink Floyd, if that didn't work try Def Leppard and Eagles as last resort. In USB at 0658. I haven't heard the FT net on this frequency before. (Howden-PA) *Neither have I, David-Larry. Heard same at 0226. (Bob Lewallyn-The Woodlands, TX)*

5417.1 Spanish female 5-digit number station in AM at 0317 (Fri). Modulation was muffled, delivery was a little erratic, definitely not machine generated speech. (Lewallyn-TX)

5574.0 San Francisco Radio working Express 15 in USB at 1154. (Levine-CA)

5626.0 Tokyo working Delta 74 at 1109 and Honolulu working Cathay 880 at 1340 in USB. (Levine-CA)

5643.0 Honolulu Radio working Hawaii 466 in USB at 1355. (Levine-CA)

5667.0 Honolulu Radio working American 126 in USB at 1342. (Levine-CA)

5732.0 Shado(w) 91 calling Plantation with message in USB at 0023. (Haverlah-TX)

6125.0 Defiance working unid station in USB at 1325. Sounded like the Coast Guard to me, interesting choice of frequencies. (L. Van Horn-NC)

6683.0 SAM 201 working SAM 204 in USB at 1424. These guys on at same time as SAM 200 on 11243.0. (Haverlah-TX)

6717.0 SAM 28000 working Andrews on F-875 in USB at (Jeffrey Jones-Tracy, CA)

6728.0 Andrews working 974 in USB at 0426. (Haverlah-TX)

6735.0 Jake working Jake Control at 1616 in USB. Also heard Jake 12 and Jake 13 calling Jake Control. (Haverlah-TX)

6738.0 Lajes working Nightwatch in USB at 0400, moved to 8967 and was wondering if anyone had contact with SDM that evening. (Howden-PA) Offutt with an EAM broadcast directed to *USS Ohio* consisting of common preamble of the week "52...", but not 26 characters long, only 20 characters in length. (Haverlah-TX) *That is a very interesting log Jeff; first time I have heard of such an EAM broadcast-Larry.*

6797.0 Number station, address: 430, 10 count, 10 dashes, count 135 then 5-digit groups in AM with parallel 5716 at 2100. (Boender-Neth) *What language, Ary-Larry?*

6815.6 U.S. Coast Guard FC net noted here at 0149. (L. Van Horn-NC)

7330.0 Black Ink working Nightwatch 01 on S307 in USB at 1238, also using S301 (not found), 9017 and 6730. (Haverlah-TX)

7910.0 Cape Radio working Liberty Star, moved here from 10780.0 with Freedom Star in USB at 1300. (Don Strock-Hemlock, MI)

7919.5 Oilpump calling Staffcar for radio check in USB at 0113. (Jones-CA)

8026.0 Andrews working Air Force 1 on primary F-290, signal check, transfer to backup F-965 in USB. (Justin Stanley-Kansas City, MO) *Make sure you include times with your logs Stan-Larry.*

8031.0 Tropical calling Lightning for radio check in USB at 2334. Heard last month on 16077.0. (Jones-CA)

8047.0 Andrews working AF1 with signal check on F-752 in LSB/USB at 0149. (Jones-CA)

8143.0 Czech female 5-digit number station in USB at 0800. (Boender-Neth)

8495.0 C-Single letter HF marker Moscow, Russia, with continuous CW marker at 2321. (Jack Dix-Yonkers, NY)

8530.0 IAR-Rome Radio, Italy, with CW traffic list at 0857. (Boender-Neth)

8560.0 Number station, 10 pulses plus 7983 5973 3751 followed by hiccup where only the 3 was heard then 7083 5073 3751 in USB at 1330. It looks like someone entered the wrong figures and made a last minute correction. (Boender-Neth)

8687.5 UGC-Noted with DE CW marker at 2354. (Dix-NY) *I believe this one might be ST. Petersburg Radio, Russia-Larry*

8861.0 Spingbok 202 working SAL Radio, Cape Verde Islands, for SELCAL check (FMAQ) and position report in USB at 0715. (Robin Hood-UK)

8942.0 Lufthansa 789 working Singapore Radio in USB at 1530. (Hood-UK)

8967.0 Overtone working Boomtown via Lajes in USB at 0024. (Lewallyn-TX)

8989.0 Andrews working 970 on self-IDed F-500 in USB at 0131. (Haverlah-TX)

9003.0 Amman, Jordan, LDOC working unid aircraft for SELCAL check in USB at 0150. (Jones-CA) *Nice catch, Jeff-Larry.*

9014.0 Gemini 38 working Raymond 7 in USB at 2310. (Haverlah-TX)

9017.0 Nightwatch 02 working Nightwatch 01 for landing weather at 0225 in USB. (Jones-CA)

9023.0 Roll Call working Edmonton Military in USB at 1446. (Haverlah-TX)

9043.5 Detox working Aviation for computer configuration. Asked "Do you have Gold Wing HF net configuration on your computer?" in USB 0415. (Jones-CA)

9101.0 Browbeat working Lopeman with relay to Nightwatch 01 in USB at 1415. Moved to 9017. (Strock-MI)

9266.0 732 sent for seven minutes in CW at 2152. (Boender-Neth)

9320.0 La Havre working Shipyard on Channel 5 in USB at 0244. (Lewallyn-TX)

9932.0 Spanish female 5-digit number station in AM at 0400 (Sunday UTC). Quite loud even with all the jamming signals noted here from 9930-9980 kHz. This area of the spectrum becoming quite bizarre now that we have a radio war on with Cuba; well worth watching. (L.Van Horn-NC)

9958.0 Spanish female 4-digit number station in AM at 0300 (Sunday UTC). Doing a number on WRMI even through all the Cuban jamming. (L.Van Horn-NC)

10002.0 Jeddah Meteo, Saudi Arabia, with 100 baud RTTY weather. New frequency, parallel 10215 kHz at 1923. (Boender-Neth)

10125.0 CIO2-Israeli Mossad number station in AM at 2326. (Boender-Neth)

10270.0 RYM-IAG Moscow, Russia, with scientific messages in Russian using USB at 0940. (Boender-Neth)

10281.2 RFLIG-French Forces Cayenne, Guiana, (French) with controle de voie using ARQ-E3 at 2343. (Boender-Neth)

10307.0 Unid station 318 transmitting in CW for 5 minutes at 0900. (Boender-Neth)

10314.0 SNN299-MFA Warsaw, Poland, with messages using POL-ARQ at 1545. (Boender-Neth)

10365.0 AHE Zenica and AHE Banja, Bosnia-Hercegovnia, working unid AHE stations between 1315-1322. (Boender-Neth) *Ary, what does the abbreviation AHE stand for-Larry?*

10400.2 RFQP-French Forces Djibouti, with controle de voie using ARQ-M2 at 0852. (Boender-Neth)

10408.6 LN2A-Norsk Telecom Seivo, Norway, with CW marker and data burst at 9836. (Boender-Neth)

10415.0 MFA Warsaw, Poland, 75 baud RTTY Polish political news in Polish and English, messages to Budapest, Sofia, Bucharest, Prague, Minsk, etc at 0605. (Boender-Neth)

10583.0 SAM-MFA Stockholm, Sweden, with SWED-ARQ messages to Ambassaden Moskva from Cabinet at 1445. (Boender-Neth)

10584.0 Unid station KUL sending 5-digit groups using 75 baud RTTY at 1425. (Boender-Neth)

10798.0 RFLI-French Forces Fort de France, Martinique, with ARQ-E3 messages at 0009. (Boender-Neth)

10854.0 Unid station KUL sending RY plus 4 messages (5 letter groups) using 75 baud RTTY at 1430. Same messages as those transmitted on 12193.0. (Boender-Neth)

10871.8 S-Single letter HF marker Arkhangelsk, Russia, with continuous CW marker at 2244. (Dix-NY)

10871.9 C-Single letter HF marker Moscow, Russia, with continuous CW marker at 2240. (Dix-NY)

11048.0 G8T-French Embassy Belgrade, Serbia, using FEC-A at 1535. (Boender-Neth)

11053.0 SAM 204 working Andrews on F-354 for phone patch to Tinker Meteo in USB at 1750. (Jones-CA)

11053.5 D6D calling B0M and P90 in USB at 1605. (Jones-CA)

11123.5 DFL26-PIAB Bonn with FEC-A news at 2040. (Boender-Neth)

11133.0 BZG41-XINHUA Beijing, China, with 50 baud news in French at 1658. (Boender-Neth)

11176.0 Shark 16 with phone patch to Lobo via Albrook. Arrived MHIC at 1330, departed MHSC at 1545. Then phone patch to Dusty Ops at Silicano Air Base (Sp?-Larry)...stated would need 15,000 lbs fuel for second shuttle to Swan Island. (Lewallyn-TX) *Yes, Swan Island is back in business for you old timers who recall the name. More about that at the convention-Larry.*

11178.0 PEMMB calling PJX repeatedly, no luck in USB at 1911. Then passed "airborne Key West at 1509 Quebec" twice in the blind. This is most likely a Dutch naval patrol boat a/c participating in the Haiti blockade. Heard PJX calling K2Z at 1909 with no luck.

11220.0 Andrews working SAM 300 (new aircraft) on F-311 with signal checks out of four locations, one IDed as McClellan in USB at 2245. (Jones-CA)

11229.0 Andrews working SAM 28000 on F-823 in USB at 0102. (Jones-CA)

11292.0 MFA Cairo with SITOR-A message signed by Minister at 1550. (Boender-Neth)

11342.0 Unid station sending 124 and 5-digit groups in CW at 1605. (Boender-Neth)

11453.0 IMB33-Rome Meteo, Italy, with 50 baud RTTY weather codes at 2130. (Dix-NY)

11460.0 SAM 972 working Andrews on F-295 with phone patch traffic to unid comm control ground station. Ground station said he was on RF4 out of Strawberry location having no luck in establishing comms with SAM 972. (Jones-CA)

11466.0 Air Force 1 working Andrews with phone patch to Crown. "Can you call us on nationwide? Use Roland, Iowa, station." on F-965 in USB at 1601. (Stanley-MO)

12193.0 Unid station KUL sending RY and 4 messages (5 letter groups) using 75 baud RTTY at 1410. (Boender-Neth)

12350.0 UFZX-m/v *Azerbayszhan* working Odessa Radio in USB at 0940. Odessa on 13197 (Channel 1241). (Hood-UK)

13241.0 Andrews working SAM 049 on F-624 in USB at 0022. (Jones-CA)

13247.0 Shark 29 multiple phone patches to Lobo and C-Tech via Albrook. 'C-Tech' is Chrysler technical support (somewhere in Panama, logically Howard

AFB). Aircraft was Alenia/Chrysler C-27 Spartan with air conditioning and pressurization problems. They agreed aircraft could keep flying for a couple of days without repairs if they remained below 10,000 feet. Albrook now uses this frequency for more lengthy phone patch traffic when 11176 gets a log jam during the day. (Lewallyn-TX)

13288.0 Honolulu Radio working Northwest 924, United 186, United 188, United 822, United 1 and Leisure World 1556 in USB at 0045. (Levine-CA)

13354.0 Honolulu Radio working Leisure World 1112 in USB at 0115. (Levine-CA)

13825.0 Andrews working SAM 28000 on F-194 in USB at 0100. (Jones-CA)

14460.0 GYU-Royal Navy Gibraltar with 75 baud RTTY RY/Foxes at 2050. (Boender-Neth)

15011.0 Andrews working 173? reporting Air Force 1 ETA on secondary F-732 in USB. (Stanley-MO)

15038.0 Inequity entering net with Nightwatch 01. Performed Parkhill voice check at 1547. Advised that Remedial was relay to Audio Kit on W113. Inequity and Audio Kit were heard getting working frequencies for Nightwatch 01 (X211 primary and W113 secondary) from Andrews on 15015 at 1543. (Lewallyn-TX)

16030.0 Radio Moscow International feeder broadcast in USB at 0910. (Boender-Neth)

16982.5 HKMR called by KOAT in CW at 1420. (Dix-NY) *Anybody have any ideas on this one? I have been chasing these two stations for several years now with no positive results yet-Larry.*

17015.8 C-Single letter HF marker Moscow, Russia, with continuous CW marker at 2110. (Dix-NY)

17096.0 VPS80-Cape D'Aguilar Radio, Hong Kong, with CW CQ marker at 2323. (Dix-NY)

18060.0 MFA Warsaw, Poland, calling NH with messages in Polish using POL-ARQ at 1335. (Boender-Neth)

18300.0 OMZ88-MFA Prague with ID and RYs and diplomatic bulletin 112 (in Czech) using 100 baud RTTY at 0811. Note that the 'OM' international call block is now allocated to the Slovak Republic, but MFA Prague is still using OMZ. (Hood-UK)

18331.0 SAM 28000 working Andrews on F-551 in USB at 2323. (Jones-CA)

18735.0 Naval comm station with recorded message for station ID and receiver alignment in USB at 0415. (Jones-CA)

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Finding Frequencies

When you play a slot machine, you put in a coin, pull the handle and hope that you'll win the jackpot. In the hobby of scanning, we perform a similar ritual. We punch in a frequency, hit the enter button and hope to be rewarded with hours of listening enjoyment.

Frequencies however, don't always produce the desired results—you don't always hit the jackpot. And like the compulsive gambler who needs more coins, scanner buffs are constantly in need of more frequencies.

Finding active frequencies that can be placed into your scanner radio can be an exciting, intriguing, and exhausting experience. It's not uncommon for scanner buffs to spend hours and even days looking for an elusive target. The following hints and suggestions will help you to find more frequencies in less time and with less effort.

Where to Look

Local frequency lists can often be obtained from service stations. Look for a service station with a tow truck parked nearby. Although it's illegal, some tow truck operators routinely monitor the police frequencies to locate disabled motorists.

Volunteer and professional fire companies are another excellent source for local frequencies. The majority of fire fighters listen to scanner radios and welcome the opportunity to share a few frequencies. Don't forget to bring along a few extra copies of *MT*—it's an excellent way to say "thank-you" and to promote the hobby.

Nearly everyone is familiar with *Police Call*. It's a frequency directory that is available in more than six thousand Radio Shack stores throughout the United States. Few people realize, however, that Radio Shack stores are an excellent source for obtaining free frequency lists. The lists are usually maintained and offered by store employees who are scanning enthusiasts.

Frequency lists may also be available in practically any business establishment that sells or repairs radio equipment. A few examples are: two way radio repair shops, electronic gadget stores, pawn shops, and large department stores. If you can't get a printed list, ask the person behind the counter to turn on a display model. The frequencies that are stored in the scanner radio's memory may represent a sampling of local frequencies.

Airborne Frequencies

Don't overlook CB radio as a source for scanner frequencies. A large number of CB operators are scanner buffs and can provide frequencies "on the air." Another CB radio organization that can provide local scanning frequencies is "REACT International."



Looking for scanner frequencies? Check out the local auto repair shop!

REACT is an all-volunteer team that utilizes CB radio to provide a variety of safety and special event communications, and therefore has need to know local frequencies. REACT has members in all fifty states. To contact the REACT team near you, write to REACT, P.O. 998, Wichita, Kansas 67201.

Scanner buffs who are licensed Amateur Radio Operators can also obtain local frequency information on the air. The two meter ham band (144 to 148 MHz), is where local hams gather to discuss a variety of topics. All types of radio buffs are available on two meters to answer your ques-

tions.

Don't have a Ham license? Did you know that you can obtain a ham license without learning Morse Code? For more information, contact the American Radio Relay League (AARRL), 225 Main Street, Newington, Connecticut 06111.

Computer Bulletin Board Services (BBS's) can also be used to find active frequencies. Several of the larger services, such as Prodigy, have specific departments dedicated to radio enthusiasts. There are also smaller services that are scattered throughout the country. The Grove BBS, which contains a scanning conference, can be accessed via modem on the following numbers: (704) 837-9200, (704) 837-5957, (704) 837-7081 or (704) 837-5183, 5:30 pm to 7:30 am and 24 hrs. on weekends. Although I am not active on the board, editor Rachel Baughn forwards messages pertinent to the column via "snail mail."

Frequencies are also available on CD-ROM. With the help of a computer it's possible to sort through thousands of listings and to print selected frequencies. In the near future, Grove Enterprises will offer a CD-ROM with mapping! The mapping ability of the CD will pinpoint the transmitter site on a map. For more information, contact Grove at (704) 837-9200.

In the above suggestions, I've purposely failed to mention spectrum analyzers, frequency counters and other high tech and expensive gadgets. Scanning clubs were also omitted, but they are listed in *MT's* "Club Circuit." My intent was to provide you with the least expensive means of obtaining active frequencies for your local area. The Frequency Exchange in this column is another obvious source.

If my hints and suggestions help you to hit the frequency jackpot, don't forget to drop me a note. I'll share the wealth with other *MT* readers in the Exchange.

Treasure Hunt

Interest in monitoring and displaying sub-audible tones is at an all-time high. Scanner buffs from coast to coast have discovered that

millions of business and government radio systems are using CTCSS tones.

Displaying sub-audible tones, DCS Codes and touch-tones (DTMF) in your shack is easy with the DC440, this month's Treasure Hunt prize from Optoelectronics. With the DC440 connected to your scanner radio, you'll have the ability to instantly display tones and/or codes on a backlit, LCD display. As you probably already know, displayed tones can be used to help identify specific users of a particular frequency.

The DC440 is compact and features convenient front panel controls. A serial interface is also included for connecting the unit to your computer. Retail price is \$259.00 dollars.

Your budget doesn't allow it? No problem. Answer the following clues and you may win the DC440 absolutely free.

- 1) Provide the five words that are represented by "CTCSS."
- 2) How many CTCSS tones are utilized?
- 3) The DC 440 can be used to decode the touch tones of a cordless phone. True or False?
- 4) In the July issue of *MT*, provide three page numbers that contained ads by Optoelectronics.
- 5) What is the toll free number of Optoelectronics?

Send your entries to the Treasure Hunt, P.O. Box 98, Brasstown, North Carolina 28902. All entries should be postmarked separately. Postcards are strongly recommended. Faxed entries will not be accepted.

For more information on the DC440, you are invited to call Optoelectronics: (305) 771-2050. Don't forget to mention *MT*.

The Frequency Exchange

The colorful fall foliage in **Williamsport, Pennsylvania**, is a spectacular sight. If we climb onto the roof of William Dickerman's home, we can see the fall colors and watch the airplanes land at Williamsport.

119.000 Tower	257.800 Air show
121.900 Ground	272.700 Air show
124.900 NY center	455.80 WRAK FM radio
146.73 Ham radio repeater	457.525 Airport communications
148.15 Civil air patrol	464.55 Airport communications
236.600 Air show	469.50 Airport communications

Dave Wolf lives in nearby **Indiana, Pennsylvania**, and he has provided a few of his favorite listening targets.

33.68 Indiana fire	154.74 County Police
33.70 Indiana fire	155.79 County Police
33.94 Indiana fire	155.07 County Police
155.325 Hospital	155.01 County Police
42.62 State Police	155.43 County Police
	155.475 County Police

The view along the northbound **New Jersey Turnpike** isn't as colorful, but Dominic Post has provided us with the necessary frequencies.

856.2375	856.9625	857.7125	858.4625
856.4375	857.2125	857.9375	858.4875
856.4625	857.2375	857.9625	858.7125
856.4875	857.4375	858.2125	858.9375
856.7125	857.4625	858.2375	858.9625
856.9375	857.4875	858.4375	

As we arrive in **Syracuse, New York**, don't unbutton your coat. Since our invitation is anonymous, we'll be standing outside.

154.74 Onondaga Sheriff	464.525 ... Carousel Mall
155.415 ... Onondaga Sheriff	464.725 ... Great Northern Mall
155.10 Clay Police	154.49 Market Place Mall
460.325 ... Syracuse Police	168.525 ... VA hospital
460.35 Syracuse Police	453.40 Auburn Prison
460.15 Syracuse Jail	453.475 ... Onondaga Com. Col.
460.175 ... Jamesville correctional fac.	460.90 Airport Security
154.695 ... NY State Police	47.32 Dept. of Transp.
159.435 ... Forest Rangers	47.22 Dept. of Transp.
461.05 Shoppington Mall	150.935 ... Autoclub
461.70 Syracuse University Police	453.525 ... Thruway police

The fall colors in **Connecticut** are spectacular in October. Best of all, we can sit around Gary Saffer's fire place, sip hot cider, and listen to his scanner radio.

State Police

42.06 Patrol	42.30 Detectives
42.36 Patrol	42.20 Traffic
42.48 Patrol	42.24 Traffic
42.52 Patrol	42.58 Speed enforcement
42.18 Detectives	42.64 Speed enforcement
	42.68 Speed enforcement

One of the best places to enjoy the fall colors is **Colorado Springs, Colorado**. This is from another anonymous contributor, so don't expect to be served more refreshments.

Great books on SCANNING and MORE!!

EMERGENCY RADIO! Norm Schrein
Scanning News As It Happens 214 pages, \$14.95
"Excellent..." *Barry Goldwater* "A winner..." *911 Magazine*
"Rates a 10!" *Dispatch Magazine* "Irresistable" *Bill Cheek*

SCANNERS & Secret Frequencies Henry Eisenson
320 pages, \$19.95
"Must reading." *Electronics Now* "Useful, knowledgeable..." *PopComm*
"A giant undertaking...authoritative" *Monitoring Times* "You can't miss!" *ASG*
"Absolutely the best..." *Norm Schrein* "A high point!" *RCMA*

AND COMING THIS SUMMER...

ULTIMATE SCANNER Bill Cheek
Scanner modifications - **THREE** ~250 pages, large format, \$22.95
Bill Cheek is the master of scanner modification, Editor of *World Scanning Report* and author of *Scanner Modification Manuals* Volumes 1 & II.

TRAVELSCAN Henry Eisenson
Good Frequencies Across America ~200 pages, \$14.95
Handy pocket guide to scanning in every area of America. 100 top cities, plus every state and many federal agencies, speedtraps, recreation. **MORE!**

Cellular Fraud Damien Thorn
Vulnerability of cellular telephone technology. ~240 pages, \$24.95
The #1 authority, in a ripping exposé. The **REAL** technology.

Not scanning, but HOT!

Underground Database 100 pages, large format, \$23.75
Everything that's sort of legal. "Fascinating" *ASG*

Television GRAY Market Henry Eisenson
Cable & satellite chips, descramblers, etc. 160 pages, \$23.75
"Explores this shadowy fringe area in depth... good info." *PopComm*

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San Diego, CA 92122 All credit cards
619-281-2957 (editorial) **Order line 800-546-6707**

155.175 ... Search & rescue
 155.235 ... El Paso search & rescue
 453.50 Airport security
 462.975 ... Police

453.75 Police
 460.525 ... Police
 453.85 Police
 460.625 ... Fire dispatch

Are you looking to extend the summer season? If so, welcome to **Sacramento, California**. Frequencies and refreshments are compliments of Sam Mitch.

460.05 City police
 460.20 City police
 460.325 ... City police
 460.075 ... Tactical
 460.50 Detectives
 460.55 Tactical
 123.050 ... Life flight helipad
 453.90 County sheriff
 453.95 Metro airport
 125.700 ... Metro tower

121.700 ... Metro ground control
 119.100 ... Approach
 123.700 ... Approach
 124.500 ... Approach
 125.500 ... Approach
 125.250 ... Departure
 122.050 ... Flight service
 122.200 ... Flight service
 127.950 ... Oakland center

Our final stop is the home of Ralph Fellows, where we'll walk off some of those calories. Ralph lives in **San Bernardino, California**, and here are his favorite frequencies.

<i>Mountain, Public Safety</i>	<i>Phone Patch</i>	<i>Desert, Public Safety</i>
866.6875	856.825	855.475
867.3375	858.525	856.225
867.8375	858.775	857.225
868.1125	866.1875	857.95
868.6875	867.1125	858.25
		858.45
		859.45
		859.95

Inviting the Frequency Exchange to your home town is easy. Send your frequency lists and/or computer disks to the Frequency Exchange, P.O. Box 98, Brasstown, NC 28902.

Dear Ann Landers

Ann Landers is a popular advice columnist. In one of her syndicated columns she wrote that third party listeners can only hear one side of cellular and cordless phone conversations.

As you probably already know, she was bombarded with letters from readers telling her that she was misinformed. In a later column, she admitted the mistake and printed a corrected response.

Can we monitor both sides of cordless and cellular conversations? We all know the answer. But should we be so willing to share our knowledge with the news media? In the past, the newspapers' portrayal of the scanning hobby hasn't been very flattering.

Maybe it's time to change our strategy. Let's agree with the newspaper headlines that read, "New Computerized Radio System Cannot Be Monitored." Better yet, let's write a letter to Ann Landers.

Dear Ann:

It's impossible to monitor cordless and cellular phone conversations. It's also impossible to monitor the new computerized radio systems that local police are using. The hobby of scanning is dead.

Signed: *Heart Broken Scanner Listener*

What do you think? Is it about time we use a little reverse psychology?

Wash and Bake

Here's another response to my question, "Have you ever washed your scanner radio?"

"I wash circuit boards in a household dishwasher, 180 degrees with powdered dish detergent on normal cycle. After washing, I place the circuit board in the oven at 150 degrees for approximately two hours." (D.W. Cater, Orlando, Florida.)

911 Bandits

When a man called 911 in Glendale, California, to ask for directions to a particular street, the dispatcher politely explained how to get there.

Ten minutes later, the same dispatcher received a call from a woman who reported that her father had lost his wallet and house keys. After confirming where the man lived, the dispatcher remembered that she had just given directions to the same street. Becoming suspicious, the dispatcher sent a patrol car to the home of the person who had lost their keys and wallet. Two suspects were apprehended after they tried to unlock a door that was dead bolted from the inside. (News clipping from *Dispatch Monthly*.)

Scanner Buff Arrested

An Eastpointe, Minnesota, man was arrested for having a police scanner in his van. "All I was doing was going for a walk and carrying around a police scanner for entertainment," said Vincent Hoffert.

Eastpointe Police said that Hoffert was arrested after police responded to a complaint of a suspicious person looking into parked vehicles. According to the police, Hoffert had violated state laws by equipping his vehicle with a scanner radio without obtaining permission from State Police. (News clipping from *Macomb Daily*.)

Baby Monitor Solution

Nothing performs like a base scanner radio that is connected to a roof top antenna. Sure, your hand-held provides mobility, but reception is often compromised. To solve the problem, simply place the transmitter unit from a baby monitor near the speaker of your scanner radio. You can then carry the baby monitor's receiver to any location within your home. Depending upon the size of your home, you'll probably be able to carry the receiver outside and enjoy the scanner action as you rake leaves or work on the car.

Next Month: Going to Grandmom's for Thanksgiving dinner? Don't forget to take your scanner radio.

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 Scanning
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 Wagontown, PA
 19376

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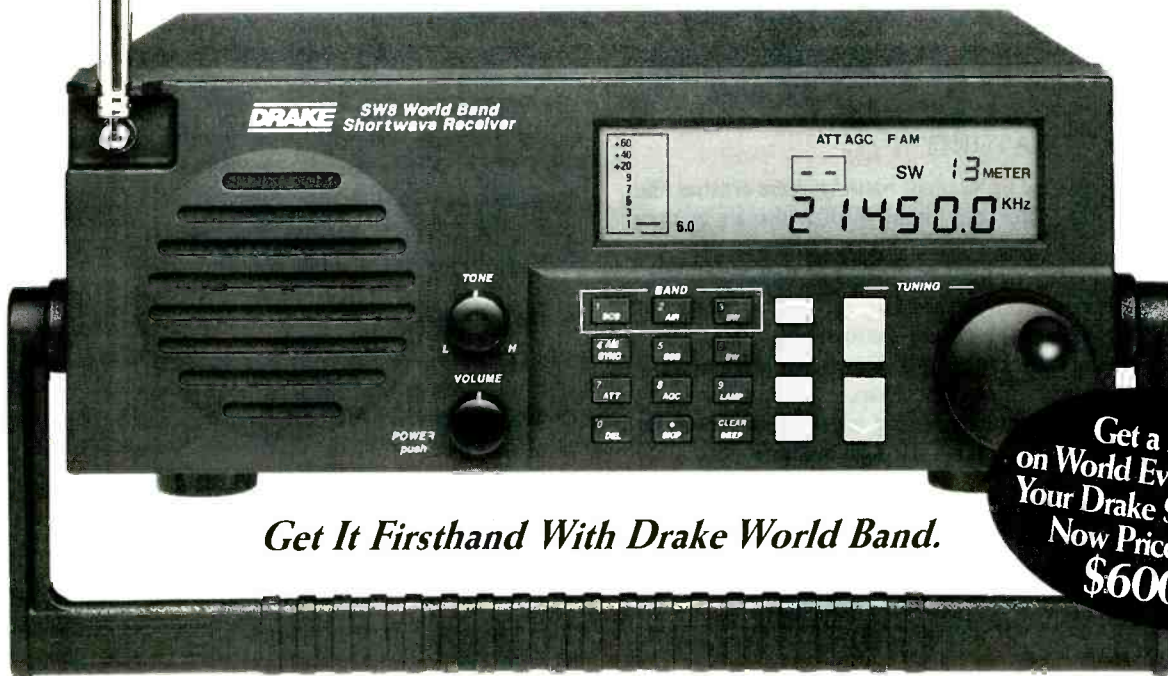
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Kit Building

As you are reading this page, the multitudes of the faithful are preparing once again to descend upon the Atlanta Airport Hilton for the fifth annual *Monitoring Times* Convention. If you have been following the promotions for this event in the pages of *MT*, you are already aware of the many activities, forums and vendors that all come together to make this get together so much fun. Of course Old Uncle Skip will be holding forth with a couple of beginners forums.

I'm going to let you in on a little radio convention secret. (I feel it is my duty to share this with all my beginner friends so they won't miss out when they get to the convention.) Listen closely: Some of the best fun and learning doesn't occur during ANY of the organized activities! Yep, you heard right. Even though I have always gleaned tons of important data from the scheduled events, there is even more to learn when the activities break up and radio people get together in their rooms or at some nearby source of food and beverages. Gatherings like the MTCO 95 bring together hundreds of folks with countless years of radio experience.

I don't want you folks just starting out, to miss out on all the fun. So meet me in Atlanta and I'll point out all the neat places to hang out with folks that are friendly and more than willing to help you learn your way around our hobby.

Uh, Uncle Skip, I thought you were going to talk about kits.

I am! Brace yourself for the segue; it's a doozy.

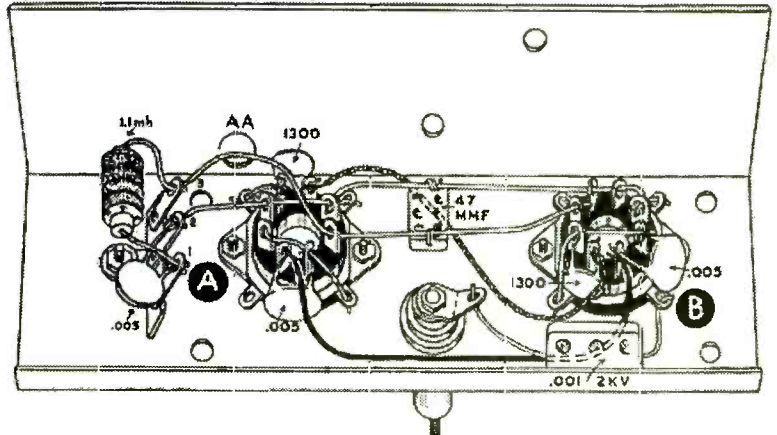
Whenever radio folks gather at conventions, after all the organized stuff is finished, late at night, some of us with more than a few rings around our trunks begin to wax nostalgic. We will remember old radios, old QSOs, old hobby publications. If it's old and gone we will put in overtime lamenting its passing. We even remember old companies. If you want to get a bunch of seasoned radio freaks to go all misty eyed late at night, just whisper one single word:

HEATHKIT!!!

Steely eyed folks hardened by years of battling static crashes and propagation will develop noticeable lumps in their throats as they remember DX-100s, SB-303s Benton Harbor Lunch Boxes, and radios named for Native American tribes. I'd toss in my teddy bear to snuggle with my old HW-8.

What made all these radios and accessories so memorable was they came in kit form. Nothing in the entire radio hobby compares to using a piece of equipment you put together yourself. And the biggest surprise of all was discovering that putting together an electronic device was not all that hard once you learned a few basic assembly techniques.

Many radio hobbyists in the sixties, seventies and most of the eighties attempted at least one Heathkit project. These folks are easy to recognize at radio get togethers. They all have one or two soldering iron scars on their fingers. If you want to get their attention, all you have to do is show them a cupcake pan (more on this later). The Heath



If this picture of a DX 100 Sub-assembly gets your heart pumping, you are probably a fan of Heathkit equipment.

folks buried their Heathkit product line a few years back and the radio hobby lost one of its greatest institutions.

Hope for the Future

There are just too many old timers addicted to the smell of burning solder and too many newcomers curious about kit building, however, for things to stay quiet for any length of time. If you glance through the pages of just about any radio hobby magazine you are bound to find a few companies that are producing kits aimed at the radio hobbyist. Kits for receivers, transmitters, frequency converters, active antennas, power supplies and test equipment are popping up all over the place. Many of these projects are inexpensive and just the thing to get a beginner rolling down the road to radio building bliss.

If you check the side-bar, you will be clued in to a list of kit dealers who will supply you with your first project. Incidentally, as you peruse these folks' catalogs, you will probably notice that many of these kits are geared toward getting started in amateur radio. Nothing creates the incentive to pass your ham ticket quite like having a transceiver project three quarters done.

Tooling Around

You don't need to have a ton of tools to get into kit building. The basics should keep you going for a long time. Start out with a pair of needle nosed pliers, a pair of diagonal cutters, a couple of screwdrivers and a small set of hex nut drivers. Most folks have these tools around the house just to keep body and soul together.

All you need to add to get into kit building is a 25 or 30 watt soldering pencil, some rosin core solder and a heat sink to protect delicate parts when soldering (although the needle-nose pliers will work in a pinch if you have someone to hold them while you are soldering). If you need to purchase tools, remember, quality tools cost a bit more but they will last forever if you take good care of them.

I have tools passed down to me by my great-grandfather that I still use almost every day.

What to do when the mail carrier arrives

Okay, your kit has just arrived in the mailbox. The first thing to do is . . . DO NOT OPEN THE BOX YET!

You heard that right, Compadre. You have a couple of things to get done before you dare break the seal on that package. The reason I tell you to leave your future pride and joy in the box is that it is very easy to lose parts, making your kit fairly useless. Murphy's law indicates that the part you will lose is the one that will be on back order for six months when you try to get a replacement. So hold off on spreading that kit out for the moment.

Mark Your Territory

Even a simple kit is going to take a long evening to assemble. Most projects will take you at least a few nights to get finished. The key to success is to have a work space that will remain completely undisturbed between assembly sessions. A good analogy is putting together a jigsaw puzzle. Once you spread things out you really don't want to put the pieces away every time you need to take a break. Wherever you plan to work, make sure everyone who shares your living space knows to keep their hands off the merchandise. Those of you with toddlers and cats will have to keep your project behind at least one door.

If your project involves soldering (most do), you will need to work on a surface that can be splashed with hot liquid solder without causing a divorce. A good solution is to cover the work surface with a piece of scrap plywood or paneling. Failure to do this may result in your being banished to the doghouse where the light is usually too bad for kit building.

Let's Get Organized

Now that you have your work area cleared and ready to go, finally you can open up that kit box. The first thing you will want to do is take out the assembly manual or instruction sheets and READ THEM! Don't just glance over them: read them through. Most manuals will give you assembly hints and techniques that will make the project go a lot easier. You will also get a feel for logical stopping places if you have to break the work up over a couple of days.

The next thing you will want to do is find the parts list. Sometimes it will be a separate sheet of paper, but often it is incorporated into the assembly manual (which you have already read, right?). Check to make sure that you have all the parts required to get the job done. If anything is amiss, get on the phone to the supplier and get the right parts shipped out. It is usually not a good idea to start without all the parts, because most kit manuals are set up to install components in a particular order so you can't "work around" a missing part.

More complicated kits will be packed in a series of sub-assemblies. Once you have accounted for the parts in each individual sub-assembly, put everything back into the bag and seal that puppy up until you are ready to go on to that section of the project. This will further cut down on the clutter and confusion.

One of the things that the old Heathkit manuals always suggested was to sort the parts into a cupcake pan. The individual cupcake "holes" keep the parts organized and prevents them from spilling on the floor. If you plan to make kit building a habit, you will want to buy your own workbench cupcake pan to avoid any friction in the family.

After all, you don't want your carefully sorted components spilled all over your work surface because it's your significant other's turn to bring refreshments to the PTA meeting.

Some Thoughts on Soldering

Soldering is not that hard a skill to master. You just have to do a few things in the right order.

1) Let the soldering iron warm up and then "tin" the tip with some solder.

2) Make sure the component has a solid mechanical connection at the terminal strip, printed circuit board trace or other component.

3) If you are soldering a transistor, integrated circuit or other semiconductor, place your heat sink between the component and the location you are soldering to draw heat away and prevent damage to the part.

4) Touch the hot soldering iron to a point where the component lead and whatever it is being soldered to meet, and heat the connection.

5) While the soldering iron is still in place, touch the solder to the component lead and let it flow over the connection. Use enough solder to make a good connection but not so much that it drips off or spills over onto other components or circuit board traces.

6) Remove the solder first and then the iron. A good solder joint should have a shiny surface. A dull or crystallized surface is a sign of a "cold" joint that could fail down the road.

If you are new to soldering, don't try to learn on your project. Go to an electronics store and buy a few cheap components (resistors are good). Twist the component leads together and practice soldering on these parts 'till you get the hang of it. It won't take long.

Who knows, maybe by the Sixth Annual *Monitoring Times/Satellite Times* Convention you will have a few kit building tales to swap after hours. Have fun!

LIST OF KIT SUPPLIERS

A&A Engineering
2521 W. LaPalma #K
Anaheim, CA 92801
714-952-2114

DX Radio Supply
Box 360
Wagontown, PA 19376
1-610-273-7823

Jade Products, Inc.
PO Box 368
E. Hampstead, NH 03826
603-329-6995

Oak Hills Research
20879 Madison Street
Big Rapids, MI 49307
616-796-0920

Ramsey Electronics, Inc
793 Canning Way
Victor, NY 14564
1-800-446-2295

S&S Engineering
14102 Brown Road
Smithburg, MD 21783
301-416-0661

624 Kits
171 Springlake Drive
Spartanburg, SC 29302

Ten Tec
1185 Dolly Parton Pkwy
Sevierville, TN 37862
1-615-453-7172

DON'T PANIC...

... if you haven't received your *Monitoring Times* by the beginning of the month. Postal delays do occur, and we must wait until the 10th of the month before sending replacements for lost issues.

Be patient and wait until the 10th; if you still don't have your *MT*, call us at 1-800-438-8155 and we will be happy to send a replacement.



VOA Bethany Relay to be Shut Down

The Voice of America plans to close down its Bethany, Ohio, site by year end; it may even be off the air by Oct. 1. Plans are also to close the Greenville, North Carolina, receiver site, and one of the two transmitter sites. John Vodenik, engineer at the Bethany site and an avid supporter of the radio hobby, says the engineers who work at the stations are campaigning to prevent this, not merely to save their jobs, but to keep VOA from making a terrible mistake.

Overseas relays, satellite feeds and "placement" are all subject to control, curtailment, or censorship by foreign governments and businesses—what happened in Liberia and Rwanda are perfect examples. VOA must retain its capability to broadcast direct to the world on shortwave from U.S. territory. Vodenik asks all listeners to please ask their senators and congresspersons to oppose the VOA's plans.

ALASKA KNLS tentative W (winter)-94 Sept. 26 to Mar. 26, 1995, as planned last March: English at 0800 and 1300 on 7365; Russian 0900 on 7365, 1100 on 6150, 1700-1800 on 7355; Mandarin 1000 and 1200 on 7365, 1400-1700 on 7355 (Mark Schiefelbein, USENET via George Thurman) KNLS offers to test DAB—digital audio broadcasting—on shortwave (HCJB *DX Partyline*)

AUSTRALIA Besides ABC Regional Radio and CAAMA, a third station uses time on N.T. transmitter VL8K, 5025 or 2485—TEABBA—Top End Aboriginal Bush Broadcasting Association, Mon-Fri 2045-2300, 0730-0830 (Mike Welsh, Internet via *NASWA Journal*) Australia on 9610 again, but not Perth—R. Australia, Darwin, 250 kW at 1100-1430 and 2200-0100, both English at 290° (Jerome van der Linden, FIDONET *SW Echo* via Thurman, and Wolfgang Büschel) From *2158 peaking around 2230, past 0000 (John H. Cobb, Jr., GA) Also audible here (gh) RA has moved into the ABC domestic service building in South Melbourne; postal address remains GPO Box 428G, Melbourne 3001, but phone and fax change: switchboard: +61-3-626-1800; transmission management 626-1914; fax 626-1899 and 626-1916 (Andreas Volk, USENET via Thurman)

AZERBAIJAN Director of R. Azerbaijan, at Vancouver SW conference, confirmed spelling of external service is R. Dedekorhut, via Russian transmitter (Walt Salmaniw, *DX Ontario*) Had been reported as R. Dada Gorgud.

BANGLADESH R. Bangladesh external on 13615v and 9548v at 1230-1730, first half hour in English; on 9683v and 7190v at 1745-1815 V. of Islam in English, own service at 1815-1845, and Bengali 1915-2000 (BBC Monitoring) On new 9650 at 1315-1730 (Victor Goonetilleke, Sri Lanka, Radio Netherlands *Media Network*)

BELARUS At Vancouver conference, I tried to convince Aleksey Vlasenko, Dir. of R. Minsk, to start a weekly weekend English segment. He seemed willing to oblige (Walt Salmaniw, *DXO*)

BOLIVIA Early broadcasts from the new Guayaramerin station on 4632.4 (see last two issues) were identifying as R. Carlos Antonio, at 2300 (JOE, BM and HBG, Sweden, *SW Bulletin*)

BOSNIA-HERCEGOVINA R. Yugoslavia, via Bijeljina for some transmissions, has expanded R. of the Serbian Republic of B-H to half an hour at 2200 on 7265, 0100 on 11870 (BBCM) Maybe 30 or 60 minutes later on lower winter frequencies (gh) This service also heard at 1730-1800 on 9505 announcing 2100 local time on 11870 to North America, 0800 local time on 7265 to Australia, but not heard at 1900 or 0600 UT (BBCM)

BOUGAINVILLE R. Free Bougainville moved from 3870 to 3850 to avoid government's R. United Bougainville on 3880; RFB heard at 0800; power previously reported at only 5 watts (IARN via John Norfolk, *W.O.R.*)

BRAZIL Santa Maria station with 1 kW on 5965 or 11705 renamed R. Nova Visão, ex-R. Transamérica (Omija, Brasil, via T. Inoue N., *Play-DX*) SRI relay at 0030 finally on nominal 5885 ex-5888.3 (Joel Rubin, Bill

*All times UTC; all frequencies kHz. *Asterisk before/after time station sign-on/sign-off; // parallel; + means continuing but not monitored; = 2 x indicates 2nd harmonic of following frequency.*

Westenhaver, Kevin Hecht)

CANADA Letters matter in persuading leaders to restore RCI funding as recommended by Senate committee—tell why RCI should be restored and strengthened to: The Right Hon. Jean Chrétien, Prime Minister of Canada, Ottawa K1A 0A6; fax 613-995-5980; and The Hon. André Ouellet, Minister of Foreign Affairs, Ottawa K1A 0G2; fax 613-944-0699 (Coalition to Restore Full RCI Funding, USENET, via Thurman) RFPI's Salmon Arm, B.C., project is still on, though at least a year away. The land is purchased, and they hope to buy a used 50 kW AM transmitter for only US\$17K and Convert it to SW, which is not too difficult (Walt Salmaniw, *DX Ontario*)

CHINA V. of Jinling, from Jiangsu to Taiwan, on new 5860 ex-4875 around 1130-1600; also on 7215 at 2330-0200 (Tatsuo Gima, Asian Broadcasting Institute via R. Japan *Media Roundup*)

COLOMBIA Correction to last month: Samacá, not Samaci
COSTA RICA RFPI replaced 7375 with 7384.6 to avoid jamming, 30 kW at 2300-0800; a great improvement, and noise on 7375 then disappeared; hope pirates will use 7375 instead. Rotatable log-periodic for 9400-USB damaged, so reactivated with smaller but higher antenna permanently aimed north. May resume USB on 21-mb in 0000-1800 period when 21465 is not usable. Quarterly program changes take place Oct. 1 (gh) TIFC very strong on 9644.7 since Mid-July, probably new transmitter, 0530-0700 at first with spurs on 9538.1 and 9751.3; sounds like 10 kW or more (Ernie Behr, Kenora, Ont.) R. Reloj reactivated on 4831.45 // 6005.52, at 1015, great signal (Dave Valko, PA, *FT*)

CZECH REPUBLIC R. Metropolis is licensed to use two 40 kW at Podebrady, on 31, 41 and 49 mbs, maybe already on, to Europe, South America, and in English to North America; promotes Czech companies' business in the world (Vashek Korzinek, South Africa, *NU* via J. D. Stephens, *SW Echo* via Ken Zichi, *MARE Tipsheet* via HCJB *DX Partyline*) see August

ECUADOR R. Federación on reserve frequency 5980 instead of



4960.9 in difficult-to-identify Shuar language (Henrik Klemetz, Colombia, HCJB DXPL)

EGYPT R. Cairo unexpectedly added early prepeat of N. American service, 2300-0030 on 9900 in English, modulation still awful, news at 2315 (Bill Westenhaver, PQ, W.O.R.)

GERMANY Contrary to last month's assumption, DW delayed next *Stadtbummel* a week to Sun. Sept. 25 just after timeshift to an hour later at 0632, 1432, 2232; German game from Bad Harzburg, also has multi-lingual greetings at end. Bad Harzburg, "a place for all seasons," also subject in English of *Living in Germany*, Oct 5,6,9, including UT Mon to N.America. (gh) DW has to leave asbestos-contaminated building in Cologne; will move to new building in Bonn mid-1997 (Dieter Weirich, DW, RNMN via BBCM)

GUATEMALA La Voz Popular, URNG clandestine, Tue./Fri. 5-6:45 and 8-9 pm local time on 7000 and 3500 both variable; army bombs mountainside before each broadcast hoping to disable station and sometimes comes close; 2 kW has trouble penetrating jamming in Guat. City (Julia Batrez Lemus, LVP, visiting Canada via Robert Ross, DXO)

HAWAII KWHR W-94: 2200 on 17510, 0400 on 9930, 1600 on 6120, 1800 on 13625, 2000 on 11980 (George Jacobs & Associates) *World of Radio* no longer UT Sun 0600, but UT Mon 0330 on 17510. The team scouting for another SW site here were definitely Adventists, but since AWR has disclaimed them it seems likely to have been Prophecy Countdown, next step after taking over WCSN (gh)

INDONESIA RRI Medan clear on new 9745 at 0430-0800, not Sorong on listed 9743 (Victor Goonetilleke, Sri Lanka, RNMN)

IRELAND *Christ Gospel Broadcast*, P.O. Box 786, Jeffersonville, IN 47131, QSLed broadcast on 3910 at 1900-2100 Sunday, but site not specified. Is on *Reflections Europe* service of pirate Radio Fax, which also uses 6205 (*SW Bulletin*, Sweden)

ISRAEL Israel R. English went into effect Aug 28 with end of summer time: 0500-0515 on 7465, 9435, 17545; 1100-1130 on 15640, 15650, 17575; 1400-1425 Sun-Thu on 15640, 15650; 2000-2030 on 7405, 7465, 9435, 11603, 17575; 2230-2300 on 7405, 7465, 9435, 11603, 15640 (via Diane Mauer, WI)

KOREA NORTH Young Soldiers station resumed 1613v and 3025 in late July, but not yet 2624 (Tsunaaki Ashinori, Japan, SPEEDX and Yurihiko Nishino, ABI, Tooru Yamashita, RJMR) V. of National Salvation, clandestine to the South, good and clear without jamming at 0510 on 13350 = 3 x 4450. 13350 also bears a mixing product from RCI at *1456-1530* in Russian on 6150 and 7200 (Ashinori, Japan, SPEEDX) The latter is listed at Yamata, Japan, relay (*DX Listening Digest*)

KOREA SOUTH Canada relay of RKI at 1030-1100 on 11715 doesn't work west of the terminator, and direct reception often is the pits; try 9570 for *SW Feedback*, Suns. 1307, or 7180 at 1237 (gh, OK) RKI activated brand new 250 kW Thomcast transmitter at Kimje Aug 1 (*R. Korea Newsletter* via Bill Flynn)

MOZAMBIQUE Voz da Renamo returned 18 July, after missing since 30 May—0500 on 6145, 1045 on 9900, 1600 on 5180 (BBCM)

NETHERLANDS RN suspended Arabic Aug. 6, filled time with English (RNMN)

NEW ZEALAND Print Disabled Radio renamed Radio Reading Service, plans new 5960 USB //7290 Sun.-Fri. 2030-0500 Mon.-Sat. // 1602 and 3935 which run until 1000; Suns. 0600-0900 on 1602 and 3935 only (Arthur Cushen, RNZI *Mailbox*) RNZI plans to replace 11900 and 6100 with 9700 from Oct. 1, but schedule received has wrong times (gh)

NICARAGUA Check 5770 periodically for potential return of this country's only SW station, R. Miskut. Full-data QSL letter says YNPMK, Puerto Cabezas has 1 kW ITT MacKay, and a Telex S-1903 hi-gain horizontal dipole, but off air due to problems in two MSR-6214 modules



(Dave Valko, PA, *Fine Tuning*)

PALAU KHBN, W-94 from Sept. 25: 9830 at 0800-1600, 2000-2300; 9965 at 1200-1900, 2100-2400; 15140 at 2300-0200; 15395 at 0800-1200; 17630 at 0000-0800 (GJ&A) Will independence bring new numerical call-sign and remove it from FCC jurisdiction?

PERU After a short period on 4781 with new 500-watt transmitter, R. Satélite reverted to 6726.6 for technical reasons. New on 4300.4 from 2330 is R. La Voz de Naranjos, from new town of same name in Rioja prov., S. Martín; broadcast greeting to R. Satélite. Cutervo stations are out-of-band neighbors: New R. Sudamérica on 5521.5. R. Ilucán on 5614, La Voz de Cutervo on 5660.5. New from Cuzco dept. on 5305.2 is R. Municipal de

Paruro, heard around 1100 and 0000, no ads. Reactivated: R. Visión 2000 on 5131, R. L.V. de Huamanga on 6070.3, R. Centinela, Huancabamba on 6544.7 (Henrik Klemetz, Colombia, HCJB DXPL) Also back is L. V. de San Antonio, 6627.4 at 0100; R. Paucartambo, 5894.7 in morning only at 1135 (Klemetz, *Play-DX*) R. Municipal, 5305 also heard at 0940-0952 (Fernando Viloria, Venezuela via Stgo. San Gil)

PHILIPPINES R. Liberty began using VOA site mid-Aug in Russian to the east, 0700-1100 on 11860, 2000-2200 on 7230 (S. Aoki, Japan, RNMN)

PORTUGAL Deutsche Welle's English to Europe at 2000-2050 W-94 is via Sines 5960, 7285 (Wolfgang Büschel, Germany)

RUSSIA State TV and radio system is collapsing due to cash shortage. Some 88% of funds are consumed by MinCom for ground stations and satellites, only 12% spent on program production. Hours on air may have to be cut (Anatoliy Lysenko, director in *Sevodnya* via Pavel Mikhaylov, V. of Russia via BBCM) Once all over the HF bands, Mayak now claims to cover 99% of Russia's population without SW but on LF, MF, VHF, satellite; our monitoring hardly finds it above 6 MHz except some feeders—6751, 5276, 3778 as well as 4940, 4930, 4825 (BBCM) DW W-94 English relayed via Russia: 0200 on 9815 Zhigulyovsk, 0900 on 12055 Irkutsk, 1600 on 7305 Novosibirsk (Wolfgang Büschel)

ST. HELENA R. Saint Helena sent me a QSL although I never heard their broadcast and only sent them a thank-you note for doing it; same happened with Western Samoa via Radio Korea (Carl Kruger, England, HCJB DXPL) We also got full-data QSLs from Iraq and Qatar without sending them reception reports (Ken MacHarg & Rich McVicar, *DXPL*) That makes our treasured QSLs for St. Helena worthless, even though we really heard them (gh) This year's special is Fri. Oct. 14 at 2000-2300 on 11092 (Arthur Cushen, RNZI *Mailbox*) Lots of stations QSL automatically as a "courtesy" (gh)

SAUDI ARABIA BSKSA's head of engineering at the Vancouver conference assured me that the English service has not been abandoned. The SW transmitters are being refurbished and should return shortly with superior signals (Walt Salmani, *DX Ontario*) Was 1700-2100 on 9705 and/or 9720

SOMALIA Feasibility study to rehabilitate R. Hargeisa includes new 25-kW SW transmitters (R. Hargeisa via BBCM)

DX Listening Digest

More broadcasting information by country compiled
by Glenn Houser

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SOUTH AFRICA VOA now via Meyerton, Sat. & Sun. 1600-1700 on 3970, Mon.-Fri. 1800-1900 on 4985, English to Africa; first time for VOA on tropical band? (RNMN) Well, Ukraine relayed them on 4940 (gh)

SUDAN (see last month) R. Omdurman heard irregularly in July on 9370 (Mike Osborn, *BDXC Communication*) By August, English at 1800-1900 on 9200 but not daily, so maybe sometimes on other frequencies (Edwin Southwell, England) 9200 ex-9165, also in French 1700 (Eugene Gebreurs, RVI *Radio World* via Büschel, Cline, Mauer) Also Arabic before 1700 (Achim Brückner, Germany, *DSWCI SW News*)

SWITZERLAND See Sept; SRI in Portuguese at 1030-1045 on 11640 et al, is not for Timor, but Brazil (gh) Is unofficial, simulcasting satellite feed for placement (Walter Funkhauser, SRI, *RNMN*)

SYRIA Syrian Arab Republic R., Main Program, as expected for winter time from Oct. 1, in Arabic: 0559-1700 on 15095, 12085; includes program for Golan Heights Sat. 1445-1600, and Palestine broadcast daily 1630-1730 (BBCM)

THAILAND BBC WS to build its eighth relay station in northern Thailand, 4 x 250 kW and two aerial systems operational within three years, towards China, Indian subcontinent (*BBC Worldwide*) 300 rai of land in Nakhon Sawan Province, western Thailand, total cost 12.3 megapounds; Britain pays Thailand 5 megapounds; English and 10 other languages but Thai not allowed, 20-year agreement, expected on air before 1996 (V. of Free Asia via BBCM) To replace Hong Kong, 250 km N of Bangkok, 14 curtains, main beams centered on 280 and 45 degrees (*International Broadcast* magazine via Büschel) Though heard at 1325-1330 on 6764.9 USB, Bangkok Meteorological Radio announced official schedule on 6765 as: 0000-0200, 0300-0500, 0600-0800, 0900-1100, 1200-1300, 1600-1700, 1800-2000, 2200-2300—weather in Thai and English (Takayuki Inoue Nozaki, *Relámpago DX Logging* via *Play-DX*) Radio Thailand began via VOA-Udorn Aug. 11. English: 0000-0030 on 9690 to S. Africa; 0030-0100 on 15370 to E. N. America; 0300-0330 on 15370 to W. N. Am.; 1900-2000 on 9700 to Scandinavia; 2030-2045 on 9700 to Britain. Other languages: 0100-0200 and 0330-0430 on 15370; 1100-1130 on 7245; 1130-1200 on 6040; 1200-1230 on 11805; 1300-1400 on 11845, 1800-1900 on 9690, 2000-2030 and 2045-2115 on 9700 (via Dan Ferguson, VOA, Usenet via George Thurman) Best here at 1300-1400 is 11845, but only English heard is "HSK9" ID between languages; should do morning broadcast to us instead of evening—15370 sometimes audible, fluttery. Better yet, insist on using VOA US sites (gh, OK)

UKOGBANI BBC WS and Red Cross have launched *Radio Link*, in Croatian and Serbian, to help refugees, separated families get in contact, Suns. 1930-2000 on 1296, 5875, 6125, 9825, 9915, 11680 (BBCWS via BDXC) Now 2030?

USA VOA revived Spanish on SW calls itself "Voa-Sat," at 0100-0200, 1200-1300 but terminated the weekday 1700 and 2130 broadcasts (gh & Vodenik)

On short notice, KGEI, Redwood City, CA, closed down at the end of July. Financial support for the Latin American service had declined and FEBC could no longer justify it; their main target is, of course the Far East. On his final broadcasts, Pastor José Holowaty announced he was organizing OCRA—Operación Cristiana de Radiodifusión Americana, hoping to raise \$40K per month to continue his ministry via satellite or some other SW facility; fax him at home: 415-347-6320, or write José, P.O. Box 0927, San Carlos, CA 94070. KGEI had been on the air since 1939, lately using 15280 from 2200, 9615 from 0300 (gh) ELWA, Liberia, may get the vintage KGEI 50 kW transmitter, and FEBC may move the 250 to Philippines (RNMN) Within two weeks, transmitters, antennas, towers, dismantled and sold to different buyers in the world (Adrian Peterson, via Tom Sundstrom, SWL-List via *DXPL*) Area surrounding KGEI is heavily contaminated with PCBs (Robert Fortner, Intersearch, Vancouver conference via Walter Salmaniwi, *DXO*)

If you're reading this after Sept. 27, WYFR's Harold Camping was

wrong about the World ending just now. Tentative W-94 schedule shows WYFR using lowest possible frequencies pioneered by other stations, both toward Europe: 5810 at 2000-2300, 5825 at 1845-2145 (gh) Camping's "divine numerics" are refuted in detail by G. Richard Fisher, reviewing Camping's vanity-published book, in *The Quarterly Journal of Personal Freedom Outreach*, P.O. Box 26062, St. Louis, MO 63136 (via Larry Sites, *Holysmoke* via J. J. Hitt, via Jeff Miller, *SW Echo*, via George Thurman) Annual giving to Family Radio is up 20% this year to \$12 million (AP via Doylestown *Intelligencer* via John Schmid)

WRMI, 9955, added Ernst Zundel, Nazi programming Sat in English, Sun in German, both at 1900-1930. Due to unrest in Cuba, La Voz de la Fundación doubled WRMI airtime not only at 0200-0500 but also at 1100-1400 except local Sundays. See also HONDURAS (gh)

Expect WCSN to change officially to WVHA in Nov. or Dec. WCSN's final W-94 schedule, presumably meant for WVHA programming only, depends on day of week: Mon., Wed., Fri. 2300 on 7465, 0400 on 5850, 1100 on 11695, 1300 on 15665, 1500 on 21670, 1700 on 17612.5, 2000 on 11695. Not only frequencies, but some targets and azimuths differ on Sun., Tue., Thu., Sat.: 2300 on 7465, 0400 on 5850, 1100 on 11695, 1600 on 15665, 1800 on 9930, 2000 on 5850.

Moniro Radio International's new *Letterbox* host is Lisa Dale (WSHB, via Pete Costello via George Thurman) Moved to .49 past the hour weekdays, "10 before the hour," reduced to only 3 minutes and repeated all day (gh) Daily news programs updated thrice weekly at 0900, 1600, 2000, the last repeated over and over until 0900 next day (Jim Moats, OH)

Another time to hear *Outlaw for Peace*, Willie Nelson & Friends is Wed. 2300 on WRNO 7355 (Diane Mauer & gh) *Latino USA* apparently gone this and other days from WRNO (gh)

KCBI Denton, Texas has been renamed KAIJ (Jerry Berg, *NU* via *NASWA Journal*) Tried to confirm one night at 0300, on 9815, but no legal ID despite pauses/music in *World University Network* programming for the purpose—FCC should cite such infractions; try at 0200 frequency shift (gh)

Until Oct. 30, KVOH is registered: 0000-0700 on 9785; from Oct. 30 it may use 9785 or 7415 at 0000-0800; and entire season 1200-0300 on 17775 (GJ&A) Only one transmitter, so it may switch from 17 to 9 or 7 any time between 0000 and 0300 (gh)

WWCR program host Tom Donahue (*America's Town Forum*) went to jail in Mansfield, TX, appealing and claiming he is innocent, but no longer doing his show. (via Adam Lock, WWCR) Donahue was convicted on 32 counts of racketeering and fraud (James Latham, RFPI)

FCC hiked spectrum usage fee imposed on SW stations from \$35 to \$45 per frequency hour, blaming cost of living (George McClintock, WWCR)

WHRI, W-94 simplifies its schedule: toward Europe, 2200 (or as early as 2000)-1500 on 7315, 1500-2200 on 13760; toward S. America, 1800-1000 on 9495 (alternate 15545 at 2100-2300), 1000-1300 on 9850, 1300-1800 on 15105 (GJ&A)

WINB, W-94: 1600-1900 on 15715 62°, 1900-2400 on 11915 62°, 0000-1100 11950 242° (GJ&A)

VENEZUELA R. Caracas R. is not on 25705 or any SW frequency (Winter Denyite Monges, BDXC)

VIETNAM VOV H'Mong Service: 0430-0600, 1100-1330, 2200-2330 on 6166v, 5033v (BBCM)

ZAMBIA Deregulation allows private SW, and Christian Voice has CP, target Dec. 1, with 100-kW Continental, "shower service" vertical incidence antenna covering 1500-km radius; site is 8000-acre farm, 35 km from Lusaka where also building Bible college, med center; mainly in English, some programs produced in UK, will be stronger domestic service than the national station, and further plans are for external service to North and South Africa; plenty of power, near generating station. Besides Christian programming, also with health, news and sport (RNMN)

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

Broadcast Loggings

Gayle Van Horn



Thanks to our contributors — Have you sent in YOUR logs?
Send to **Gayle Van Horn**, c/o Monitoring Times.
English broadcast unless otherwise noted.

0000 UTC on 13760

NORTH KOREA: Radio Pyongyang. Editorial on atomic energy agencies. North Korea concerned over apparent nuclear waste being dumped by Japan in North Korean waters. Listeners letters, schedule and anthem to 0047*. (Steve Hunter, Draxel Hill, PA) Station heard on 13760 at 1300. (Jim Moats, Ravenna, OH)

0000 UTC on 6175

UNITED KINGDOM: BBC. *Good Books* show featuring a great sea novel, *The Riddle of the Sea*. (Hunter PA) *Newsdesk* noted on 12095 at 0358. (Moats, OH) BBC Canadian relay heard on 9515 at 1515. (Bob Fraser, Cohasset, MA; Leroy Long, Edmond, OK; Douglas Carn, Phoenix, AZ)

0008 UTC on 9540

SPAIN: Radio Exterior de Espaa. Newscast, Africa and Asian topics. News on restoration projects in Madrid, and feature on a popular Spanish rock group. (Alex R. Johnson, Atlanta, GA) Station monitored on 9540 at 0100-0130. (Long, OK; Carn, AZ)

0020 UTC on 3300

GUATEMALA: **Radio Cultural.** Religious programming. Additional Guatemalans monitored: **Radio Tezulutlan** on 4835 at 0305, **Radio Kekchl** on 4845 to 0305*, **Radio Buenas Nuevas** on 4799 to 0330*. (Sam Wright, Biloxi, MS)

0109 UTC on 9885

SWITZERLAND: Swiss Radio Intl. Interview, European politics // 6135. Recent politics in Mexico. *Program News Net* weekly headlines. (Frank Hillton, Charleston, SC)

0116 UTC on 9955

USA: Radio Miami Intl. Interesting travelogue on the Philippines, noting Spanish history and attractions. ID at 0120 with frequency and QSL address. DX news covered by Fidel's jammer at 0127. (Charlie Patterson, Mobile, AL; Hunter, PA)

0130 UTC on 11645

GREECE: Voice of Greece. Station ID to English newscast and national weather update. (Moats, OH; Long, OK) VOG audible at 0721 on 9425, 15650 kHz. (Giovanni Serra, Rome, Italy; Long, OK)

0155 UTC on 5040

COLOMBIA: La Voz de Yopal. Spanish. U.S. pops to ad jingles. Regional updates to station promotionals. (Tom Banks, Dallas, TX)

0155 UTC on 9735

PARAGUAY: Radio Nacional de Paraguay. Spanish. Paraguayan music to frequency station IDs. Good signal most evenings. (Hunter, PA)

0200 UTC on 9475

EGYPT: Radio Cairo. Time pips to ID. Frequency quote, no mention of // 11600. Program preview into Egyptian music and feature. Usual poor audio. (Banks, TX)

0250 UTC on 4825

PERU: **La Voz de la Selva.** Spanish. Local info at tune-in. Pop vocals to 0300 ID. Announcer chat to promo, ID/frequency quote and sign-off anthem at 0309. Peru's **Radio Ancash** at 1000 on 4991. Morning show included chat, commercial and ballads. (Wright, MS)

0632 UTC on 6015

BELGIUM: Radio Vlaanderen Intl. National news, weather forecast. Pop tunes to ID. DX program **Radio World** audible on // 9925. (Serra, Italy) **Brussels Calling** monitored on 15545 at 1300. (Moats, OH)

0800 UTC on 15445

FINLAND: Radio Finland. Time signal pips at tune-in. Station ID to news. Classic music bridge to feature, *Studying in Finnish* heard on // 17800. (Serra, IT)

1026 UTC on 6160

CANADA: CKZN St. John's, Newfoundland. *Labrador Mornings*, sports report to pop music. Talk on events in Happy Valley, Newfoundland. Signal should improve dramatically during winter months. (Hunter, PA)

1040 UTC on 3280

ECUADOR: **La Voz del Napo.** Spanish. Ecuadorian flute music at tune-in. Fair signal for ID/promo and public service promos. Ecuador's **Radio Centro** on 3289 at 1050 with morning show. (Brian Bagwell, St. Louis, MO)

1102 UTC on 21600

GERMANY: Deutsche Welle. World news to station ID. Feature on composer Orlando Di Lasso audible on 17860, 17800, 17765, 15410, 17715. (Serra, IT)

1105 UTC on 4753.4

INDONESIA: (SULAWESI) RRI-Ujung Padang. Indonesian. Lady announcer with news and talk. Pop vocals audible to 1136. (Bagwell, MO)

1105 UTC on 3315

ADMIRALTY ISLANDS: **Radio Manus.** Fair signal for morning religious service and hymns. New Guinea's **Radio Western Highland** heard at 1120 on 3375. (Bagwell, MO)

1110 UTC on 4874.6

INDONESIA: (IRIAN JAYA) RRI-Sorong. Indonesian. WOW! Signal reading

of S-91 60's era classic pops to lady DJ's talk and music. ID breaks for pop Indo tunes. Fanfare twice to Intro ID and news at 1200. Signal fade by 1205. (Wright, MS)

1200 UTC on 9675

PAPUA NEW GUINEA: NBC. Nat'l news to forecast. Port Moresby time check at "3 past 10" into vocals. Music and PNG sports update. On rechecks, this station audible up to 1550! Very quiet conditions for a solar flux rating of 71, resulted in very good Asia/Pacific signals. Recheck the next morning bagged following PNG frequencies. 1110-1140: 3345, 3315, 3275, 3305, 3355, 3375, 3395, 4890/9675. (GVH/NC)

1220 UTC on 15009

VIETNAM: Voice of Vietnam. Vietnamese. Lady announcer presenting haunting Asian music. Station info to 1228*. English service *1230 with sign-on ID/frequency quote, and program preview. National and world news headlines to editorial. Sign-off routine at 1256, followed by French service sign-on with ID/frequencies and newscast. (GVH/NC)

1315 UTC on 15165

SAUDI ARABIA: BSKSA. Arabic. Holy Koran presentation and music audible to 1505. // 17880, 15280 not heard. Additional BSKSA programming noted at 1318 on 15175 (very good signal!) and // 15060 with male/female announcer duo. Features, news, IDs and talks on Riyadh. Holy Koran noted also on 11965 at 1504. (GVH/NC)

1315 UTC on 9625

CANADA: CBC, Northern Quebec Serv. *Good Morning Quebec* Saturday morning program. Country music to regional forecast. Station's programming monitored 1400-1800. (Hunter, PA)

1443 UTC on 17695

FRANCE: Radio France Intl. Listener pen pal data from British accented DJ. Current affairs trivia contest to French pop vocals. ID with frequency quote, audible on // 15530, 12015, 17795 at 1605 with African news and updates. (Robert Carney, San Angelo, TX)

1445 UTC on 17595

MOROCCO: RTV Marocaine. Sunday English programming, with good signal! Featuring on world wide affairs through eyes of the United Nations. Today's focus on China. Station promo to ID and instrumental. French service commencing at 1500, with ID and international news. (Garland J. Thomas, Cleveland, OH)

1610 UTC on 15675

PAKISTAN: Radio Pakistan. National news to commentary. Regional music and time check. Discussion on upcoming conference in Muslim state, and update on national economy. (J.P. Conrow, Ft. Payne, AL)

1710 UTC on 11990

KUWAIT: Radio Kuwait. Arabic. World news and features to English service at 1800. Time pips, ID, local Kuwait time into program preview. (Banks, TX) Kuwait monitored this frequency 2000-2100. (Hunter, PA) (Thomas, OH)

1812 UTC on 15180

RUSSIA: Radiostansiya Tikhyy Okean. Tentative logging from this station in Vladivostok. Russian lady with text and music. Noted also on // 11870. No sign of // 11985, 15530, 21480. Radio Iraq Intl in Arabic under 15180. (GVH/NC)

1930 UTC on 15290

RUSSIA: Radio Moscow Intl. Music program, *Melodies of Love*. Music at *Your Request* heard on 11675 at 2030. (Fraser, MA)

2019 UTC on 9575

MOROCCO: **Radio Medi Un.** French. International newscast to Arabic vocals at 2025. French pop tunes presented by DJ format. (GVH/NC) **VOA's Morocco relay** heard on 17895 at 1730. (Fraser, MA)

2033 UTC on 15095

SYRIA: Radio Damascus. Arabic music to ID at 2035. Feature on Arabic music and leading national musician. Bothersome audio buzz present during national headlines. Arabic service commencing at 2103. No // 12095 freq. (John Harrison, Chicago, IL)

2202 UTC on 9445

TURKEY: Voice of Turkey. *Turkish Press Review* to station ID. News on international music festival, audible on // 11710, 7185. (Serra, IT)

2250 UTC on 4915

GHANA: GBC. Vernaculars. Regional music to DJ chatter. Reggae rhythms to 2300. "GBC" ID to pop vocals on a local Saturday night. Noted station at 2326 on 3366, with classic hits from Eric Clapton. (Patterson, AL)

2335 UTC on 5075

COLOMBIA: Caracol. Correspondents phone-in report during national news. Caracol promo, Bogotá time check and political news update. Station jingles and ID at 0005. (Carney, TX)

2350 UTC on 4930

HONDURAS: **Radio Internacional.** Spanish. Romantic ballad to 2355. Local time check and ID with jingle. Frequency quote with station promo. Local ads and vocal music. Honduran **HRET**, noted on 4960.8 with fair signal. Religious programming to hymn and announcer talk. (Conrow, AL)

U, F, K, GCT, YPP, XCB F9, P, CI ...

A new code broken by *MT*'s utility editor? Well, not this time! They are call letters of non-directional navigation beacons, monitored below the broadcast band from 525 kHz down to 190 kHz.

Non-directional beacons (NDB) signals consist of a letter and number or two to three letters, sent in continuous Morse code.

Popular among utility enthusiasts, NDB's act as site identification, with the companion carrier used for radio-bearing determination.

If you are interested in DXing or IDing the NDB beacons, why not join the Long Wave Club of America (LWCA)? LWCA also publishes an NDB beacon guidebook. For more information write: 45 Wildflower Road, Levittown, PA 19057.

ANTARCTICA

ZHF 44-Faraday Station, 9106 USB. Full data station QSL, full data prepared QSL, and personal letter signed by Simon Townshend. Photo of station and description of station duties included. Received in 399 days for an English utility report. Station address: British Antarctic Survey, Faraday Antarctic Station, High Cross, Madingley Rd., Cambridge, United Kingdom CBE 0ET. (Steve McDonald, Port Coquitlam, BC Canada)

BANGLADESH

Radio Bangladesh, 15255 kHz. Full data "Tribute to Martyrs" card signed by Md. Ramizuddin Bhuiya-Senior Engineer, and station schedule. Received in 888 days (198 after follow-up report via Bangladesh Embassy in U.S.) QSL received from DXer in Germany who received my QSL and I received his! Station address: Research & Receiving Centre, NBA, Radio Dhaka, 121 Kazi Nazrul Islam Ave., Dhaka-1000, Bangladesh. (Mike Hardester, Jacksonville, NC)

BULGARIA

Radio Bulgaria, 9700 kHz. Full data QSL card unsigned. Stickers, schedule, and personal note included. Received in 199 days for an English report. Station address: 4 Dragan Tsankov Blvd., Sofia, Bulgaria. (FAX: 650-560-871-061). (LeRoy Long, Edmond, OK)

CHINA

Xinjiang PBS Urumchi, 4735 kHz. Partial data QSL letter signed by Zhao Ji-shu. Used Chinese postage stamps and postcards included. Received in 223 days for an English report, cassette, used U.S. stamps, and one U.S. dollar. Station address: People's Broadcasting Station of Xinchiang, Urumchi, Xinjiang 830044, People's Republic of China. (Charlie Washburn, North Perry, ME)

DOMINICA

DBS Radio 595, 595. Date/frequency form letter, signed by Fred White, AG-Chief Technician. Received in 153 days (22 after follow-up report), AM report, 1 IRC, mint stamps, and address label. Station address: Dominican Broadcasting Corp., Victoria St., Roseau, Commonwealth of Dominica. (Hardester, NC)

HONG KONG

VPS8, 4232.5 USB. Full data letter signed by T.Y. Chan-Sr. Engineer. Received in 21 days for an English utility report. Station address: Hong Kong Telecom Intl Ltd., Telecom House 3, Gloucester Rd., GPO Box 597, Hong Kong. (McDonald, CAN)

ITALY

Italian Radio Relay Service (IRRS), 7125 kHz. Full data "downtown Milan" card unsigned. Card was numbered # 9372, mailed in Switzerland. Received in 481 days for an English report and one U.S. dollar. Station address: P.O. Box 10980, I-20110 Milan, Italy. (Washburn, ME)

NON-DIRECTIONAL BEACONS

YPP, 303 kHz-Lac Mauser, Quebec. Full data QSL verified. Received in 31 days for an English utility report and mint stamps. Beacon was commissioned 12/14/1993. QSL address used: Transport Canada, Technical Services, 4900 Yonge St., Suite 300, Willowdale, Ontario M2N 6A5. Additional reports should go to: Transport Canada, P.O. Box 5000, Montreal Intl Airport, Dorval, PQ Canada H4Y IBO. (Hank Holbrook, Dunkirk, MD)

GCT, 518 kHz-Guthrie, Iowa. Full data prepared QSL card signed by Cary R. Walthan-Clerk. Data sheet on airport included. Received in 10 days for an English utility report and mint stamps. Station address: City of Guthrie Center, 102 North 1st St., Box 100, Guthrie, IA 50115. (Holbrook, MD)

JB, 384 kHz-Lumberton, North Carolina. Full data QSL letter signed with illegible signature. Received in 19 days for an English utility report and mint stamps. Station address: Lumberton Municipal Airport, Lumberton/Roberson Airport Commission, Airport Blvd., Lumberton, NC 28358. (Holbrook, MD)

XCB, 260 kHz-Carlisle, Pennsylvania. Full data QSL letter signed by James L. Boothe-Master Sgt, U.S. Army, Director. Received in 21 days for an English utility report and mint stamps. Station address: Dept of the Army, Headquarters Carlisle Barracks, Carlisle, PA 17013-5002. (Holbrook, MD)

POLAND

SPB28-Szczecin, Poland, 2829.5 kHz. Full data

QSL letter for CW traffic. Received in 111 days for an English utility report. Station address: Panstwowa Agenja Rodiokomunikacyjna, Zarzad Krajowy, UL Kasprzaka 18/20, 01-211 Warszawa, Poland. SPB28 runs 5 kW into an omni. (McDonald, CAN)

SHIP TRAFFIC

MONTRACHET-KIMH, 4119 kHz (Tanker). Full data prepared QSL card signed by Bud Pratt-Radio Officer. QSL stamped with ship's seal and personal letter included. Friendly phone call received from Mr. Pratt. Received in 76 days for an English utility report, one U.S. dollar (returned) and a self-addressed-envelope. Ship address: c/o Crest Tankers, 8182 Maryland Ave., P.O. Box 11533, St. Louis, MO 61305-3721. (Russ Hill, Oak Park, MI)

MAGNOLIA ACE-3EVP8, 156.65 MHz (Pure Car Carrier). Full data letter and photo of ship. Received in 22 days for an English utility report and mint stamps. Ship address: Williams, Diamond & Co., 180 Howard St., 3rd Floor, San Francisco, CA 94105. (Holbrook, MA)

STAR ALABAMA-ELPG3, 156.65 MHz (Gearbulk). Full data prepared QSL card verified. Received in 26 days for an English utility report and one U.S. dollar. Ship address: c/o E.B. Communications (Great Britain) Ltd., 20 Imperial Way, Croydon, CRO4RR United Kingdom. (Holbrook, MD)

UNITED STATES

WEWN, 13615 kHz. Full data postcard unsigned, letter from V. Phillips-Frequency Manager, and station schedule. Received in 28 days for an English report. Station address: P.O. Box 100234, Birmingham, AL 35210. (Gerry LeStrange, East Brunswick, NJ)

WPEN-950 kHz AM. Full data letter signed by Larry Paulausky-Chief Engineer. Received in 8 days for an English utility report, mint stamps, and address label (used on return). Station address: One Bala Plaza, Bala Cynwyd, PA 19004-1494. FAX: (215) 664-9610. (Hardester, NC)

WHOO-990 kHz AM. Full data prepared QSL signed by J. Stevens-Program Director. Received in 425 days (12 days after 3rd follow-up). Station address: 1 Radio Rd., Orlando, FL 32808. (Hardester, NC)

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 Daylight Savings Time) 4, 5, 6 or 7 hours for Eastern, Central, Mountain or Pacific Time, respectively.

Note that all dates, as well as times, are in UTC; for example, the BBC's "John Dunn Show" (0030 UTC Sunday) will be heard on Saturday evening (8:30 pm Eastern, 5:30 PM Pacific) in North America, not on Sunday.

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 except for the "Newswire" listing, which begins on the next page.

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 and Hot Spots

CAMBODIA The radio station of the Khmer Rouge has changed its name again to an even longer one: R. of the Provisional Government of National Union and National Salvation of Cambodia; 5408 at 1200-1400, 2300-0200 only in Cambodian, according to the BBC Monitoring Service. Unfortunately, Cambodia continues to be a hot spot, despite several peace initiatives, including the United Nations effort described in this month's feature.

CUBA is another hot spot featured in this issue. As you read in Larry Van Horn's special report, following demonstrations in Habana, jamming of exile broadcasts seemed increased, notably on R. Martí on 11930 and 6055; WHRI on 9850, 9495; Caimán on 9965; CID on 9941.6, 6305.8; WRMI on 9955, among others—even at times these stations were off the air!

Radio Habana Cuba bumped Coro's DX program around the schedule to cover Castro speeches. Meanwhile, Glenn Hauser heard he had been blacklisted from any reference on Cuban DX programs, for alleged CIA connections! ("Is McCarthyism alive and well in Revolutionary Cuba?!" asks Hauser) Castro was also heard on R. Rebelde at

0500 on 4757.7 and 5021.5, as reported by Ed Rausch (NJ) on HCJB's *The Latest Catch*.

[non] As the exodus from Cuba worsened, R. Martí increased from six to ten frequencies to combat jamming in Havana (Greg Pierce, *Washington Times* via Chet Copeland) White House spokeswoman Dee Dee Myers said that although money and gifts Cuban-Americans can send to relatives in Cuba are being restricted, batteries and radios will be allowed as gifts, so that they can listen to Radio Martí. ("With power being doubled to 100,000 watts, they could probably pick up Martí on a toaster—if they had a toaster," comments Rachel Baughn.)

KAZAKHSTAN R. Kazakhstan replaced English from R. Alma-Ata at 1830-1900 with Russian at 1800-1900 on 17765, 17730, 17715, 17605, 15385, 15360, 15215, 15155, 5970, 5260, 5035; Russian is new on external service (BBCM)

RWANDA R. Rwanda reactivated on 6055 under RPF control, at first matching former R. Muhabura schedule, then modified to include news in Kinyarwanda at 0430, 1730; English at 1145 and 1830 or 1845, but 6055 was not

heard after Aug 1 (BBCM)

A Brussels-based human rights group for refugees in Kinyarwanda is broadcasting a daily "Amahuru" (?) program (meaning peace) via Africa Number One, Gabon, 9790, at 1700-1800. It also plans to add 0430-0530 via Ethiopia on 9560, according to Radio Netherlands *Media Network*.

ZAIRE authorized Reporters Without Frontiers to operate Radio Gatashya (meaning "swallow heralding good news," in Kinya-rwanda), on FM and SW to Rwanda, as reported on PeaceNet via Patrick Crumhorn. Broadcasts are also in French and Swahili from Bukavu or Goma; perhaps this is the unidentified station in K-R at 0845 on 6120 (BBCM via RNMN)

Voice of Zaire, Bukavu, near Rwanda, can be heard on second harmonic on 6553 (2 x 3276). It has been previously heard on 9695 (2 x 4848v); news in French at 0430, 1630, relays Kinshasa at 0500 (BBCM)

Thanks to Glenn Hauser, David R. Alpert, BBC Monitoring Service, Radio Netherlands Media Network and others for this month's Hot News and Hot Spots.

MT Monitoring Team

Gayle Van Horn, Frequency Manager
North Carolina

Next Reporting Deadline
September 23, 1994

Jim Frimmel, Program Manager
Texas

Dave Datko B.W. Battin
California New Mexico

Jacques d'Avignon
Propagation Forecasts
Ontario, Canada

newslines

"Newslines" is your guide to news broadcasts on the air. • All broadcasts are world news reports unless followed by an asterisk, which means the broadcast is primarily national news. • All broadcasts are daily unless otherwise noted by the day codes.

0000 UTC (8:00 PM EDT, 5:00 PM PDT)

BBC
CBC Northern Quebec Service
China Radio Int'l
Monitor Radio Int'l [T-F]
Radio Australia
Radio Havana Cuba [T-S]
Radio Moscow
Radio New Zealand Int'l [M-A]
Radio Prague
Radio Thailand
Radio Yugoslavia [M-A]
Spanish National Radio
Voice of America (am)
0003
Radio Pyongyang
0009
BBC*
China Radio Int'l*
0010
Radio Havana Cuba [T-S]*
Voice of America (ca) [T-A]*
0030
HCJB
Radio Havana Cuba [T-A]
Radio Moscow
Radio Nacional de Venezuela [T-S]
Radio Netherlands Int'l
Radio New Zealand Int'l [M-F]
Radio Sweden [T-A]
Radio Thailand
Radio Vlaanderen Int'l
Voice of America (am) [T-S]
(Special English)
Voice of America (as) (Special English)
0050
RAI Italy
0055
Vatican Radio [S-W-F]

0100 UTC (9:00 PM EDT, 6:00 PM PDT)

All India Radio
BBC
CBC Northern Quebec Service [S/T-F]
Deutsche Welle
FEBC (Philippines)
Monitor Radio Int'l [T-F]
R Slovakia Int'l [A]*
R Slovakia Int'l [S/T-F]
Radio Australia
Radio Canada Int'l
Radio Havana Cuba [T-S]
Radio Japan

Radio Korea
Radio Moscow
Radio New Zealand Int'l [M-A]
Radio Norway Int'l [M]
Radio Prague
Radio Tashkent
Radio Ukraine Int'l
Spanish National Radio
Swiss Radio Int'l
Voice of America (am)
Voice of Indonesia
0110
Radio Australia [M-F]*
Radio Havana Cuba [S/T-F]*
Radio Japan [A]*
0130
BBC (as) [T-A]*
Radio Austria Int'l
Radio Havana Cuba [T-A]
Radio Moscow [T-A]
Radio Netherlands Int'l
Radio Sweden [T-A]
Radio Tirana
Voice of Greece
0145
BBC (ca) [T-A]*
0155
Voice of Indonesia

0200 UTC (10:00 PM EDT, 7:00 PM PDT)

BBC ("Newsdesk")
CBC Northern Quebec Service [M-A]
Christian Science Sentinel [A]
Deutsche Welle
Monitor Radio Int'l [T-F]
Radio Australia
Radio Budapest Int'l
Radio Canada Int'l
Radio Havana Cuba [T-S]
Radio Moscow
Radio New Zealand Int'l [M-A]
Radio Romania Int'l
Voice of America (am) [T-A]
Voice of America (as)
Voice of Myanmar (Burma)
WINB [T-A]
WWCR #3 [T-A]
0203
Voice of Free China
0210
Radio Havana Cuba [T-S]*
0215
Radio Cairo
Radio Nepal

0230
Radio Havana Cuba [T-A]
Radio Moscow
Radio Netherlands Int'l
Radio Pakistan
Radio Portugal Int'l [T-A]
Radio Sweden [T-A]
Radio Tirana

0300 UTC (11:00 PM EDT, 8:00 PM PDT)

BBC
CBC Northern Quebec Service
China Radio Int'l
Deutsche Welle
HCJB
KVOH [T-A]
Monitor Radio Int'l [T-F]
Radio Australia
Radio Havana Cuba [T-S]
Radio Japan
Radio Moscow
Radio New Zealand Int'l [M-A]
Radio Prague
Radio Thailand
Voice of America (af) [A-S]
Voice of America (af) [M-F]*
WHRI #2 [T-A]
WINB [T-A]
WWCR #1 [T-S]
WWCR #3 [T-A]
0303
Voice of Free China
0309
BBC*
China Radio Int'l*
0310
Radio Havana Cuba [S/T-F]*
0315
Radio Cairo
0320
Radio Philipinas [M-A]
0330
BBC (af)*
Radio Budapest Int'l
Radio Dubai
Radio Havana Cuba [T-A]
Radio Japan [A]*
Radio Nacional de Venezuela [T-S]
Radio Netherlands Int'l
Radio Prague
Radio Sweden [T-A]
0340
Voice of Greece
0355
Radio Japan

0400 UTC (12:00 AM EDT, 9:00 PM PDT)

BBC ("Newsdesk")
BBC (af)
CBC Northern Quebec Service
Channel Africa
China Radio Int'l
Christian Science Sentinel [A]
Deutsche Welle
Monitor Radio Int'l [T-F]
Radio Australia
Radio Canada Int'l
Radio Havana Cuba [T-S]
Radio Moscow
Radio New Zealand Int'l [A]
Radio New Zealand Int'l [M-F]*
Radio Romania Int'l
Radio Tanzania
Radio Ukraine Int'l
Swiss Radio Int'l
Voice of America (af)
Voice of Turkey
WHRI #2 [T-H/A]
WINB [M-A]
WYFR (Satellite Network) [T-S]
0403
Radio Pyongyang
0409
China Radio Int'l*
0410
Radio Havana Cuba [T-S]*

0411
Channel Africa [T]
0425
RAI Italy
0430
Channel Africa [A]
Radio Bulgaria
Radio Havana Cuba [T-A]
Radio Moscow
Radio Yugoslavia
Voice of America (af) [M-F]*
0431
Channel Africa [T/H/F]
0440
BBC (af) [A-M]*
0445
BBC (af) [T-F]*
Radio Yerevan

0500 UTC (1:00 AM EDT, 10:00 PM PDT)

BBC ("Newshour")
CBC Northern Quebec Service
Channel Africa
Christian Science Sentinel [S]
Deutsche Welle
HCJB

Monitor Radio Int'l [T-F]
Radio Australia
Radio Cameroon
Radio Canada Int'l [M-F]
Radio Havana Cuba [T-S]
Radio Japan
Radio Moscow
Radio New Zealand Int'l [S-F]
Radio Norway Int'l [M]
Spanish National Radio
Swiss Radio Int'l (eu)
Voice of America (af)
Voice of Israel
WINB [M-A]
0510
Radio Australia [M-F]*
Radio Havana Cuba [T-S]*
0530
Channel Africa [S-F]
Radio Austria Int'l
Radio Dubai
Radio Finland
Radio Havana Cuba [T-A]
Radio Moscow
Radio Romania Int'l
Voice of Nigeria
0555
Radio Japan [A]

0600 UTC (2:00 AM EDT, 11:00 PM PDT)

BBC
BBC (af) [A-S]*
BBC (af) [M-F]
Channel Africa
Deutsche Welle
Monitor Radio Int'l [T-F]
Radio Australia
Radio Havana Cuba
Radio Japan
Radio Korea
Radio Moscow
Radio New Zealand Int'l
Swiss Radio Int'l
Swiss Radio Int'l (eu)
Vatican Radio [T/F]
Voice of America (af) [A-S]
Voice of America (af) [M-F]*
Voice of America (me)
Voice of Kenya
Voice of Malaysia
WINB [T-A]
WWCR #1 [S-H]
0603
Radio Pyongyang
0609
BBC*

- 0610**
Radio Havana Cuba [S/T-F]*
- 0627**
BBC (af) [M-F]*
- 0630**
Channel Africa []
Radio Austria Int'l [T-S]
Radio Havana Cuba [T-A]
Radio Japan [A]*
Radio Moscow
Vatican Radio [H]
Voice of Nigeria [M-F]
- 0632**
Radio Romania Int'l
- 0640**
Vatican Radio [T]
- 0645**
Radio Romania Int'l
Voice of Nigeria [M-F]*
- 0655**
Voice of Med. (Malta) [M-F]
- 0700 UTC**
(3:00 AM EDT, 12:00 AM PDT)
BBC
Monitor Radio Int'l [T-F]
Papua New Guinea
Radio Australia
Radio Ghana
Radio Japan
Radio Moscow
Radio New Zealand Int'l [M-F]*
Radio Prague
Vatican Radio [M-A]
Voice of Myanmar (Burma)
- 0703**
Radio Pyongyang
Voice of Free China
- 0705**
Radio New Zealand Int'l [M-F]*
- 0710**
Radio Australia [M-F]*
- 0730**
BBC (af) [A]*
HCJB
Radio Austria Int'l [T-S]
Radio Japan [A]*
Radio Moscow [M-A]
Radio Netherlands Int'l
Radio Pakistan
Radio Prague
Radio Vlaanderen Int'l
- 0745**
Radio Finland
- 0750**
[A]
Radio New Zealand Int'l [M-F]*
- 0755**
Radio Japan
Voice of Med. (Malta) [M-F]
- 0800 UTC**
(4:00 AM EDT, 1:00 AM PDT)
BBC
Christian Science Sentinel [T/F]
KNLS
Monitor Radio Int'l [T-F]
Radio Australia
Radio Korea
Radio Moscow
Radio New Zealand Int'l
Radio Pakistan
Voice of Indonesia [A-H]
Voice of Malaysia
- 0803**
Radio Pyongyang
- 0810**
Radio New Zealand Int'l [M-F]*
- 0830**
R Slovakia Int'l
Radio Austria Int'l
Radio Moscow
Radio Netherlands Int'l
- 0855**
Voice of Indonesia [A-H]
- 0900 UTC**
(5:00 AM EDT, 2:00 AM PDT)
BBC
China Radio Int'l
Christian Science Sentinel [T/F]
Deutsche Welle
Monitor Radio Int'l [M-F]
Papua New Guinea [M]*
Radio Australia
Radio Finland
Radio Japan
Radio Moscow
Radio New Zealand Int'l [M-F]
Swiss Radio Int'l
- 0909**
China Radio Int'l*
- 0930**
FEBC (Philippines)
Radio Japan [A]*
Radio Moscow
Radio Netherlands Int'l
Radio Yerevan [S]
- 0940**
Voice of Greece
- 0945**
Deutsche Welle [M-F]*
- 0955**
Radio Japan
- 1000 UTC**
(6:00 AM EDT, 3:00 AM PDT)
BBC
China Radio Int'l
Christian Science Sentinel [A]
FEBC (Philippines) [M-F]*
HCJB
Monitor Radio Int'l [M-F]
Papua New Guinea
Radio Australia
Radio Moscow
Radio New Zealand Int'l
Radio Tanzania
Radio Vlaanderen Int'l [M-A]
Swiss Radio Int'l (eu)
Voice of America (as)
Voice of Kenya
WWCR #1 [M-F]
WYFR (Satellite Network) [M-A]
- 1009**
China Radio Int'l*
- 1010**
Radio New Zealand Int'l [M-F]*
- 1030**
Radio Austria Int'l [M-A]
Radio Dubai
Radio Moscow
Radio Netherlands Int'l
Voice of Nigeria
WYFR (Satellite Network) [M-F]
- 1045**
Radio New Zealand Int'l [M-F]*
Voice of Nigeria [A-S]*
- 1100 UTC**
(7:00 AM EDT, 4:00 AM PDT)
BBC ("Newsdesk")
Channel Africa
Christian Science Sentinel [A]
Deutsche Welle
Monitor Radio Int'l [M-F]
Papua New Guinea
Radio Australia
Radio Ghana [A-S]
Radio Japan
Radio Jordan
Radio Moscow
Radio Mozambique
Radio New Zealand Int'l
Radio Pakistan
Radio Singapore Int'l
Swiss Radio Int'l
Swiss Radio Int'l (eu)
Vatican Radio [M-A]
Voice of America (as)
Voice of Israel
WYFR (Satellite Network) [M-A]
- 1103**
Radio Pyongyang
- 1110**
Radio Australia*
- 1130**
Radio Austria Int'l
Radio Japan [A]*
Radio Korea
Radio Moscow
Radio Nacional de Venezuela [M-A]
Radio Netherlands Int'l
Radio Prague
Radio Singapore Int'l
Radio Sweden [M-F]
Voice of Asia
WYFR (Satellite Network) [M-F]
- 1145**
Deutsche Welle [M-F]*
- 1200 UTC**
(8:00 AM EDT, 5:00 AM PDT)
BBC
China Radio Int'l
Christian Science Sentinel [A]
Monitor Radio Int'l [M-F]
Papua New Guinea
Radio Australia
Radio Canada Int'l [M-F]
Radio France Int'l
Radio Moscow
Radio New Zealand Int'l [H-T]
Radio Norway Int'l [S]
Radio Singapore Int'l
Radio Tashkent
Voice of America (as)
WYFR (Satellite Network) [M-F]
- 1203**
HCJB [M-F]
Radio Korea
Voice of Free China
- 1209**
BBC [W]*
China Radio Int'l*
- 1230**
HCJB [M-F]
Radio Bangladesh [S-M]
Radio Cairo
Radio Canada Int'l
Radio Finland [M-A]
Radio Moscow [M-A]
Radio Netherlands Int'l
Radio Singapore Int'l
Radio Sweden [M-F]
Swiss Radio Int'l (eu)
Voice of Vietnam
WYFR (Satellite Network) [M-F]
- 1240**
Voice of Greece
- 1258**
Africa No. 1 (Gabon)
- 1300 UTC**
(9:00 AM EDT, 6:00 AM PDT)
BBC ("Newshour")
CBC Northern Quebec Service [S]
China Radio Int'l
Christian Science Sentinel [A]
KNLS
Monitor Radio Int'l [M-F]
Papua New Guinea
Polish Radio [A]
Polish Radio [M-F]*
Radio Australia
Radio Bulgaria
Radio Canada Int'l [S]
Radio Ghana
Radio Korea
Radio Moscow
Radio Vlaanderen Int'l [M-A]
Voice of America (as)
Voice of Israel [S-H]
WWCR #1 [M-F]
- 1409**
China Radio Int'l*
- 1410**
Radio Japan [M-F]*
- 1415**
Radio Nepal
- 1424**
HCJB [M-F]
- 1430**
FEBC (Philippines)
Radio Austria Int'l
Radio Finland
Radio Moscow
Radio Nacional de Venezuela [M-A]
Radio Netherlands Int'l
Radio Romania Int'l [T-S]
RTM Morocco [S]
Voice of Myanmar (Burma)
WYFR (Satellite Network) [M-F]
- 1431**
Radio France Int'l [T]*
Radio Romania Int'l [M]
- 1435**
Voice of Greece
- 1440**
FEBC (Philippines) [S-F]*
- 1445**
BBC (as) [M-F] (Special English)
Voice of Myanmar (Burma)
- 1450**
All India Radio
- 1455**
All India Radio
Radio Japan [A]
Voice of Med. (Malta) [M-F]
- 1500 UTC**
(11:00 AM EDT, 8:00 AM PDT)
BBC
BBC (af) [M-F]
CBC Northern Quebec Service [S]
Channel Africa
China Radio Int'l
Christian Science Sentinel [A]
Deutsche Welle
Monitor Radio Int'l [M-F]
Radio Australia
Radio Bulgaria
Radio Canada Int'l [S]
Radio Japan
Radio Jordan
Radio Moscow
Radio Omdurman
Swiss Radio Int'l
Voice of America (as)
WHRI #2 [A]
WRNO [W]
WYFR (Satellite Network) [A]
- 1503**
Radio Pyongyang
- 1505**
Radio Algiers [M]

1509
China Radio Int'l*

1510
Radio Japan [M-F]*

1525
BBC (af) [S]*
Radio Veritas [T-F]

1530
All India Radio
Deutsche Welle [M-F]*
FEBC (Philippines)
Radio Austria Int'l
Radio Japan [A]*
Radio Moscow
Radio Netherlands Int'l
Radio Portugal Int'l [M-F]
Voice of Nigeria [M-H]

1540
Radio Veritas [A-M]

1550
Voice of Med. (Malta) [F]
Radio Japan [A]
Radio Veritas [A-M]
Voice of Med. (Malta) [M-H]

1600 UTC
(12:00 PM EDT, 9:00 AM PDT)
BBC
Channel Africa
China Radio Int'l
Christian Science Sentinel [A]
Deutsche Welle
Monitor Radio Int'l [M-F]
Polish Radio [A]
Polish Radio [M-F]*
Radio Australia
Radio France Int'l
Radio Jordan
Radio Korea
Radio Moscow
Radio Pakistan
Radio Prague
Radio Tallinn [M-F]
Radio Tanzania
Voice of America (af) [A-S]
Voice of America (as)
Voice of Kenya
Voice of Nigeria [M-F]
WRNO [M-F]
WYFR (Satellite Network) [M-A]

1609
BBC*

China Radio Int'l*

1611
Radio France Int'l [T]*

1612
Vatican Radio [S-F]

1615
Radio Sweden [M-F]

1630
Radio Canada Int'l
Radio Dubai
Radio Moscow [S-F]
Voice of America (af) [M-F]
Voice of America (as) (Special English)

1645
BBC (as)*

1700 UTC
(1:00 PM EDT, 10:00 AM PDT)
BBC
BBC (af)
Channel Africa
China Radio Int'l
Christian Science Sentinel [A]
HCJB [M-F]

Monitor Radio Int'l [M-F]
Radio Australia
Radio Japan
Radio Moscow
Radio New Zealand Int'l [M-F]*
Radio Pakistan
Radio Tirana
Swiss Radio Int'l
Voice of America (af)
WWCR #3 [S-F]

1703
Radio Pyongyang

1709
China Radio Int'l*

1710
Radio Australia*

1725
Radio New Zealand Int'l [F]*

1730
Radio Moscow
Radio Netherlands Int'l
Radio Romania Int'l
Radio Sweden [M-F]
Vatican Radio [F]
Voice of America (af) [S]

1740
BBC (af)*

1745
All India Radio

1755
Radio Japan [A]
Radio New Zealand Int'l [M-H]*

1800 UTC
(2:00 PM EDT, 11:00 AM PDT)
All India Radio
BBC ("Newsdesk")
Christian Science Sentinel [A]
Monitor Radio Int'l [M-F]
Polish Radio [A]
Polish Radio [M-F]*
Radio Australia
Radio Cameroon
Radio Moscow
Radio Mozambique
Radio New Zealand Int'l [M-F]*
Radio Norway Int'l [S]
Radio Omdurman
Radio Prague
Radio Tanzania
Voice of America (af)
Voice of Kenya
WHRI #1 [M-F]
WINB [M-F]
WWCR #1 [M-F]
WWCR #3 [S-F]

1805
Radio New Zealand Int'l [M-F]*

1815
Radio Bangladesh

1830
R Slovakia Int'l
Radio Austria Int'l
Radio Kuwait
Radio Moscow
Radio Nacional de Venezuela [M-A]
Radio Netherlands Int'l
Radio Yugoslavia
Voice of America (af) [A-S] (Special English)
Voice of America (me) (Special English)

1835
Radio New Zealand Int'l [F]*

1840
Voice of Greece [M-A]

1855
Radio New Zealand Int'l [M-H]*

1857
BBC (af) [M-F]*

1900 UTC
(3:00 PM EDT, 12:00 PM PDT)
All India Radio [W]
BBC
China Radio Int'l
Christian Science Sentinel [A]
Deutsche Welle
HCJB
Monitor Radio Int'l [M-F]
Radio Australia
Radio Japan
Radio Moscow
Radio New Zealand Int'l
Radio Portugal Int'l [M-F]
Radio Romania Int'l [T-S]
Radio Thailand
Radio Tirana
Radio Vlaanderen Int'l
Spanish National Radio
Swiss Radio Int'l (eu)
Voice of America (af)
WHRI #1 [M-F]
WINB [M-F]
WWCR #3

1901
Radio Romania Int'l [M]

1909
China Radio Int'l*

1910
All India Radio [W]
Radio Australia [M-F]*

1930
BBC (af) [S]*
Deutsche Welle [T-F]*
Radio Japan [A]*
Radio Moscow [A-S]
Radio Netherlands Int'l

1933
Deutsche Welle [M]*

1935
RAI Italy

2000 UTC
(4:00 PM EDT, 1:00 PM PDT)
BBC
China Radio Int'l
Deutsche Welle
KVOH [A-S]
Monitor Radio Int'l [M-F]
Radio Australia
Radio Budapest Int'l
Radio Bulgaria
Radio Finland
Radio Moscow
Radio New Zealand Int'l [S-F]
Radio Norway Int'l [S]
Radio Tallinn [M/H]
Swiss Radio Int'l
Vatican Radio [M-T]
Voice of America (af)
Voice of Indonesia
Voice of Israel
Voice of Nigeria [M-F]
WHRI #1 [M-F]
WINB [M-F]
WWCR #3 [S-F]

2003
Radio Pyongyang

2007
Radio Damascus [M-F]

2009
China Radio Int'l*

2010
Radio New Zealand Int'l [S-H]*
Voice of Israel [W]*

2025
RAI Italy

2030
HCJB
Polish Radio [A-S]
Polish Radio [M-F]*
Radio Canada Int'l
Radio Korea
Radio Moscow
Radio Sweden [M-F]
Radio Thailand
Radio Yugoslavia

2045
All India Radio [A]
Radio Yerevan

2055
Voice of Indonesia [M]

2100 UTC
(5:00 PM EDT, 5:00 PM PDT)
All India Radio
BBC ("Newshour")
China Radio Int'l
Deutsche Welle
KVOH [S]
Monitor Radio Int'l [M-F]
Radio Australia
Radio Cameroon
Radio Canada Int'l [A-S]
Radio Damascus [F]
Radio Havana Cuba [M-A]
Radio Japan
Radio Moscow
Radio New Zealand Int'l [A-H]
Radio Prague
Radio Romania Int'l
Radio Yugoslavia
Spanish National Radio
Voice of America (as)
Voice of Greece [M-A]
Voice of Turkey
WINB [M-F]
WWCR #3 [S-F]

2109
China Radio Int'l*

2110
Radio Damascus [S-M]
Radio New Zealand Int'l [S-H]*

2112
Radio Damascus [F]

2115
BBC (ca) [M-F]*
Radio Damascus [T]

2120
Radio Cairo

2125
Radio Canada Int'l [M-F]

2130
Radio Austria Int'l
Radio Cairo
Radio Havana Cuba [M-T/H]*
Radio Havana Cuba [W/F]
Radio Moscow [M-F]
Radio Nacional de Venezuela [M-A]
Radio Riga Int'l [M-F]
Radio Sweden [M-F]

2145
Radio Damascus [W]

2155
Radio Korea
Radio Japan [A]

2200 UTC
(6:00 PM EDT, 3:00 PM PDT)
All India Radio
BBC
China Radio Int'l
Christian Science Sentinel [A]
Monitor Radio Int'l [M-F]
Radio Australia
Radio Budapest Int'l
Radio Bulgaria
Radio Canada Int'l
Radio Havana Cuba [M-A]
Radio Korea
Radio Moscow
Radio New Zealand Int'l
Radio Prague
Radio Ukraine Int'l
Radio Vlaanderen Int'l [M-F]
RAI Italy
Voice of America (as)

2203
Voice of Free China

2209
China Radio Int'l*

2215
All India Radio [M/W/F]
Radio Cairo

2230
Radio Canada Int'l [A-S]
Radio Havana Cuba [M-F]*
Radio Moscow
Radio Sweden [M-F]
Radio Yerevan
Voice of America (as) (Special English)
Voice of Israel

2240
Radio Cairo
Voice of Greece [S-F]

2242
Voice of Israel [H]*

2300 UTC
(7:00 PM EDT, 4:00 PM PDT)
BBC ("Newsdesk")
CBC Northern Quebec Service [A]
Christian Science Sentinel [A]
Monitor Radio Int'l [M-F]
Radio Australia
Radio Canada Int'l [A-S]
Radio Japan
Radio Moscow
Radio New Zealand Int'l
Radio Norway Int'l [S]
Voice of America (as)
Voice of Turkey
WWCR #3 [A]

2303
Radio Pyongyang

2330
Radio Finland
Radio Japan [A]*
Radio Moscow
Radio Netherlands Int'l
Radio Sweden [M-F]
Radio Yerevan
SLBC (Sri Lanka) [M]

2335
Voice of Greece [S-F]

2345
Radio Bulgaria

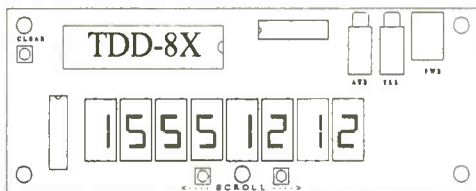
2355
Radio Japan

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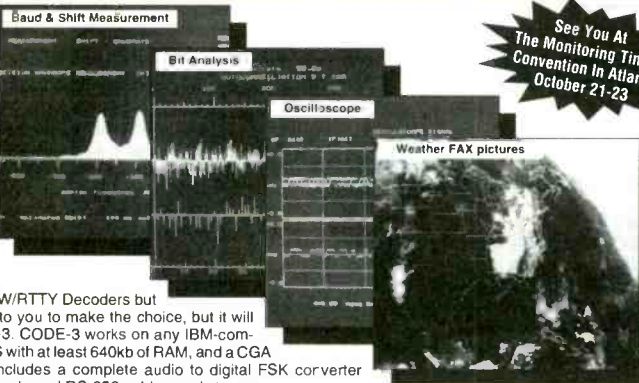
Fax: (503) 687-2492

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October 21-23

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- AX25 Packet
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- Autospec - Mk's I and II
- DUP-ARQ Artrac
- Twinplex
- ASCII
- ARQ6-90/98
- SI-ARQ/ARO-S
- SWED-ARQ-ARO-SWE
- ARQ-E/ARQ1000 Duplex
- ARQ-N-ARQ1000 Duplex Variant
- ARQ-E3-CCIR519 Variant
- POL-ARQ 100 Baud Duplex ARQ
- TDM242/ARO-M2/4-242
- TDM342/ARO-M2/4
- FEC-A FEC100A/FEC101
- FEC-S • FEC1000 Simplex
- Sports info 300 baud ASCII
- Hellsreiber - Synch/Asynch
- Sitor • RAW (Normal Sitor but without Synch.
- ARQ6-70
- Baudot F788N
- Pactor
- WEFAX

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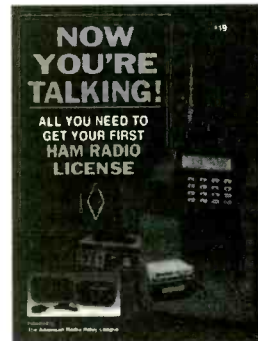
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FREQUENCIES

0000-0100	Australia, Radio	11855as 17750as	11955as	13605as	13745as	0000-0100	Thailand, Radio	9655as	11905as
0000-0100 vl	Australia, VLBA Alice Spg	4835do				0000-0100	Ukraine, R Ukraine Intl	7285na 12030na	9685na 9860na 11720na
0000-0100 vl	Australia, VLBK Katherine	5025do				0000-0100	United Kingdom, BBC London	5965as 9580as 12095sa 13740na	15180na 15580na 5975na 6175na 7325na 9590na 9915na 11750sa
0000-0100 vl	Australia, VL8T Tent Crk	4910do				0000-0100	USA, KAIJ Dallas TX	13740na	15260sa 15310as 15360as
0000-0045	Bulgaria, Radio	9700na	11720na			0000-0100	USA, KBTN Salt Lk City UT	15595am	
0000-0015	Cambodia, Natl Voice of	11940as				0000-0100	USA, KVOH Los Angeles CA	9785am	
0000-0100 vl	Canada, CBC N Quebec Sca	9625do				0000-0100	USA, KWHR Naalehu HI	17510as	
0000-0100	Canada, CFCX Montreal	6005do				0000-0100	USA, Monitor Radio Intl	7535na	9430ca
0000-0100	Canada, CFRX Toronto	6070do				0000-0030	USA, R Bosnia H via WHRI	7315am	
0000-0100	Canada, CFVP Calgary	6030do				0000-0100	USA, VOA Washington DC	5995am 7405am 11580am 15185as 17765as	6130am 7215au 9455am 9770au 9775am 11695am 11760as 15290as 17735as
0000-0100	Canada, CHNX Halifax	6130do				0000-0100 vl	USA, WCSN Scotts Cor ME	9855af	
0000-0100	Canada, CKZN St John's	6160do				0000-0100	USA, WEWN Birmingham AL	7425na	9410eu 9985sa
0000-0100	Canada, CKZU Vancouver	6160do				0000-0100 vl	USA, WHRI Noblesville IN	7315am	
0000-0100	China, China Radio Intl	9780na	11715na			0000-0100	USA, WINB Red Lion PA	11950am	
0000-0100 vl	Costa Rica, R Peace Intl	7385am	9400am	15030am		0000-0100	USA, WJCR Upton KY	7490na	13595na
0000-0100	Cuba, Radio Havana Cuba	6010na	13700na			0000-0100	USA, WRNO New Orleans LA	7355am	
0000-0027	Czech Rep, Radio Prague	7345na	9485na			0000-0100	USA, WWCR Nashville TN	5810am	7435am 13845am
0000-0045	India, All India Radio	9705as	11745as 17800as	15110as 15145as		0000-0100	USA, WYFR Okeechobee FL	6085na	
0000-0100 vl	Italy, IRRS Milan	7125eu				0030-0100	Australia, Radio	9580pa 13745as 15415as 17860pa	9660pa 11855as 13605as 13755as 15240pa 15365pa 15510as 17750as 17795pa
0000-0100	Lebanon, Wings of Hope	9960me				0030-0100	Ecuador, HCJB Quito	9745am	12005am 17490am 21455am
0000-0100 vl	Malaysia, RTM Kota Kinaba	5980do				0030-0100	Iran, VOIRI Tehran	7100na	9022na
0000-0100 vl	Malaysia, RTM Sarawak	4950do	7160do			0030-0100	Netherlands, Radio	6020na 12025as	6165na 9840na 9860as
0000-0030	Netherlands, Radio	6020na	6165na			0030-0100	Sri Lanka, SLBC Colombo	6005as	9720as 15425as
0000-0100	New Zealand, R NZ Intl	9700pa	15115pa			0030-0100	Sweden, Radio	6065sa	9810sa
0000-0050	North Korea, R Pyongyang	11335na	13760na	15130na		0050-0100	Italy, RAI Rome	9725na	11800na
0000-0100 mtwhfa	Palau, KHBN Voice of Hope	11980as							
0000-0100 vl	Papua New Guinea, NBC	9675do							
0000-0100	Philippines, FEBC Manila	15450as							
0000-0100	Russia, Radio Moscow Intl	5940na 9685na 11750na 15410na 17890as	7295na 9480na 9530as 9750na 9765na 11685na	9480na 9530as 11685na	9530as 15290na 15290na 15290na 17570as				
0000-0030 mtwhfa	Serbia, Radio Yugoslavia	9580na	11870na						
0000-0100	Spain, R Exterior Espana	9540na							

SELECTED PROGRAMS

Sundays

- 0000 Radio Bulgaria: Weekly Spotlight. The major political developments of the week with talks by prominent political figures.
- 0000 WWCR #2: University Network. Gene Scott evangelizes in his inimitable style. Get on the phone!
- 0005 Radio Thailand: News in Perspective. A current affairs program.
- 0010 Radio Australia: Charting Australia. A program intended to strengthen Australia's links with the Indian subcontinent.
- 0015 BBC: Good Books. Recommendation of a book to read.
- 0015 Radio Bulgaria: Cultural Review. A 30-minute summary of cultural events in Bulgaria, cultural newstips, and regional music.
- 0030 BBC: The John Dunn Show. A melodic mix of songs old and new.
- 0030 Radio Australia: Correspondents' Report. A round-up of global stories with Hamish Robertson.
- 0040 Radio Thailand: News in Perspective. See S 0005.

Mondays

- 0000 WWCR #2: University Network. See S 0000.
- 0005 Radio Thailand: News in Perspective. See S 0005.
- 0010 Radio Australia: Network Asia. See S 2330.
- 0015 BBC: Music Feature. Top Scores. See S 0445.
- 0030 BBC: In Praise of God. Weekly programme of worship and meditation.
- 0030 Radio Australia: International Report. Overseas and local correspondents analyze regional and global issues and events.

- 0045 Vatican Radio: Gospel.
- 0048 Radio Australia: Network Asia/Finance. Stock market and mercantile reports and the latest regional financial news.
- 0051 Vatican Radio: The Pope's Activities This Week.

Tuesdays

- 0000 WWCR #2: University Network. See S 0000.
- 0005 Radio Thailand: News in Perspective. See S 0005.
- 0010 Radio Australia: Network Asia. See S 2330.
- 0015 BBC: A Jolly Good Show. Dave Lee Travis presents your record requests and dedications in his own unique way.
- 0030 Radio Australia: International Report. See M 0030.
- 0040 Radio Thailand: News in Perspective. See S 0005.
- 0048 Radio Australia: Network Asia/Finance. See M 0048.

Wednesdays

- 0000 WWCR #2: University Network. See S 0000.
- 0005 Radio Thailand: News in Perspective. See S 0005.
- 0010 Radio Australia: Network Asia. See S 2330.
- 0015 BBC: Concert Hall. See S 1515.
- 0030 Radio Australia: International Report. See M 0030.
- 0040 Radio Thailand: News in Perspective. See S 0005.
- 0045 Vatican Radio: Bible Story.
- 0048 Radio Australia: Network Asia/Finance. See M 0048.

Thursdays

- 0000 WWCR #2: University Network. See S 0000.
- 0005 Radio Thailand: News in Perspective. See S 0005.
- 0010 Radio Australia: Network Asia. See S 2330.
- 0015 BBC: The Greenfield Collection. This classical music program replaces Ray on Record.
- 0030 Radio Australia: International Report. See M 0030.
- 0040 Radio Thailand: News in Perspective. See S 0005.
- 0048 Radio Australia: Network Asia/Finance. See M 0048.

Fridays

- 0000 Radio Bulgaria: Today. See S 1315.
- 0000 WWCR #2: University Network. See S 0000.
- 0005 Radio Thailand: News in Perspective. See S 0005.
- 0010 Radio Australia: Network Asia. See S 2330.
- 0015 BBC: Music Review. News and views from the world of music.
- 0015 Radio Bulgaria: Lifestyle. A look at everyday life in Bulgaria.
- 0030 Radio Australia: International Report. See M 0030.
- 0040 Radio Thailand: News in Perspective. See S 0005.

Saturdays

- 0000 Radio Bulgaria: Today. See S 1315.
- 0000 WWCR #2: University Network. See S 0000.
- 0005 Radio Thailand: News in Perspective. See S 0005.
- 0010 Radio Australia: Feedback. See S 0410.
- 0015 BBC: Music Feature. Sharp Talents. Interviews with five young musicians on the "cutting edge" of modern music.
- 0015 Radio Bulgaria: Folk Studio. See M 0500.
- 0030 BBC: From the Weeklies. Review of the British weekly press.
- 0030 Radio Australia: Indian Pacific. Peter Mares with news and analysis from across the Pacific and Asia.
- 0030 Radio Bulgaria: Radio Bulgaria Calling. See M 0515.
- 0040 Radio Thailand: News in Perspective. See S 0005.
- 0045 BBC: The Learning World. See M 0615.

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FREQUENCIES

0200-0300 twhfa	Argentina, RAE	11710na				0200-0300	Sri Lanka, SLBC Colombo	6005as	9720as	15425as	
0200-0300	Australia, Radio	11880pa	13605as	15240pa	15365pa	0200-0300	Taiwan, VO Free China	5950na	9680na	9765au	11740ca
		15415as	15510as	17715as	17750as			11860as	15345as		
		17795pa	17860pa	17880as		0200-0300	Thailand, Radio	9655as	11905as		
0200-0300 vl	Australia, VL8A Alice Spg	4835do				0200-0300	United Kingdom, BBC London	5975na	6175na	6195me	7155me
0200-0300 vl	Australia, VL8K Katherine	5025do						7235me	9410eu	9630af	9915am
0200-0300 vl	Australia, VL8T Tent Crk	4910do						11750sa	11955me	15260sa	15360as
0200-0300 vl	Canada, CBC N Quebec Sce	9625do						17790as			
0200-0300	Canada, CFCX Montreal	6005do				0200-0230 vl	USA, KAIJ Dallas TX	9815am	13740am		
0200-0300	Canada, CFRX Toronto	6070do				0200-0300	USA, KTBN Salt Lk City UT	7510am			
0200-0300	Canada, CFVP Calgary	6030do				0200-0230	USA, KVOH Los Angeles CA	17775am			
0200-0300	Canada, CHNX Halifax	6130do				0200-0300	USA, KWHR Naalehu HI	17510as			
0200-0300	Canada, CKZN St John's	6160do				0200-0300	USA, Monitor Radio Intl	5850na	9430ca		
0200-0300	Canada, CKZU Vancouver	6160do				0200-0230 twhfa	USA, VOA Washington DC	5995am	6130am	7405am	9775am
0200-0230	Canada, RCI Montreal	6120na	9535am	9755na	11845na			11580am	15120am	15205am	
		11940am				0200-0300	USA, VOA Washington DC	7115as	7205as	7651as	9740as
0200-0300	Costa Rica, R Peace Intl	7385am	9400am	15030am				11705as	15250as	17740as	21550as
0200-0300	Cuba, Radio Havana Cuba	6010na	9820na			0200-0300	USA, WCSN Scotts Cor ME	7465am			
0200-0300	Ecuador, HCJB Quito	9745am	12005am	17490am		0200-0300	USA, WEWN Birmingham AL	7425na			
0200-0300	Egypt, Radio Cairo	9475na				0200-0300	USA, WHRI Noblesville IN	7315am			
0200-0250	Germany, Deutsche Welle	7285as	9580as	9615as	9690as	0200-0300	USA, WINB Red Lion PA	11950am			
		11945as	11965as	12045as	15185as	0200-0300	USA, WJCR Upton KY	7490na	13595na		
0200-0300 as	Guam, KSDA AWR Agat	13720as				0200-0300	USA, WRNO New Orleans LA	7355am			
0200-0300 vl	Italy, IRRS Milan	7125eu				0200-0300	USA, WWCR Nashville TN	5810am	5935am	7435am	
0200-0230 mtwhfa	Kenya, Kenya BC Corp	4935do				0200-0300	USA, WYFR Okachobee FL	6065na	9505na		
0200-0300 smtwh	Malaysia, RTM Radio 4	7295do				0200-0245	USA, WYFR Okachobee FL	15440na			
0200-0230	Myanmar, Radio	7185do				0215-0255	Nepal, Radio	5005do	7165do		
0200-0300	Netherlands, Radio	9860as	12025as			0230-0257	Albania, R Tirana Intl	9580na	11840na		
0200-0300	New Zealand, R NZ Intl	9700pa	15115pa			0230-0300	Hungary, Radio Budapest	5970na	9835na	11910na	
0200-0300 vl	Papua New Guinea, NBC	9675do				0230-0300 s	Kenya, Kenya BC Corp	4935do			
0200-0300	Romania, R Romania Intl	6155na	9510na	9570na	11830na	0230-0245	Pakistan, Radio	7290as	15190as	17705as	17725as
		11940na						21730as			
0200-0300	Russia, Radio Moscow Intl	5940na	7205af	7295na	9530na	0230-0300	Sweden, Radio	6155na	9850na		
		9620na	9685af	9695af	9765na	0250-0300	Vatican State, Vatican R	6095na	7305na	9605na	
		11665na	11805na	12050as	15410na						
		15425na	17570as	17655au	21625na						

SELECTED PROGRAMS

Sundays

- 0200 WWCR #2: University Network. See S 0000.
- 0210 Radio Australia: Charting Australia. See S 0010.
- 0230 BBC: Features. Pig! (2nd). A profile of the pig, both in the sty and on the dish. Ataturk: The Man and the Myth (9th). Examining the legacy of the man who built modern Turkey. Creeds, Councils and Controversies (16th, 23rd, 30th). Documentaries exploring the significant aspects of Turkey's religious past and present.
- 0230 Radio Australia: Correspondents' Report. See S 0030.
- 0250 Vatican Radio: With Heart and Mind.
- 0259 Vatican Radio: Vatican On-the-Air.

Mondays

- 0200 WWCR #2: University Network. See S 0000.
- 0210 Radio Australia: Network Asia. See S 2330.
- 0230 BBC: Composer of the Month. Light opera composers are featured during October.
- 0230 Radio Australia: International Report. See M 0030.
- 0248 Radio Australia: Network Asia/Finance. See M 0048.
- 0250 Vatican Radio: Catholic Writers.

Tuesdays

- 0200 WWCR #2: University Network. See S 0000.
- 0210 Radio Australia: Network Asia. See S 2330.
- 0230 BBC: Quiz. Counterpoint. See M 1215.
- 0230 Radio Australia: International Report. See M 0030.
- 0248 Radio Australia: Network Asia/Finance. See M 0048.
- 0250 Vatican Radio: A Room with a View of the Vatican.

Wednesdays

- 0200 WWCR #2: University Network. See S 0000.
- 0210 Radio Australia: Network Asia. See S 2330.
- 0230 BBC: Andy Kershaw's World of Music. Recordings of diverse music from around the world.
- 0230 Radio Australia: International Report. See M 0030.
- 0248 Radio Australia: Network Asia/Finance. See M 0048.
- 0250 Vatican Radio: The Rome Report.

Thursdays

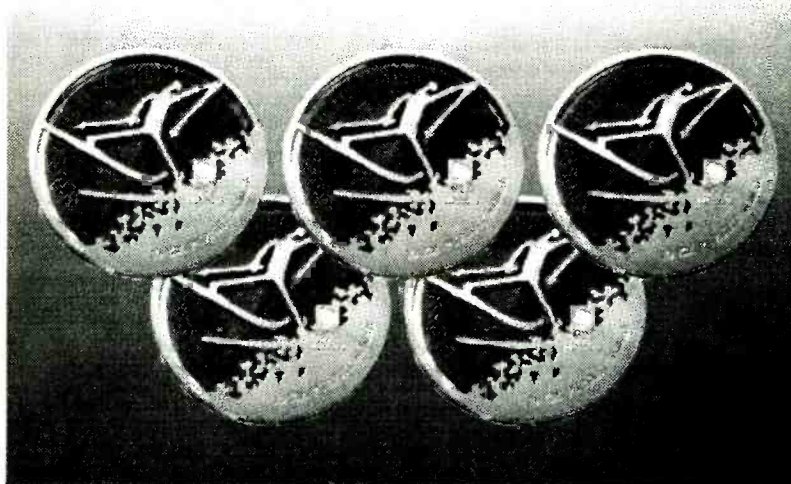
- 0200 WWCR #2: University Network. See S 0000.
- 0210 Radio Australia: Network Asia. See S 2330.
- 0230 BBC: Sports International. Live commentaries and interviews, features and discussions.
- 0230 Radio Australia: International Report. See M 0030.

- 0248 Radio Australia: Network Asia/Finance. See M 0048.
 - 0250 Vatican Radio: Vatican Week.
 - 0256 Vatican Radio: Pilgrim City.
- Fridays**
- 0200 WWCR #2: University Network. See S 0000.
 - 0210 Radio Australia: Network Asia. See S 2330.
 - 0230 BBC: Thirty-Minute Drama. See H 1130.
 - 0230 Radio Australia: International Report. See M 0030.
 - 0248 Radio Australia: Network Asia/Finance. See M 0048.
 - 0250 Vatican Radio: Cross Reference.

Saturdays

- 0200 Radio Australia (Sports): Grandstand. Live sports action from around Australia.
- 0200 WWCR #2: University Network. See S 0000.
- 0210 Radio Australia: Feedback. See S 0410.
- 0230 BBC: People and Politics. Background to the British political scene.
- 0230 Radio Australia: Indian Pacific. See A 0030.
- 0250 Vatican Radio: Orders of the Day.

QSL from Radio Norway International courtesy of Steve Hunter of Drexel Hills, Pa. The Golden Medals from the 17th Olympic Winter Games at Lillehammer are pictured on the card.



FREQUENCIES

0300-0400	Australia, Radio	11880pa 15365pa 17750as	13605pa 15415as 17795pa	13650as 15510as 17860pa	15240pa 17715as 17880as	0300-0400	S Africa, Channel Africa	3220af 9720as	5955af 15425as			
0300-0400 vl	Australia, VL8A Alice Spg	4835do				0300-0400	Sri Lanka, SLBC Colombo	5950na 15345as	9680na	9765au	11740as	
0300-0400 vl	Australia, VL8K Katherine	5025do				0300-0400	Taiwan, VO Free China	9655as 9445na	11905as			
0300-0400 vl	Australia, VL8T Tent Crk	4910do				0300-0400 vl	Thailand, Radio	9655as 9445na				
0300-0400	Bahrain, Radio	6010do				0300-0400 vl	Turkey, Voice of	4976do				
0300-0400 vl	Canada, CBC N Quebec Sce	9625do				0300-0400	Uganda, Radio	9620na	9680na	9860na	11720na	
0300-0400	Canada, CFCX Montreal	6005do				0300-0400	Ukraine, R Ukraine Intl	12030na	15180na	15580na		
0300-0400	Canada, CFRX Toronto	6070do				0300-0330	United Kingdom, BBC London	6175na 15260sa	7235me 15360as	7325na	9915sa	
0300-0400	Canada, CFVP Calgary	6030do				0300-0400	United Kingdom, BBC London	3255af 6180eu	5975na 6190af	6005af 6195eu	6175eu 7230eu	
0300-0400	Canada, CHNX Halifax	6130do				0300-0400	USA, KAIJ Dallas TX	7325eu 11955as	7265af 9575af	7280af 9885af	7340af	
0300-0400	Canada, CKZN St John's	6160do				0300-0400	USA, KATN Salt Lk City UT	9815am 7510am				
0300-0400	Canada, CKZU Vancouver	6160do				0300-0400	USA, KVOH Los Angeles CA	9785am				
0300-0400	China, China Radio Intl	9690na	9780na	11715na		0300-0400	USA, KWHR Naalehu HI	17510as				
0300-0400	Costa Rica, R Peace Intl	7385am	9400am	15030am		0300-0400	USA, Monitor Radio Intl	5850na				
0300-0400 vl	Costa Rica, Faro del Carib	5055do				0300-0400	USA, WACS Scotts Cor ME	7465am				
0300-0400	Cuba, Radio Havana Cuba	6010na	9820na			0300-0400	USA, WEWN Birmingham AL	7425na				
0300-0327	Czech Rep, Radio Prague	5930na	7345na			0300-0400	USA, WHRI Noblesville IN	7315am				
0300-0400	Ecuador, HCJB Quito	9745am	12005am			0300-0400	USA, WINB Red Lion PA	11950eu				
0300-0330	Egypt, Radio Cairo	9475na				0300-0400	USA, WJCR Upton KY	7490na	13595na			
0300-0350	Germany, Deutsche Welle	6045na 9535na	6045na 9640na	6085na 9550na	6120na	0300-0400	USA, WRNO New Orleans LA	7395am				
0300-0400	Guatemala, Radio Cultural	3300do				0300-0400	USA, WWCR Nashville TN	5810am	5935am	7435am		
0300-0400 vl	Italy, IRRS Milan	7125eu				0300-0400	USA, WYFR Okeechobee FL	6065na	9505na			
0300-0400	Japan, NHK/Radio	5960am	9680as	11875am	5210am	0300-0310	Vatican State, Vatican R	6095do	7305do	9605do		
0300-0330	Japan, NHK/Radio	11885na	17810am	17845am		0315-0330 sh	Greece, Voice of	9380na	9420na	11645na		
0300-0400	Kenya, Kenya BC Corp	4935do	11895na	15230na		0315-0345	Vatican State, Vatican R	7360af	9695af			
0300-0400 s	Lebanon, Wings of Hope	9960me				0330-0357	Czech Rep, Radio Prague	5930eu	9440eu	11640af		
0300-0400 smtwh	Malaysia, RTM Radio 4	7295do				0330-0400	Netherlands, Radio	6165na	9590na			
0300-0325	Netherlands, Radio	9860as	12025as			0330-0400	Sweden, Radio	6155na	9850na			
0300-0400	New Zealand, R NZ Intl	9700pa	15115pa			0330-0400	Tanzania, Radio	5050af				
0300-0350	North Korea, R Pyongyang	6522eu	9345eu			0330-0357	UAE, Radio Dubai	11945na	13675na	15400eu	17890eu	
0300-0400 vl	Papua New Guinea, NBC	9675do				0340-0350	Greece, Voice of	9380na	9420na	11645na		
0300-0400	Russia, Radio Moscow Intl	5940na 9685na 11665as 13615na 15410na 17605as	7295na 9750na 11690as 15265as 15425na 17675as	9530na 9765na 12030as 15375as 15535as 17720as	9620as 9880as 12050as 15385as 16190as	0345-0400	Tajikistan, Radio	7245as				

SELECTED PROGRAMS

Sundays

- 0300 WWCR #2: University Network. See S 0000.
- 0310 Radio Australia: Book Reading. See S 0110.
- 0310 Radio Thailand: News in Perspective. See S 0005.
- 0315 BBC: Sports Roundup. The latest sports news.
- 0330 BBC (eu): Europe Today. News, features, profiles and trends for the new Europe.
- 0330 BBC: From Our Own Correspondent. BBC correspondents comment on the background to the news.
- 0330 Radio Australia: At Your Request. Dick Paterson plays favorite music.
- 0335 BBC (af): Postmark Africa. Expert answers to any question under the sun.
- 0350 BBC: Write On. Air your views about World Service: write to PO Box 76, Bush House, Strand, London WC2B 4PH.

Mondays

- 0300 WWCR #2: University Network. See S 0000.
- 0305 Vatican Radio: Creation.
- 0310 Radio Australia: Sports Bulletin. See S 1310.
- 0310 Radio Thailand: News in Perspective. See S 0005.
- 0315 BBC: Sports Roundup. See S 0315.
- 0325 Radio Australia: Network Asia. See S 2330.
- 0330 BBC (eu): Europe Today. See S 0330.
- 0330 BBC: Anything Goes. See S 1430.
- 0333 BBC (af): Network Africa. Breakfast show of news, sport, personalities, music, and listener's comments.

Tuesdays

- 0300 WWCR #2: University Network. See S 0000.
- 0304 Vatican Radio: Ask the Abbot.
- 0310 Radio Australia: Sports Bulletin. See S 1310.
- 0310 Radio Thailand: News in Perspective. See S 0005.
- 0315 BBC: Sports Roundup. See S 0315.
- 0325 Radio Australia: Network Asia. See S 2330.
- 0330 BBC (eu): Europe Today. See S 0330.
- 0330 BBC: John Peel. Tracks from newly released albums and singles from the contemporary music scene.
- 0333 BBC (af): Network Africa. See M 0333.

Wednesdays

- 0300 WWCR #2: University Network. See S 0000.
- 0306 Vatican Radio: What Can I Do?
- 0310 Radio Australia: Sports Bulletin. See S 1310.
- 0310 Radio Thailand: News in Perspective. See S 0005.
- 0315 BBC: Sports Roundup. See S 0315.
- 0325 Radio Australia: Network Asia. See S 2330.
- 0330 BBC (eu): Europe Today. See S 0330.
- 0330 BBC: Discovery. In-depth look at scientific research.
- 0333 BBC (af): Network Africa. See M 0333.

Thursdays

- 0300 WWCR #2: University Network. See S 0000.
- 0305 Vatican Radio: Postcards from Rome.
- 0310 Radio Australia: Sports Bulletin. See S 1310.
- 0310 Radio Thailand: News in Perspective. See S 0005.
- 0315 BBC: Sports Roundup. See S 0315.
- 0325 Radio Australia: Network Asia. See S 2330.
- 0330 BBC (eu): Europe Today. See S 0330.
- 0330 BBC: Assignment. A weekly examination of a topical issue.
- 0333 BBC (af): Network Africa. See M 0333.

Fridays

- 0300 WWCR #2: University Network. See S 0000.
- 0305 Vatican Radio: Faith by Numbers.
- 0310 Radio Australia: Sports Bulletin. See S 1310.
- 0310 Radio Thailand: News in Perspective. See S 0005.
- 0315 BBC: Sports Roundup. See S 0315.
- 0325 Radio Australia: Network Asia. See S 2330.
- 0330 BBC (eu): Europe Today. See S 0330.
- 0330 BBC: Focus on Faith. Comment and discussion on the major issues in the worlds of faith.
- 0333 BBC (af): Network Africa. See M 0333.

Saturdays

- 0300 Radio Australia (Sports): Grandstand. See A 0200.
- 0300 WWCR #2: University Network. See S 0000.
- 0304 Vatican Radio: By the Way....
- 0310 Radio Australia: Soundabout. The very best Australian and international contemporary sounds played by Kim Taylor.
- 0310 Radio Thailand: News in Perspective. See S 0005.
- 0315 BBC: Sports Roundup. See S 0315.
- 0330 BBC (eu): Europe Today. See S 0330.
- 0330 BBC: The Vintage Chart Show. Each week a classic Top 20 from the past with Paul Burnett.

THANK YOU . . .

Additional contributors to this month's Shortwave Guide:

Kenneth Dowst, Hartford, CT; Bob Fraser, Cohasset, MA; Clyde W. Harmon, Anniston, AL; Ken Loh, Portland, OR; Jim Moats, Ravenna, OH; NASWA Journal; SPEEDX; World DX Club; BBC Summary of World Broadcasts; Grove Enterprises BBS; Internet Shortwave Newsgroup via Larry Van Horn

FREQUENCIES

0500-0600	Australia, Radio	9580pa 15365pa 17795as	9660do 15415s 17860pa	13605as 17630pa 17880as	15240pa 17750as	0500-0600	Spain, R Exterior Espana	9540na		
0500-0600 vl	Australia, VL8A Alice Spg	4835do				0500-0515 t	Sri Lanka, SLBC Colombo	9720na	15425na	
0500-0600 vl	Australia, VL8K Katherine	5025do				0500-0600	Swaziland, Swazi Radio	6155af		
0500-0600 vl	Australia, VL8T Tent Crk	4910do				0500-0530	Swaziland, Trans World R	5055af	6070af	7125af
0500-0600	Bahrain, Radio	6010do				0500-0515	Switzerland, Swiss R Intl	3985eu	6165eu	
0500-0530	Bulgaria, Radio	9700na	11720na			0500-0600	Thailand, Radio	9655as	11905as	
0500-0600	Canada, CFCX Montreal	6005do				0500-0600 vl	Uganda, Radio	4976do		
0500-0600	Canada, CFRX Toronto	6070do				0500-0600	United Kingdom, BBC London	3255af	5975na	6005af 6180eu
0500-0600	Canada, CFVP Calgary	6030do						6190af	6195eu	9410eu 9640na
0500-0600	Canada, CHNX Halifax	6130do						11760me	12095eu	15280as 15310as
0500-0600	Canada, CKZU Vancouver	6160do						15360as	15400af	15420af 15575as
0500-0530 mtwhf	Canada, RCI Montreal	6050eu 17840af	6150eu	7295eu	15430af			17830as	17885af	
						0500-0600	USA, KAIJ Dallas TX	9815am		
0500-0600	Costa Rica, R Peace Intl	7385am	9400am	15030am		0500-0600	USA, KTBN Salt Lk City UT	7510am		
0500-0600	Cuba, Radio Havana Cuba	6010na	9820na			0500-0600	USA, KVOH Los Angeles CA	9785am		
0500-0600	Ecuador, HCJB Quito	11925am	21455am			0500-0600	USA, KWHR Naalehu HI	17780as		
0500-0600 as	Eqt Guinea, R East Africa	9585af				0500-0600	USA, Monitor Radio Intl	9840af		
0500-0550	Germany, Deutsche Welle	5960na 9515na 7465na	6045na 9670na 9435na	6120na 11705na	6185na	0500-0600	USA, VOA Washington DC	6035af	7405af	9665af 11965af
								12080af	15600af	
0500-0515	Israel, Kol Israel	7465na				0500-0530	USA, VOA Washington DC	5995eu	6140eu	6873af 7170eu
0500-0600 vl	Italy, IRRS Milan	7125eu						9530eu	9700eu	11825me 15205me
0500-0600	Japan, NHK/Radio	5975eu 11740as	7230eu	9680pa	9725am			7315am	9495am	
			11885na	15410as	17810as	0500-0600	USA, WHRI Noblesville IN	11950am		
0500-0600	Kenya, Kenya BC Corp	4935do				0500-0600	USA, WINB Red Lion PA	9465eu		
0500-0600 s	Lebanon, Wings of Hope	9960me				0500-0600	USA, WJCR Upton KY	7490na	13595na	
0500-0600	Malaysia, RTM Radio 4	7295do				0500-0600 mtwhfa	USA, WMLK Bethel PA	9465eu		
0500-0600	New Zealand, R NZ Intl	9700pa	15115pa			0500-0600	USA, WRNO New Orleans LA	7395am		
0500-0600	Nigeria, Radio	3326do	4770do	4990do		0500-0600	USA, WVCN Nashville TN	5810am	5935am	7435am
0500-0600	Nigeria, Voice of	7255af				0500-0600	USA, WYFR Okeechobee FL	5985na	11580eu	
0500-0550	North Korea, R Pyongyang	9640me	9977af			0500-0545	USA, WYFR Okeechobee FL	9870af		
0500-0530 m	Norway, Radio Norway Intl	9590na	11865na			0500-0530	Vatican State, Vatican R	9695af	11625af	15090af
0500-0600 vl	Papua New Guinea, NBC	9675do				0500-0520	Vatican State, Vatican R	3950eu	3975eu	6245eu
0500-0600	Russia, Radio Moscow Intl	7165na 9760na 15180na 16190as 17675as	9530na 9880as 15425na 17570af 17835af	9685na 12010na 15465af 17590af 21670na	750na 12050na 15590na 17610me 21725as	0510-0520	Botswana, Radio	3356af	4830af	7255af
0500-0600	S Africa, Channel Africa	5995af	9695af			0525-0600	Ghana, GBC Radio 2	3366do		
0500-0553 f	Seychelles, FEBA Radio	17750me				0530-0600	Australia, Radio	9660do	13605as	15240pa 15365pa
								15415as	15510as	15565as 17715as
						0530-0600	Austria, R Austria Intl	6015na	11910as	
						0530-0600	Georgia, Radio	11810af	15340af	15380af 17790af
						0530-0600	Romania, R Romania Intl	6070af	9650af	
						0530-0600	Swaziland, Trans World R	15435as	17830as	21700as
						0530-0600	UAE, Radio Dubai			

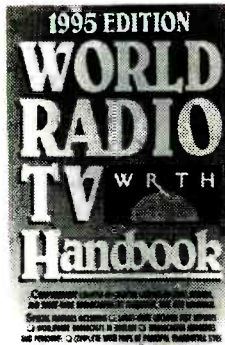
SELECTED PROGRAMS

Day	Time	Program	Description
Sundays	0500	Radio Bulgaria: Cultural Review.	See S 0015.
	0500	Vatican Radio: The Gospel.	
	0500	Vatican Radio: The Pope/the Church/the World.	
	0511	Vatican Radio: Vatican Week.	
	0513	Radio Exterior de Espana: Spanish Golden Oldies.	Popular music classics of Spain.
	0523	Radio Exterior de Espana: Distance Unknown.	A program for shortwave listeners and DXers.
	0530	BBC (eu): Europe Today.	See S 0330.
	0530	Radio Australia: The Australian Music Show.	Kim Taylor presents the music, people, and issues of the Australian contemporary music industry.
	0532	Radio Exterior de Espana: Meet the Zarzuelas.	An introduction to the light operas of Spain.
	Mondays	0500	Radio Bulgaria: Folk Studio.
0500		Vatican Radio: A Many-Splendored Thing/Letterbox	(monthly).
0512		Radio Exterior de Espana: Visitors Book.	Who's visiting Spain this week.
0514		Vatican Radio: Questions on the Faith.	
0515		Radio Bulgaria: Radio Bulgaria Calling.	DX Program for radio amateurs and shortwave listeners.
0520		Radio Australia: Sports Bulletin.	See S 1310.
0522		Radio Exterior de Espana: Spain Step-by-Step.	A journey to all corners of Spain, both present and future.
0523		Vatican Radio: Sports Corner.	
0530		BBC (eu): Europe Today.	See S 0330.
0530		Radio Australia: Pacific Beat.	See M 0410.
0541	Radio Exterior de Espana: Radio Club.	Listener letters are answered and music requests played.	
Tuesdays	0500	Radio Bulgaria: Ecology/Science/Technology.	A look at Bulgarian developments in these activities.
	0500	Vatican Radio: The Rome Report.	
	0515	Radio Bulgaria: Across the Map of Bulgaria.	A travelogue program of historical sites and interesting places and people.
	0515	Vatican Radio: Ask the Abbot.	
	0516	Radio Exterior de Espana: Panorama.	A magazine program focusing on everything that's happening in Spain.
	0520	Radio Australia: Sports Bulletin.	See S 1310.
	0523	Radio Exterior de Espana: Press Review.	Review of the Spanish press.
	0527	Radio Exterior de Espana: Sports Spotlight.	Summary of the weekend's sports results.
	0530	BBC (eu): Europe Today.	See S 0330.
	0538	Radio Exterior de Espana: Cultural Encounters.	Highlighting cultural interaction between Spain and North America.
Wednesdays	0500	Radio Bulgaria: Economy and Farming.	The effects of agriculture on the Bulgarian economy.
	0500	Vatican Radio: Vatican Week.	
	0515	Radio Bulgaria: Timeout for Music.	See M 2332.
	0516	Radio Exterior de Espana: Panorama.	See T 0516.
	0520	Radio Australia: Sports Bulletin.	See S 1310.
	0522	Radio Exterior de Espana: Press Review.	See T 0523.
	0529	Radio Exterior de Espana: Review of the Spanish Economy.	Spain's status in financial matters.
	0530	BBC (eu): Europe Today.	See S 0330.
	0530	Radio Australia: Pacific Women.	Conversations with Pacific women about their lives and the issues which affect them.
	0536	Radio Exterior de Espana: Entertainment in Spain.	Current favorites from the world of stage and screen.
Thursdays	0500	Radio Bulgaria: History Club.	True stories about the Ottoman Empire period.
	0500	Vatican Radio: Cultural Notebook.	
	0500	Vatican Radio: Talking Point.	
	0516	Radio Exterior de Espana: Panorama.	See T 0516.
	0520	Radio Australia: Sports Bulletin.	See S 1310.
	0520	Radio Bulgaria: Questionline.	See S 1530.
	0522	Radio Exterior de Espana: Press Review.	See T 0523.
	0529	Radio Exterior de Espana: As Others See Us.	Review of the foreign press.
	0530	BBC (eu): Europe Today.	See S 0330.
	Fridays	0539	Radio Exterior de Espana: Science Desk
0539		Radio Exterior de Espana: The Natural World	(biweekly). Ecological and environmental news and developments.
0549		Radio Exterior de Espana: Spanish Course by Radio.	See T 0549.
0500		Radio Bulgaria: From School to Campus.	Secondary education and talent movement in Bulgaria.
0500		Vatican Radio: Cultural Notebook.	
0500		Vatican Radio: The Church Today.	
0515		Radio Bulgaria: Timeout for Music.	See M 2332.
0516		Radio Exterior de Espana: Panorama.	See T 0516.
0520		Radio Australia: Sports Bulletin.	See S 1310.
0522		Radio Exterior de Espana: Press Review.	See T 0523.
Saturdays	0500	Radio Bulgaria: Radio Bulgaria Spectrum.	Thirty-minute digest on a wide variety of topics.
	0500	Vatican Radio: Orders of the Day.	
	0512	Vatican Radio: Orders of the Day.	
	0516	Radio Exterior de Espana: Panorama.	See T 0516.
	0520	Vatican Radio: By the Way....	
	0522	Radio Exterior de Espana: Press Review.	See T 0523.
	0529	Radio Exterior de Espana: Window on Spain.	A different region of Spain is described each week.
	0530	BBC (eu): Europe Today.	See S 0330.
	0530	Radio Australia: One World.	Carolyn Court reports on environmental issues important to the Pacific.
	0539	Radio Exterior de Espana: Arts in Spain.	A review of cultural activities.

FREQUENCIES

0600-0700	Australia, Radio	9660do	11910pa	13605as	15240pa															
		15510as	17715as	17795pa	17880as															
0600-0700 vl	Australia, VL8A Alice Spg	4835do																		
0600-0700 vl	Australia, VL8K Katherine	5025do																		
0600-0700 vl	Australia, VL8T Tent Crk	4910do																		
0600-0700	Bahrain, Radio	6010do																		
0600-0700	Canada, CFCX Montreal	6005do																		
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, R Peace Intl	7385am	9400am	15030am																
0600-0700	Cuba, Radio Havana Cuba	9820na																		
0600-0627	Czech Rep, Radio Prague	7345eu	9505eu	11990eu																
0600-0700	Ecuador, HCJB Quito	11925am	15155am	21455am																
0600-0700 as	Eq Guinea, R East Africa	9585af																		
0600-0650	Germany, Deutsche Welle	11915af	13790af	15185af	15205af															
		17820af	17875af	21680af																
0600-0630	Ghana, GBC Radio 1	4915do																		
0600-0615	Ghana, GBC Radio 2	3366do																		
0600-0700 vl	Italy, IRRS Milan	7125eu																		
0600-0700	Japan, NHK/Radio	9680as	11860as	21610as																
0600-0625	Kenya, Kenya BC Corp	4935do																		
0600-0700 vl	Kiribati, Radio	9825do																		
0600-0630	Laos, National Radio of	7116as																		
0600-0700 s	Lebanon, Wings of Hope	9960me																		
0600-0700	Liberia, Radio ELWA	4760do																		
0600-0700 smtwha	Malaysia, RTM Radio 4	7295do																		
0600-0700	Malaysia, Voice of	6175as	9750as	15295as																
0600-0700	Malta, V of Mediterranean	9765me																		
0600-0700	New Zealand, R NZ Intl	9700pa	15115pa																	
0600-0700	Nigeria, Radio	3970do	4770do	4990do																
0600-0700	Nigeria, Voice of	7255af																		
0600-0650	North Korea, R Pyongyang	15180as	15230as																	
0600-0700 vl	Papua New Guinea, NBC	9675do																		
0600-0700	Russia, Radio Moscow Intl	9530eu	9580af	9750eu	9765eu															
		9865eu	11985as	12010na	12050na															
		15010as	15180na	15190eu	15425na															
		15470me	15535as	15540as	15560me															
		16190as	17675as	17805me	17860as															
		17890as	21625as	21670na	21725me															
0600-0700	S Africa, Channel Africa	15220af																		
0600-0700	Slovakia, AWR Europe	13715as																		
0600-0630 vl	Solomon Islands, SIBC	5020do																		
0600-0700	South Korea, R Korea Intl	11945na																		
0600-0700	Swaziland, Swazi Radio	6155af																		
0600-0700	Swaziland, Trans World R	6070af																		
0600-0630	Switzerland, Swiss R Intl	3985eu	6165eu	9885af	13635af															
		15430af																		
0600-0700	United Kingdom, BBC London	6005af	6180eu	6195af	9410eu															
		9640na	11760me	11940af	11955as															
		12095eu	15280as	15310as	15360as															
		15400af	15575eu	17790as	17830as															
		17885af																		
0600-0700	USA, KAJJ Dallas TX	9815am																		
0600-0700	USA, KTBN Salt Lk City UT	7510na																		
0600-0700	USA, KVOH Los Angeles CA	9785am																		
0600-0700	USA, KWHR Naalehu HI	17780as																		
0600-0700	USA, Monitor Radio Intl	9840eu	9870eu																	
0600-0700	USA, VOA Washington DC	6035af	6873af	7120af	7405af															
		9530af	9665af	11950af	12080af															
		15080af	15600af																	
0600-0630	USA, VOA Washington DC	3980eu	5995eu	6040eu	6060eu															
		6140eu	6873eu	7120eu	7170eu															
		7325eu	11805me	11825me	15205me															
		7425na																		
0600-0700	USA, WEWN Birmingham, AL	7315am																		
0600-0700	USA, WHRI Noblesville IN	7315am	9495am																	
0600-0700	USA, WINB Red Lion PA	11950na																		
0600-0700	USA, WJCR Upton KY	7490na																		
0600-0700 smtwhf	USA, WMLK Bethel PA	9465eu																		
0600-0700	USA, WWCN Nashville TN	5810am	5935am	7435am																
0600-0700	USA, WYFR Okeechobee FL	5985na	7355eu	11770eu	13695af															
0600-0610 mtwhfa	Vatican State, Vatican R	3950eu	6245eu	7250eu	9645eu															
		11740eu	15210eu																	
0600-0700	Yemen, Yemeni Rep Radio	9780do																		
0625-0700	Kenya, Kenya BC Corp	4935do																		
0630-0700	Australia, Radio	9580pa	9860pa	11880pa	11910as															
		15240pa	17715as	17795pa	17880as															
		21725as																		
0630-0700	Austria, R Austria Intl	6015na																		
0630-0700	Belgium, R Vlaanderen Int	6015eu	9925au																	
0630-0700	Vatican State, Vatican R	9725af	11625af	15570af																
0632-0641	Romania, R Romania Intl	7225eu	9550eu	9665eu	11810eu															
0640-0700	Monaco, Trans World Radio	7385eu																		
0645-0700	Finland, YLE/Radio	6120eu	9560eu	11755eu																
0645-0700	Romania, R Romania Intl	11775pa	15250pa	15335pa	17720pa															
		17805pa		</																

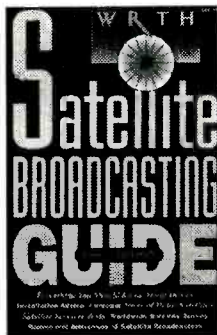
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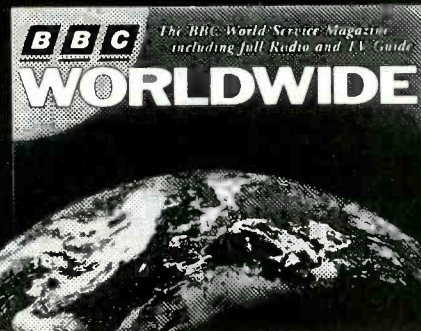
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BBC WORLD SERVICE

FREQUENCIES

0900-1000	Australia, Radio	9510as	9580pa	9860pa	13605as				
		15170as	21725as						
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	Bahrain, Radio	6010do							
0900-0930 mtwta	Belgium, R Vlaanderen Int	6035eu	13690eu	17595af					
0900-1000	Canada, CFCX Montreal	6005do							
0900-1000	Canada, CFRX Toronto	6070do							
0900-1000	Canada, CFVP Calgary	6030do							
0900-1000	Canada, CHNX Halifax	6130do							
0900-1000	Canada, CKZU Vancouver	6160do							
0900-1000	China, China Radio Intl	8450au	11755pa	15440pa	17710pa				
0900-1000	Costa Rica, AWR Alajuela	6150am	9725am						
0900-1000	Costa Rica, R Peace Intl	7385am	9400am	15030am					
0900-1000	Ecuador, HCJB Quito	9745pa	11925pa	17490pa	21455pa				
0900-1000 as	Eqt Guinea, R East Africa	9585af							
0900-0950	Germany, Deutsche Welle	6160as	9565af	11715as	12055as				
		15410af	17715as	17780as	17800af				
		21600af	21680as						
		4915do							
0900-0915 mtwtf	Ghana, GBC Radio 1	4915do							
0900-0915	Ghana, GBC Radio 2	3366do							
0900-1000	Guam, KTWR Agana	11840as							
0900-0915	Guam, KTWR Agana	15200as							
0900-1000 vl	Italy, IRRS Milan	7125eu							
0900-1000	Japan, NHK/Radio	9680as	9750as	11815as	15195as				
		15270au							
0900-1000	Malaysia, RTM Radio 4	7295do							
0900-0930	Netherlands, Radio	5955eu							
0900-1000	New Zealand, R NZ Intl	9700pa	9720pa	9895eu					
0900-1000	Nigeria, Radio	3326do	4990do						
0900-1000 mtwfta	Palau, KHBN Voice of Hope	9830as							
0900-1000 vl	Papua New Guinea, NBC	4890do							
0900-1000	Russia, Radio Moscow Intl	9680eu	11805eu	11900af	12020eu				
		12070eu	13650eu	15190eu	15210eu				
		15290as	15345eu	15355na	15380eu				
		15440eu	15495eu	15500na	15540eu				
		15580as	17595eu	17605eu	17760eu				
		21515eu	21540eu						
0900-1000 vl	Solomon Islands, SIBC	5020do	9545do						
0900-0930	Switzerland, Swiss R Intl	9885au	11640au	13685au	21820au				
0900-1000	United Kingdom, BBC London	6190af	6195as	9410eu	9740as				
		11750as	11760me	11940af	12095eu				
		15070eu	15190sa	15310as	15575me				
		17640eu	17705eu	17790af	17830as				
		17885af	21660af	21715as					
0900-1000	USA, KAJI Dallas TX	9815am							
0900-1000	USA, KTVN Salt Lk City UT	7510am							
0900-1000	USA, KWHR Naalehu HI	9930as							
0900-1000	USA, Monitor Radio Intl	7395sa	9840pa	13615pa	17555au				
0900-1000	USA, WEWN Birmingham AL	9350na	12160eu						
0900-1000 vl	USA, WHRI Noblesville IN	7315am	7355am						
0900-1000 vl	USA, WINB Red Lion PA	11950na							
0900-1000	USA, WJCR Upton KY	7490na	13595na						
0900-1000 smtwfhf	USA, WMLK Bethel PA	9465eu							
0900-1000	USA, WWCR Nashville TN	5810am							
0910-0940	Mongolia, R Ulaanbaatar	11850au	12050au						
0915-1000	Ghana, GBC Radio 2	6130do	7295do						
0920-0935 sh	Greece, Voice of	15650au	17525au						
0930-1000	Canada, CKZN St John's	6160do							
0930-1000	Netherlands, Radio	5955eu	9715pa	9720pa	9810eu				
		9895eu	12065as	15470as					
0930-1000	Philippines, FEBC Manila	11690as							
0940-0950	Greece, Voice of	15650au	17525au						
1000-1100	Australia, Radio	9580pa	9710pa	9860pa	15170as				
		21725as							
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 mtwtha	Belgium, R Vlaanderen Int	6035eu	13690eu	17595eu					
1000-1100	Canada, CFCX Montreal	6005do							
1000-1100	Canada, CFRX Toronto	6070do							
1000-1100	Canada, CFVP Calgary	6030do							
1000-1100	Canada, CHNX Halifax	6130do							
1000-1100	Canada, CKZN St John's	6160do							
1000-1100	Canada, CKZU Vancouver	6160do							
1000-1100	China, China Radio Intl	8450au	11755pa	15440pa	17710pa				
1000-1100	Costa Rica, AWR Alajuela	5030am							
1000-1100	Costa Rica, R Peace Intl	7385am	9400am	15030am					
1000-1100	Ecuador, HCJB Quito	9745pa	11925pa	17490pa	21455pa				
1000-1100 as	Eqt Guinea, R East Africa	9585af							
1000-1100	Ghana, GBC Radio 2	6130do							
1000-1100	India, All India Radio	15050as	15180as	17387au	17895as				
		21460as							
1000-1100 vl	Italy, IRRS Milan	7125eu							
1000-1100 vl	Malaysia, RTM Kota Kinaba	5980do							
1000-1100 mtwh	Malaysia, RTM Radio 4	7295do							
1000-1100	Netherlands, Radio	12065as	15470as						
1000-1030	Netherlands, Radio	5995eu	9715pa	9720pa	9895eu				
1000-1100	New Zealand, R NZ Intl	9700pa	15115pa						
1000-1050	North Korea, R Pyongyang	15340as							
1000-1100 mtwhfa	Palau, KHBN Voice of Hope	9830as							
1000-1100 vl	Papua New Guinea, NBC	4890do							
1000-1100	Philippines, FEBC Manila	11690as							
1000-1100	Russia, Radio Moscow Intl	9750eu	11675na	11705eu	11805eu				
		11900af	12010eu	12015eu	12020eu				
		12070eu	13650eu	15105na	15175eu				
		15210eu	15290as	15320na	15355na				
		15380eu	15435na	15465na	15470na				
		15500na	17710na	17760na	21515eu				
		21540eu							
1000-1100	S Africa, Channel Africa	17810af							
1000-1030	Switzerland, Swiss R Intl	6165eu	9535eu						
1000-1100	United Kingdom, BBC London	6190af	6195as	7160as	9410eu				
		9740as	11750as	11760me	11940af				
		12095eu	15070eu	15190sa	15310as				
		15400eu	15575me	17640eu	17705eu				
		17790me	17830af	17885af	21470af				
		21660af							
1000-1100	USA, KAJI Dallas TX	9815am							
1000-1100	USA, KTVN Salt Lk City UT	7510am							
1000-1100	USA, KWHR Naalehu HI	9930as							
1000-1100	USA, Monitor Radio Intl	7395sa	7465na	13625pa	17555as				
1000-1100	USA, VOA Washington DC	5985as	7405am	9590am	11915am				
		15120am							
1000-1100	USA, WEWN Birmingham AL	9370as							
1000-1100 vl	USA, WHRI Noblesville IN	7315am	7355am						
1000-1100 vl	USA, WINB Red Lion PA	11950na							
1000-1100	USA, WJCR Upton KY	7490na	13595na						
1000-1100	USA, WWCR Nashville TN	5935am	15685am						
1000-1100	USA, WYFR Okeechobee FL	5950na							
1000-1030	Vietnam, Voice of	10059as	12025as	15010as					
1020-1030 mtwfta	Vatican State, Vatican R	6245eu	11740af	15210af	21730me				
1030-1100	Austria, R Austria Intl	15450au							
1030-1057	Czech Rep, Radio Prague	7345eu	9505eu	11990eu					
1030-1100 vl	Malaysia, RTM Sarawak	4950do	7160do						
1030-1100	South Korea, R Korea Intl	11715na							
1030-1100	Sri Lanka, SLBC Colombo	11835au	15120as	17850as					
1030-1100	UAE, Radio Dubai	13675eu	15320eu	15395eu	21605eu				

Hauser's Highlights: WWCR

Home Satellite International Radio Show disappeared in August, but may return if finances permit; *Golden Age of Radio* filled the UT. Sun. 0030 hour on 7435. For lack of support *Jazz Show*, UT Sun. 0345 on 7435 gave up after years, and *Christian Connection*, dating show, Sat. 0400 on 7435 quit after two episodes. Revamped weeknight lineup of right-wing talk and rare-coin shows on 5810 and 7435. For better western coverage, Bro. Stair tried 9475, replaced by 12160 Mon.-Sat. 1300-1500, and 1100-1300 replaced 5810 by 5890. WWCR also planned same switch for evenings by beginning of Sept., to be less out of band, including *World of Radio*, UT Suns. 0600. (Adam Lock, WWCR)

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FREQUENCIES

1200-1230	Australia, Radio	5995pa 11800pa	6060pa 15565as	6080pa	9580pa	1200-1300	Singapore, SBC Radio One	6155do			
1200-1300 vl	Australia, VLBA Alice Spg	2310do				1200-1300	Singapore, R Singapore Int	9530as			
1200-1300 vl	Australia, VLK Katherine	2485do				1200-1300	South Korea, R Korea Intl	7180as			
1200-1300 vl	Australia, VL8T Tent Crk	2325do				1200-1300	Taiwan, VO Free China	7130na	9610na		
1200-1300	Bahrain, Radio	6010do				1200-1230	Thailand, Radio	9655as	11905as		
1200-1300	Brazil, Radiobras	11745na	15445na			1200-1300	United Kingdom, BBC London	6190af	6195na	7160as	9410eu
1200-1215	Cambodia, Natl Voice of	11940as						9515na	9740as	9760eu	11750as
1200-1300	Canada, CFCX Montreal	6005do						11760me	11940af	12095af	15070eu
1200-1300	Canada, CFRX Toronto	6070do						15220na	15310as	15575as	17640eu
1200-1300	Canada, CFPV Calgary	6030do						17790af	17885af	21660af	
1200-1300	Canada, CHNX Halifax	6130do				1200-1300	USA, KAJ Dallas TX	9815am			
1200-1300	Canada, CKZV St John's	6160do				1200-1300	USA, KTVN Salt Lk City UT	7510am			
1200-1300	Canada, CKZU Vancouver	6160do				1200-1300 vl	USA, KWHR Naalehu HI	9930as			
1200-1300 mtwhf	Canada, RCI Montreal	9635na	9705na	11855na	17820na	1200-1300	USA, Monitor Radio Intl	7465ca	9425pa	9455na	13625as
1200-1300	China, China Radio Intl	8425as	9665as	9715as	11660as	1200-1300 s	USA, Radio Miami Intl	9955am			
		11795pa	15210na	15440pa		1200-1300	USA, VOA Washington DC	6110as	9560as	9760as	11715au
1200-1300	Costa Rica, R Peace Intl	7385am	9400am	15030am				15160as	15425as		
1200-1300	Ecuador, HCJB Quito	11925am	15115am	17490am	17890am	1200-1300	USA, WEWN Birmingham AL	9350na	9985ca	15695na	
		21455am				1200-1300 vl	USA, WHRI Noblesville IN	7315am	9850am		
1200-1300	France, Radio France Intl	9805eu	3625af	13640af	15155eu	1200-1300	USA, WJCR Upton KY	7490na	13595na		
		15195eu	15325af	17575na		1200-1300	USA, WWCR Nashville TN	5810am	13845am	15685am	
1200-1230	Iran, VOIRI Tehran	9525me	11715me	11790as	11910as	1200-1300	USA, WYFR Okeechobee FL	5950na	6015na	11830na	17750na
		11930as				1200-1230	Uzbekistan, R Tashkent	7285eu	9715eu	15295eu	17745eu
1200-1300 vl	Italy, IRRS Milan	7125eu				1206-1300 occsnal	New Zealand, R NZ Intl	9700pa			
1200-1300	Jordan, Radio	9560eu				1215-1300	Egypt, Radio Cairo	17595as			
1200-1300 vl	Malaysia, RTM Kota Kinaba	5980do				1220-1230 vl	Ghana, GBC Radio 1	4915do			
1200-1300	Malaysia, RTM Radio 4	7295do				1230-1300	Australia, Radio	5995pa	6060pa	7260as	11800pa
1200-1230	Mongolia, R Ulaanbaatar	11850as	12050as					15565as			
1200-1300	Netherlands, Radio	5955eu	9650eu			1230-1300	Bangladesh, Radio	9548as	13615as		
1200-1206	New Zealand, R NZ Intl	9700pa				1230-1300 s	Belgium, R Vlaanderen Int	15545na	17775as		
1200-1300	New Zealand, R NZ Intl	15115pa				1230-1300	Canada, RCI Montreal	9660as	15195as		
1200-1230 s	Norway, Radio Norway Intl	17860as				1230-1300 mtwhf	Finland, YLE/Radio	11900na	15400na		
1200-1300 mtwhf	Palau, KHBN Voice of Hope	9830as				1230-1300	Ghana, GBC Radio 2	6130do	7295do		
1200-1230 a	Palau, KHBN Voice of Hope	9830as				1230-1300	Sri Lanka, SLBC Colombo	6075as	9720as	15425as	
1200-1300 vl	Papua New Guinea, NBC	4890do	9675do			1230-1300	Sweden, Radio	15240na	17870na		
1200-1300	Russia, Radio Moscow Intl	9540af	9835af	11705as	11985eu	1230-1300	Switzerland, Swiss R Intl	6165eu	9535eu		
		12055eu	15105af	15280af	15290na	1230-1300	Turkey, Voice of	9675as			
		15295as	15320eu	15335af	15350af	1230-1300	Vietnam, Voice of	10059as	12025as	15010as	
		15355na	15440eu	15470me	15485eu	1240-1250	Greece, Voice of	11645af			
		15500na	15525af	15540eu	17760na						

SELECTED PROGRAMS

Sundays

- 1200 WWCR #2: University Network. See S 0000.
- 1201 BBC: Plays of the Week. See S 0101.
- 1210 Radio Australia: Charting Australia. See S 0010.
- 1230 Radio Australia: Report from Asia. A weekly roundup of Asian events.

Mondays

- 1200 WWCR #2: University Network. See S 0000.
- 1209 BBC: Words of Faith. People of all faiths share how their scripture gives authority and meaning to their lives.
- 1210 Radio Australia: Variable Feature. See S 1120.
- 1215 BBC: Quiz. Counterpoint. A wide-ranging musical quiz.
- 1230 Radio Australia: International Report. See M 0030.
- 1245 BBC: Sports Roundup. See S 0315.

Tuesdays

- 1200 WWCR #2: University Network. See S 0000.
- 1209 BBC: Words of Faith. See M 1209.
- 1210 Radio Australia: Variable Feature. See S 1120.
- 1215 BBC: Multitrack: Hit List. See M 2330.
- 1230 Radio Australia: International Report. See M 0030.
- 1245 BBC: Sports Roundup. See S 0315.

Wednesdays

- 1200 WWCR #2: University Network. See S 0000.
- 1209 BBC: Words of Faith. See M 1209.
- 1210 Radio Australia: Charting Australia. See S 0010.
- 1215 BBC: New Ideas. See M 1615.
- 1230 Radio Australia: International Report. See M 0030.
- 1235 BBC: Feature. Among My Souvenirs. See M 1635.
- 1245 BBC: Sports Roundup. See S 0315.

Thursdays

- 1200 WWCR #2: University Network. See S 0000.
- 1209 BBC: Words of Faith. See M 1209.
- 1210 Radio Australia: Variable Feature. See S 1120.
- 1215 BBC: Multitrack: X-Press. See W 2330.
- 1230 Radio Australia: International Report. See M 0030.
- 1245 BBC: Sports Roundup. See S 0315.

Fridays

- 1200 WWCR #2: University Network. See S 0000.
- 1209 BBC: Words of Faith. See M 1209.
- 1210 Radio Australia: Variable Feature. See S 1120.
- 1215 BBC: Feature. The Ottoman Empire (7th). A look at the greatest Islamic power in history. Heritage (14th, 21st, 28th). Istanbul's ancient buildings, excavation of the world's oldest shipwreck, and the very ancient city of Petra in Jordan.
- 1230 Radio Australia: International Report. See M 0030.
- 1245 BBC: Sports Roundup. See S 0315.

Saturdays

- 1200 WWCR #2: University Network. See S 0000.
- 1209 BBC: Words of Faith. See M 1209.
- 1210 Radio Australia: Ockham's Razor. Robyn Williams with straight, sharp talk about science.
- 1215 BBC: Multitrack: Alternative. See F 2330.
- 1230 Radio Australia: Background Report. In-depth reports examining a broad range of influences that shape our world.
- 1245 BBC: Sports Roundup. See S 0315.

QSL from Radio Korea courtesy of Patrick Barry, Mission Viejo, California



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FREQUENCIES

1400-1430	Australia, Radio	5995pa	7240pa	9710pa	11800pa	9560as	9755na	9825eu	9890eu
1400-1500 vl	Australia, VL8A Alice Spg	2310do				9895na	11705na	11960na	15105eu
1400-1500 vl	Australia, VL8K Katherine	2485do				15140as	15210na	15290na	15320na
1400-1500 vl	Australia, VL8T Tent Crk	2325do				15355na	15455eu	15500na	17570eu
1400-1500	Bahrain, Radio	6010do				17590eu	17750eu	17760na	21630eu
1400-1500 vl	Canada, CBC N Quebec Sce	9625do				21740eu	21785eu		
1400-1500	Canada, CFCX Montreal	6005do				1400-1500	Singapore, SBC Radio One		
1400-1500	Canada, CFRX Toronto	6070do				1400-1500	Slovakia, AWR Europe		
1400-1500	Canada, CFPV Calgary	6030do				1400-1500	South Korea, R Korea Intl		
1400-1500	Canada, CHNX Halifax	6130do				1400-1500	Sri Lanka, SLBC Colombo	9720as	15425as
1400-1500	Canada, CKZN St John's	6160do				1400-1500	United Kingdom, BBC London	6195as	7180as
1400-1500	Canada, CKZU Vancouver	6160do						9600eu	9740as
1400-1500 s	Canada, RCI Montreal	11955na	17820na					9750eu	9515na
1400-1500	China, China Radio Intl	4200as	7405na	11815as	15165as			11820as	11940af
1400-1500 vl	Costa Rica, R Peace Intl	7385am	9400am	15030am				15260af	15310me
1400-1430	Ecuador, HCJB Quito	11925am	15115am	17490am	17890am			17640af	17705eu
		21455am						17880af	21660af
1400-1500	France, Radio France Intl	11910as	17560me	17695eu		1400-1500	USA, KAIJ Dallas TX	15725am	
1400-1420	Ghana, GBC Radio 1	4915do				1400-1500 vl	USA, KJES Mesquite NM	11715na	
1400-1500	Ghana, GBC Radio 2	6130do	7295do			1400-1500	USA, KTBN Salt Lk City UT	7510na	
1400-1500	India, All India Radio	13750as	15120as			1400-1500	USA, Monitor Radio Intl	9355as	11900na
1400-1500	Iraq, Radio Iraq Intl	15250as				1400-1500	USA, VOA Washington DC	6110as	7215as
1400-1425 smtwh	Israel, Kol Israel	15640na						9770as	11705au
1400-1500	Italy, AWR Europe	7230eu						15395au	15425as
1400-1500 vl	Italy, IRRS Milan	7125eu				1400-1500	USA, WEWN Birmingham AL	9350na	
1400-1500	Japan, NHK/Radio	9535na	9750as	11705na	11840as	1400-1500 vl	USA, WHRI Noblesville IN	9465am	15105am
		11955na				1400-1500	USA, WJCR Upton KY	7490na	13595na
1400-1500 mtwhfa	Lebanon, Wings of Hope	9960me				1400-1500	USA, WWCR Nashville TN	9475am	13845am
1400-1500 vl	Malaysia, RTM Kota Kinaba	5980do				1400-1500	USA, WYFR Okeechobee FL	6015na	11550na
1400-1500	Malaysia, RTM Radio 4	7295do				1415-1500	Bhutan, Bhutan BS	5025as	11830na
1400-1500 vl	Malaysia, RTM Sarawak	4950do				1415-1425	Nepal, Radio	5005do	1765do
1400-1500	Malta, V of Mediterranean	11925eu				1430-1500	Australia, Radio	5995pa	6080pa
1400-1500 s	Morocco, RTV Marocaine	17595af						9710pa	9770as
1400-1500 vl	Myanmar, Radio	7185do						11800pa	11660as
1400-1500	Netherlands, Radio	9890as	13700as	15150as		1430-1500	Austria, R Austria Intl	6155eu	9870af
1400-1500	New Zealand, R NZ Intl	15115pa				1430-1500	Ecuador, HCJB Quito	11925am	13730af
1400-1500 occsnal	New Zealand, R NZ Intl	9655pa				1430-1500	Myanmar, Radio	5990do	17490am
1400-1430 mtwhf	Palau, KHBN Voice of Hope	9830as				1430-1500	Romania, R Romania Intl	11775as	15335as
1400-1500	Philippines, FEBC Manila	11995as				1445-1500	Guam, KTWR Agana	11580as	17720as
1400-1500	Russia, Radio Moscow Intl	6025eu	6065eu	7280eu	7315as	1445-1500	Mongolia, R Ulaanbaatar	7260as	13780as

SELECTED PROGRAMS

Sundays

- 1400 Israel Radio Int'l: Israel News Magazine. See S 1100.
- 1400 WWCR #2: University Network. See S 0000.
- 1401 BBC: Features. Turkey Today (2nd, 9th, 16th). A three-part series that takes the pulse of Turkey. A Turkish Season Phone-In (23rd). A live call-in program. The Turkish Diaspora (30th). How Germany's two million Turks see themselves and their future.
- 1407 Israel Radio Int'l: Calling All Listeners. Israel Radio's weekly mailbag program.
- 1410 Radio Australia: Variable Feature. See S 1120.
- 1419 Israel Radio Int'l: Israel DX Corner. Program for shortwave listeners.
- 1430 BBC: Anything Goes. A variety of music and much more with Bob Holness.
- 1430 Radio Australia: Report from Asia. See S 1230.

Mondays

- 1400 BBC (as): Dateline East Asia. Magazine program dealing with political and economic affairs of SE/NE Asia.
- 1400 Israel Radio Int'l: Israel News Magazine. See S 1100.
- 1400 Vatican Radio: Thinking it Through.
- 1400 WWCR #2: University Network. See S 0000.
- 1405 BBC: Outlook. An up-to-the-minute mix of conversation, controversy and color from around the world.
- 1406 Israel Radio Int'l: The Israel Sound. The latest in Israeli popular music.
- 1410 Radio Australia: Variable Feature. See S 1120.
- 1430 BBC: Off the Shelf. See M 0430.
- 1430 Radio Australia: International Report. See M 0030.
- 1445 BBC: Music Feature. Top Scores. See S 0445.
- 1450 Radio Australia: Stock Exchange Report. Financial news from Sydney and other exchanges.

Tuesdays

- 1400 BBC (as): Dateline East Asia. See M 1400.
- 1400 Israel Radio Int'l: Israel News Magazine. See S 1100.
- 1400 WWCR #2: University Network. See S 0000.
- 1405 BBC: Outlook. See M 1405.
- 1407 Israel Radio Int'l: Israel Mosaic. See M 1115.

- 1410 Radio Australia: Variable Feature. See S 1120.
- 1421 Israel Radio Int'l: New from Israel. The latest Israel exports are discussed.
- 1430 BBC: Off the Shelf. See M 0430.
- 1430 Radio Australia: International Report. See M 0030.
- 1445 BBC: Music Feature. Composers' Journeys. See M 0145.
- 1450 Radio Australia: Stock Exchange Report. See M 1450.

Wednesdays

- 1400 BBC (as): Dateline East Asia. See M 1400.
- 1400 Israel Radio Int'l: Israel News Magazine. See S 1100.
- 1400 WWCR #2: University Network. See S 0000.
- 1401 Vatican Radio: What Can I Do?.
- 1405 BBC: Outlook. See M 1405.
- 1405 Israel Radio Int'l: Talking Point. See T 1115.
- 1410 Radio Australia: Variable Feature. See S 1120.
- 1418 Israel Radio Int'l: Eco Alert. Environmental issues in Israel.
- 1430 BBC: Off the Shelf. See M 0430.
- 1430 Radio Australia: International Report. See M 0030.
- 1445 BBC: Good Books. See S 0015.
- 1450 Radio Australia: Stock Exchange Report. See M 1450.

Thursdays

- 1400 BBC (as): Dateline East Asia. See M 1400.
- 1400 Israel Radio Int'l: Israel News Magazine. See S 1100.

- 1400 Vatican Radio: Postcards from Rome.
- 1400 WWCR #2: University Network. See S 0000.
- 1405 BBC: Outlook. See M 1405.
- 1410 Radio Australia: Variable Feature. See S 1120.
- 1411 Israel Radio Int'l: Studio Three. See H 1115.
- 1430 BBC: Off the Shelf. See M 0430.
- 1430 Radio Australia: International Report. See M 0030.
- 1445 BBC: The Learning World. See M 0615.
- 1450 Radio Australia: Stock Exchange Report. See M 1450.

Fridays

- 1400 BBC (as): Dateline East Asia. See M 1400.
- 1400 Vatican Radio: Faith by Numbers.
- 1400 WWCR #2: University Network. See S 0000.
- 1405 BBC: Outlook. See M 1405.
- 1410 Radio Australia: Variable Feature. See S 1120.
- 1430 BBC: Off the Shelf. See M 0430.
- 1430 Radio Australia: International Report. See M 0030.
- 1445 BBC: Global Concerns. See F 0145.
- 1450 Radio Australia: Stock Exchange Report. See M 1450.

Saturdays

- 1400 WWCR #2: University Network. See S 0000.
- 1401 BBC: Sportsworld. The weekly sports magazine.
- 1410 Radio Australia: Ockham's Razor. See A 1210.
- 1430 Radio Australia: Background Report. See A 1230.

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See pp. 8-9 for additional information.

FREQUENCIES

1500-1600	Australia, Radio	5995pa 9710pa 11800pa	6060pa 9770as	6080pa 11660as	7260as 11695pa	1500-1600	North Korea, R Pyongyang	9325eu	9640af	9977af	13185eu
1500-1600 vl	Australia, VL8A Alice Spg	2310do				1500-1600	Philippines, FEBC Manila	11995as			
1500-1600 vl	Australia, VL8K Katherine	2485do				1500-1530	Romania, R Romania Intl	11775as	15335as	17720as	
1500-1600 vl	Australia, VL8T Tent Crk	2325do				1500-1600	Russia, Radio Moscow Intl	6065eu	7305eu	9505eu	9540eu
1500-1600	Bahrain, Radio	6010do						9560eu	9755af	9825eu	9895as
1500-1600	Bulgaria, Radio	15460as	17705as					11695eu	11875eu	11940as	12030as
1500-1600 vl	Canada, CBC N Quebec Sce	9625do						15105na	15180eu	15210as	15290na
1500-1600	Canada, CFCX Montreal	6005do				1500-1600	S Africa, Channel Africa	15320as	15425eu	15470as	15500na
1500-1600	Canada, CFRX Toronto	6070do				1500-1600	15540eu	15550eu	17760na		
1500-1600	Canada, CFPV Calgary	6030do				1500-1543 mtwhfa	Seychelles, FEBA Radio	4945af	11770af		
1500-1600	Canada, CHNX Halifax	6130do				1500-1545	Seychelles, FEBA Radio	9810as	11870as		
1500-1600	Canada, CKZN St John's	6160do				1500-1545	Singapore, SBC Radio One	7205as			
1500-1600	Canada, CKZU Vancouver	6160do				1500-1600	Sri Lanka, SLBC Colombo	6155do			
1500-1600 s	Canada, RCI Montreal	11955na	17820na			1500-1600	Switzerland, Swiss R Intl	6075as	9720as	15425as	
1500-1600	China, China Radio Intl	4200as	7405na	9785as	11815as	1500-1530	United Kingdom, BBC London	11960as	13635as	15505as	
		15165as				1500-1600		6190af	6195as	7180as	9410eu
1500-1600 vl	Costa Rica, R Peace Intl	7385am	9400am	15030am				9515na	9740as	11750as	11940af
1500-1527	Czech Rep, Radio Prague	5930as	7345eu	13580me		1500-1600	USA, KAIJ Dallas TX	12095eu	15070af	15260na	15310as
1500-1600	Ecuador, HCJB Quito	11925am	15250am	17490am	17890am	1500-1600	USA, KATN Salt Lk City UT	15400af	15420af	17705eu	17840na
		21455am				1500-1600	USA, Monitor Radio Intl	17880af	21470af	21490af	21660af
1500-1600	Ethiopia, Voice of	7165do	9560do			1500-1600	USA, VOA Washington DC	15725am			
1500-1550	Germany, Deutsche Welle	7185af	9735af	11965af	17800af	1500-1600		15590na			
		21600af				1500-1600		9930as			
1500-1600	Guam, KTWR Agana	11580as				1500-1600		9355as			
1500-1600	Iraq, Radio Iraq Intl	15250as				1500-1600		6110as	7215as	7245as	9510as
1500-1600 vl	Italy, IRRS Milan	7125eu				1500-1600		9760as	9770as	11785as	15160as
1500-1600	Japan, NHK/Radio	9535na	9750as	11915as	11955na	1500-1600		15205eu	15385as	15395as	17640as
		15355af				1500-1600		17730as	17800as	17830as	19379eu
1500-1600	Jordan, Radio	9560eu				1500-1600		15665eu			
1500-1600 mtwhfa	Lebanon, Wings of Hope	9960me				1500-1600		9350na	17510eu		
1500-1600 vl	Malaysia, RTM Kota Kinaba	5980do				1500-1600		9465am	15105am		
1500-1600	Malaysia, RTM Radio 4	7295do				1500-1600		7490na	13595na		
1500-1600	Malaysia, RTM Sarawak	4950do	7160do			1500-1600		15420na			
1500-1600	Malta, V of Mediterranean	11925eu				1500-1600		13845am	15685am		
1500-1515	Mongolia, R Ulaanbaatar	7260as	13780as			1500-1600		11705na	11830na	17750na	
1500-1525	Netherlands, Radio	9890as	13700as	15150as		1525-1530 twhf		15140as			
1500-1600	New Zealand, R NZ Intl	15115pa				1530-1600		11780as			
1500-1600 occsnal	New Zealand, R NZ Intl	9655pa				1530-1600 mtwhf		21515me			
						1540-1555 asm		15140as			
						1545-1600		12050as	15585as		

SELECTED PROGRAMS

Sundays

- 1500 BBC (af): Postmark Africa. See S 0335.
- 1500 WWCR #2: University Network. See S 0000.
- 1515 BBC: Concert Hall. Classical music concerts.
- 1515 Radio Bulgaria: Weekly Spotlight. See S 0000.
- 1530 Radio Australia: Fine Music Australia. See S 1130.
- 1530 Radio Bulgaria: Questionline. Ten minutes of answers to listeners' questions.

Mondays

- 1500 WWCR #2: University Network. See S 0000.
- 1510 Radio Australia: Asia Focus. Reporting on the commercial interrelationships of the Asia/Pacific Region.
- 1515 BBC (af): Focus on Africa. Up-to-the-minute reports on the day's events from all over the continent.
- 1515 BBC: Features. See M 0101.
- 1515 Radio Bulgaria: Answering Your Letters. See M 0445.
- 1530 Radio Australia: Innovations. See M 1130.
- 1530 Radio Bulgaria: Folk Studio. See M 0500.
- 1545 Radio Bulgaria: Radio Bulgaria Calling. See M 0515.

Tuesdays

- 1500 WWCR #2: University Network. See S 0000.
- 1510 Radio Australia: Asia Focus. See M 1510.
- 1515 BBC (af): Focus on Africa. See M 1515.
- 1515 BBC: A Jolly Good Show. See T 0015.
- 1515 Radio Bulgaria: Today. See S 1315.
- 1530 Radio Australia: Arts Australia. See T 1130.
- 1530 Radio Bulgaria: Ecology/Science/Technology. See T 0500.
- 1545 Radio Bulgaria: Across the Map of Bulgaria. See T 0515.

Wednesdays

- 1500 WWCR #2: University Network. See S 0000.
- 1510 Radio Australia: Asia Focus. See M 1510.
- 1515 BBC (af): Focus on Africa. See M 1515.
- 1515 BBC: From Our Own Correspondent. See S 0330.
- 1515 Radio Bulgaria: Today. See S 1315.
- 1530 BBC: Quiz. The Litmus Test. The return of the science quiz that asks brain-teasers.
- 1530 Radio Australia: Science File. See W 1130.
- 1530 Radio Bulgaria: Cultural Review. See S 0015.

Thursdays

- 1500 WWCR #2: University Network. See S 0000.
- 1510 Radio Australia: Asia Focus. See M 1510.
- 1515 BBC (af): Focus on Africa. See M 1515.
- 1515 BBC: The Greenfield Collection. See H 0015.
- 1515 Radio Bulgaria: Today. See S 1315.
- 1530 Radio Australia: Couchman. See H 1130.
- 1530 Radio Bulgaria: History Club. See H 0500.
- 1550 Radio Bulgaria: Business and Finance. See M 2315.

Fridays

- 1500 WWCR #2: University Network. See S 0000.
- 1510 Radio Australia: Asia Focus. See M 1510.
- 1515 BBC (af): Focus on Africa. See M 1515.
- 1515 BBC: Music Review. See F 0015.
- 1515 Radio Bulgaria: Today. See S 1315.
- 1530 Radio Australia: The Parliament Program. See F 1130.
- 1530 Radio Bulgaria: Lifestyle. See F 0015.
- 1545 Radio Bulgaria: Timeout for Music. See M 2332.

Saturdays

- 1500 BBC (af): Spice Taxi. See A 0630.
- 1500 WWCR #2: University Network. See S 0000.
- 1515 BBC: Sports World. See A 1401.
- 1515 Radio Bulgaria: Answering Your Letters. See M 0445.
- 1530 Radio Australia: Business Weekly. See A 1130.
- 1545 Radio Bulgaria: Radio Bulgaria Calling. See M 0515.

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Hauser's Highlights

GUAM KTWR final W-94 from Sept. 25 uses 9430, 9475, 9590, 9785, 9815, 9820, 9870, 11580, 11660, 11665, 11700, 11840 and 15200, including English: 0745-0915 on 15200; 0845-1000 on 11840; 1445-1630 Mon.-Tue., 1445-1645 Wed.-Sat., 1445-1700 Sun. on 11580 (Via ASWLC) *DX Asiawaves* on KSDA rescheduled: Sat 1415, Sat & Sun 1500 on 9370; Sat 2300, Sun 2315 on 11980 (via Wolfgang Büschel)

SWAZILAND TWR S-94 changes include English: 0600-0735 (Mon-Fri. 0805) on 9500; 0430-0500 on 3200 ex-6070 (TWR via Wolfgang Büschel)

FREQUENCIES

1900-2000 mtwhf	Argentina, RAE	15345eu			
1900-2000	Australia, Radio	6060pa 9560as 11880pa	6080pa 9860pa	7240pa 11660pa	7260as 11695pa
1900-2000 vl	Australia, VLBA Alice Spg	2310do			
1900-2000 vl	Australia, VL8K Katherine	2485do			
1900-2000 vl	Australia, VL8T Tent Crk	2325do			
1900-2000	Bahrain, Radio	6010do			
1900-1918	Brazil, Radiobras	15268eu			
1900-2000	Canada, CFCX Montreal	6005do			
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	6955me	9440af	11515af	
1900-2000	Costa Rica, R Peace Intl	7385am	9400am	15030am	21465am
1900-2000	Ecuador, HCJB Quito	15270eu	17490eu	17790eu	21455eu
1900-2000 vl	Eq Guinea, Radio Africa	7200af			
1900-2000	Finland, YLE/Radio	9730eu	9770eu	11755eu	15440eu
1900-1950	Germany, Deutsche Welle	9670af 11810af	9735af 13690af	11740af 13790af	11785af
1900-1930	Hungary, Radio Budapest	3955eu	6110eu	7220eu	
1900-1945	India, All India Radio	7412eu 11935af	9650me 15075af	9950me	11620eu
1900-2000 vl	Italy, IRRS Milan	7125eu			
1900-2000	Japan, NHK/Radio	6150as 9680as	7140au	9535as	9580au
1900-2000	Kuwait, Radio	11990eu			
1900-1930 as	Latvia, Radio	5935eu			
1900-2000	Liberia, Radio ELWA	4760do			
1900-1925	Netherlands, Radio	6020af	9605af	17655af	21590af
1900-2000	New Zealand, R NZ Intl	11735pa			
1900-1916	New Zealand, R NZ Intl	15115pa			
1900-2000	Nigeria, Radio	3326do	4770do	4990do	
1900-2000	Nigeria, Voice of	7255af			
1900-2000 vl	Papua New Guinea, NBC	4890do			
1900-1930 mtwhf	Portugal, Radio	9780eu	9815eu	11975af	17680af
1900-2000	Romania, R Romania Intl	9690eu	9750eu	11810eu	11940eu
1900-2000	Russia, Radio Moscow Intl	6120eu 7260eu 13665eu 15425na 17605eu	6970eu 9685eu 15105af 15525af 17760eu	7105na 12050eu 15180eu 15580af 17875af	7170na 12050eu 15290af 17560af
1900-2000	Slovakia, AWR Europe	15625as			
1900-2000	Spain, R Exterior Espana	11775af			
1900-2000	Swaziland, Trans World R	3200af	3240af		
1900-1930	Switzerland, Swiss R Intl	3985eu	6165eu		
1900-2000 vl	Uganda, Radio	4976do			
1900-2000	United Kingdom, BBC London	3255af 7160me 11955as 17880af	6180eu 9410eu 12095af	6195eu 9630af 15070af	7110as 9740me 15400af
1900-2000	USA, KAIJ Dallas TX	15725am			
1900-2000	USA, KBTN Salt Lk City UT	15590am			
1900-2000 as	USA, KVOH Los Angeles CA	17775am			
1900-2000	USA, KWHR Naalehu HI	13625as			
1900-2000	USA, Monitor Radio Intl	13770eu	15665eu	17510af	
1900-2000 as	USA, Radio Miami Intl	9955am			
1900-2000	USA, VOA Washington DC	3980eu 9700eu 13710af 17800af 19379eu	6040eu 11870as 15410af	7415af 11920af 15445af	9525as 12040af 15580af
1900-2000	USA, WEWN Birmingham AL	13615na	18930sa		
1900-2000 vl	USA, WHRI Noblesville IN	9485am	9590am	13760am	
1900-2000	USA, WINB Red Lion PA	15715eu			
1900-2000	USA, WJCR Upton KY	7490na	13595na		
1900-2000	USA, WMLK Bethel PA	9465eu			
1900-2000	USA, WRNO New Orleans LA	15420am			
1900-2000	USA, WWCR Nashville TN	13845am	15610am	15685am	
1900-2000	USA, WYFR Okeechobee FL	15355eu	21615af		
1910-1920	Botswana, Radio	3356af	4830af	7255af	
1917-2000	New Zealand, R NZ Intl	9700pa			
1930-2000	Iran, VOIRI Tehran	9022me	9745me		
1930-2000	Netherlands, Radio	17605af	17655af		
1930-2000	Slovakia, R Slovakia Intl	5915eu	7345eu	9440eu	
1935-1955	Italy, RAI Rome	7275eu	9575eu		
1940-2000	Mongolia, R Ulaanbaatar	11790as	11850eu		
1950-2000	Vatican State, Vatican R	3950eu	5882eu		

2000-2100	Bahrain, Radio	6010do			
2000-2100	Bulgaria, Radio	9700eu	11720eu		
2000-2100	Canada, CFCX Montreal	6005do			
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	4130eu 9920eu	6950eu 11715af	8260eu 15110af	9440af
2000-2100	Costa Rica, R Peace Intl	7385am	9400am	15030am	21465am
2000-2027	Czech Rep, Radio Prague	5930eu	7345eu	9485eu	
2000-2100	Ecuador, HCJB Quito	21455am			
2000-2100 vl	Eq Guinea, Radio Africa	7200af			
2000-2030 mt	Estonia, Estonian Radio	5925eu			
2000-2050	Germany, Deutsche Welle	5960eu	7285eu		
2000-2030	Ghana, GBC Radio 1	4915do			
2000-2030	Ghana, GBC Radio 2	3366do			
2000-2010 mtwhfa	Greece, Voice of	9395eu			
2000-2100	Indonesia, Voice of	9675as	11752as		
2000-2030	Israel, Kol Israel	7405na	7465na	9435eu	11603na
2000-2100 vl	Italy, IRRS Milan	7125eu			
2000-2010 mtwhf	Kenya, Kenya BC Corp	4935do			
2000-2100	Kuwait, Radio	11990eu			
2000-2100	Liberia, Radio ELWA	4760do			
2000-2100	Mongolia, R Ulaanbaatar	11790eu	11850eu		
2000-2025	Netherlands, Radio	17605af			
2000-2100	New Zealand, R NZ Intl	9700pa	11735pa		
2000-2100	Nigeria, Radio	3326do	4770do	4990do	
2000-2100	Nigeria, Voice of	7255af			
2000-2100	North Korea, R Pyongyang	6576eu	9345eu	9977eu	
2000-2030 s	Norway, Radio Norway Intl	9590eu	15220af		
2000-2100 vl	Papua New Guinea, NBC	4890do			
2000-2100	Russia, Radio Moscow Intl	7260eu 9665na 9895na 11750na 12050na 15580na	9190na 9450na 9620na 11730as 11760eu 11805eu 11940eu	9450na 9620na 9880na 11730as 11805eu 11805eu 15425eu	9620na 9880na 11730as 11940eu 15425eu
2000-2100	Slovakia, AWR Europe	6055as			
2000-2100 vl	Solomon Islands, SIBC	5020do	9545do		
2000-2100	Sri Lanka, SLBC Colombo	9720eu	15120eu		
2000-2045	Swaziland, Trans World R	3240af			
2000-2015	Swaziland, Trans World R	3200af			
2000-2030	Switzerland, Swiss R Intl	6135af 15505af	9770af	9885af	13635af
2000-2050	Turkey, Voice of	9400eu			
2000-2100 vl	Uganda, Radio	4976do			
2000-2030	United Kingdom, BBC London	7160me	9630af	9740me	17880af
2000-2100	United Kingdom, BBC London	3255af 7325eu 15260sa	6180eu 6195eu 7110as	6195eu 7110as 7110as	7110as 7110as 15070af
2000-2100	USA, KAIJ Dallas TX	15725am			
2000-2100 vl	USA, KJES Mesquite NM	15385na			
2000-2100	USA, KBTN Salt Lk City UT	15590am			
2000-2100 as	USA, KVOH Los Angeles CA	17775am			
2000-2100	USA, KWHR Naalehu HI	11980as			
2000-2100	USA, Monitor Radio Intl	13770af	15665eu		
2000-2100	USA, VOA Washington DC	3980eu 11820af 15445af 21485af	6040eu 15160af 15580af	7415af 15205eu 17800af	9700eu 15410af 19379me
2000-2100	USA, WEWN Birmingham AL	13615na			
2000-2100	USA, WHRI Noblesville IN	9485am	13760am		
2000-2100	USA, WINB Red Lion PA	15715eu			
2000-2100	USA, WJCR Upton KY	7490na	13595na		
2000-2100	USA, WMLK Bethel PA	9465eu			
2000-2100	USA, WRNO New Orleans LA	15420am			
2000-2100	USA, WWCR Nashville TN	13845am	15610eu	15685am	
2000-2100	USA, WYFR Okeechobee FL	17612af	21525af	21615eu	
2000-2045	USA, WYFR Okeechobee FL	15355eu			
2000-2030	Vatican State, Vatican R	9645af	11625af	15570af	
2000-2010	Vatican State, Vatican R	3950eu	5882eu		
2005-2100	Syria, Radio Damascus	12085eu	15095na		
2010-2100 sa	Kenya, Kenya BC Corp	4935do			
2025-2045	Italy, RAI Rome	7235me	9710me	11800me	
2030-2100	Canada, RCI Montreal	5995eu 15315af	7235eu 15325me	13650eu 17820me	13670me 17875af
2030-2100	Egypt, Radio Cairo	15375af			
2030-2100 smtwha	Moldava, R Dnestr Intl	15290eu			
2030-2100 mtwhfa	Palau, KHBN Voice of Hope	11980as			
2030-2100	Poland, Polish R Warsaw	5955eu	6135eu	7285eu	
2030-2100	Serbia, Radio Yugoslavia	9620eu			
2030-2100	South Korea, R Korea Intl	5965eu	5975eu	9640eu	9870eu
2030-2100	Sweden, Radio	6065af	9655me		
2030-2100	Vietnam, Voice of	10059as	12025as	15010as	
2045-2100	India, All India Radio	7412eu 11715pa	9910au 9950eu	9950eu	11620eu

2000 UTC

2000-2100	Australia, Radio	6060pa 7260as 9560pa	6080pa 9860pa	7240pa 11660pa	7260pa 11695pa
2000-2100 vl	Australia, VLBA Alice Spg	2310do			
2000-2100 vl	Australia, VL8K Katherine	2485do			
2000-2100 vl	Australia, VL8T Tent Crk	2325do			

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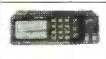
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FREQUENCIES

2100-2200	Australia, Radio	6060pa 11855as	6080pa 11880pa	7240pa 11955pa	7260as
2100-2130 vl	Australia, VLBA Alice Spg	2310do			
2100-2130 vl	Australia, VL8K Katherine	2485do			
2100-2130 vl	Australia, VL8T Tent Crk	2325do			
2100-2106	Bahrain, Radio	6010do			
2100-2130	Belgium, R Vlaanderen Int	5910eu			
2100-2200 vl	Canada, CBC N Quebec Sca	9625do			
2100-2200	Canada, CFCX Montreal	6005do			
2100-2200	Canada, CFRX Toronto	6070do			
2100-2200	Canada, CFVP Calgary	6030do			
2100-2200	Canada, CHNX Halifax	6130do			
2100-2200	Canada, CKZN St John's	6160do			
2100-2200	Canada, CKZU Vancouver	6160do			
2100-2130	Canada, RCI Montreal	5995eu 15325af	7235eu 17820af	13650me 17850af	13670me 17875af
2100-2200	China, China Radio Intl	4130eu	6950eu	8260eu	9920eu
2100-2130	China, China Radio Intl	3985eu	11715af	15110af	
2100-2200	Costa Rica, R Peace Intl	7385am	9400am	15030am	21465am
2100-2200	Cuba, Radio Havana Cuba	15165eu	17760eu		
2100-2127	Czech Rep, Radio Prague	5930eu	7345eu	9420eu	
2100-2130	Ecuador, HCJB Quito	21455am			
2100-2200	Egypt, Radio Cairo	15375af			
2100-2150	Germany, Deutsche Welle	9670as 11785as 3955eu 7412eu	9735af 13690as 6110eu 9910au	9765as 15135af 7220eu 9950eu	11765af 11620eu
2100-2130	Hungary, Radio Budapest	7125eu			
2100-2200	India, All India Radio	6035as 9750me 9660as 9960me	6185as 11925eu 11915as	9625af 9680af	9680af
2100-2200 vl	Italy, IRRS Milan	7125eu			
2100-2200	Japan, NHK/Radio	9660as 9960me			
2100-2115	Japan, NHK/Radio	9660as			
2100-2200	Lebanon, Wings of Hope	9960me			
2100-2200	Liberia, Radio ELWA	4760do			
2100-2137	New Zealand, R NZ Intl	11735pa			
2100-2200	New Zealand, R NZ Intl	9700pa			
2100-2200	Nigeria, Radio	3326do	4770do	4990do	
2100-2200	Nigeria, Voice of	7255af			
2100-2200 mtwhfa	Palau, KHBN Voice of Hope	11980as			
2100-2200 vl	Papua New Guinea, NBC	4890do	9675do		
2100-2125	Poland, Polish R Warsaw	5995eu	6135eu	7285eu	
2100-2200	Romania, R Romania Intl	7225eu	9690eu	9750eu	11940eu
2100-2200	Russia, Radio Moscow Intl	7150na 9665na 9880eu 11770na 13665eu 15580na	9470eu 9685eu 9895as 11730na 11920na 17605na	9530af 9750eu 9820eu 11750na 12050na 17675as	9550eu 9820eu 11750na 12050na 15425na
2100-2130	Serbia, Radio Yugoslavia	7265eu			
2100-2115 vl	Sierra Leone, SLBS	3316do			
2100-2200 vl	Solomon Islands, SIBC	5020do	9545do		
2100-2200	South Korea, R Korea Intl	6480eu	15575eu		
2100-2200	Spain, R Exterior Espana	6125eu			
2100-2130	Sri Lanka, SLBC Colombo	9720eu	15120eu		
2100-2105	Syria, Radio Damascus	12085eu	15095na		
2100-2200	Ukraine, R Ukraine Intl	4825eu 11950eu	6010eu 12030eu	6020eu 6090eu	6090eu
2100-2200	United Kingdom, BBC London	3255af 6180eu 9410eu 15260sa	3915as 6195eu 11955as 15370as	5975na 7110as 12095af 15400na	6005af 7325eu 15070eu 15575eu
2100-2200	USA, KAIJ Dallas TX	15725am			
2100-2200	USA, KTBN Salt Lk City UT	15590na			
2100-2200 s	USA, KVOH Los Angeles CA	17775am			
2100-2200	USA, KWHR Naalehu HI	13720as			
2100-2200	USA, Monitor Radio Intl	13770eu	13840pa	15665eu	
2100-2200	USA, VOA Washington DC	6040eu 13710as 15445af 19379eu	6095eu 15185au 15580af 21485af	9760eu 15205eu 17735as 18930sa	11870as 15410af 17800af
2100-2200	USA, WEWN Birmingham AL	13615na			
2100-2200 vl	USA, WHRI Noblesville IN	13760am			
2100-2200	USA, WINB Red Lion PA	15715eu			
2100-2200	USA, WJCR Upton KY	7490na	13595na		
2100-2200	USA, WMLK Bethel PA	9465na			
2100-2200	USA, WRNO New Orleans LA	15420am			
2100-2200	USA, WWCR Nashville TN	13845am	15610am	15685am	
2100-2200	USA, WYFR Okeechobee FL	15566eu	17612af	21525af	
2100-2145	USA, WYFR Okeechobee FL	21615eu			
2110-2200	Syria, Radio Damascus	12085na	15095na		
2115-2200	Egypt, Radio Cairo	9900eu			
2115-2130 mtwhf	United Kingdom, BBC Carib	6110am	15390am	17715am	
2130-2145 s	Armenia, Radio Yerevan	11790eu	11945eu	11960eu	
2130-2200	Australia, Radio	11695pa	15365pa	17795pa	17860pa
2130-2200 vl	Australia, VLBA Alice Spg	4835do			
2130-2200 vl	Australia, VL8K Katherine	5025do			

2130-2200 vl	Australia, VL8T Tent Crk	4910do			
2130-2200	Austria, R Austria Intl	5945af	6155af	9880eu	13730af
2130-2200	Ecuador, HCJB Quito	11835eu	15270eu	17490eu	21455eu
2130-2200	Sweden, Radio	6065eu			
2138-2200	New Zealand, R NZ Intl	15115pa			

2200 UTC

2200-2300	Australia, Radio	11695pa 13755as	11855as 15365pa	11880pa 17795pa	11955pa 17860pa
2200-2300 vl	Australia, VLBA Alice Spg	4835do			
2200-2300 vl	Australia, VL8K Katherine	5025do			
2200-2300 vl	Australia, VL8T Tent Crk	4910do			
2200-2300	Bulgaria, Radio	9700eu	11645eu	11720na	
2200-2300	Canada, CFCX Montreal	6005do			
2200-2300	Canada, CFRX Toronto	6070do			
2200-2300	Canada, CFVP Calgary	6030do			
2200-2300	Canada, CHNX Halifax	6130do			
2200-2300	Canada, CKZN St John's	6160do			
2200-2300	Canada, CKZU Vancouver	6160do			
2200-2230	Canada, RCI Montreal	11705as	11845am	11875am	15305am
2200-2300	Canada, RCI Montreal	5960na	9755na	13670am	
2200-2300	China, China Radio Intl	9880eu			
2200-2300	Costa Rica, R Peace Intl	7385am	9400am	15030am	
2200-2300	Cuba, Radio Havana Cuba	9550na			
2200-2245	Egypt, Radio Cairo	9900eu			
2200-2300 vl	Eq Guinea, Radio Africa	7200af			
2200-2230	India, All India Radio	7412eu 11715pa 7125eu	9910au 15225eu	9950eu 11620eu	11620eu
2200-2300 vl	Italy, IRRS Milan	7125eu			
2200-2225	Italy, RAI Rome	9710as	11800as	15330as	
2200-2300	Lebanon, Wings of Hope	9960me			
2200-2300 vl	Malaysia, RTM Kota Kinab	5980do			
2200-2300 smtwha	Malaysia, RTM Radio 4	7295do			
2200-2300	New Zealand, R NZ Intl	9700pa	15115pa		
2200-2300	Nigeria, Radio	3326do	4770do	4990do	
2200-2300	Nigeria, Voice of	7255af			
2200-2250	North Korea, R Pyongyang	9325eu	13185eu		
2200-2300 mtwhfa	Palau, KHBN Voice of Hope	11980as			
2200-2300 vl	Papua New Guinea, NBC	9675do			
2200-2300	Russia, Radio Moscow Intl	9550eu 9880as 11790na 12050na 15425na	9620na 11710as 11805na 12065as 17570as	9665na 11730as 11920ca 15290na 17605na	9750na 11760as 11960as 15410na 17690na
2200-2215 vl	Sierra Leone, SLBS	3316do			
2200-2300	Slovakia, AWR Europe	11610as			
2200-2235 vl	Solomon Islands, SIBC	5020do	9545do		
2200-2230	South Korea, R Korea Intl	9640as			
2200-2210	Syria, Radio Damascus	12085na	15095na		
2200-2300	Taiwan, VO Free China	17750eu	21720eu		
2200-2250	Turkey, Voice of	7185me	9445na	11710eu	
2200-2300	UAE, Radio Abu Dhabi	9770na	11885na	13605na	
2200-2300	United Kingdom, BBC London	3915as 7180as 9590na 11955as 15400af	3955eu 7180as 9915am 12095af 15575eu	5975na 9410eu 11695as 15070eu 15260as	6195eu 9570as 11750sa 15260sa
2200-2300	USA, KAIJ Dallas TX	15725am			
2200-2300	USA, KTBN Salt Lk City UT	15590am			
2200-2300	USA, KWHR Naalehu HI	17510as			
2200-2300	USA, Monitor Radio Intl	13625as	13770na	15405as	17555sa
2200-2300	USA, VOA Washington DC	6035as 11760as 15305as 17735au	7415as 13710af 15410as 17800af	9535as 15185au 15445af 17820as	9770as 15290as 15580af 21485af
2200-2300	USA, WEWN Birmingham AL	13615na			
2200-2300	USA, WHRI Noblesville IN	9495am	13760am		
2200-2300	USA, WINB Red Lion PA	15715eu			
2200-2300	USA, WJCR Upton KY	7490na	13595na		
2200-2300	USA, WRNO New Orleans LA	15420am			
2200-2300 vl	USA, WWCR Nashville TN	12160am	13845am	15685am	
2200-2245	USA, WYFR Okeechobee FL	17612af	21525af		
2230-2243	Armenia, Radio Yerevan	11790eu			
2230-2300	Finland, YLE/Radio	11755na	13750as		
2230-2300	Israel, Kol Israel	7405na 15640sa	7465eu	9435sa	11603na
2230-2300	Sweden, Radio	6065eu			
2240-2250 smtwhf	Greece, Voice of	7420eu			
2245-2300	Ghana, GBC Radio 1	4915do			
2245-2300	Ghana, GBC Radio 2	3366do			
2245-2300	India, All India Radio	9705as 15145as	9950as 17800as	11745as 15110as	
2245-2300 mtwhf	USA, Voice of the OAS	9670na	11730na	15155na	
2245-2300	Vatican State, Vatican R	9600as	11830au		

FREQUENCIES

2300-0000	Australia, Radio	9580pa 15365pa	9660do 17795pa	11695as 17860pa	13755as	2300-0000	Russia, Radio Moscow Intl	9620na 11750as 15425na 17890as	9685na 12050na 17570as 21480na	9750na 15290as 17610as	11665as 15410as 17690na
2300-0000 vl	Australia, VL8A Alice Spg	4835do				2300-0000	Thailand, Radio	9655as	11905as		
2300-0000 vl	Australia, VL8K Katherine	5025do				2300-0000	UAE, Radio Abu Dhabi	9770na	11885na	13605na	
2300-0000 vl	Australia, VL8T Tent Crk	4910do				2300-0000	United Kingdom, BBC London	5975na	6175na	6195na	9570as
2300-0000 vl	Canada, CBC N Quebec Sce	9625do						9590na	9915am	11945as	11955as
2300-0000	Canada, CFCX Montreal	6005do						15260sa	15370as		
2300-0000	Canada, CFRX Toronto	6070do				2300-0000	USA, KAIJ Dallas TX	13740am			
2300-0000	Canada, CFVP Calgary	6030do				2300-0000	USA, KTBN Salt Lk City UT	15590na			
2300-0000	Canada, CHNX Halifax	6130do				2300-0000	USA, KWHR Naalehu HI	17645as			
2300-0000	Canada, CKZN St John's	6160do				2300-0000	USA, Monitor Radio Intl	13625as	13770na	15405as	17555sa
2300-0000	Canada, CKZU Vancouver	6160do				2300-0000	USA, VOA Washington DC	7215as	9770as	11760as	15185as
2300-0000	Canada, RCI Montreal	5960na	9755na	13670na				15290as	15305as	17735as	17820as
2300-0000 as	Canada, RCI Montreal	11940am	15235am			2300-0000	USA, WEWN Birmingham AL	9985eu	11820sa	13615na	
2300-0000	Costa Rica, R Peace Intl	7385am	9400am	15030am	21465am	2300-0000 vl	USA, WHRI Noblesville IN	7315am	9495am		
2300-0000	Ecuador, HCJB Quito	21455am				2300-0000	USA, WINB Red Lion PA	15715eu			
2300-0000	Guam, KSDA AWR Agat	15610as				2300-0000	USA, WJCR Upton KY	7490na	13595na		
2300-0000	India, All India Radio	9705as 17800as	9950as	11745as	15145as	2300-0000	USA, WRNO New Orleans LA	7355am			
2300-0000 vl	Italy, IRRS Milan	7125eu				2300-0000 vl	USA, WWCR Nashville TN	5810am	13845am	15685am	
2300-0000	Japan, NHK/Radio	5965eu 9680as	6155eu	6185as	9625as	2300-0000 m	Vatican State, Vatican R	9600as	11830au		
2300-0000	Lebanon, Wings of Hope	9960me				2300-0000	Belgium, R Vlaanderen Int	11740na	13655sa		
2300-2330 mtwhf	Lithuania, Radio Vilnius	9530na				2300-0000	Netherlands, Radio	6020na	6165na		
2300-0000 vl	Malaysia, RTM Kota Kinab	5980do				2300-0000 m	Sri Lanka, SLBC Colombo	15425na			
2300-0000 smtwha	Malaysia, RTM Radio 4	7295do				2300-0000	Sweden, Radio	11910as			
2300-0000	New Zealand, R NZ Intl	9700pa	15115pa			2300-0000	USA, R Bosnia H via WHRI	7315am			
2300-2350	North Korea, R Pyongyang	11700na	13650na			2300-0000	Vietnam, Voice of	10059as	12025as	15010as	
2300-2330 s	Norway, Radio Norway Intl	9655sa	11860na			2300-0000	Greece, Voice of	9425sa	11595sa	11645sa	
2300-0000 mtwhfa	Palau, KHBN Voice of Hope	11980as				2345-0000	Bulgaria, Radio	9700na	11720na		
2300-0000 vl	Papua New Guinea, NBC	9675do									

SELECTED PROGRAMS

Sundays

- 2300 Radio Bulgaria: Today. See S 1315.
- 2300 WWCR #2: University Network. See S 0000.
- 2310 Radio Australia: Sports Bulletin. See S 1310.
- 2315 Radio Bulgaria: Cultural Review. See S 0015.
- 2330 BBC: Features. Turkey Today. See S 1401.
- 2330 Radio Australia: Network Asia. John Westland hosts this program of in-depth interviews and information about world, regional and Australian issues.

Mondays

- 2300 Radio Bulgaria: Today. See S 1315.
- 2300 WWCR #2: University Network. See S 0000.
- 2310 Radio Australia: Sports Bulletin. See S 1310.
- 2315 BBC: Music Features. The Motown Legacy (3rd, 10th, 17th, 24th). The discovery of hundreds of unmarked tape-boxes and their contents. Sampling Made Whole (31st). How the "borrowing" of others' music is everywhere in today's pop world.
- 2315 Radio Bulgaria: Business and Finance. Economic news briefs and financial developments in Bulgaria.
- 2324 Radio Bulgaria: Sports Roundup. A review of seasonal sporting events over the past weekend.
- 2330 BBC: Multitrack: Hit List. The UK Top 20.
- 2330 Radio Australia: Network Asia. See S 2330.
- 2332 Radio Bulgaria: Timeout for Music. A wide variety of Bulgarian classical, pop and folk music is played.

Tuesdays

- 2300 Radio Bulgaria: Today. See S 1315.
- 2300 WWCR #2: University Network. See S 0000.
- 2310 Radio Australia: Sports Bulletin. See S 1310.
- 2315 Radio Bulgaria: Cultural Review. See S 0015.
- 2330 BBC: Omnibus. Each week a half-hour programme on practically any topic under the sun.
- 2330 Radio Australia: Network Asia. See S 2330.
- 2359 Vatican Radio: Ask the Abbot.

Wednesdays

- 2300 Radio Bulgaria: Today. See S 1315.
- 2300 WWCR #2: University Network. See S 0000.
- 2301 Vatican Radio: What Can I Do?
- 2310 Radio Australia: Sports Bulletin. See S 1310.
- 2315 Radio Bulgaria: Cultural Review. See S 0015.
- 2330 BBC: Multitrack: X-Press. New pop records, interviews, news and competitions.
- 2330 Radio Australia: Network Asia. See S 2330.
- 2335 Radio Bulgaria: Questionline. See S 1530.

Thursdays

- 2300 Vatican Radio: Postcards from Rome.
- 2300 WWCR #2: University Network. See S 0000.
- 2310 Radio Australia: Sports Bulletin. See S 1310.
- 2330 BBC: Quiz. The Litmus Test. See W 1530.
- 2330 Radio Australia: Network Asia. See S 2330.

Fridays

- 2300 WWCR #2: University Network. See S 0000.
- 2310 Radio Australia: Asia Focus. See M 1510.

- 2330 BBC: Multitrack: Alternative. Latest developments on the British music scene.
- 2330 Radio Australia: At Your Request. See S 0330.

Saturdays

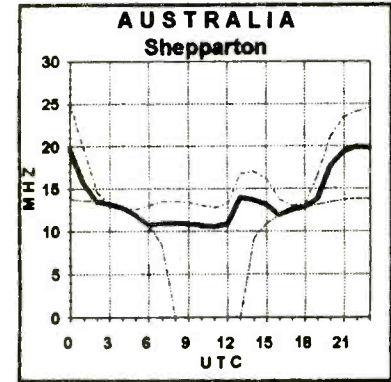
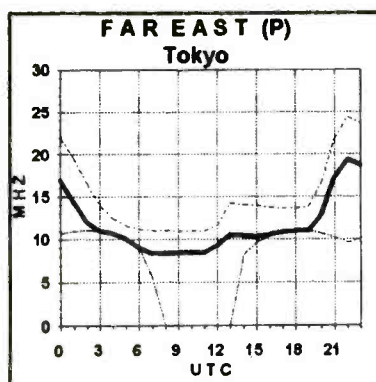
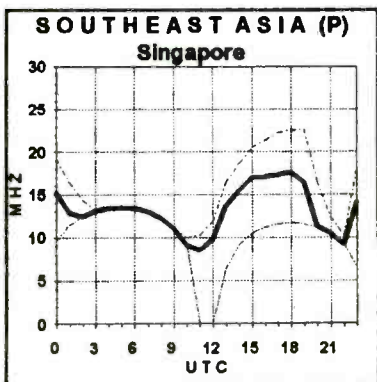
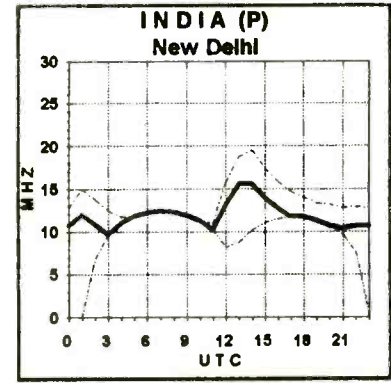
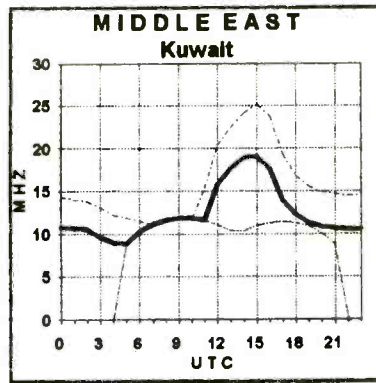
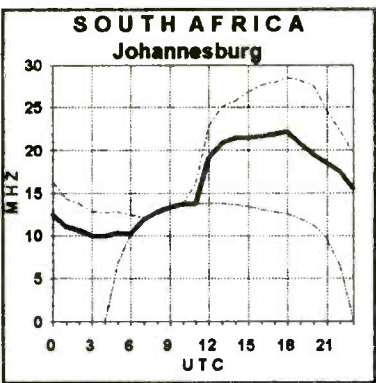
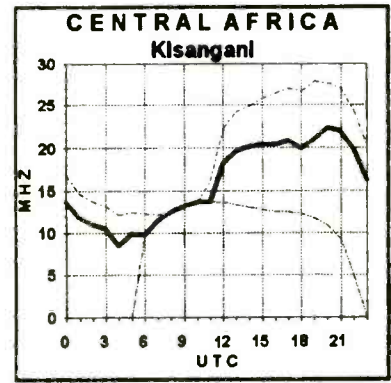
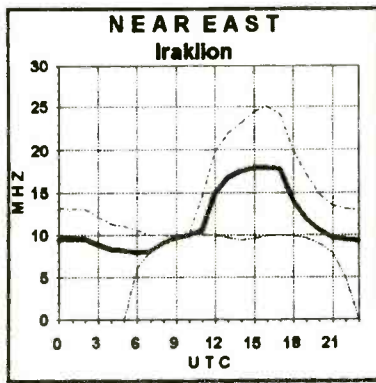
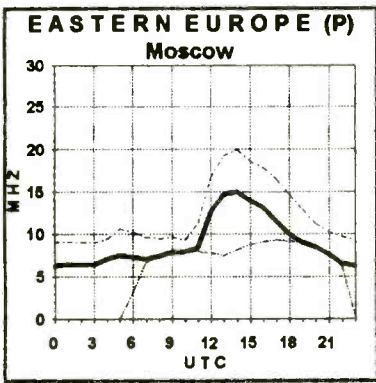
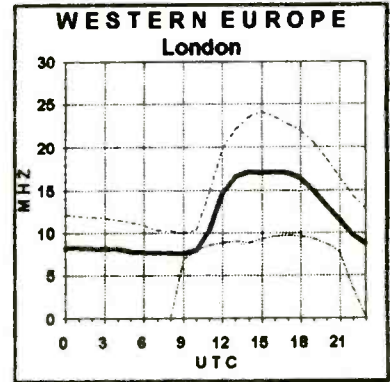
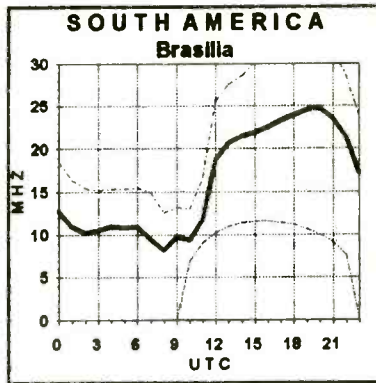
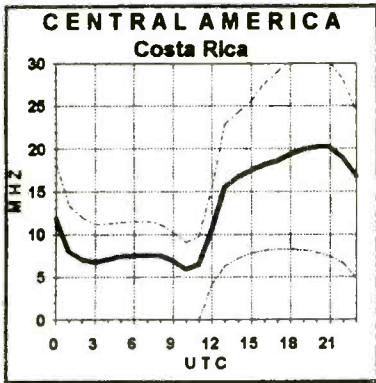
- 2300 WWCR #2: University Network. See S 0000.
- 2310 Radio Australia: Australia All Over. A mailbag and call-in program for Australian listeners.
- 2330 BBC: Music Features. Cole Porter (1st, 8th, 15th). Portrait of the composer in three documentary programs. A Tapestry of Sounds (22nd, 29th). Turkey's musical heritage.

Gerald Brookman shares this QSL from Radio Norway International.



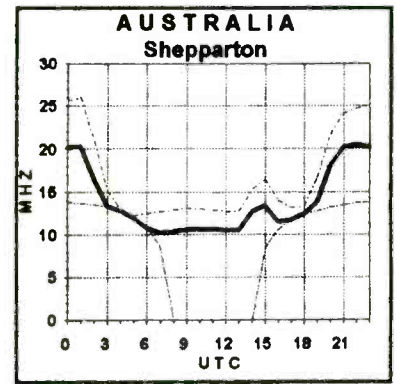
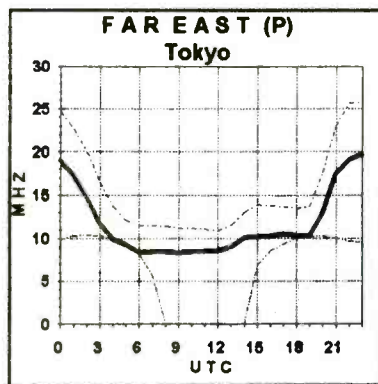
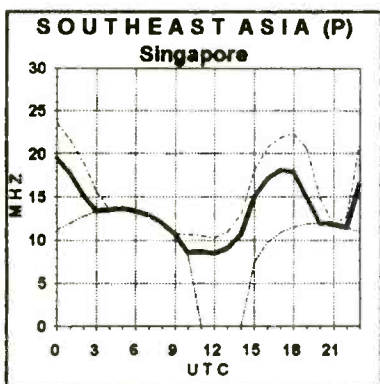
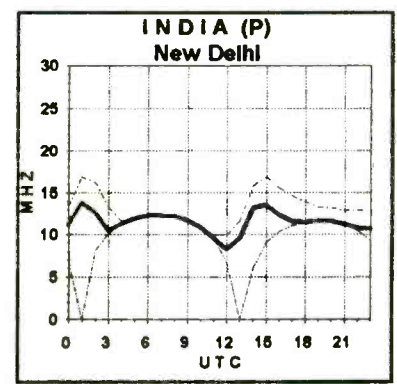
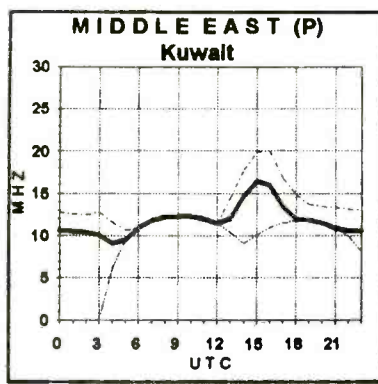
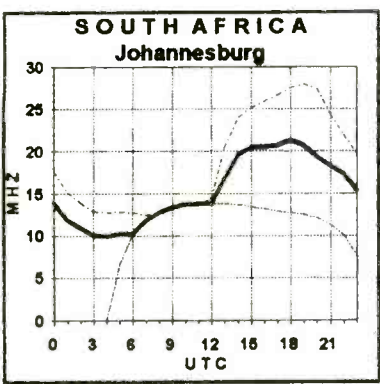
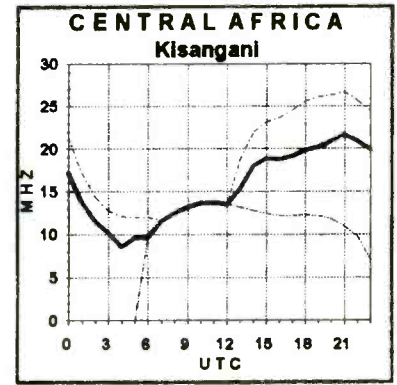
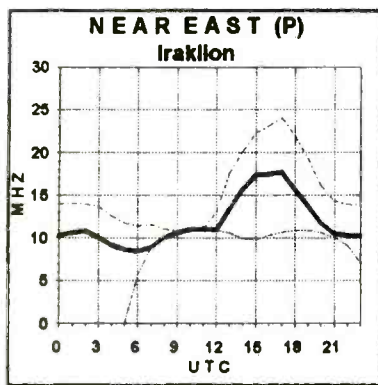
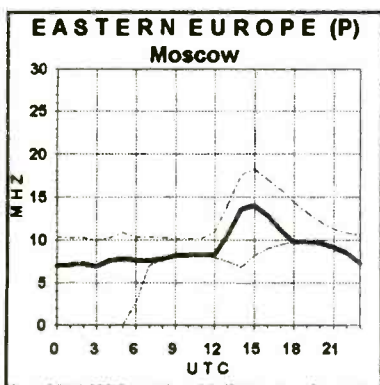
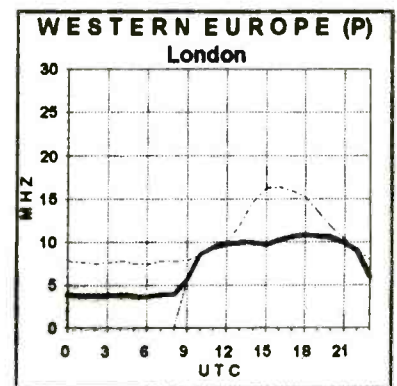
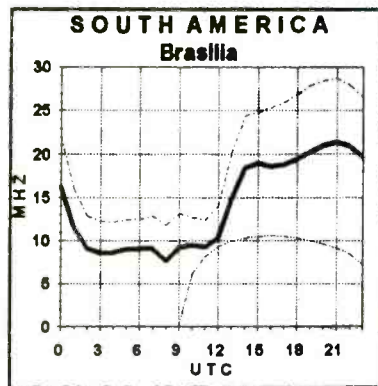
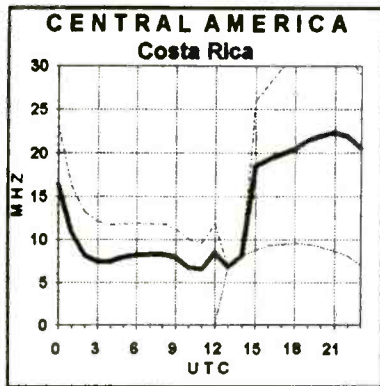
Propagation conditions: Eastern United States

How to use the propagation charts: Propagation charts can be an invaluable aid to the DXer in determining which frequencies are likely to be open at a given time. To use the propagation charts, choose those for your location. Then look for the one most closely describing the geographic location of the station you want to hear.



Propagation Conditions: Western United States

Once you've located the correct charts, look along the horizontal axis of the graph for the time you are listening. The top line of the graph shows the maximum usable frequency (MUF), the heavy middle line is the frequency for best reception, or optimum working frequency (OWF), and finally, the bottom line is the lowest usable frequency (LUF). You will find the best reception along the heavy middle line. Circuits labeled (P) cross the polar auroral zone. Expect poor reception on these circuits during ionospheric disturbances.



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- Receiver characterization with DELTA COMM™ I-7100 birdie log function automatically logs any receiver birdies prior to a frequency search operation. Birdie channels are then locked out during a frequency search operation, thus eliminating false channel logging.
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DELTA COMM™ I-7100 communication manager comes complete with Delta Research custom (CI-V) communication interface, UL listed power supply, manual and receiver interface cable for \$349.00 + \$8.00 (U.S.) or \$25.00 (foreign) S&H. Contact us for additional information on DELTA COMM™ communication managers for ICOM™ R7000, R71A, R72 and IC735. Performance is proportional to video card, type of computer and receiver squelch detection method.



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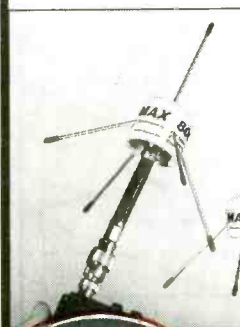
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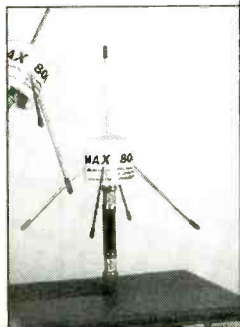
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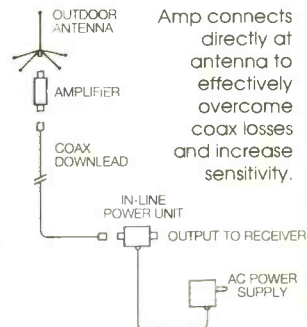


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CALIFORNIA, STATE OF	WNN5451	859 2625						
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CALIFORNIA, STATE OF	KOR617	154 1600	CRESCENT FIRE PROTEC	WNKJ623	154 4450	FB		
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CALIFORNIA, STATE OF	KSM6647	151 3850	SUTTER COAST HOSPITA	KNDV810	463 0250	FB		
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DEL NORTE, COUNTY OF	WNGY257	154 4450	IB ARCATIA REDWOOD COMPANY	WNR991	154 5400	FB		
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Decoding the "Friendly Skies"

In a previous column we introduced the air/ground/air digital mode known as ACARS. In this issue we will focus on decoding typical air-to-ground transmissions.

ACARS is the acronym for **Aircraft Communications Addressing and Reporting System**. This system is an air/ground network which enables aircraft to function as mobile computer terminals linked to a ground-based command and control management system. Information collected from sensors onboard ACARS-equipped aircraft is automatically transferred by VHF radio link to ACARS ground facilities. It is then relayed via the ground stations to a central computer processor where the data is converted into inter-airline operational messages through the ARINC ESS (Electronic Switching System).

Radio Frequency Usage and Environment

ACARS was initially intended to be used in a line-of-sight VHF band radio environment. Depending on VHF propagation conditions, line-of-sight for high altitude aircraft can be as much as 200 to 300 miles in distance. ACARS transmissions can be found on the following channels in the AM VHF Aircraft Band (frequencies MHz).

- 131.550** — The primary channel for ACARS in the United States and Canada
- 130.025** — Secondary ACARS channel for busy areas of the United States
- 129.125** — Tertiary ACARS channel for busy areas of the United States
- 131.475** — The proprietary company channel for Air Canada
- 131.725** — The primary channel for ACARS in Europe
- 131.450** — The primary ACARS channel for Japan

What Equipment Do You Need?

To monitor ACARS transmissions you require a VHF scanner/receiver capable of tuning the AM Aircraft band (118.00 to 136.00 MHz). A suitable VHF antenna is also required. While table-top scanner/receivers are preferred, they certainly are not

necessary.

ACARS decoding and the concept of "scanning" are mutually exclusive. Because ACARS transmissions are split-second in nature, the squelch control on your radio must be turned completely off. Otherwise, the transmission will be half over before the squelch circuit opens.

The Universal M-400, M-1200 and M-8000v5 Decoders are currently the only commercially available decoders for ACARS.



Decoding ACARS Messages

ACARS transmissions employ a 7-bit International Civil Aviation Organization coding scheme with an eighth bit odd parity transmitted in short bursts at 2400 baud. The sound is similar to packet, but the duration is much shorter (typically under a second). An extensive error checking system known as Block Check Sequencing (BCS) is utilized to ensure the integrity at both ends of the link.

Not all ACARS messages contain visible text. Some are composed of special control characters only, which trigger special actions in the receiving processor. ARINC-defined message types often contain mandatory fixed-format text fields followed by optional "free talk" as required. Text message length may not exceed 220 characters.

Label **Q0** is used as a Link Test message initiated by either the pilot or the control unit. The ground then replies with any traffic they may have in the queue for the aircraft.

**.N323AA Q05
0404AA0038**

.N323AA ... Address Field: Aircraft Registration Mark, American Airlines Boeing 767

- Q0** Message Label: Q0 - ACARS Link Test
- 5** Downlink Block Identifier (optional)
- 0404** Message Sequence Number: 4 minutes and 4 seconds past the hour
- AA0038** Flight Number: American Airlines #38

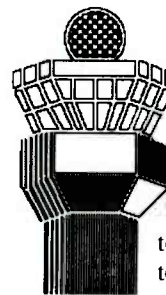
The *Address field* identifies the aircraft with which the ground station is communicating. For uplink (ground-to-air) messages it will be either the aircraft's official registration mark or the flight number of the service operating the aircraft. For downlinked (air-to-ground) messages it always must be the aircraft's official registration mark.

By international agreement, the official registration marks are coded according to a country of origin one or two letter ICAO prefix. The single letter "N" is the prefix for all aircraft registered in the United States. Some other prefixes include "C" for Canada, "G" for Great Britain, "F" for France and "HB" for Switzerland.

American registered aircraft may also contain a unique carrier suffix that forms an integral part of the official registration. For example, N176UA is Boeing 747-400 owned and operated by United Airlines, while N176DN is a Boeing 767 owned and operated by Delta Airlines.

For ACARS purposes, the Address field must be seven characters in length and is always right-justified. If the aircraft's registration mark is less than seven characters, it must be left-filled with periods. Hence the following valid addresses:

**N1825TU .N123UA ..N1901 ...N409
.C-FDCA .F-GHGF .HB-IGC**



ACARS message types are identified by a unique two-character Message Label. ARINC has defined two major types of labels: 1) System Essential and 2) Service-Related. Labels are utilized in both downlink (air-to-ground) and uplink (ground-to-air) messages. In addition, you will find that many carri-

ers have also defined their own labels for company operation purposes.

The optional Downlink Block Identifier is a single character located after the label. Its function is to enable the ground-based processor to detect duplicate messages or message blocks. The Airborne Sub-system changes the bit pattern transmitted in this character position each time a general response or new message or new message block is downlinked to the ground. The Downlink Block Identifier consists of a single character in the range of "0" to "9".

Since ACARS allows for up to five retries at downlinking an unsuccessful transmitted message, you will often copy the same message. The clue that it has been retransmitted lies in the fact that the Message Sequence Number and the Downlink Block Identifier continue to have the same values as the first time the message was originally downlinked.

For most downlink messages, the *Message Sequence Number* is a four digit number that represents the time in minutes and seconds that the message was originally downlinked. This time is obtained from the GMT clock in the airborne ACARS Management Unit.

The six-character *Flight Number* field is comprised of a two-character airline identity code followed by a four-character alpha/numeric flight number. The two-character airline code conforms to the International Air Transport Association two-character Airline Designator.

If the Flight Number is less than four characters in length, it generally will be right-justified and left-filled with leading zeroes, as in: AC1030 BA0294 UA0038 AA0006

Flight Numbers for Northwest Airlines appear to be an exception to the ARINC standard. They will often leave a leading space (blank) before a three-digit flight number - for example: NW 201. Business jets normally utilize a generic flight number of GS0001.

Event Recording Examples

OFF and ON events are typically recorded through sensors in the aircraft's landing gear. IN and OUT events are usually triggered by the closing or opening of passenger doors, or the release or application of aircraft brakes. Separate Event Sensors are used which automatically record the event condition and the GMT time. Event times can then be called up on demand by the pilot as well as being automatically transmitted to the ground station without the need of aircrew intervention.

An OUT event normally refers to the time the aircraft is "Off the Gate," or when the

aircraft is pushed back by the tug. The term "time off the block" has also been used to describe this procedure—as this is generally the time when the wheel blocks are removed. Technically, for many airlines, it is recorded when two conditions are met: (1) all the passenger doors are closed and (2) the aircraft's brakes are released.

a) Off Report

This transmission from the aircraft indicates the "Wheels Up" time from the departure airport. The first 17 characters of the text field are fixed format. Characters 18 through 220 are available for "free talk."

**.N1844U QB
1108UA0731YYZ0310**

.N1844U ... Address: Aircraft Registration Mark
QB Message Label: QB - Off Report
1108 Message Sequence Number: 11 minutes and 8 seconds past the hour
UA0731 Carrier and Flight Number: United Airlines #731
YYZ Station of Activity: Pearson International, Toronto, Ont.
0310 Off (Wheels Up) Time 0310 UTC

b) On Report

This transmission from the aircraft indicates the time when the wheels "touched down" at the destination runway.

**.N6807 QC8
1851AA0319ORD0018**

N6807 Address: Aircraft Registration Mark
QC Message Label: QC - On Report
8 Downlink Block Identifier

1851 Message Sequence Number: 18 minutes 51 seconds past the hour
AA0319 Carrier and flight number: American Airlines flight #319
ORD Departure Station: Chicago, O'hare
0018 On Time: 0018 UTC

Note that the station of activity field contains the departure station code. This message is transmitted automatically following the declaration of an ON event.

c) Out/Return In Report

This transmission from the aircraft results from the aircraft returning to the gate after an OUT event has been declared. The text portion of the message contains a 21-character fixed format followed by optional "free talk."

**.N93105 QG
4916TW0721LGW09110922**

.N93105 ... Address: Aircraft Registration Mark
QG Message Label: QG - Out/Return In
4916 Message Sequence Number: 49 minutes and 16 seconds past the hour
TW0721 Carrier and Flight Number: Trans World #721
LGW Departure Station: London, Gatwick, UK
0911 OUT Time (time off gate): 0911 UTC
0922 Return In Time: 0922 UTC

Note that even though the departure station was at London Gatwick, this message was not transmitted until the aircraft was in range of New York VHF. Your editor copied the message from his QTH in Toronto, Canada. Receiving transmissions from this distance augers well for monitors who do not live in close proximity to a major airport.

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Get Your Shack Ready for Winter DX

With the *Monitoring Times* Convention at hand, and the fall season having fallen, it is time to start thinking about how you can improve your listening post for the upcoming winter months. For those of you who, like myself, live in harsher climates, this is a good time to be sure any outdoor antennas are ready for winter. The ravages of wind, below zero temperatures, and precipitation in the form of ice and snow can take their toll on anything exposed to the elements. So, let's look at a few things to do to prepare your broadcast DX antennas for the winter.

For AMDXers, this usually means checking insulators to make sure that they are not cracked or otherwise deteriorated. A simple long wire antenna stretched to a nearby tree is popular for AM listening as well as for shortwave, and trees can bear the brunt of a bad winter. Check to see that no branches are tugging on the wire, and make sure that there is plenty of slack to allow to the tree to sway in the wind and not break your antenna. If the wire is frayed, replace it now, before the snow flies.

For all-band antennas, make sure that your ground wire is securely fastened to the ground rod or water pipe and is not corroded in any way. Winter can bring abrupt changes in humidity, from very damp to very wet, and this can take its toll on metal-to-metal connections. New ground rods are no further away than your local hardware store. They are an inexpensive route toward improving your winter DX. Your ground is also your best protection against lightning and other static discharges, such as occurs from falling precipitation. Remember to use good, heavy gauge copper wire to connect to your ground source, and keep the lead as short as possible. Having a good ground covered by snow can produce great DX!

UHF/VHF Requires TLC

FM and TV antennas require a bit more attention. Throughout the year, coax cables can crack and become more lossy. Replacing them and checking all connec-



This antenna farm on Ridge Avenue serves practically every station in the Philadelphia area—AM, FM and TV—including well-known WFLN, though WPGR-AM comes through the loudest. It's the combination, say engineers, that's causing appliances and lights in the neighborhood to have a mind of their own. See discussion in "Bits and Pieces."

tions can help you avoid a nasty roof visit or tower climb in the cold weather. Also, check any 75/300 ohm transformers to see if they have water in them. Replace anything wet inside! Check that your antenna elements are straight and fix any broken ones. Remember that the coax near the rotator has to be able to flex with rotation, and it may wear out sooner. This is a good time to consider whether or not to add a mast-mounted preamp or other accessories to help you get the DX.

If you live in an area that has a few high powered FM stations within the metropolitan area, a mast-mounted preamp may cause more problems than it solves by overloading your receiver. But, if you live in a rural area with few close by stations, a preamp mounted near the antenna will bring you stations you may have never heard before. These outdoor preamps are powered by either a separate wire or by a special coax coupler that feeds the low-

voltage DC up the coax with the signals.

The advantage of mast-mounted preamps is that they amplify the signals before any losses from the coax can make them harder to hear. Their main disadvantage is that they have to remain turned on in order for *any* signals to pass. They can also overload in any area where there are strong TV or FM signals. This overload can cause phantom signals to appear across the dial, making one station appear in many places it doesn't belong. Next month, I will present how to build a three-section trap to help reject strong local stations and bring in DX you never thought possible!

Looking through past issues of *MT* will give you many ideas for antennas for AM DXing, like box loops, active antennas and long wires that can be constructed easily at home. Don't forget to work on the TV/FM antennas, too! With a long winter of TV sports ahead, a good DX array might bring in a blacked-out game!

Check out the "Antenna Topics" column for more on getting your listening post ready for DX.

Creative DX Reporting

With digital sound cards becoming less expensive and popular in many home computers, a new way of saving some of your best DX catches for instant retrieval has been born! Computer sound cards now offer CD-quality digital stereo reproduction and the Microsoft Windows ".WAV" format has become very popular.

Using the sound editor found in Windows 3.1, you can edit out everything but the actual station ID and save it as a file any other Windows user can play. In addition, instead of mailing tapes, you can e-mail your DX as a file! Make sure to make these files as short as possible, as sound files can become enormous if they are more than a few seconds long. But, it is a unique way to share your DX fun with other DXers!

Bits and Pieces

If you are reading this now, it is because Harold Camping is wrong and the world has not come to an end! Mr. Camping's religious program is heard on many religious broadcasters predicting the end of the world in the month of September. Thanks to Thomas McKeon for that one!

R.A. Sklar in Seattle sends in a report about more duopolies being formed by some prominent names in area broadcasting. KIRO AM-FM adds KING-AM to its stable of offerings. More and more markets are being dominated by these powerful new groups of three stations merging into single ownership. Seattle already has at least three other trios of stations grouped together, vying for their share of the market.

Tom White from Pennsylvania found an article about how neighbors cope with interference from a nearby 50kW AM radio station. Residents complain of hearing it in toasters, hair dryers, telephones, and other appliances. Some have fluorescent lights that never turn off, due to the powerful RF field. They blame one station—WPGR-AM—for the problems, since it is the one they hear the easiest.

A recent business trip took me to that exact neighborhood to fix an RF problem in a nearby nursing home. Practically every station serving the Philadelphia area—AM, FM and TV—radiates from the Ridge Avenue antenna farm in the Roxborough



Philadelphia's WFLN

neighborhood of Philadelphia. Most engineers agree that it is not just one station, but the combination of several powerful stations on all bands, that contributes to the malfunctioning VCRs, TV sets and other modern conveniences.

Talk shows are what have helped AM radio survive, pitted against the vastly higher audience numbers for FM radio. Contests and giveaways are what FM stations use to keep that market share. Combine the two, and you get one of the most entertaining and informative shows on talk radio today! I am talking about Craig Crossman's *Computer America*, heard Sundays at 3-6 pm Eastern Time. Craig talks all about personal computers and what's new, and features guests on topics ranging from hardware to software.

The best part about this show is that Craig encourages his listeners to call in by randomly giving prizes to his callers, ranging from software to entire computer systems and other incredible hardware to make your computer even more powerful. Call 1-800-800-8852 to find out the station in your area that carries this program from the Business Radio Network. I write this column using software won on the show! This is a fun way to use your DXing skills to enhance your listening post computer system. It is also available via satellite on Satcom F4 T10 8.08 MHz narrowband FM.

Coming Up

Be ready next month for a do-it-yourself way to increase your FM reception capabilities, even in tough locations with close-by high power stations. Thanks to all of you who now correspond via the Internet! E-mail has provided many good listings of DX catches for this month's column. If you would like to write directly to me, you can via Prodigy at JPGC40A or via the Internet at jpgc40a@prodigy.com.

I am also on America Online at JoeE262156 or via the Grove BBS. DX and any news items of interest to broadcast listeners can also be sent to me via the MT Brasstown address.

Skipping In

John Dunn of Holbrook, MA caught some good E-skip FM DX from his car while driving near Boston.

1800 WAPE 95.1 Jacksonville, FL
1700 WLVE 93.9 Ft. Lauderdale, FL,
"Love 94"

Mark Scheifelbein reports this DX from Phoenix, AZ

0200 KATU-TV 2 Portland, OR, ABC programming
1900 KDFW-TV 4 Dallas, TX, CBS programming
2000 KCBI-FM 90.9 Arlington, TX, religious programs

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Going... Going... Gone???

Back in July, I wrote that something strange was going on in “Uzi City”—a.k.a. Miami, Florida. Miami has long been the home of numerous federal installations. For example, there’s the University of Miami South Campus, where a phony business set-up called Zenith Technical Enterprises was actually the Central Intelligence Agency’s base of operations—the largest in the western hemisphere and the control point for the Bay of Pigs fiasco. Today, that same area is home to a number of diverse enterprises, the most interesting of which is the Customs/Drug Enforcement Administration C31 base—Command, Control, Communications, and Intelligence headquarters for the war on drugs in the Caribbean.

The property which was once the Richmond Naval Air Station (a piece of which still exists, as you’ll see), now houses the Miami MetroZoo, the Gold Coast Railroad Museum, a U.S. Navy Radio Observatory, the University of Miami South Campus, and the former CIA headquarters.

Right next door to it is a Coast Guard Communications Station and the C31 complex. Their shared antenna field bristles with antennas, including Navtex on 518 kHz. C31 can be heard every night on 9014 and 6750 kHz tracking suspicious aircraft. There are also VHF and UHF links to the aircraft carrying data from the ground to the planes and then back down.

In addition to the normal Customs/DEA frequencies, the following UHF channels are in use:

Identifier	Frequency
BLUE 1	282.425
BLUE 2	260.800
BLUE 3	353.900
BLUE 4	254.200
BLUE 5	234.600
BLUE 6	228.900
BLUE 7	238.400
AIR SUPPORT	361.800

All of the above are in the AM mode. The data links are encrypted, but the voice is usually in the clear.

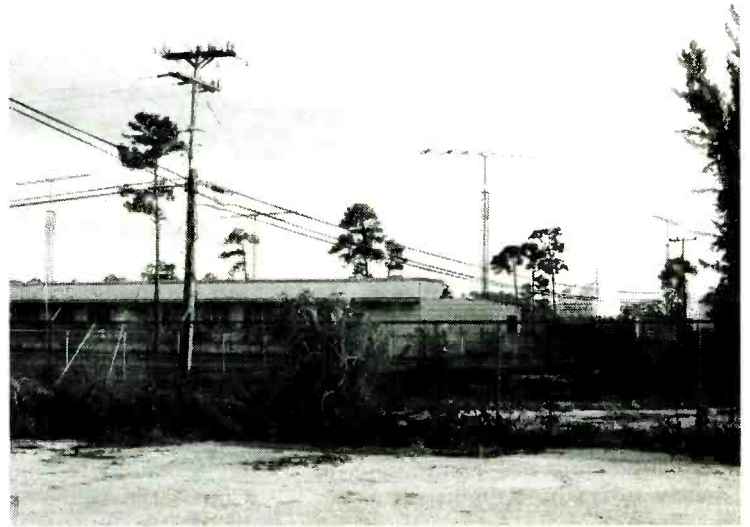
Next door to the MetroZoo complex is what remains of the Richmond Naval Air Station—receive site for the National Communications System station. As I mentioned

in the previous column, there is evidence of life in the seemingly deserted buildings. This site had many, many antennas before Hurricane Andrew. It had a microwave link out to the National Communications Station transmitter site at 2400 SW 177 Avenue (the Krome Avenue site). The receive/transmit sites were positively identified as the home of KKN39, the State Department/CIA transmitter that was one of the KKN-- series. Once Hurricane Andrew came through, we never heard KKN39 again.

In a visit to the Krome Avenue site in early June 1994, the antennas had appeared again. As I reported in July’s column, there was quite an antenna farm “growing” out there. But, on July 30, I went back and got the surprise of my life. It was gone! The antennas had vanished—not lying on the ground, but completely gone. The building had been emptied out and the FEMA (Federal Emergency Management Administration) trailers had all been removed. A sign was posted that read: USAF-RTAO (Regional Technical Assistance Office) 2400 S.W. 177th. Avenue. The gate guard was no longer there, although the gate was locked, and the American flag was still flying.

I went down to the receive site near MetroZoo, and all appeared to be business as normal. There are numerous HF, VHF, and UHF antennas there along with a heavily guarded gate. There is a new sign at the entrance to the receive site that reads (what a coincidence!): USAF-RTAO DELIVERIES HERE.

The next day I made a telephone call to the U.S. Army National Communications System Miami office (yes, they are in the telephone book, listing the MetroZoo address).



Although Hurricane Andrew did substantial damage to the KKN39 receive site at Richmond Naval Air Station, there are still signs of activity around the seemingly deserted buildings. Many of the antennas in this pre-hurricane photo have been replaced.

They told me that the Krome Avenue site was history, and they didn’t know how much longer the receive site would be there. In just looking at the number of antennas that are appearing at the receive site, it looks as though they will be there for a long time—but then, that’s what I thought about the transmitter site!

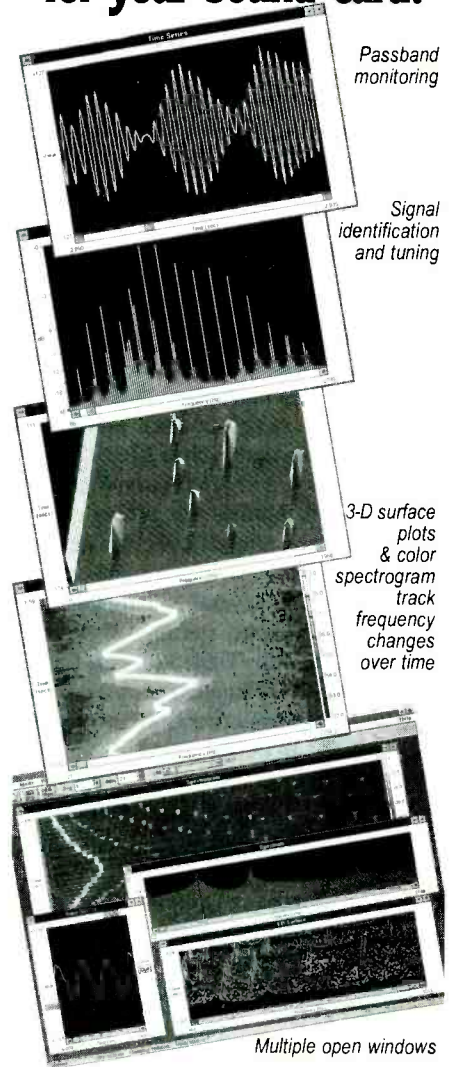
My next call was to the U.S. Army Corps of Engineers—they are the real estate people for the Army. They told me the same story: the Krome Avenue site was defunct. They didn’t know what other sites were going to be phased out. I called the NCS main office at the Pentagon and they told me they were going to check into it. As of this writing, they are still checking.

What does all of this mean? Perhaps nothing; but perhaps we are seeing the demise of the KKN-- stations. The KKN50 station, which was a beacon on 6924 kHz, is still heard, but only rarely now. The numbers stations are also being heard less and less. Are we seeing the demise of an old friend that has kept stringing us along for so many years?

The Feds Pack Their Trunks

While in Miami, the new federal government trunking system was discovered. So far,

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the Federal Bureau of Investigation is the only apparent user, and all of the conversations are in the clear. The data channel was heard up into the northern end of Ft. Lauderdale on 407.95 MHz. The actual configuration, used nationwide, is as follows:

Federal Government Trunking Systems

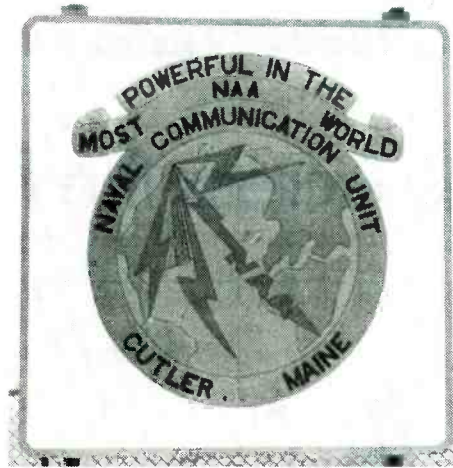
	BASE	MOBILE
Group 1	406.350	415.150
	407.150	415.950
	407.950	416.750
	408.750	417.550
	409.550	418.350
Group 2	406.750	414.750
	407.550	415.550
	408.350	416.350
	409.150	417.150
	409.950	417.950
Group 3	406.550	415.350
	407.350	416.150
	408.150	416.950
	408.950	417.750
	409.750	418.550
Group 4	406.950	414.950
	407.750	415.750
	408.550	416.550
	409.350	417.350
	410.150	418.150

The above system uses the Motorola Saber System. If you are starting to miss your favorite federal agency on their usual channels, you might try checking these frequencies—especially in the larger metropolitan areas. This system is being installed in most military bases of any size, as well as on the larger naval vessels, such as aircraft carriers.

The Department of Defense Anti-Drug task force has been monitored on 418.775 MHz. Other joint Federal/state/local task forces have been reported on the 851-869 MHz Specialized Mobile Radio (SMR) trunking channels operating as legitimate businesses. The best time to find them is after 2100 hrs. local time when the plumber and air conditioner dispatchers have gone home. I can't tell you where to listen; it will vary from city to city. Just listen. You never can tell what you will find.

Leaky Lines and Beached Whales

The U.S. Post Office Bulk Mail Processing facility has just installed a VHF repeater system that is quite unique. It was first discovered at the facility on Summit Blvd. in suburban West Palm Beach. The system has



Any idea what the "moaning whales" might be that emanate from such locations as Cutler, Maine?

an input on 162.225 MHz and an output on 164.500 MHz.

What makes it unique is the antenna. There is none. The system radiates on a "leaky line" coax strung throughout the massive facility. If you get a quarter mile away from the building, you cannot hear it. Inside the building, it is full quieting. Look for this in other large office complexes—especially federal buildings.

Strange sounds on the high frequency bands are being heard on 8776 and 11205 kHz. These sounds resemble "moaning whales." They have been "DFed" (located by direction finding techniques) to Jacksonville, Florida; Cutler, Maine; and Virginia Beach, Virginia. All these locations have naval installations. Any ideas?

Agency of the Month:

**Dept of the Air Force—
Office of Special Investigations**

This division of the Air Force provides criminal, counterintelligence, personnel security, and special investigative services to the Air Force. It is found on most all Air Force installations as well as in major cities.

Chan	Freq	Use
01	141.5250	C/M
	138.1750	RPTR OUT
02	138.0750	SIMPLEX
03	138.1650	SIMPLEX
04	138.1850	SIMPLEX

Coming up at the MT Convention (and in a later edition of this column): new revelations on the numbers stations, exclusive to *Monitoring Times*. Stay tuned.

Voices Across the Pacific

Welcome aboard for a flight to Honolulu! When aircraft fly over the oceans, the UHF/VHF frequencies used over land for company communications and even traffic control can no longer reach them. They must resort to HF frequencies which travel longer distances. Contractual Carriers such as ARINC (Aeronautical Radio, Inc.) often provide the link between client airlines, air traffic control, and, in this case, aircraft over the oceans.

We'll cover a few of the most-traveled oceanic routes in several installments over the next few months, starting off with the Central East Pacific. Table 1 lists the Central East Pacific (CEP) frequencies used by aircraft flying the busy corridor between San Francisco and Honolulu.

Table 1: Central East Pacific

CEP I	CEP II	CEP III	LDOCF*
3413	2869	6640**	3013
5574	5547	6673	6640
8843	11282	10057	11342
13354	13288	11282	13348
17904	21964**	13288	17925
		11342**	21964

* LDOCF stands for Long Distance Operation Control frequency(ies);

** Also used as LDOC frequency.

There are a few things you should keep in mind when you're monitoring the CEP family of frequencies:

The higher the sun, the higher the frequencies in use. Basically, the primary and secondary frequencies are at the discretion of the operator and the propagation. For instance, in area CEP-1 during the day, the operators will generally use frequencies on the 5 and 8 megahertz bands. 5 MHz is great for all inbound and outbound flights until about 10 or 11 a.m. Most operators will go up to the 8 and 13 MHz bands after mid-morning.

In the afternoon, after the first hour of shift, the operator will probably go back to the 8 and 5 MHz frequencies. As the sun fades, he may then go to 5 and 3 MHz bands. On "mids" (midshift—midnights), 5 and 3 are also used. 3 MHz works better for the initial outbound, and sometimes 3 MHz must



be used due to some sort of tone on the 5 MHz band around 3:30 am.

The CEP-2 region operates about the same, using frequencies on 5 and 11 MHz. 5 MHz good for initial report and OG (on ground) SELCAL (selective calling) all day long. For instance, on 5 MHz a position would be taken over at DUETS and then the pilot would be told to call DOPPS progress on 11 MHz. (DUETS AND DOPPS are Oceanic Reporting Points.) In the afternoon, 11 and 5 bands are utilized, shifting to 5 and 2 MHz later in the day. Mids also use 5 and 2 MHz. 2869 kHz is better for close-in reports.

ARINC Subscriber Airlines Using Central East Pacific Frequencies

CEP-1: San Francisco and Honolulu ARINC. Active 24 hrs.

Daytime 1200 - 2000

TWA, Delta, UPS, FEDEX, Aeroflot, Hawaiian, Singapore, Cathay, Thainter (Thai International), Dynasty (China Air), VARIG, Korean, VASP, EVA, World, Tower Air, American Trans Air, Mandarin, Southern Air, Evergreen, Air China, China Eastern, China Southern, Indonesian, Asiana, Philippine, Malaysian, Corse Air, French Line, Air France, Polynesian, Leisure World, Rich Air, Connie Kallita, all itinerant (Novembers) - which usually includes private aircraft.

DACO (Douglas Aircraft), and Boeing sometimes call for Radio/Selcal checks on the ground, or will be required to give operations normal reports when out of radar range.

Afternoon 2000 - 0400

As above and when CEP-3 closes, add American Airlines and military flights, except REACH

and AIR EVAC.

Mids 0400 - 1200

Same as above; also add Northwest, Canadian, Elite and Air Canada.

Around the Christmas season, you will probably hear additional airlines flying cargo to Honolulu and Anchorage.

CEP-2: San Francisco and Honolulu (Honolulu does not have 2869 kHz). Active 24 hrs.

Daytime 1200 - 2000

United, New Zealand, Qantas, Continental, all Nippon, all Nippon Cargo (These are regular traffic).

Afternoon 2000 - 0400

Same as above; when CEP-3 closes - add: Northwest, Japan Air, Canadian, Air Canada, Elite, REACH, and AIR EVAC.

Mids 0400 - 1200

Japan Air, REACH, AIR EVAC. All others go to CEP-1.

CEP-3: San Francisco and Honolulu. Open 1200 - 2330 (6673 and 11057 SF only)

American, Northwest, Canadian, Japan Air, Air Canada, Elite, all military - foreign and domestic.

When CEP-3 closes, traffic is transferred as follows:

2330-0400

American goes to CEP-1. All others, including military, go to CEP-2.

LDOCF are normally used for phone patches, other company traffic and radio maintenance such as radio/selcal checks. These frequencies are sometimes used by ARINC for regular traffic, but *only* if one of the other groups is down for maintenance. They are *never* used for frequency saturation.

13348 kHz is now shared with "CEDAR RAPIDS RADIO" (Collins Radio). This station will operate the following LDOCF over Northern Canada to support United's Chicago and New York trips to the Far East: 6637, 8933, 10075, 13348, and 17940, 21964 kHz. Incidentally, New York ARINC also

shares 8933 kHz. Frequency 21964 kHz is shared with Universal (Houston) Radio, Aero Mexico, and Cedar Rapids Radio.

The above information was compiled and reviewed by K. Dale Jordan, San Francisco ARINC Operations Manager, and was contributed by Carolyn Stone, Radio Operator. Thanks, Dale and Carolyn!

Book Review

While books and directories for VHF and UHF frequencies abound nowadays, it's still rare to find a book containing not only up-to-date HF aero band frequencies, but also one that has a lot of other useful info in it. However, hold on to your hats, folks! Bob Evans has updated his *Worldwide Aeronautical Communications Frequency Directory*, and it's even better than the first edition!

A nice, thick 260 pages, it covers everything civilian from MWARA (Major World Aero Route Areas) and sector maps, to LDOC and company frequencies. Military coverage and VOLMET stations are included as well as digital modes used for telecommunications on HF (AFTN, Aeronautical Fixed Telecommunications Network). There's even a chapter covering VHF monitoring and a large section devoted to ACARS (Aircraft Communications Addressing and Reporting System).

Bob has included appendices which include ICAO (Int'l Civil Aviation Organization), AFTN, and IATA (Int'l Air Transport Association) codes, which are used to identify cities, airports, and airlines. There are also designators and waypoint data, which can be a big contribution toward enabling a monitor to understand what he's hearing.

This helpful book is one that you'll want to keep at your monitoring station at all times. The experienced listener will appreciate Bob Evans' thorough coverage of the different areas of aero monitoring, and at the same time, it's easy enough for the newcomers to our hobby to understand.

You can order your copy from the publisher, Universal Radio, Inc, or from Grove Enterprises and other providers of radio equipment. The price is \$19.95 (a steal for what it contains!). Universal's address is 6830 Americana Parkway, Reynoldsburg, OH 43068; (614) 866-4267. At the same time, ask to be included on their mailing list so you can get notices of other upcoming books and goodies.

Denver Int'l Bites the Bullet

In order to expedite the opening of Denver International Airport, the City of Denver has finally decided to build an ordinary conveyor belt system to handle passengers' baggage.

The highly-touted, high-tech, computer-

ized baggage hauler (costing \$193 million dollars) has been plagued with glitches, including virtually eating the suitcases and other items it was supposed to deliver safely to various areas of the concourses. This problem has not only cost the city \$1 million dollars a day, but has delayed the opening of DIA for 10 months. (See Plane Talk's coverage of DIA in the August *MT*.) The conveyor belt system will cost \$50 million to be built, but at least it will allow the airport to open while technicians try to make the computerized system operable.



Reader's Corner

Charles Bernth (NY) writes that he recently spent a day at Gabreski Airport in Westhampton, NY, the home of the 106th Rescue Group of the Air National Guard. He reports that they really put on a show!

"King 88" and "King 79" each dropped four parachutists—King 88 dropped from 900 feet and King 79 from about 2000 feet. All landed in the vicinity of a sand pit at the north end of the field.

The 106th flies C-130s (pictured, p. 84). They also use HH-66 Blackhawk helicopters, designated "Jolly" when not on an actual rescue mission. When on a mission they become "Rescue ##", as do the "King" aircraft which act as mother ships and provide refueling. While the para drops were going on, a third "King" was refueling "Jolly 8" offshore.

Frequencies in use at the airport were:

Tower	125.3/236.6 MHz
Ground	121.8/225.4
Rescue Training	251.9
Training/Refueling	252.8
Rescue Ops	287.5
Approach/Departure	288.1
HF	6714/ 8984 kHz

Charles reports the 106th Rescue Mission is on duty all year round. He says he's monitored some "pretty hairy" missions on his scanner, shifting to HF when they go out of scanner range, and then back to the scanner for the return flight.

Charles also contributed the photo of the British Aircraft BAe HS-125. The aircraft in the foreground is a Cessna Citation.

Well, that's all for now. Upcoming is a trip to the Oakland Center's Oceanic Operations,

and more readers' contributions, as well as some more airline addresses. Hope to see all of you at the Convention! Until then, 73 and out.

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Reviewed by Larry Miller in April '93 "MT"

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Solar Outages

My father, a lifelong amateur astronomer, tells the story of the astronomy professor who was delivering his standard lecture on the Sun to an interested civic group. "The Sun," he told them, "will burn itself out in several billion years."

"Excuse me, Professor," said an anxious woman near the front, "did you say million or billion?"

"Madam," replied the professor, "I said billion."

The woman turned to her friend and said in a relieved voice, "Thank goodness! For a moment I was worried."

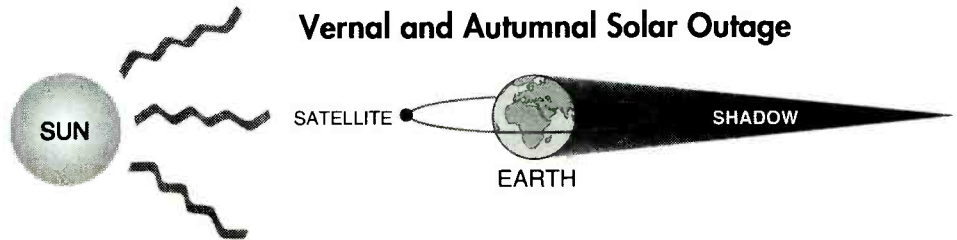
If you have a satellite system you don't have to wait that long for the Sun to have a dramatic effect on your viewing. Twice a year, at the Vernal and Autumnal Equinox, energy from the sun wreaks havoc on the entire line-up of satellites in our view.

Here's How It Works

Our geosynchronous satellites are all neatly lined up in a space along the Equator some 23,000 miles in space. As the Earth travels around the Sun during the course of a year, this plane on which the satellites fly comes directly between the Earth and the Sun. The result is that for a few minutes each day, during the week before and after the actual equinox, each satellite must compete with the RF energy from the sun.

There is no contest. The Sun wins each time. When your dish is pointed at a satellite behind which lurks the Sun, with its untold Effective Isotropic Radiated Power, the satellite signal becomes lost.

This occurrence is commonly known as a "Solar Outage" or the "Solar Transit Effect" and is one of two solar related phenomena which happens throughout the year. The other effect, also at the time of each equinox, happens when a satellite passes through the Earth's shadow. The effect is that, for a period of anywhere from a few minutes to an hour, the satellite's solar power panels are not being charged. As long as the on-board storage batteries are functioning properly, this is not a problem. An "Earth Eclipse" has no effect on your viewing.



Melting Moments

These solar outages have a profound effect on satellite reception. The first effect is the presence of "sparklies"—little bright, white, dots of light which dance around on your screen in an otherwise perfect picture. (You can see these same effects with a dish that's not properly aligned.) Generally, sparklies signify noise and indicate that the dish is not receiving all of the signal that it should.

However, in the solar outage, it indicates that another source of radio energy is getting into the dish. As the transition continues, the satellite signal may be overwhelmed by the Sun and the picture will be lost. (Incidentally, the effect is worse on sunny days than on cloudy ones.)

As with the woman in the opening story, you may be alarmed. "Is there any danger to my equipment from a solar outage?" The answer depends on your equipment. Usually black mesh reflectors reflect more signal than heat and there will be no damage to your equipment. Older solid dishes may put your equipment at risk. The key is the reflective ability of your dish.

You may have noticed that most solid dishes have a slightly rough texture finish. This is just enough to keep the temperature of the dish cool. The white pigment also helps to throw off heat. The worst potential offenders are the spun aluminum dishes with their shiny, perfectly smooth surfaces. They are, in fact, solar cookers, and guess what we're having for lunch: your LNB!

I use several small spun aluminum dishes for experiments and you may imagine my horror as I saw the insulation on my coax smoking! The blue plastic feedhorn throat cover had melted completely to a puddle at the bottom of the dish. Happily, the LNB appears to have been unaffected. I say "ap-

pears," because it's entirely possible weakened components may cause premature failure. Needless to say, I now coat my aluminum dishes with a white metal spray paint. It does an excellent job of dissipating the heat.

Living With Outages

Solar outage incidents are very frustrating. You may have tried to tape a movie on a channel which experiences the effect just at the most crucial part of the movie. The effect happens every autumn during a critically important football game or in the spring during college basketball tournament time. You've probably heard the announcers talk about "technical difficulties" or "problems with sun-spots," neither of which are true. The fact is that you can't avoid them, so you have to work around them.

It takes all day for the Sun to work its way around the viewing arc. So plan your viewing around it. Try not to "track" the Sun by inadvertently trying to watch programming on satellites which are directly between you and the Sun. And, above all, don't attempt to peak your dish during these few days. You'll be driven mad at what appears to be a completely misaligned dish!

Satellite Notes

- Anik E2 has returned to the land of the living. After mysteriously spinning out of control last January, engineers at Telesat Canada regained use of the satellite June 21 almost exactly six months later. Officials still don't know exactly what caused the mishap but are greatly relieved to have the bird flying again. Telesat scientists have developed a technique they call Ground Loop Attitude Control System which uses computers to fire onboard thrusters about every fifteen min-

utes. And no wonder they're so happy; they've rescued what many had consigned to "space junk" and extended its life to the year 2003—only one year off its original design life.

- At the first of this month, PrimeTime 24 moves its services from Satcom F2R to G4. Viewers will see quite an improvement in signal since G4 has twice the power of the F2 transponders.

- Two big names in home electronics have bowed out of the satellite TV market. Panasonic and Fujitsu, both citing different reasons, may return to the market later. According to industry journals, Panasonic cited the intrusion of Direct Broadcast Satellite systems as its reason for the exit. Fujitsu cited exchange rates and the cost of production for its bailing out.

- July was a great month to watch NASA Select, the agency-supported channel devoted to space related activities. Viewers were treated in one 2-week period to not only an on-going Space Shuttle mission with its usual breathtaking live feeds (including a close-up of a Pacific Ocean typhoon), but also the Jupiter/Comet collision. Lengthy, informative press conferences with various scientists topped anything seen on any of the networks.

It reminded me that ten years ago this very month I installed my first satellite system. It featured an irregularly shaped fiberglass dish sporting a 120 degree LNA, a downconverter mounted on the pole under the dish, which fed a brand new Amplica 300 receiver.

The reason I began my odyssey in the Clarke Belt was in pursuit of NASA feeds. In 1981, with the inaugural launch of Columbia, the networks buzzed with information on America's new space effort. Missions were given full coverage during lift-off and landing. But, as the missions became more routine, less and less valuable network time could be afforded this effort. My interest, however, was not diminished.

While reading everything I could get my hands on regarding satellite TV, I realized that NASA maintained a press feed during its missions and it was there via satellite for the viewing. At that time it was located on Satcom F1 at 139 degrees west on channel 9. I considered it a personal triumph to have installed the system, gotten it up and running, and watched the NASA channel for every minute of every mission.

The great thing is that ten years later, despite budget constraints, technical disasters and rumors to the contrary, NASA Select is still there. For all the rest of my fellow Earth-bound space cadets my advice is: If there was only one reason to get involved

with satellite TV this is it. The next few years will provide even more intriguing programming as the U.S. and Russia get together again in space, and who knows when the next comet will be on a collision course with one of our planets?

Euro-Satellite News

Roger Bunney reports in his column in the British *Short Wave Magazine* that the Space Shuttle downlinks FM video at 2250 MHz, which should be receivable on receivers with built-in video demodulators such as the ICOM R-7000. I would like to know if any *MT* readers have had any experience with this.

John Locker of Merseyside, UK, reports that "...Arianespace have got their launch programme back on course, putting first Intelsat 702, then PAS 2 into orbit..." He notes that PAS 3 will be launched this fall at about 42 degrees west. John is on a one-man mission to get someone, anyone, in Europe to carry the NASA feeds for European consumption. At one point he had British Telecom interested, but no luck so far.

The BBC is said to be testing Digital Audio Broadcasting (DAB) for its terrestrial service in the U.K. Satellite delivered DAB will be quite a few years down the road. However, as reported in *BBC Worldwide*, a North American based company is planning to launch a DAB satellite signal to Africa and the Middle East via its AfriStar bird in 1996. I'm sure there will be many investors watching those developments closely. Meanwhile INMARSAT continues its plans to test mobile satellite broadcasting techniques next year. (Thanks to *MT* reader Jack Belck of Illinois for this info).

MAILBAG

Bill Perrelli, N1MRK of Hamden, CT, wants information on computer BBSs which carry TVRO and WXSAT related information. According to *TVRO Dealer*, a monthly trade journal, three news groups are currently on Internet: "alt.satellite.tv.forsale" is said to be TVRO related equipment for sale from around the world; The newsgroup "alt.satellite.tv.europe" involves the European TVRO scene; "rec.video.satellite" is a general purpose U.S. oriented TVRO newsgroup. Access to Internet can be made through any of the popular on-line computer services such as Compuserve or America On-Line.

According to *WeatherSat Ink's* Third Quarter 1994 issue "...Rick Emerson (System Support Group) has an Internet mailing list which he unselfishly maintains as a source for disseminating NOAA messages and bulletins. In addition, there is a constant exchange of technical information on this mailing around the world. To subscribe electronically to the WxSat Mailing List, send your request to wxsat-request@ssg.com..."

NOTES:

- LNA— Low Noise Amplifier
- LNB— Low Noise Block Downconverter
- NASA— National Aeronautics and Space Administration
- NOAA— National Oceanographic and Atmospheric Administration



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Finding Your Way

In Japan, and in many parts of Europe, radio direction finding (DFing) is more than just a hobby. It is a serious, highly competitive sport. Contestants combine their athletic ability and DFing skills to see who can be first to locate a well hidden “fox” (the name given to the hidden transmitter).

Even though the stakes aren’t as high, looking for a nearby beacon can also be challenging—and it’s a fun way to sharpen your navigation skills, too. This month I’ll describe an easy way to do it using inexpensive equipment you may already have handy—a portable receiver, a map, a compass, and a pencil.

Before You Start

You may already know that the beacon you’re looking for is a local station. If so, great. You’re ready to begin. But if not, it’s wise to make some quick checks before investing too much time in a lengthy search. The first step is to observe the signal for a few days. If it’s very strong and its strength does not change from day to night, there’s a good chance the site is within reasonable driving distance.

As a double check, you can take some preliminary bearings close to home to get a rough idea of the beacon’s location. You’ll be able to use these DFing skills now, and also later on for the close-in search, so let’s get started!

Getting Your Bearings

Most longwave portables have a built-in ferrite rod antenna that is quite suitable for basic direction finding. To see if your receiver has one, rotate the set while monitoring a longwave signal. If a ferrite rod is present, you’ll notice a change in signal strength as the set is turned, and at some point during the rotation, there will be a sharp null (dip) in the received signal.

Because ferrite antennas exhibit a minimum response when one end of the rod is pointed at the transmitter, it is possible to do fairly accurate direction finding using this technique. (The antenna will also exhibit a peak response when the broadside of the rod faces the transmitter, but the null is what we’re interested in for direction finding. It gives a much sharper pattern than the broadside peak.)

Ferrite antennas are usually mounted along the lengthwise dimension of the radio. So, for the typical portable, you simply orient the set for a null and then sight along the top of the cabinet (much like looking down the barrel of a shotgun) to determine the direction of the incoming signal. Actually, the signal could be coming from *either* end of the rod, but that problem will be solved shortly when we plot the bearings on a map.

If you plan to use an external loop antenna, the basic technique for homing is the same, with one important difference: A loop exhibits a null response off the broadside of the antenna, and a peak off the ends—you guessed it—just the opposite of the ferrite rod antenna.

No matter which type of directional antenna you use, the plotting technique is identical. Start by taking null bearings from two well established points on a map (near street crossings for example) and draw the bearings onto the map as shown in Figure 2. The intersection of the plot lines indicates the approximate location of the transmitter. Plan on repeating the process a few times as you close in on the target. Each time your plots should become more precise.

HINT: When you get close, remember to turn down the receiver’s RF GAIN to prevent receiver overload. (On a recent trip, I was able to get sharp nulls on a beacon from just 300 feet away by doing this.)

The final and most exciting step is to visually pinpoint the beacon shelter. This may require searching on foot, as beacons can be found almost anywhere—in fields, near runways, even in residential areas. By all

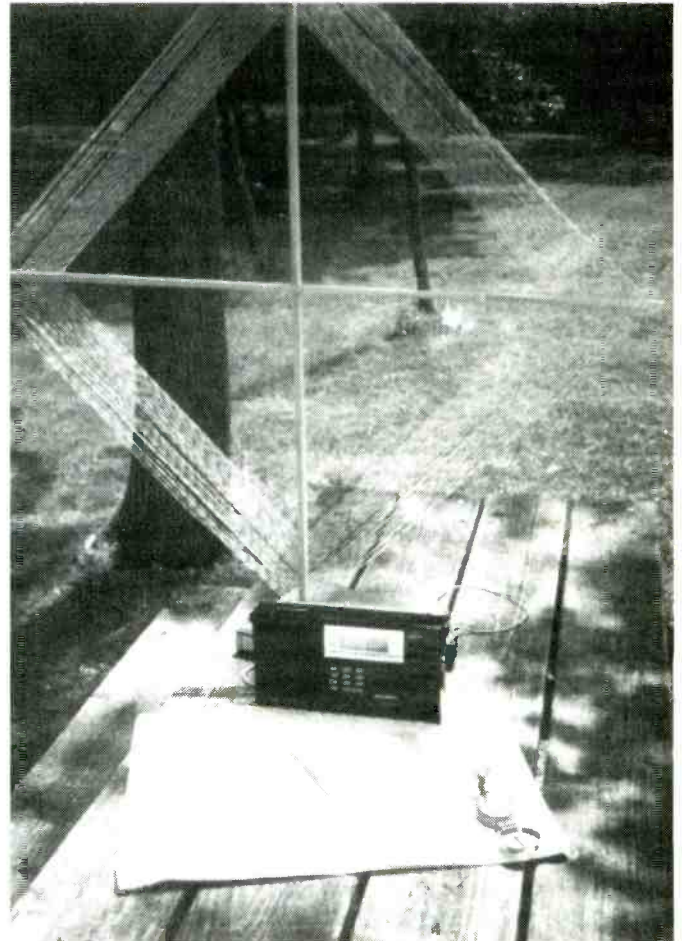


FIGURE 1: Here’s all you need to get started with direction finding.

means, obey trespassing rules, and if you drive, be careful not to get stuck in off-road areas. Happy hunting!

Reader Loggings:

Allen Renner (PA) sent along several of his favorite beacon catches from earlier this season. He received signed verifications for each, plus some unexpected “extras” like pamphlets, approach plates from the various airports, tourist guides, and even a station award sheet for hearing JA (344 kHz) in Jacksonville, FL.

Allen thanks *MT* for his interest in the longwaves, and reports that he’s logged over 140 beacons since starting in 1993. Sixty-

eight of his loggings have been verified since then and more are on the way. Allen uses a Realistic DX-440 receiver with the internal ferrite rod antenna. He also has plans to build an external loop antenna for even better results. His loggings are shown in Table 1.

Getting Online:

A new 24 hour computer bulletin board system (BBS) is now available which is run

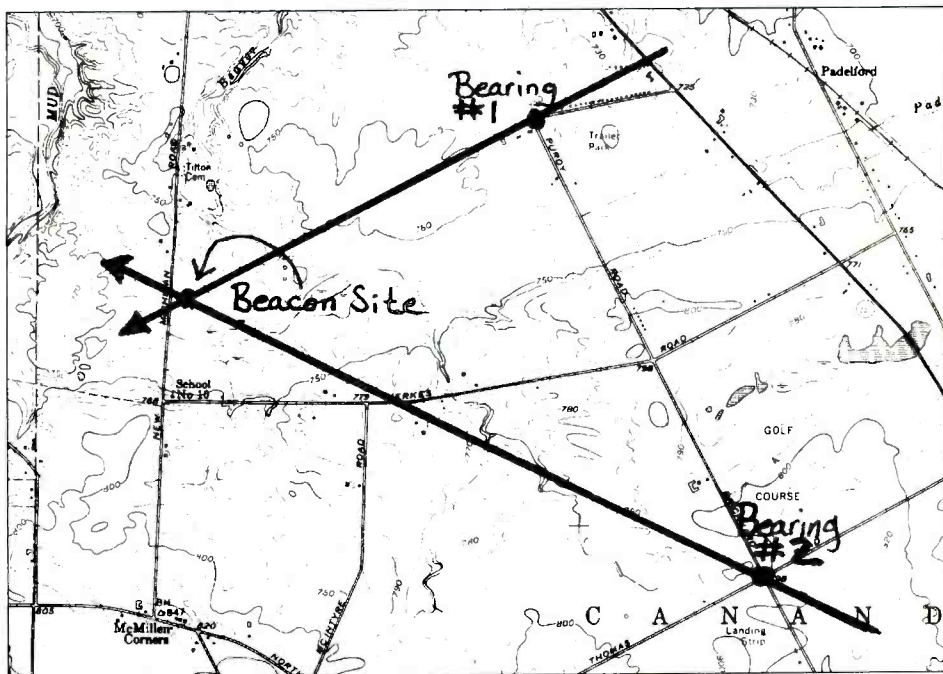


Figure 2. DF plots are the best way to start your search.

TABLE 1: Beacon Loggings		
FREQ.	ID	LOCATION
257	YXR	Earlton, ONT
329	YHN	Hornepayne, ONT
335	HP	Heath Pt., ONT
338	DE	Detroit, MI
340	YY	Mont Joli, QUE
341	YYU	Kapaskasing, ONT
344	JA	Jacksonville, FL
347	YG	Charlottetown, PEI
351	YKQ	Waskaganish, QUE
378	RJ	Roberval, QUE
379	CM	Port aux Basques, NFD
388	AM	Tampa, FL
390	JT	Stephenville, NFD
404	Y	North Bay, ONT
409	YTA	Pembroke, ONT
413	CBC	Anahuac, TX

by the US Coast Guard. The board carries general radionavigation information, including the status of LF Radiobeacons, LORAN, OMEGA and GPS. There's no charge for using the system and anyone is welcome to call. The only cost will be your long distance charge for placing the telephone call. The number for the BBS is (703) 313-5910.

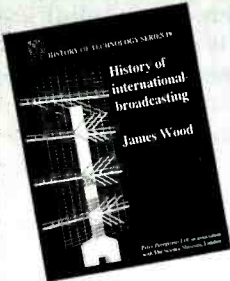
Another BBS, this one specifically geared towards the longwave/lowfer hobbyist, is being operated by John Davis, *LF Notebook*

editor for *The Lowdown* journal. The hours of operation are from 7 PM to 8AM EDT and all weekend. The phone number for the board is (706) 672-0360. As with the Coast Guard BBS, there is no user charge for this system.

Are you new to the world of computers and BBS operation? I recommend reading Bill Grove's excellent primer on the subject—*The Friendly Computer*, which appeared in the May '93 issue of *MT* (Page 16).

That wraps up another month. I'll see you in Atlanta!

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Low Tech Organizer

Computers have been a real asset to most of us in our hamshacks: however, quite often we find simpler is better. For example, I have for a long time kept bits of information on index cards. These included things like the frequency and time my favorite SWBC station was on the air, dates and times of contests I wanted to enter, skeds with various friends, and times/dates and frequencies of special event stations.

The problem I had with index cards was that they kept getting lost, or I forgot to look at them. Eventually I thought about using the computer for maintaining this data, and tried it out. It worked, but no better than the index cards; besides, I couldn't carry it with me.

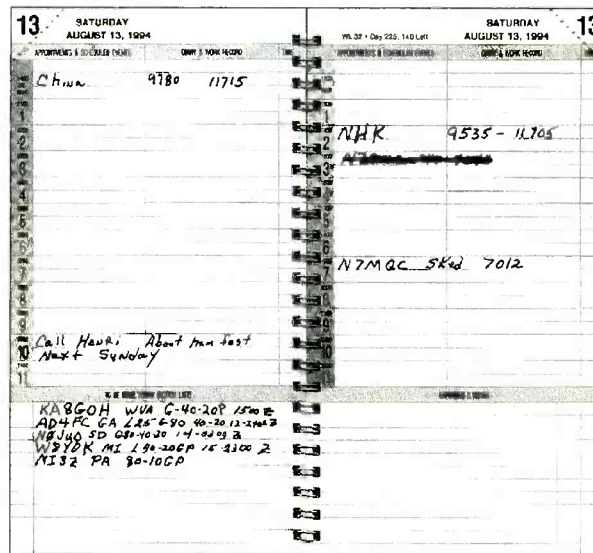
A few months ago I came across a product that proved to be ideal for keeping me up to date and managing my time more effectively. It's called a DayTimer®, which we've all known about for a long time, but I, at least, had never thought about applying to my radio hobby.

What is a Daytimer?

A DayTimer is one system of time management—a day by day calendar. The system comes with 12 books, one for each month. Several smaller books are included with the system: an advance planner contains a two year calendar with each month on two pages so you can plan ahead for special events, another small book for phone numbers and addresses, and a complete instruction manual on how to get the most out of your system. DayTimers come in various sizes and formats—all good, though the Jr. Pocket version does not have a 24 hr. format.

How do I use it? Take a look at the page for August 13 from my DayTimer. As you can see at 0000 hrs Z I noted China, 9780 11715; indicating I wanted to listen to Radio China on either 9780 or 11715 kHz. The next notation is to call Henri about next Sunday's hamfest. On the right side I note that NHK (Japan Radio) was on at 1400 Z and noted the frequencies, followed by a note that I have a schedule with N7MQC on 7012 kHz.

The notes on the bottom of the left side are special event stations I want to attempt to work. I need WVA for WAS (Worked All States) special event station (more about this next month). In *QST* magazine's special event



column I found that KA8GOH was going to be active from WVA, so the G means General sub bands, and 40-20p means 40 and 20 meter phone, and the time is 1500Z during which he will be active. The other stations follow the same format, and are special event stations I want to attempt working on this particular day. If you are a DXer, you will want to note the times and freqs that rare one will be on, or when the DXpedition to wheres-it-at will start activity. I'm sure you will find many more uses for this system.

To avoid the aggravation of trying to remember where you read or heard about something when the need for it arises, keep your Daytimer handy and write down the information in the appropriate place at the time you come across it. The book is so easy to carry, that even away from the house, the information goes with me. I use my DayTimer daily; it has made a big difference in my operating and in my daily life.

You can keep radio and personal events separate by using different color ink. Using red ink means it's a business/social event and the hour is local time. Black ink indicates a radio related activity and time is in UTC.

You can get more info about DayTimers by calling 800-225-5005. Ask for a sample kit and a catalog (it's free).

160 Meters

Let's pick up our interrupted overview of the various ham bands with a look at the 160 meter band. For many years 160 was shared with LORAN (LONG Range Aid to Navigation), and the band was split into many 25 kHz segments, depending on what part of the country you lived in; in addition, power was restricted to 25 watts or less in some areas; other areas were not allowed operation at all.

All of this has now changed and hams operate in the entire 1.8 to 2 MHz band with full power. There are still some radio location stations active, and

hams are not allowed to cause interference with them, but this has not been a problem to my knowledge. For quite a few years it was thought that the hams would lose use of 160, and a lot of manufacturers did not include the band on their rigs. Nowadays, however, most rigs include this band.

During the daylight hours, the band's range is normally 300 miles or less. As darkness gathers, the D layer of the ionosphere which absorbs 160 meter energy dissipates, and communication over distances exceeding 3000 miles is possible. In fact, intercontinental contacts are frequent. The limiting factor on 160 is QRN (atmospheric noise); consequently, the band is most useful in the fall through spring months when electrical storm activity is at a minimum.

One of the nice things about 160 is the ability to carry on roundtable contacts with

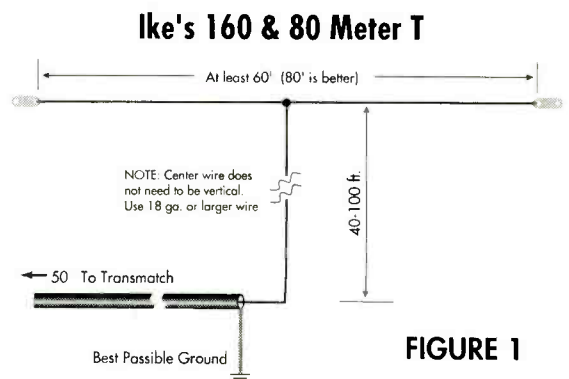
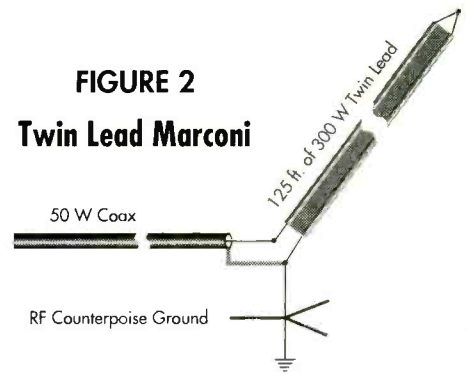


FIGURE 1

Bob Leonard's Ham DX Tips

Well, in the temperate zones the leaves are falling, and there is frost on pumpkins—which means once again we are at the height of the DX season and the start of the ham HF contest season (which will start this month and run 'til May).

ANTARCTICA Starting mid October Communications officer Eddie De Young of the Australian National Antarctic Research Expedition will be active from here as VKODX. Eddie will be establishing a permanent ham station at Davis Base until mid March 1995. He hopes to operate as time permits on as many different bands as possible in SSB, CW, and possibly RTTY. He will answer QSL requests when he returns home: 131 Plantain Rd., Shailer Park, Queensland 4128, Australia **BELGIUM** Until the end of 1994 amateurs here may use the special prefix OS to celebrate the 50th anniversary of the liberation of Belgium by Allied forces in WWII. Belgian hams will also be operating special events stations using the special prefix OS50. These stations will be active from cemeteries for US, Canadian, and British troops who were killed in WWII fighting in Belgium. **CANADA** The famed EME (Earth-Moon-Earth) operation by members of the Toronto VHF Society, using the call sign VE30NT, will take place during the ARRL EME contests in late October and November, for what may be the last time. EME contacts facilitate worldwide VHF and UHF communications via the weak signal modes of SSB and CW. The VE30NT team once again has been allowed use of the 46 meter (approx 150 ft) dish antenna belonging to the Canadian Terrestrial Science Centre in Algonquin Park, Ontario (the grid square is FN05xw). The group will have certain frequencies on which they will transmit and listen for responses, depending on the specific band of that weekend's contest. October 29th: transmitting on 432.050 MHz CW and SSB, listening to 432.050 to 432.060 MHz between 0645 and 1815 UTC. October 30: transmitting on 1296.050 MHz and listening to 1296.050 to 1296.060 MHz SSB and CW modes between 0754 and 1844 UTC. During the ARRL 144 MHz EME contest the week-end of 26 and 27 November: transmitting on 144.100 MHz and listening to 144.100 to 144.110 MHz between 0538 and 1645 UTC on the 26th and 0646 to 1713 UTC on the 27th. **HAMS: DO NOT** operate on VE30NT's frequency; they will work "split," listening to a frequency in the range listed above for each band of operation. QSL to the route announced during the operation. **CONTESTS** One of the biggest contests of the season—the CQ World Wide SSB contest—will take place October 29th and 30th. Hams worldwide will be exchanging CQ zones and signal reports commencing at 0000 UTC on the 29th and ending at 0000 UTC 31 October. Activity will take place on 160, 80, 40, 20, 15, and 10 meter SSB frequencies. **SLOVAKIA** To celebrate the Slovakian national uprising and the end of Nazi occupation in their country, Slovakian amateurs will operate special events stations using the suffix "SNP." If you log special station OM9SNP (QSL to OM3LA Ivan Dobrocky, Ticha 16, 974 00 Banska Bystrica, Slovakia) you can earn 5 points toward the "Slovak National Uprising Award." Other stations using "SNP" prefix will earn you 1 point. If you live in Europe (outside Slovakia) you need 30 points to earn the award, the rest of the world 10 points, and Slovakia 50 points. Hams and SWL's who have logged these stations need to send a listing of the logging data and 8 IRC's to: Orenburska 13, 97401 Banska Bystrica, Slovakia. **SWITZERLAND** Special station HB4JAM will operate 25 October from the Swiss Scout jamboree near Lucerne, Switzerland. QSL route will be announced. They plan to be on as many different modes and bands as possible during the week-end, and hope to link up with other Scouting groups. **TAIWAN** BV00 will be an Islands on the Air DX-pedition to take place from Orchid Island October 8th and 10th. Look for them on the SSB frequencies of 14260, 21260, 28460 and 28560 kHz. QSL's should go to BV8BC, P.O. Box 222, Tai Tung 950, Waiwan, Republic of China. — Have a safe and happy Halloween and good DX to all!




stations from 1 to 3000 miles and be able to hear everyone. While the 1 to 3000 mile range is not common, it is not at all unusual to hear half a dozen or more stations in a round table from one coast to the center of the country with all stations hearing each other.

More hams would use 160 if the antennas required were not so long (250 ft±). There are several short antenna designs available for this band, and figures 1 and 2 will give you some ideas. If you have further questions on these designs, send them to Ham Bands with an SASE.

With the solar flux hovering in the high 60 to low 70 range, 160 will be a fun band to use. When the higher freqs are dead, you will find 160 to be a hotbed of activity any evening.

73 de Ike

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And it completely eliminates static charge buildup on the antenna. The charges travel down the coax shield to ground — not through the radio.

The balun is weatherproof, rustproof and has an SO-239 connector for coaxial cable (not supplied).

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RFPI Chases Pirates off 7385 kHz

In an early August frequency shift that had major consequences for North American pirates, **Radio for Peace International** in Costa Rica shifted its 7375 kHz 41 meter transmitter to 7384.6 kHz. The reason for this 10 kHz shift is somewhat unclear. On-air announcements indicated that although the station's antennas had recently suffered lightning damage, the change was a "provisional move."

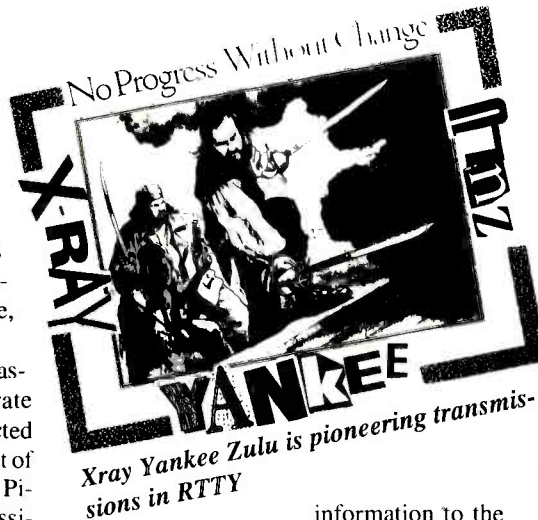
As we see once again in this month's massive collection of North American pirate loggings, the RFPI move immediately impacted 7385 kHz, which had been used during most of the summer as the main pirate frequency. Pirates will have to move somewhere else, possibly to spots like 7370 kHz or 7470 kHz. The dust has not yet settled.

There has been much speculation about the reason behind the move. *MT*'s Glenn Hauser reported on "World of Radio" that RFPI's chief engineer was on vacation at the time of the frequency change. Many, including *MT* reader Kirk Trummel of Springfield, MO, have noticed that RFPI suffered jamming on 7375 kHz. He speculates that the 10 kHz journey might have been an attempt to shake the jammer.

However, many DXers have noticed that the jamming followed RFPI to 7385 kHz. I spotted the heterodyne noise that causes the problem on 7385 kHz at 1400 UTC on a Sunday morning. This noise is characteristic of the Cuban jammers targeted toward anti-Castro clandestines such as **Radio Caiman** on 9965 kHz and the recently reactivated **La Voz del CID** on 9941.65 kHz. This, plus the clear propagation to Cleveland on a Sunday morning, strongly suggests that Cuba is the source of RFPI's jammer.

Why would Castro want to jam Radio for Peace International? Most North American English language shortwave broadcasters feature right wing and/or religious programming. In stark contrast, RFPI's generally leftist slant is much closer to Castro's political ideology. Electricity has been in somewhat short supply in Cuba, so the logic of a Cuban jammer toward RFPI remains a mystery.

Many of us will be anxious to discover new frequencies that are selected by pirates in response to the new RFPI interference. If you hear a pirate, it will help all of us if you send this



information to the "Outer Limits" at PO Box 98, Brasstown, NC 28902.

Shortwave Liberation

The tremendous explosion of pirate loggings in last month's and this month's columns was associated with the biggest explosion of North American pirate activity in history. Under a semi-organized label of "Shortwave Liberation," dozens of pirate stations initiated broadcasts on a *daily basis* between June 18 and July 18. At least one station took to the air on all days during this event. Even weeknights were hotbeds for pirate activity during the summer.

The unprecedented daily volume of activity took a nosedive when Shortwave Liberation ended, partially because of fatigue! The RFPI frequency shift also seemed to confuse a few stations. But, we have some upcoming opportunities to hear increased pirate activity. Halloween is traditionally one of the biggest pirate holidays of the year, so mark your calendar.

KIWI Still Active

New Zealand pirate **KIWI** is continuing its activity on 7445 kHz. Gigi Lytle of Lubbock, TX, really seems to have the magic touch when it comes to trans-Pacific pirate reception. She reports a midsummer log of Australian pirate **Radio G'Day** at 0700 on 7445 kHz via a KIWI relay. In addition, KIWI produced a special program called **Radio Gigi** in her honor. Station operator Graham Barclay says that when the station

is on, it uses 0600-0800 UTC for its broadcasts targeted to listeners in North America. Most of these shows are heard on weekends.

Radio Tornado

MT received a station press release from **Radio Tornado**, one of the few European pirates that broadcasts from Lithuania. When active, the station uses 1637, 6205, 6230, and 6400 kHz. So far they have received reception reports from a dozen European countries, but so far their signal has not made it across the Atlantic Ocean. If you are the first to hear them in the Western Hemisphere, they would love to hear from you. Their address is RT, PO Box 493, 5802 Klaipeda, Lithuania.

What We are Hearing

Maildrop addresses used by North American pirate stations heard by *MT* readers this month include PO Box 452, Wellsville, NY 14895; PO Box 109, Blue Ridge Summit, PA 17214; PO Box 146, Stoneham, MA 02180; PO Box 605, Huntsville, AL 35804; and PO Box 2024, Faribault, MN 55021. When you write to these stations, you should enclose three 29¢ stamps to the USA and \$1 US cash to foreign addresses. This finances return postage and the mail forwarding process. Frequencies listed here are in kHz, with times in UTC:

6YVOS, The Voice of Smoke- 7386 at 0130.

Like **KNBS**, **Radio Free Euphoria**, and **WEED**, Pigen Marley's station is dominated by pro-marijuana advocacy. Its Jamaican location is reinforced by the station call letters and its reggae music. Addr: Wellsville. (Chris Scheiner, River Ridge, LA; Tom Prevo, North Platte, NE)
Amiga Computer Generated Radio- 7386 at 0130. This new station is completely computer oriented. It plays computer generated music, features a male computer synthesized announcer, and sends out logo 3.5" computer disks as **QSL's**. Addr: Faribault. (Harold Frodge, Midland, MI)
Caribbean Sound System- 7385 at 0100. This new one, featuring Count Whip's reggae oldies music from a cruise ship in the Caribbean, promised additional future broadcasts during summertime tests. Addr: Stoneham. (Randy Ruger, Brandon, FL; Kirk Trummel, Springfield, MO)

CRSN- 7385 at 0100. This rock station uses a slogan of "Radio Start of the North," which explains the call letters. This was John's first

pirate; he credits frequency tips from this column! Do not confuse this one with **Radio Scottish Montreal**, which uses call letters of **CRSM**. Addr: Wellsville. (John Sedlacek, Omaha, NE; Michael Prindle, New Suffolk, NY; Frodge, Scheiner)

Free Radio Signal Corps- 7388 at 0200. Here's another example of a new breed of RTTY pirates. When I heard them, they were using 650/45 baud and shift parameters. Addr: None, but their RTTY text says that they will verify ACE loggings. (George Zeller, Cleveland, OH)

KICK- 7385 at 0200. Here's a new one that features hard rock music and a male announcer. Addr: Huntsville. (William T. Hassig, Mt. Prospect, IL)

KMOM- 7385 at 0100. Samantha Jones is Mom on this station. She cleverly mixes rock music with sexual innuendo. Early QSL's have featured her DX panties as enclosures. Addr: Wellsville. (Scott Gentry, Matteson, IL)

KTVI- 7385 at 0030. Emmanuel Goldstein mainly broadcasts Pink Floyd rock, with new age music during station ID's. Addr: Faribault. (Scott Krauss, Cleveland, OH; Frodge)

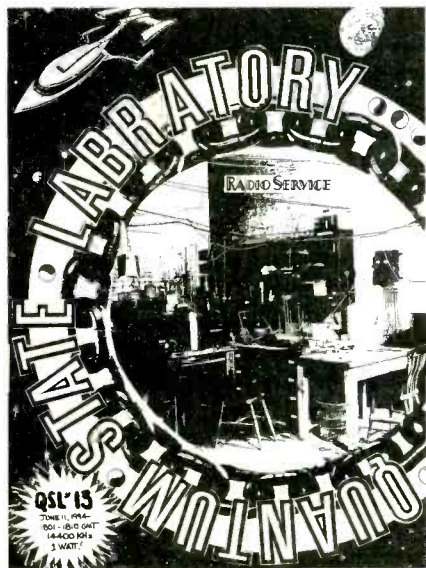
Mrs. Beasley's Radio Program- 7385 at 0130. The "old lady" announcer on this comedy station sounds an awful lot like a falsetto voiced man. Addr: None. (Frodge)

Omega Radio- 7385 at 0330. When this one started back in 1990, Dick Tator was mainly a religious station. He now relays other pirates, and his own shows increasingly are dominated by secular rock music. Addr: Wellsville. (Trummel)

Quantum State Laboratory- 7385 at 0130. This relatively new rock station sent me the QSL pictured this month. They list one watt as their power, which certainly is my best ever QRP. Addr: Stoneham. (Zeller, Frodge)

Radio Airplane- 7385 at 0245. There is no truth to the rumor that Captain Eddy's airborne pirate has the government contract for the United States' **Radio Discovery** clandestine broadcasts in Haiti. Sources in Haiti say that the 1035 kHz clandestine signal is poorly heard there. Addr: Wellsville. (J. D. Stevens, Huntsville, AL; Hassig, Scheiner, Prevo, Syko)

Radio Azteca- 7385 at 0200. There are several excellent DX parody stations on the air today, but Bram Stoker's version is among the very best. He's



This pirate used the unusual frequency of 14400 kHz.

always hilarious. Addr: Wellsville. (Lytle, Trummel)

Radio Bob's Communications Network- 7465 at 0100. RBCN's Radio Bob still entertains listeners with original creative productions of southern humor. Addr: Atlanta. (Ruger, Frodge)

Radio Doomsday- 7385 at 0315. Although Nemesis' volume of broadcasts has declined lately, his rock music and pirate radio commentary can still be heard occasionally. He has announced that his formerly excellent QSL response rate will be drastically cut in the future. Addr: Wellsville. (Max Syko, Gaylord, MI; Prindle, Hassig, Lytle)

Radio Free Euphoria- 7385 at 0030. Captain Ganja still transmits drug music and comedy in a marijuana advocacy format. Addr: Wellsville. (Prindle, Scheiner)

Radio Free Jesus- 7385 at 0100. This sly religious parody station announced that they would verify all reception reports sent to them, but Chris found that they demand a complete set of the traditional report details that include date, time, and frequency of reception, supplemented by program details. Addr: Huntsville. (Scheiner, Syko)

Radio Outhouse- 7385 at 0230. Bob and Billy Joe Jim Jack Daniels converse endlessly on this station from an Arkansas outhouse. Even though they stick to a single "country humor" theme, the shows are amusing, although Paul thinks that they are too crude. So far they have not been verifying reports. Addr: None. (Paul Roales, Tulsa, OK; Prevo, Sedlacek, Prindle, Syko, Frodge, Hassig, Scheiner)

Radio USA- 7385 at 2315. Mr. Blue Sky's punk rock music and comedy features have been on the pirate bands for ten years now from a leaky bathtub off the North American coast. Addr: Wellsville. (Krauss, Syko)

Radio USA (fake)- 7385 at 0930. This worthless jammer sometimes appears late in the evening, as Harold noticed in the wee hours. Addr: None. (Frodge)

Solid Rock Radio- 7385 at 0200. Dr. Love offers traditional pirate fare of rock and rap music with pirate commentary, but he is establishing a good relationship with his listeners. Addr: Wellsville. (Syko, Scheiner, Hassig, Frodge, Sedlacek, Prindle)

Southern Music Radio- 7385 at 0315. This pirate plays the "best possible music from Down Under, from the South Island of New Zealand." When we hear the station, it almost always is using a North American relay. Addr: Wellsville, requires \$1. (Trummel)

Spam Radio- 7385 at 0245. King Spam's station blends comedy, songs about Spam meat, and the old Monty Python Spam music. Mailbags and a European guest Spam Barclay were recently featured. Addr: Faribault. (Scheiner, Frodge, Sedlacek)

The Asylum- 7385 at 0100. This odd one is attracting the attention of its listeners with rock music, well produced sound effects, and stream of consciousness rhetoric from an inmate. It was Tom's first pirate, but as you see in other logs, it did not scare him away. Addr: None. (Prevo, Scheiner)

The Joint- 7385 at 0015. Phil Muzik of **KNBS** and Captain Ganja of **Radio Free Euphoria** have combined forces on this rock music and marijuana advocacy station. Thus, the station name is logical. Scott listens to pirates in his car on a DX-440 while delivering pizzas! Addr: Wellsville. (Gentry, Trummel)

Up Against the Wall Radio- 7385 at 0100. The 25th anniversary of Woodstock has turned our attention to music of the period. Owsley's station

recreates the anti-war and anti-government protest mood of the late 1960's and early 1970's. Addr: Wellsville. (Frodge)

Voice of the Runaway Maharishi- 7387 at 0445. Maharishi Ali Ganja moonlights between **Radio Free Euphoria** and his own pro-marijuana station. Addr: Wellsville. (Scheiner)

White Christian Guy- 7385 at 0230. Here's an example of an unfortunate scourge on the pirate bands. This guy jams other pirates while reading the Bible and making racist remarks. Needless to say, this is poor broadcasting practice. Addr: None. (Syko)

WKND- 7415 at 2330. Radio Animal is back with rock music and listener mailbag shows. A recent program featured an interview with Captain Willy of **WVOL**. The Animal still is a big canine fan. Addr: Blue Ridge Summit. (Prindle)

WLIS- 7385 at 0215. Jack Boggan still plays shortwave broadcast interval signals as hit tunes, and Charles Poltz' QSL's still feature a picture of MT Convention speaker Ian MacFarland somewhere in the design. Addr: Blue Ridge Summit. (Prindle, Frodge)

WREC- 7385 at 0230. P. J. Sparx is now a veteran unlicensed broadcaster. His shows typically feature rock music, but comedy is sometimes included. Addr: Wellsville. (Frodge, Syko)

Xray Yankee Zulu- 7385 at 0100. This one sometimes relays other pirates, but it is best noted for RTTY pirate broadcasts (170/45). Addr: None, but verifies logs in ACE with the sheet that we see this month. (Frodge, Krauss)

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Finally there's a Duck with real gain for the 800 MHz band! Even 1/4 wave tuned antennas can't come close to matching Seeker 800's performance. The secret is Seeker 800's patented, 1/2 wave, ground independent, commercial quality design. Significantly improves signal reception on handheld scanners, counters, & cell phones! Only 11.75 inches long! Connects to a standard BNC antenna mount.

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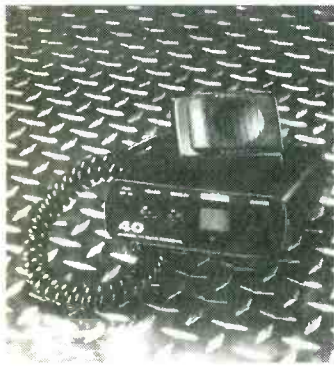
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Uniden PRO 501XL CB Radio



CB, the papers keep saying, is really hot. I mean, it's so hot that people are talking about getting together a convoy and trying to ratchet-jaw with First Mama. (Former First Lady Betty Ford's CB "handle.") Well, maybe not that hot.

One thing is for certain, though: the big manufacturers are pushing CB again. The other thing is that prices have come down like a rock in free-fall.

If all of this hype has got you thinking that maybe you'd like to explore the good old 27 MHz band again but you don't want to spend a lot of money, look for Uniden's new Pro 501XL CB Radio. This unit lists at \$59.95. You may well see it for sale in stores at an even lower price.

It covers all 40 AM channels and incorporates the same quality and performance as many larger units. There's a channel display, channel selector, squelch control, volume control, and an LED that lights up when you are transmitting. There's also a built-in ANL (Automatic Noise Limiter) and mounting hardware.

That's about all you'll need to get under way. An optional magnetic antenna and cigarette lighter plug will cost you 20 bucks. The accessories are packed together with a Pro 501XL and are relabeled as a Pro 501 AXL. Check your local radio or department store for availability.

Well, that's about it, good buddy. The new S-9 just came in the mail and I'm gonna settle down and see what Tomcat has to say. 73s!

Hidden Ham Antennas

What do flagpoles, fences, and tomato plants all have in common? They can all, according to author Frank Hughes, VE3DQB, hide an amateur radio antenna.

Today, as more and more people put more and more restrictions on what we can and can't do, getting an antenna up in the air can become a legal nightmare. From the people who think antennas are ugly, to the people who think they're dangerous, it now takes ingenuity to get that signal out.

Hidden Ham Antennas shows out-of-doors, inside, high frequency, and VHF-UHF antennas. It also shows you how to make 'em and how to hide 'em. Hughes also covers antenna tuners, grounds and counterpoises, and easily disguised commercially-available antennas. The book is illustrated with over 40 diagrams.

You can get your copy of *Hidden Ham Antennas* from Tiara Publications, P.O. Box 493, Lake Geneva, Wisconsin 53147. The price is \$12.95 plus \$2.00 book rate shipping.

Scanner Cases

Here's a nice idea—Design EQ, the people who wrote the book on the AR1000, are now offering custom cases for the Radio Shack PRO-39, PRO-43, and PRO-44 handheld scanners. As Howard Bornstein says, "This thick, leather case was designed with a specific strategy in mind: to protect your scanner from falls, bumps, and other physical shocks."

There are cut-outs in the case



for the keyboard and display, controls and antenna, but what we really liked was the velcro flap that lets you get to the batteries without taking off the case.

The price for Design EQ's leather cases is \$29.95 plus \$2.00 shipping. If you're in California, like Howard is, don't forget to feed the governor—add \$2.47 in tax. The address is Design EQ, P.O. Box 1245, Menlo Park, CA 94025.

Saladino Software

Ben Saladino is a long-time *MT* reader and radio buff who has put his shoulder to some shareware. The first is Frequency Manager for Windows 1.05. It's designed to help organize and manage radio frequencies that amateur radio operators and scanner enthusiasts use. The price of Frequency Manager for Windows 1.05 is \$15.00.

Radio Manager for Windows 1.05 is a radio control program for the ICOM R-7000, R-7100 and R-9000. It's \$30.00. Unregistered versions of either program is available by sending \$3.00 to Ben Saladino, 660 West Oak Street, Hurst, Texas 76053-5526. For more information, call Ben at 817-282-0331.

MT REVIEW

Black Box Antenna



Every once in a while, we get a product that's, well, just plain neat. Ron McClintock's Black Box antenna is a tunable loop antenna that is mounted inside a jet-black VHF cassette tape box. It works this way: you tune your AM radio into the station you want to hear. Then you put the Black Box next to the radio, tune the dial, and presto, the previously weak signal is now significantly stronger. Additionally, you can use the Black Box Antenna to null out adjacent channel stations.

Better still, the Black Box doesn't use any electricity—no wall socket, no batteries. And it really works. In fact, the manufacturer guarantees it to "significantly improve your reception."

We were really pleased with the performance of the Black Box Antenna. The frequency range is 500 to 1700 kHz, and the unit weighs in at about a pound. The price is reasonable, too, at just \$49.95 plus \$6.00 shipping.

To order yours, call 1-800-99RADIO. Or send your check or money order to Black Box Antenna, 14624 Deon Dr., Sonoma, CA 95370.

—L.M.

Books and equipment for announcement or review should be sent to "What's New?" c/o Monitoring Times, P.O. Box 98, 300 S. Hwy 64 West, Brasstown, NC 289202.

Monitoring the Pros

Mountain Sales is a company that's producing audio tapes of scanning action in the Big Apple. If you're like us and live in an area of less-than-constant seat-of-the-pants action, these tapes can be real eye-openers. This is New York City in action, not Wagontown, Pennsylvania, working structure fires on a 60 minute audio tape.

Mountain Sales offers four tapes: Manhattan Boro, Queens Boro, Bronx & Staten Island Boros, and Brooklyn Boros, each at \$10.00 postpaid. The tapes come with a printed list of the New York City Fire Department 10-Codes.

To order, write Mountain Sales, Unit 257, 163 East Main Street, Little Falls, New Jersey 07424. Tell them you read about the tapes in "What's New."

NatScan and NESN Merge

National Scanning, the nation's number one scanning magazine, and Northeast Scanning News (NESN), the first-rate scanning club, have joined forces.

"I've always been a big fan of North-East Scanning News," says NatScan publisher Larry Miller. "For years, Les Mattson and I have talked about working together. But



we were always too busy."

"As time went on and NESN continued to grow, it got to be a monstrous job," said Mattson. "I wanted to get rid of the publishing and paperwork and stick to writing and editing. Larry's giving me the chance to do that."

Both NatScan and NESN readers should be happy with the new combined publication, which was mailed to subscribers last month. "NatScan will now be packed with tons of the hottest local information as well as the great national features from NatScan."

Sample copies of the new NatScan are available for \$3.00 from NatScan, P.O. Box 360, Wagontown, PA 19376. Subscriptions are \$17.50 and include a free frequency printout for your county. Call 1-800-423-1331.

— T.M.

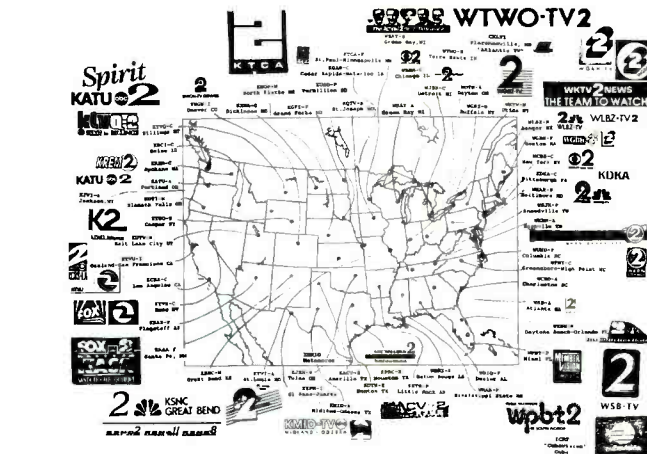
Guide to FAX

Facsimile broadcasts in the shortwave spectrum have always held a special fascination for utilities monitors. Weather maps, satellite photos, news photos and other imagery is transmitted over great distances by this medium.

The Guide to Fax Radio Stations carries a list price of \$34.95 and is available from MT book dealers.

(Nearly) Free TV E-Skip Maps

One of the great things about working at Monitoring Times is the people you meet. One of my favorite acquaintances has been Karl Zuk, former American Bandscan columnist. In addition, TV DXing is one of my favorite pursuits, so be forewarned that, in the interests of journalistic integ-



riety, this is a completely biased review!

Zuk, who is himself a TV DX freq, has put together a pack of E-Skip maps that'll help you identify the unusual stations that can come floating into your TV set this time of year. Each has a map of the U.S.. There's one map with the location, call letters, and even logo, of every TV station on

Channel 2. There's another for Channel 3 and so forth, up to Channel 6.

Best of all, you can get the new 4th edition of the TV E-Skip Maps for 52 cents and a self-addressed, stamped envelope. Send to Karl Zuk, 154 Old Post Road North, Croton-on-Hudson, NY 10520. Tell 'em Miller sent you.

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Bruce Elving *FMedia!*

We can highly endorse Dr. Bruce Elving's superb *FM Atlas*. It's a great little guide to FM broadcasting stations, complete with maps.

We cannot endorse his SCA modifications. My SuperRadio III modification took too long, the external installation reminded me of Frankenstein, and the SCA sounded scratchy. The radio was returned without proper packing. Then, some time later, I got a card from Elving saying that the SCA mod sounded scratchy, but for an additional fee he would now fix it. I gave the radio to my wife and went back to my Sangean SG 786.

Where Elving sticks to print, however, he's fine. That's why we can endorse his *FMedia!* newsletter. *FMedia!* averages 11 issues a year. It's a true newsletter, with few, if any, pictures, but jammed with information for the FM broadcast band junkie.

This isn't an easy-read sort of publication, though. There's little commentary; just gobs and gobs of data. The front page starts with a list of new "FM Translator Station Grants," arranged by state. Then it's on to "Call Letters Assigned or Changed." "Facilities Changes Granted" is followed by format changes, "On Air—Real Stations and Pirates," "Off Air," and more. It's a virtual smorgasbord of FM information that's crammed into eight incredible pages.

Normally, the cost of a single issue is \$5.95. A subscription is \$65.00. We've arranged a little bargain for you, the *MT* reader. Mention *Monitoring Times* and you can get a sample for \$3.00 and a subscription for \$25.00. Hey, don't thank me.

To sign up or sample, write Bruce Elving, Ph.D., Publisher, *FMedia!*, 241 Anderson Road, Esko, MN 55733-9413.

Amateur Radio Class



Mitch (WB2JSJ) and Ronni (KA1NRR) Stern are two amateur radio operators who will come to your town and teach you how to get your ham license—in *two days* of intensive training. Mitch and Ronnie suggest that you get together a group of, say, 10 people, and find a place to hold the class. Then you give them a call and they'll do the rest. The seminar, which is held from 9:00 am to 6:00 pm on Saturday and Sunday, normally costs \$119 per person and includes course material.

What kind of results do you get with this kind of crash course training? Says Ronnie, "the right combination of lecture, demonstration and review has produced a pass rate of nearly 100%."

Could you pay the entire fee yourself and be personally tutored into your ham license, right there at home? We didn't ask, but anything's possible. Interested? Pick up the phone and dial 802-879-6589 (after 5:00 PM).

W1FB's Help for Hams

W1FB is a code name for the person who is probably respon-

sible for "Elmering" more hams and hams-to-be than anyone else. He works secretly, under cover of his call letters, producing books like *W1FB's Help for New Hams*.

We have now received word that this excellent book has been extensively revised in an all new second edition. The chapter lineup includes things like "Your New Equipment—Getting Acquainted," "Building and Using Antennas," "Station Layout and Safety," "On-the-Air Conduct and Procedures," "DX and Contest Operating," and more. Additionally, the book has been typeset so that it is easier to read.

W1FB's Help for New Hams is 304 pages, is published by the American Radio Relay League, and is available for \$10.00 from your favorite radio bookseller. By the way, W1FB is a regular columnist for *MT*. You probably know him as Doug DeMaw.

Monitoring Award

Bill Lauterbach of DWM Enterprises has put together a team of experienced radio hobbyists from around the U.S. to form the International Short-Wave Awards Congress (ISWAC). The press release says, "ISWAC wants to reward individuals for their interest in the hobby, and to introduce them to friendly competition among themselves, thus spawning even more interest and involvement."

There is quite a list of available categories and fancy awards, which don't stop at SW broadcasting, but cover utilities and whatever your listening interest may be. For a list of the rules, awards, and costs (and it does cost), send a self-addressed, stamped envelope to ISWAC, P.O. Box 87, Hanover, MI 49241.

World College

World College, an affiliate of the Cleveland Institute of Technology, has been approved by the Commonwealth of Virginia



Council of Higher Education to confer a Bachelor of Electronics Engineering Technology Degree (BEET). It's a five year program designed to provide high quality, independent study, at an affordable cost.

The Cleveland Institute of Technology was founded in 1934 as the Smith Practical Radio Institute. It offers 12 career courses engineered for the student striving for a comprehensive electronics education at the associate level. For more information, contact the college at 1-800-696-7532.

Great Book, Better Price

Some time ago, we had the pleasure of reviewing James Wood's *History of International Broadcasting*. The 250+ page book examines the birth of the medium, its early commercial days and its rapid growth as an instrument of war. It's good reading for the serious student of international radio. The only problem with the book was that it was \$59.00, which is just a bit steep.

We now receive word that *HIB* is available as a paperback at the more modest price of \$35.

You can get your copy from the Institute of Electrical Engineers (a non-profit charitable organization), Dotty Rodriguez, PPL Dept./IEEE Service Center, 445 Hoes Lane, P.O. Box 1331, Piscataway, New Jersey 08855-1331. For more information call 908-562-5551. In Europe, write to IEEE at Michael Faraday House, Six Hills Way, Stevenage, Herts, SG1 2AY, United Kingdom or call (0438) 313311.

The GAP Multiband Vertical Antenna

Because of the omnidirectional radiation pattern, low radiation angle, single mounting point and small space required, I have tried a variety of ground-mounted HF verticals over the years, but I've always been disappointed, probably because I skimmed on the grounding system. Instead of dozens of radial wires extending from the base of the antenna, my system usually consisted of a ground rod and maybe four random-length radials laid on top of the ground, which lasted until I mowed the lawn.

The GAP Challenger DX-VIII, however, is a multiband vertical antenna which requires no buried radials, and only three 25-foot-long counterpoise wires (not supplied). Ground losses are minimized by raising the feed point, with its current maximum, off of the ground. The GAP also achieves multiband operation without traps or inductors, eliminating another source of losses.

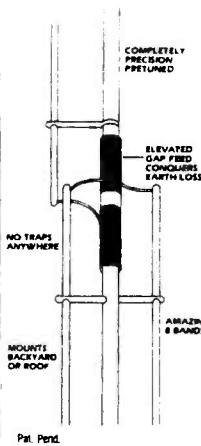
Installation

The GAP antenna may be roof or ground mounted. It took me an afternoon to install the antenna on the hill behind my house, including digging a three-foot-deep hole in rocky soil for the mount section. The instructions supplied were clear and concise, with plenty of illustrations. A nutdriver for the antenna's 30 stainless steel sheet metal screws is supplied in the package.

No measuring is required with this antenna, as is required in assembling some multiband trap verticals, and assembly was straightforward, with all pieces fitting together without a hitch.

The installation instructions state that guys are optional for ground mounting, but required for roof mounting. I would highly recommend them for either installation—the assembled antenna is some 35 feet tall! Four non-conductive ropes (not supplied) should be used for guying. No guy ring or other guying hardware is supplied with the antenna. Their inclusion would have been helpful; I guyed the antenna with four nylon ropes tied to nearby trees for anchors.

The antenna base inserts into a three-foot-long plastic mount section which goes into the ground (for ground mounting). Concrete may be used if desired, but is not required. I dug a three-foot-deep, eight-inch-diameter hole, and



inserted the mount section. Then I backfilled the hole with dirt and rocks, tamping well. This resulted in a sufficiently sturdy installation with the soil conditions in this area. The antenna has survived several thunderstorms with no damage.

The three 25-foot-long, insulated counterpoise wires were attached to the base of the antenna and run across the ground.

Performance

Once the GAP is erected, it is ready to go. There are no adjustments. This is a nice change from some trap verticals I have used, which required adjustment of multiple sections for minimum VSWR on each band.

The GAP Challenger bandwidth is exceptionally broad. My measurements showed the 2:1 VSWR bandwidth on 80 meters to be 230 kHz, and on 40, 20, 15, 12, and 10 meters the VSWR never exceeded 1.2:1, except at the very high end of 10 meters where the VSWR hit 1.4:1. No antenna tuner is needed here!

This antenna is also specified to work on the amateur 6 and 2 meter bands, but I did not test it there other than monitoring the local repeater.

In two weeks of casual operating, I worked several 40 and 20 meter stations, all giving good signal reports, consistently better than on my center-fed, tuned wire antenna, and certainly much better than any of my previous multiband verticals.

It is also a very good, general coverage, shortwave listening antenna; received signal strengths were consistently stronger than on my wire dipole. In some cases my long wire antenna was still preferable, however, because of lower received atmospheric static level, probably due to the directivity of the dipole.

Conclusion

For a multiband HF antenna in a limited space situation, the GAP Challenger DX-VIII is hard to beat. It offers good performance, exceptional bandwidth, rugged construction, and easy no-tune installation. It is available for \$259 plus shipping from GAP Antenna Products, 6010 - Building B, North Old Dixie Highway, Vero Beach, FL 32967.

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Realistic™ PRO-2035

It looks like it means business, and business is just what it does. Covering 25-520 and 760-1300 MHz (less cellular, unrestorable), this new desktop scanner from Radio Shack offers 1000 memory channels (ten 100-channel banks) plus another 100 “scratchpad” search-discovered or manually-tuned-in frequencies.

An auto-store mode automatically stores search-discovered frequencies into available memory channels. Up to ten separate search ranges may be stored, one in each of the ten memory banks.

A direct search feature permits automatic signal searching up or down from any keyboard-entered or tuned frequency. The mode and tuning step size may both be changed in this function.

A one-inch tuning knob affords both frequency tuning and memory-channel stepping. The display is characteristically Realistic: a green-backlit LCD.

Scanning along or searching at 50 channels per second, the PRO-2035 exhibits excellent sensitivity, typically 0.5 microvolts throughout the typical VHF/UHF land mobile services. Selectivity bandwidths (-6/-50 dB) offer a shape factor of 2:1 at 12 kHz AM, 20 kHz NFM and 300 kHz WFM.

The circuit is a triple up-conversion scheme with the first two IFs at approximately 612 and 48.5 MHz. First conversion IF rejection is 60 dB, very good to prevent image interference. No dynamic range specifications are given.

Audio output power is a powerful 1.3 watts (nominal) into 8 ohms, such as the internal 3-inch speaker or rear-panel 1/8" (3.5 mm) external speaker jack. A front-panel headphone jack (same size) provides anti-blast-protected 16 mW, while a rear-panel RCA phono jack permits 600 mV (nom.) to be connected to a tape recorder or other external audio device.

Blocks of channels may be moved down from partially-used upper registers into lower banks to fill them. Temporary, search-discovered or manually-entered “monitor” channels may be entered into permanent memory banks. All memory contents may be deleted by pressing a reset button, or you may delete all locked-out channels in a bank (or the entire bank) by simple keypress routine.



A rear-panel, 10 dB attenuator switch can reduce overall sensitivity in strong-signal areas to thwart overload interference (intermod). A sound squelch feature permits the scanner to skip over channels which have no active voice or other sound, thus avoiding hanging up on “birdies” (spurious signals).

Up to 99 of the 100 channels in any bank may be temporarily locked out from the scanner sequence. Any one of the 1000 channels may be selected for priority, sampled every two seconds for activity, taking precedence over any other function presently running in order to be sure not to miss a transmission on that frequency.

All 11 NOAA National Weather Service and marine weather channels are in permanent memory and may be automatically scanned, manually stepped through or tuned through.

The three primary VHF/UHF reception modes, amplitude modulation (AM), narrowband frequency modulation (NFM) and wideband frequency modulation (WFM) are automatically chosen depending upon what frequency range is currently selected, but this default may be overridden by pressing a mode key to select one of the other modes.

Similarly, the most appropriate tuning, scanning or searching step (5, 12.5 or 50 kHz) is automatically chosen for any particular frequency range, but it, too, may be changed by a key press.

But does it work?

Sensitivity is excellent and the many functions are easy to learn. The accompanying manual is particularly well written.

Adjacent-channel selectivity is adequate but not outstanding. While the filter bandwidths allow strong FM broadcasters to be heard within several hundred kilohertz of the actual frequency, and strong AM and NFM signals to be heard on unoccupied

adjacent channels, the presence of a legitimate signal on those adjacent channels will wipe out the residual “splatter” from the neighboring signal.

Audio is crisp, but definitely contoured for voice reproduction; music sounds rather tinny, although an external speaker will help. The high-volume range is enormous—it will blow you out of the room, making it particularly suitable for a noisy environment such as a mobile installation.

The enclosure has two, hinged, front tilt feet for better viewing angle on a table or desktop surface. The rubber feet resist skidding during keypresses.

If a mobile mounting is preferred, a 12-volt jack on the rear panel allows battery power operation; the AC cable, however, is permanently attached. There are no mounting bracket provisions, but an autosound department should be helpful in choosing a suitable suspension device.

A rear-panel BNC permits the use of an external antenna, while a top-hole on the cabinet is provided to insert a screw-in telescoping whip (provided).

While we would have preferred a tuning knob with a finger indent for rapid tuning, the knurled-edge knob is easy to use and the detent shaft provides a positive “feel”.


As with all current Radio Shack scanners, and virtually every scanner on the market, the cabinet is plastic. This is not reassuring when additional shielding is desirable, but it lowers

costs and does not seem to compromise performance. It is also sturdy.

The PRO-2035 replaces the now-discontinued PRO-2006, perhaps the most successful scanner of all time. Circuit performance is virtually identical, although FM broadcast reception is somewhat improved over its predecessor. And the additional features justify the \$50 price increase over the old model.

(PRO-2035, \$449.95 at Radio Shack stores; also available from Grove Enterprises for \$399.95 plus \$8 shipping)

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SoftWave Computer-Controlled Radio System

If you've been thumbing through electronics magazines recently, you could hardly help but notice that a California firm, ComFocus, is advertising a computer-controlled radio system called the SoftWave. It comes complete with a plug-in control board for your PC, as well as sophisticated software and hardware for shortwave and other types of radio reception.

"Remember when a room full of computers couldn't do what your PC could do today?" So say the SoftWave ads, and they're right. Years ago, I helped design and implement what was then believed to be the largest computerized database in the private sector. It took years and millions of dollars for two huge rooms full of computers, complete with armed guards and fortress-like walls, to do what can be done today on a laptop in a tepee for a few thousand dollars.

One of Earliest Computer Applications

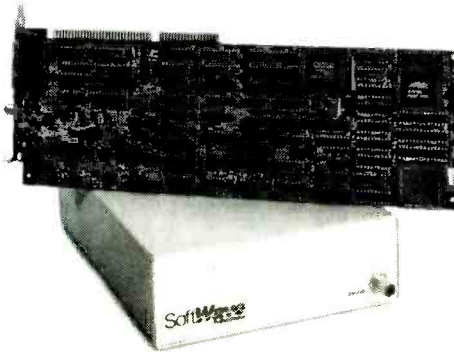
Of course, there's nothing new about mating computers with radio receivers. Intelligence organizations have been doing it for decades. Indeed, the NSA pioneered this field, and in so doing gave the embryonic computer business a shot in the arm. Hobbyists have also caught on in recent years, with several freelancers and commercial enterprises now offering software packages for computer control of shortwave radios.

But SoftWave is something of a first, because you get pretty much everything in one integrated system. This time around, given what we found as we put this early version through its paces, we tested it mainly for its fresh approach to operating technology, rather than as a radio.

Getting Started

What you need to run it, besides the \$1,495 required to ante up for the SoftWave package, is a DOS-based system other than an IBM PS/2 with a 386 or 486 microprocessor and various degrees of capacity—plus a speaker or headphones and a suitable antenna. More on that antenna in a moment.

Putting it all together calls for some com-



puter smarts—Rick Mayell, *Passport's* resident computer scientist, called it "lateral thinking"—but that's mainly because of shortcomings in the instructions. The engineering side of ComFocus thanked us sincerely when we notified them of specific problems and solutions, and they suggested that the instructions and software would be revised accordingly.

However, the administrative side seemed to feel that the problems we came across lay more with the user than the instructions or the product. ("Gee, nobody else seems to have that problem.") So make sure you deal with the engineering people, who know their stuff. Indeed, their help line (800/763-8983) is a refreshing departure from the voice-mail idiocy that increasingly dominates the computer-vendor landscape.

Besides shortwave, the SoftWave system tunes VHF from 108-174 MHz and the AM broadcast band. It comes with no less than 46 bandwidths, ranging from 49 Hertz to 11 kilohertz, and also includes digital signal processing. There are a lot of other juicy radio goodies, too, but it's the computer interface that makes the SoftWave stand out. That's what we've homed in on.

Operation Is a Mixed Bag

What we've found is a mixed bag. The software is largely well-thought-out, with attractive windows and boxes and mouse-driven icons. If you're used to that environment, as we are, you'll find operation to be pretty intuitive.

There's a database of sorts, too. While the data itself is downright pitiful, accessing it is easy enough. By the way, that data *can* be updated by the operator.

In that regard, a feature that'll raise your eyebrows is the map window. You can use your mouse to click up attractive color maps of the world—or individual parts of the world—then bring up data for a particular country.

Serious Horsepower Brings Serious Hash

You need some serious computer horsepower for this system to fly. At a minimum, you should have a 486 processor, preferably one of the faster versions. Even then, some may feel it's a bit too slow. So we did our main testing on what's becoming the new norm for DOS-based systems, the low-voltage Pentium processor, which started appearing on the market early this summer. Ours is 90 MHz, which is probably close to or less than what will be widely available as the PC norm by sometime in 1995. With this Pentium, the SoftWave runs lickety-split.

Although SoftWave is a bit sluggish on 386 and some 486 systems, these machines usually don't generate much hash. That's because slower processors tend to be quieter than faster ones. For example, the Dell OmniPlex 590 Pentium is much faster than any x86 machine. But it's also much noisier—even though it is FCC certified Class B, the quietest classification.

What this means is that with a Pentium configuration, reception on the SoftWave may be so noisy that the only way it can be used successfully is with a large, passive outdoor antenna having a coaxial-cable lead-in. As a practical matter, this means that you'll have to use something like the Alpha-Delta Sloper, which is one of the few good antennas that meets these criteria.

Active antennas? Even our McKay Dymek DA100D, which has a remote pickup head and coaxial lead-in, produces noisy results with the OmniPlex.

Hash Can Be Bashed

Now, something needs to be emphasized here. The interface between the computer and the SoftWave's radio module is utterly quiet. In this important respect, the SoftWave's engineering is spot-on. The problem isn't there.

It's afterwards, when the antenna, lead-in and/or amplifier box pull in computer hash, right along with the radio signals you're trying to hear.

It would have helped had there been more than the few feet of cable that the system provides between the computer and the radio module. With a much longer cable, the radio module—which you really don't need to access, anyway, since it doesn't have any controls—could be placed farther away from the computer.

You can't replace or lengthen that cable, either, and don't look to the manufacturer for a replacement. ComFocus' engineer tells us that to have a longer cable would call for a major redesign of the system, something apparently not in the works. However, they are considering the attractive option of offering an active antenna—theirs or somebody else's—having amplification *within* the remote pickup head, thus obviating the need for an amplifier box near the computer.

But for now, if you're determined and you understand radio, you can bring the problem of computer hash under control. To begin with, make sure that the computer you're using is quiet. Here, a fast 486 system with Class B certification is probably the best bet, even if it isn't the emerging technology the Pentium is. Not only will you get better reception, you'll save some money, too.

Also, use an antenna with a coaxial lead-in. Any good coax with the correct impedance should do.

Finally, if you use an active antenna, locate its amplifier module far away from the computer. There are practical limits to this; but, for most, the farther away, the better. After all, these lovely little boxes *amplify* the noise! And, of course, make sure the antenna itself is placed well away from the computer.

More Sizzle Than Steak

But even before you try leaping over these

PASSPORT® TO WORLD BAND RADIO'S Radio Database International White Paper® equipment reports contain virtually everything found during IBS' exhaustive tests of premium receivers and outdoor antennas. These are available in the U.S. from Grove Enterprises, Universal Radio, EEB and DX Radio Supply; in Canada from Sheldon Harvey (Radio Books), 79 rue Kipps Street, Greenfield Park PQ, J4V 3B1; in the United Kingdom from Lowe Electronics Limited, Chesterfield Road, Matlock, Derbyshire DE4 5LE, England; and in Japan from IBS Japan, 5-31-6 Tamanawa, Kamakura 247. For a complete list of available reports, please send a self-addressed stamped envelope to RDI White Papers, Box 300M, Penn's Park PA 18943 USA.

hurdles, consider whether this type of system is what you really want. For our three-person test panel, all with long backgrounds in computers, the answer was clearly "no."

To begin with, the SoftWave is, overall, at least as cumbersome to operate as an ordinary radio with top-notch performance. Hopping around windows and boxes and fiddling with mice might be entertaining, but it's usually not as efficient as the hard knobs and keys found on conventional receivers.

Then, too, consider whether you want a radio that's tied to yet another device. Okay, this is a matter of personal taste, but tastes are changing. Although I can think of a good dozen colleagues who are going to wring my neck (electronically, of course) for flirting with the following apostasy, here it is: The SoftWave flies against all trends in consumer electronics. Nearly everything electronic is becoming smaller, more portable and more personal. Just as An Wang predicted in the early 1960s.

Overall: Yes for Some, No for Most

The bottom line is that if computers are something you really enjoy—not just tools, but fun—the new SoftWave system may very well appeal to you, even after the novelty has worn off. You can also rationalize its purchase, because even though it calls for some serious hardware, it's one new cyberoffering that doesn't require Gigaware to run.

What we tested was only the second version of the SoftWave system. Indeed, the first version we tried was superseded so quickly that it could probably be considered more like a beta unit. As with anything really innovative and complex, the SoftWave is probably going to see beaucoup improvement over time. So it may be wise to wait a while before diving in.

That's if you are really into computers. For those who regard computers as tools, rather than playmates, there's not a whole lot of really useful extras that the SoftWave system has to offer. Many of the features sound good and look good, but in practice we tended to find them to be more trouble than they're worth.

Peering ahead, much of what the SoftWave system offers may eventually be upgraded and incorporated within handheld portables. (You can almost see the ads: "Remember when it took a computer, radio and big antenna to do what one handheld radio now does better?")

But that was then, and this is now. Today's SoftWave system gets high marks for breaking fresh ground in consumer electronics. ComFocus clearly knows its stuff—its engineer reportedly has had years of experience

doing this sort of thing for a Certain Organization, and it shows. The company also has exciting plans for the future. So for those who relish gliding along the nosetip of technology, the SoftWave can be a fun thing to have.

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.

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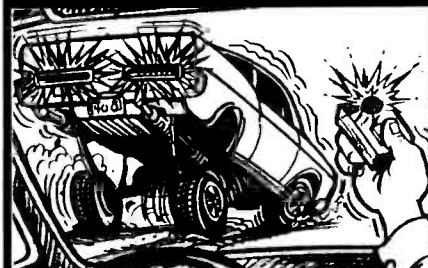
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HOKA is Klaar

(That's Dutch for HOKA is ready)

Hoka, made by a Dutch company, is here! For those of you who have not been following the Hoka saga, few in North America have ever seen the software decoder. It is now being carried in the U.S. by Computer Aided Technologies (see their ad this issue for address and phone). I have now had the privilege of using a Hoka Code 30, version 1.41, for several weeks; was it worth the wait? Does it perform the rumored decoding miracles? Am I ready to toss my PK-232? We'll see over the next two visits.

But first, let's reflect upon the evolution of the encoded shortwave signals we are trying to decode. In the 1950's, while my father did his woodworking hobby, we would listen to a Zenith shortwave table radio in the basement. In plentiful abundance was the sound of radioteletype press reports from UPI, AP, Reuters and many country-owned news stations. Of course, most people couldn't decode RTTY, since it took a specialized, expensive electromechanical apparatus about the size of a desk. When my father told me of the information that was being sent by the buzzing we were listening to, my imagination was piqued for the next thirty years by this "magic" mode of communications.

Although the Zenith was replaced by a succession of ever-improving shortwave models, the shortwave spectrum itself changed little over the years, with the exception of number and variety of stations and the advent of single sideband (SSB). But change was coming. In 1977 using a single board computer called a KIM-1, I finally realized my dream of reading that RTTY buzzing I had first heard twenty years before. The decoding was seven letters at a time on an LED calculator display, using a simple homemade TNC. But it was *great!* News, stock prices, precious metals, telegrams, shipping messages, weather, and even some military tactical communications were everywhere, and with little exception, transmitted in a readable form.

In 1983, using a Kenwood R-1000, Sony ICF-2001 Apple II, Atari 800 and a homemade TNC from 73 magazine, RTTY decoding still was a source of wonderment and entertainment. But by then about 20% of the

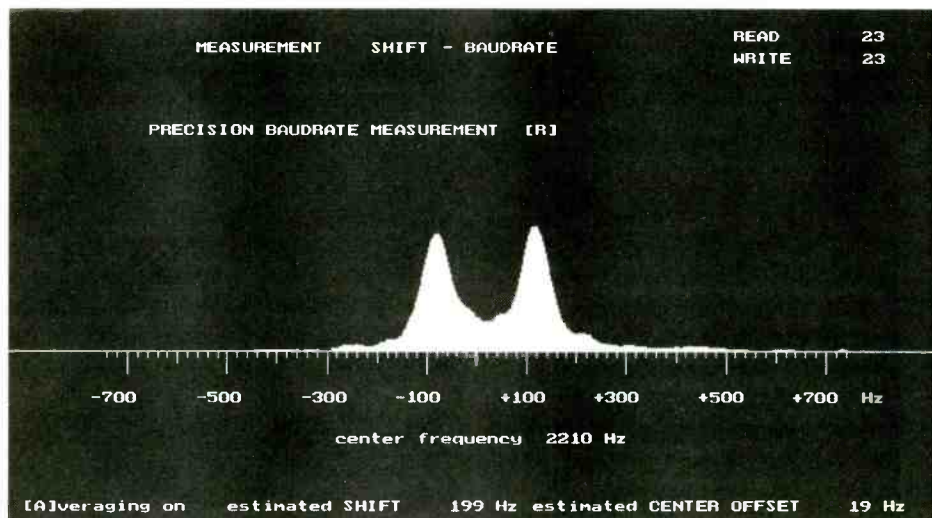


FIGURE 1 — HOKA spectrum screen of a two-tone signal.

signals could not be decoded. The computer also enabled RTTY stations to "jumble" the message. Most of the stations could still be read, but strange new modes were appearing, more complex than RTTY. I remember thinking in 1985 that I could spend twenty-four hours a day decoding and never get bored. But, I was in the middle of a career; this exciting decoding would wait until I retired and had the time, right?

My Yaesu FRG-8800 heard the unthinkable at the end of the eighties. Not only was the number of encrypted signals up, but so was the number of modes. The majority of my time was now used in trying to tune in stations, not reading the messages, and it was much less entertaining. Worse yet, the number of RTTY signals was *dropping!* This couldn't be! But it was, and the trend continues today, thanks in part to the reliability of satellite communications.

Today's scenario finds ever fewer utility stations on shortwave, with many different modes of transmission, most of them encrypted. Further, with the current economic conditions, many countries are cutting back or stopping their shortwave broadcasting altogether. Not good, shortwave fans. Such circumstances may make the purchase of *any* decoder for shortwave digital transmissions questionable.

After more than a month of using and comparing HOKA and PK-232MBX, these unfortunate shortwave facts of life have become even more painfully apparent. Will HOKA help this situation? Will Superman arrive in time? Is it holy HOKA? Let's see.

Here's HOKA !

HOKA CODE 30, version 1.41, is made up of one high density disk, PC board, and an instruction manual. The manual's organization, printing and illustrations are very basic, at best. But the manual is very, very, light on explanation. All those decoding modes we heard rumors about, all the flexibility, is described in fifty pages with print so small a magnifying glass should be included. The manual, which buries or omits several bits of critical information, may in fact be the primary limitation of the decoder, but more on that as we go.

Since the HOKA board does not contain a microprocessor, the host computer is not simply displaying the output of the board, as with the PK-232. Instead, HOKA uses the user's computer to do all the digital signal processing, decoding, and displaying. With all the features the HOKA performs, this is no easy task, and requires a 386DX, 486SX or 486DX with a clock speed of 25 MHz or greater. Hard

drive, Ram of 640K and MSDOS version 2.0 or later are required. Although the book says HOKA will work with Hercules, CGA, EGA, VGA, and SVGA, VGA or SVGA is recommended.

The HOKA card is similar in size and connector layout to my Soundblaster Pro sound card. Since the HOKA card is encased in soldered shields, the actual board is not visible for other comparisons. The card is installed in one of the PC's expansion sockets. The input BNC connector on the card is connected to the receiver's recorder output or speaker. That's all it takes to install the CODE 30's hardware.

Be Careful ... Be Very Careful

Okay. You have a solder sealed PC card for hardware. How can the system be pirated? Why would anyone want the software without the hardware? Good questions. But HOKA's copy protection has to be transferred from the disk to the hard drive before it will work. If you delete the file on the hard drive without returning the copy protection back to the floppy, *your HOKA is history*. In my opinion, this is a user-unfriendly inconvenience for such an expensive program.

The software must be installed to a hard drive and will not work from the floppy. The install program takes about three minutes, is easy to use, and works well, resulting in a CODE 30 sub directory and all the files on the hard drive.

Setting Up the System

Running the INSCODE file brings up system choices that match the hardware to your system. These can also be accessed from inside CODE 30 once it's running. The parameters are Converter, Center Frequency and Timing. The pull-down for Converter reveals only one choice, LF1, which is the included board.

Once the LF1 is chosen the input level must be picked. If the input is from the receiver's recorder output, then the 0.49 volt input should be used. If the speaker output is used, a higher level should be set from the software. This setting is *critical* to the proper operation of HOKA, as I found out the hard way.

The Center Frequency is the frequency that will appear in the center of the screen and keyed on by the software. The choices are 2100 and 1700 Hz. The third choice is user programmable to any frequency. Pretty nifty. The center frequency can be further adjusted with the arrow keys, while monitoring.

Setting the timing is another matter. The manual says that this is very important for the proper operation of HOKA, but unfortunately, this statement is buried half way through the manual on page 48. I must confess, after reading the manual I'm still not sure if this timing calibration is for all of the software or just the FAX portion.

The procedure for setting the timing of the software to your computer's timing makes use of a straight vertical line sent by facsimile. Since most faxes have a frame or timing bar on their image, that part is not hard. However, unlike other fax programs, HOKA's timing correction requires the user to jump back and forth between two different menus. One is the fax capture/viewing screen. In the other, the user guesses at a number which will "straighten" the image. Then back to the fax screen to see the effect. To do it right, this procedure took a good (?) fifteen minutes. The same timing procedure takes less than one minute with the fax programs from AEA and SSC.

Running CODE 30 displays the main screen with the main functions line at the bottom of the screen. They are: Mode, Analysis, File, Info, Tool and Quit. Clicking on these causes the screen to be filled with detailed menus. The one that is used the most is the Analysis screen. (Since the menus come from the bottom of the screen, are they called "Push-up" menus?) Page 8 contained the only decoding sequence instructions I could find; no Help files of any kind appeared on the disk. Well, who said Nirvana was easy to reach?

Hokering Signals

Let's start with something reliable and simple like marine SITOR. Tuning around 6300 kHz, the familiar sounds of 100 baud SITOR is heard. Clicking on the SPECTRUM command displays an amplitude versus frequency graph (see figure 1). The two peaks are the dual tones of SITOR. To see this area in higher detail, tune the receiver so the peaks are in the center of the horizontal axis, press M for zoom (many times I pressed Z instead, only to have the graph freeze!) and a number for the degree of enlargement.

Under the graph in Figure 1 a solid line appears. This shows the bandwidth of the input filter. By pressing S and a number, the user uses the smallest bandwidth that will bracket the important graph features; for SITOR it's similar to the two peaks seen in Figure 1.

Pressing F1 takes us to the Speed-Shift Measurement Module. Again press S and the number used for the bandwidth. The program

then identifies the baud rate and bandwidth of the signal. Next, the user presses F3 to get into the Auto-Classify Module where the program will attempt to identify the signal.

For our first signal, a very strong SITOR station was chosen. But the F1 display did not show any peaks. All connections were rechecked; the receiver tuned through a wide range; LF1 choice confirmed. Still no peaks on the display. There's no mention of this circumstance in the manual.

This "little" problem kept me awake until 3 am, when I at last solved it: if the HOKA signal level setting (which we set up in installation) is either too high or too low as compared to the actual receiver output, HOKA displays nothing.

The surprising part is that a high receiver output also produces a "no signal" condition. (Something to do with input filter design?) Once remedied by either adjusting the receiver output or HOKA's input sensitivity from the LF1 screen, the two tones were clearly visible.

The actual identification took six seconds, compared to the PK-232's twelve seconds. Once HOKA decides on the type of signal you're listening to, it tells you at the bottom right of the screen. By hitting ENTER you will automatically enter that decoding module and the decoding screen will be displayed, along with the decoded message.

What's Next?

Okay. That was an easy one. Strong signal. Common mode. It posed no problem for the PK-232, either. But how about those signals that the PK-232 rejects with an "UNKNOWN MODE"? What will HOKA do with those? How many modes does the Code 30 do? And, how many signals will we get clear copy from?

Sorry, you'll have to wait 'til we meet again to get ..." the rest of the story."

Bits of Bytes

There is lots happening in the computer world. We're awaiting new review products from Grove, ComFocus, MFJ, and several others. By the way, the new version of ScanCat/ScanPro also handles the OptoScan 456 (see review feature).

As we predicted, CD ROM drives are selling at ten times the rate they did last year. Single spin CD ROM drives are now at, or below, \$100.

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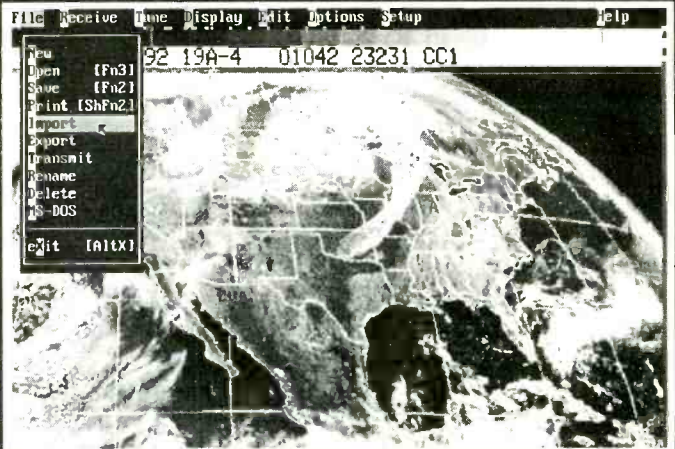
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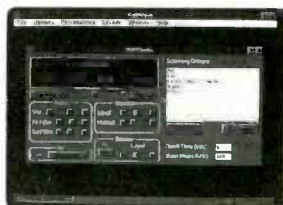
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Getting to Know the Dip Meter—an Old Friend

A great many modern radio amateurs and experimenters have never seen a dip meter, and some of those who have examined one of these useful shop instruments are unfamiliar with the utility of the instrument. In bygone days there was scarcely a tinkerer's electronics shop that did not have a home-made or commercially constructed (Fig. 1) dip meter.

A few decades ago these units were called "grid dip meters" because they contained a triode tube oscillator. A marked decline (dip) in grid current occurred when the instrument was coupled to a tuned circuit that was resonant at the dipper's oscillator frequency. This enabled the user to develop tuned circuits for specific frequencies by means of trial and error, because the dip meter was usually tunable from, say, 1.5 MHz to 150 MHz by virtue of plug-in coils.

Later on, the designers changed from vacuum tubes to transistors when constructing dip meters. Bipolar or field-effect transistors (FETs) became the active devices of choice for dip-meter oscillators. In the latter case, the testers were often called "gate dippers."

There was a time when handbooks for amateurs contained circuits for home-made dippers, and the electronics hobby magazines also featured construction articles that showed how to build one. I was saddened recently to find that neither the *ARRL Handbook* nor *The Radio Handbook* contain circuits for dippers. Times have changed! On the other hand, there are pages of detailed construction data for building your own transistorized dipper in the *Radio Society of Great Britain's Radio Communications Handbook*, 4th and 5th editions.

Dippers Have Many Uses

Let's suppose that you have a prewound coil, but you do not know its inductance.



FIGURE 1 — This photograph shows two commercially made dip meters. The larger unit is a tube type, laboratory-grade instrument that was once produced by Measurements Corp. It operates from 1.6 through 420 MHz. The smaller solid state Kenwood unit is a DM-81 that covers the range from 1.6 MHz to 250 MHz.

You can connect a known-value capacitor (such as a 56-pF unit—not critical) in parallel with the coil, then place the dip meter probe coil near the end of the unknown coil while tuning through the dipper's range until a sharp decline in meter reading is observed (see Fig. 2). This dip tells you that you have found the resonant frequency of the unknown tuned circuit.

At resonance, the inductive reactances of the coil and capacitor are equal. If we know both the frequency and capacitance, then we can compute the reactance using the equation:

$X_c(\text{ohms}) = 1/[2\pi \times f(\text{MHz}) \times C(\mu\text{F})]$.
Now that we know the reactance, and already knew the frequency, we can find the inductance of the coil by using the equation $L(\mu\text{H}) = XL/[2 \times f(\text{MHz})]$.

In a like manner you can explore the useful tuning range of the unknown coil by using a variable capacitor in parallel with the coil, rather than a fixed-value capacitor. Happily, you can turn this procedure around and determine the values of unknown capacitors by checking them while they are in parallel with a known inductance.

Antenna resonance can be checked with a dipper by placing a two- or three-turn small coil of wire across the feed line (feeder disconnected from the station) and probing it with a dipper. A deep dip will occur at the fundamental frequency of the antenna. Smaller dips can usually be seen at the harmonics of the fundamental frequency, i.e., a deep dip at 3.8 MHz and shallower dips at 7.6 and 11.4 MHz, when checking a 75-meter dipole. This technique is useful when adjusting the length of an antenna to obtain resonance at a particular frequency.

Wavemeter Function

Most dip meters have a switch that removes the operating voltage from the transistor oscillator within. In this mode the transistor functions as a diode (base to emitter or gate to source) and can be used to detect RF energy from oscillators or transmitter tuned circuits. The dipper plug-in coil for the appropriate frequency range is lightly coupled (not too close) to a tuned circuit that is producing or amplifying RF energy. When the dipper is tuned to the resonant frequency of the test circuit, the dipper's meter will deflect sharply upward. The frequency can then be read on the dipper's dial plate.

This procedure is handy when trying to determine if a particular transmitter stage is functioning correctly or is, perhaps, on the wrong frequency. Unwanted spurious oscillations can usually be detected in this manner.

CAUTION: Never use a dip meter near circuits that carry high voltage. The practice could be lethal! Also, some dippers have a phone jack for monitoring AM transmitter output signals for audio quality.

Use as a Signal Generator

The oscillator in a dip meter radiates a fairly robust signal close in. The plug-in

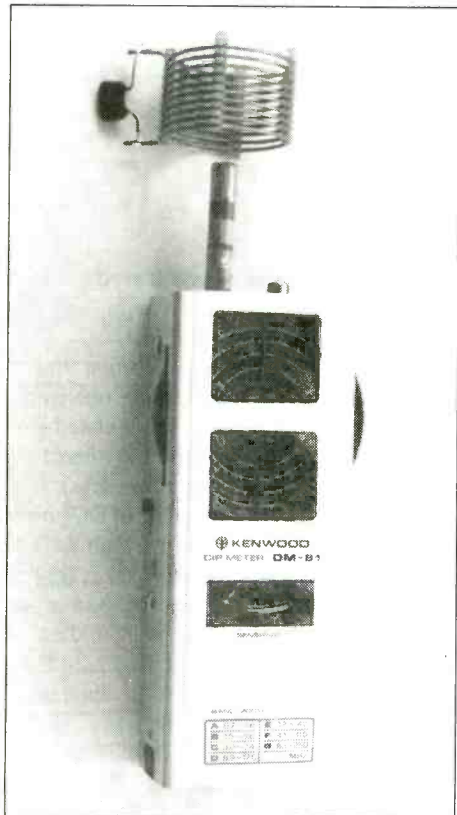


FIGURE 2 — The dip-meter coil should be in the same plane as the coil under test. A dip can not be obtained when the dipper coil is at a right angle to the coil being tested. Best results will be had when the dipper is kept as far from the test coil as possible, consistent with obtaining a dip indication.

coil acts as a small antenna. The instrument can be used, therefore, as a signal generator when checking a receiver. Certainly, the frequency readout on a dipper dial is far from being as accurate or well defined as that of a modern communications receiver with a digital display. Nonetheless, the exact dipper frequency can be determined by monitoring its signal by means of a well-calibrated, accurate receiver.

As an aside, I have known amateurs who concealed dip meters near their easy chairs and had fun wiping out the TV picture when someone was watching a favorite program. It was done only for fun, on a momentary basis. But, this does illustrate how potent a dipper signal can be when the instrument is close to a receiver!

Acquiring a Dipper

Numerous models of used commercial

dip meters can be found at radio flea markets. I have a laboratory-grade instrument and a Kenwood DM-81 (Fig. 1) Both deliver outstanding performance and they have good frequency readout accuracy, compared to some other dippers. The James Millen tube type and FET dip meters are also very nice units. Old Heathkit and Eico dippers are often available as used equipment, and the price is apt to be modest.

Keep an eye on the classified ads in radio magazines if you wish to buy a used dip meter. Conversely, if you advertise for one you will probably receive many offers by mail. Make certain that the unit you buy includes a complete plug-in coil set.

Closing Thoughts

There is nothing shameful or old fashioned about wanting a dip meter. Even though we seldom see these instruments advertised as new equipment, they are an asset to laymen and experienced builders, alike. I continue to maintain that no experimenter's shop is complete without a dip meter. I use mine with regularity.

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Status Indicator

Anything from a pilot lamp to a warning light can be called a status indicator. The neat thing about this one is its use of dual colors rather than just a light that goes on or off. This one goes red or green, yellow or blue—whatever happens to be your preference to indicate some kind of off/on; safe/danger; go/no-go; or yes/no status. The design is not ideal for pure ON-OFF situations where you want *no* current to

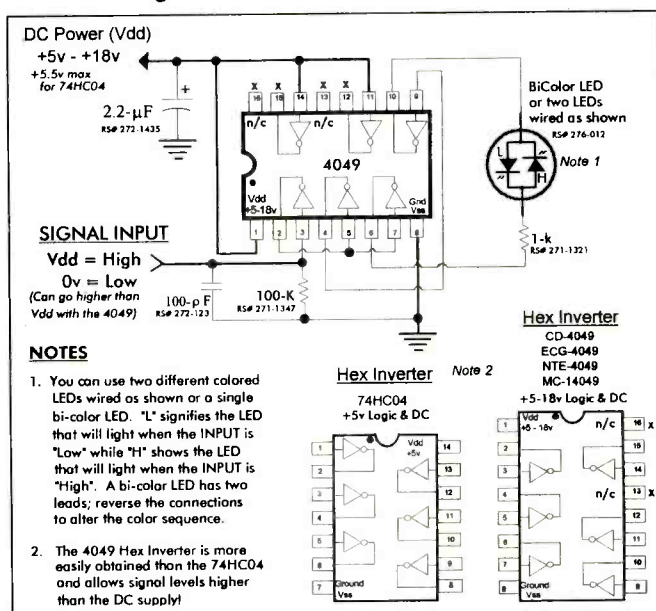
be drawn when something is off. Instead, it is useful for indicating whether a door is open or closed; a liquid level is in the safe or dangerous zone; or to indicate when a signal breaks your receiver's squelch.

Another neat thing about our Status Indicator is that it needs only one LED if you can find the two-lead, bi-color variety like Radio Shack's #276-012. That's right, a single LED can light up one of two colors, usually red or green, depending on which way current flows through it. If you can't locate a bi-color LED, just use two colors you like, wired in parallel, but cathode to anode and anode to cathode. A 1-k Ω resistor in series with one side (doesn't matter which) completes the dual color status indicator section.

You'll need a CMOS Hex Inverter chip to drive the LED unit. It's almost as simple as wiring the LEDs together, as you'll see in the accompanying diagram. Total parts count can be as few as five or as many as seven if you're forced to use two LEDs.

You can use most any sort of Hex Inverter, I suppose, but I prefer CMOS for extremely low current requirements, typically a maximum of about 5-ma for this circuit. There are at least two readily available CMOS Hex Buffers, the 74HC04 (my favorite) and the

FIGURE 1: Logic Probe or Status Indicator



4049. This latter type is found almost anywhere, except Radio Shack, under the following part numbers: CD-4049; NTE-4049; ECG-4049; and MC14049. Retail electronics supply houses usually stock the NTE or ECG lines, either of which will work fine. DigiKey and other national supply firms carry National Semiconductor's CD-4049 or Motorola's MC14049.

I like the high-speed CMOS 74HC series over the 4000 series because of generally faster operation at lower currents, but for use as a Status Indicator, it really doesn't matter. When the time comes that you get into more digital projects, it makes sense to concentrate on one or two logic families in order to avoid having to stock a parts warehouse to meet basic needs. The 74HC and 4000 series of CMOS logic will meet a wide variety of needs without sending you to the poorhouse.

Wiring is not at all critical; just guard against foolish errors like shorts and solder globs. Installation can be wherever and however best suits the needs of your application. The circuit can be installed in one location and the LED in another with a pair of wires between. Or, the circuit and LED can be remotely installed somewhere with three wires to feed it from the main location. For this

latter scenario, you'll need a ground wire, a +5v power wire, and one wire to carry the signal.

There are two important considerations for this circuit: one is that the power supply is a regulated +5v, (routinely available in almost all things electronic nowadays). The 4049-series is capable of DC power and signal inputs as high as +18 volts, while the 74HC04 is limited to +5.5 volts, max, DC power and signal. Pick your poison. Just be sure to use the specified 2.2- μ F capacitor as shown in the diagram to filter any spikes and transients before they get to the chip. The 100-pF capacitor on the input is optional, but probably mandatory if the signal source is to be at any distance from the circuit. Eliminate the 100-pF capacitor if your application is for a Logic Probe (discussed below).

The second, and probably the most important consideration for this circuit, is that the Signal Input **MUST** be approximately equal to the power supply voltage for "high" inputs and approximately equal to ground potential (0-v) for "low" inputs. You cannot, for example, power the circuit with +12-volts and then use signal levels of 5-volts and 0-volts. The circuit will be confused by the 5-volts and possibly not know how to act, or else it will ignore it and think it is a low.

Generally speaking, signal levels must be within about $\pm 10\%$ of the power supply and ground levels. In the case of a +12 volt supply, the high signal input will have to be around 11 volts, while the low input will have to be less than 1 volt; if you're looking to display the status of 5-volt logic, then use +5v power, etc.

Incidentally, this signal and DC power consideration is pretty much universal for all digital logic chips, especially in the CMOS families. Select your chips accordingly: 4000-series for 5 to 15 volts, and 74HC series for 5 volts only. Only a very few chips can mix logic levels. The 4049 chip can accept logic levels *higher* than the power supply voltage, unlike the 74HC04, so it's probably the better choice for routine applications.

Logic Probe

The described circuit can also be used as a Logic Probe....the kind that costs anywhere from \$20 to \$40, ready-made. A logic probe is an indicator of logic levels. Commercial models have overvoltage protection and some fancy stuff that's not usually needed by the casual hobbyist. However, a logic probe is great for quick and dirty checks to see if a circuit point is "high" or "low."

Ours is quite simple, depending on how fancy you want to get with the housing for the circuit. Radio Shack's #61-2626 penlight flashlight makes a good probe housing. I'll leave the mechanical part up to you. Just build this month's circuit using the 4049 Hex Inverter (*not the 74HC04!*) into whatever you want, with three conductors for the outside world. Obviously, the signal input should be a needle or other pointed tip with which to touch the signal trace. The other two conductors should be alligator-clip leads about 8"-10" long, one black for ground and one red for (+) volts.

Just as with the Status Indicator, it is mandatory that the Logic Probe be powered with the same supply voltage as the logic level you're about to measure. Most levels nowadays are +5v, but there are CB radios and other older rigs that used +8v and +15v logic.

You have to determine your logic levels in advance and be sure to connect the alligator clips to the proper points. If you're measuring +8v logic, it will have an +8v power supply in it where you can attach the alligator clips. Same for +15v and +5v. Those are the only logic levels I know about, short of negative logic, which is not common. The Logic Probe will only handle signals 0v to +15v.

Ultra-modern 3.3-volt logic is coming into vogue these days and the Logic Probe should handle it, especially with a 74HC04 chip, but be aware the 74HC04 cannot take more than +5v power or signal! The 4049 might gag on less than 5-volts, but you could safely try it on 3.3-volts if needed.

The Theory Behind It

Okay, for those who like a little theory with their breakfast, here's how the circuit works. Say we have it powered up with +5v dc, but no signal at the input. The GREEN or left LED in the schematic will be lit. Why? With no signal on Pin 3, the 100-k resistor pulls the input to a Low or 0-volts. A Low passes through the buffer as a Low but gets inverted to a High (+5v) at Pin 2. This High is split two ways: one to Pin 5 and the other to Pin 7.

Now we have to split our thinking. First, the High at Pin 5 gets inverted to a Low at Pin

4 and is fed to an Input at Pin 9, which is inverted to a High at Pin 10. This Pin 10 High is fed to the top of the two LEDs, so we'll see +5v on the anode of the "L" LED and on the cathode of the "H" LED. Now let's go back to the split from Pin 2 and evaluate the other half of the action.

The High at Pin 2 also feeds an Input at Pin 7 to be inverted to a Low Output at Pin 6. This Low is fed to the bottom of the LEDs through the 1-k resistor. Thus there is a low (0-v) on the cathode of the "L" LED, and on the anode of the "H" LED. Simple enough.

Now, see that +5v on the cathode of the "H" LED and the 0-v on the anode of the "H" LED? Sure enough, that is a reverse-bias condition and the "H" LED cannot conduct; therefore, it will not be lit. But look at the "L" LED! Plus 5v on the anode and 0-v on the cathode is a forward bias condition and therefore the LED will light! Provided you selected a GREEN LED to indicate Low, then that's what we'll see: Green!

Now suppose +5v is on the Signal Input at Pin 3? That high becomes a Low at Pin 2 which feeds Lows to Pins 5 and 7. The outputs of those sections are inverted to Highs at Pins 4 and 6. The High at Pin 6 is fed through the 1-k resistor to the cathode of the "L" and the

anode of the "H" LEDs. Meanwhile, the High at Pin 4 feeds to Pin 9 to be inverted to a Low at Pin 10 and thereby feeds the anode of the "L" LED and the cathode of the "H" LED. The "L" LED cannot light because it is reverse-biased, but the "H" LED certainly will light, thanks to its forward bias!

The sixth Inverter section at Pins 14 & 15 is not used, so we tie its input to +5v, so that it will not oscillate and cause problems. Unused inputs of all CMOS circuits must be tied to either Low or High and not allowed to float! Unused outputs of CMOS circuits should be left floating as shown.

The 1-k resistor is a required current limiter for the LEDs. Most LEDs will burn out when current exceeds about 25-35 mA. The brightness of an LED does not appreciably change as its current is varied, unlike incandescent lamps, so it makes sense to limit the current to a very safe value, not only for the LED, but also for the chip that has to produce that current. The 2.2- μ F capacitor cleans up any noise on the DC power feed, while the 100-pF capacitor cleans noise from the signal line in cases where you have to use a long signal conductor.

Enjoy the circuit as both a practical application as well as a great training-aid! See ya next month.

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Differences Between Groundplane Antennas

Groundplane antennas are used at HF, VHF, UHF and even microwave frequencies. And there are good reasons for this popularity:

- their horizontal-directivity pattern provides good all-around coverage;
- their vertical directivity has from fair to very good low-angle radiation which support local communications on HF and higher frequencies as well as HF DX;
- they yield vertical polarity which is a requisite on some bands, and their gain is quite adequate for many day-to-day communications applications.
- They are also rugged, easy to build and economical.

THE QUARTERWAVE

The basic groundplane antenna has a vertical element a quarter wavelength tall and, like almost all groundplane antennas, this design usually has three or four radials each a quarter wavelength long. With these radials extended horizontally, the groundplane's feedpoint impedance is about 36 ohms. With the radials slanted at 45 degrees, the impedance becomes a good match for 52-ohm coaxial-cable feedline. Matching can also be accomplished by such devices as a quarterwave transformer, as is done in the quarterwave of fig. 1A.

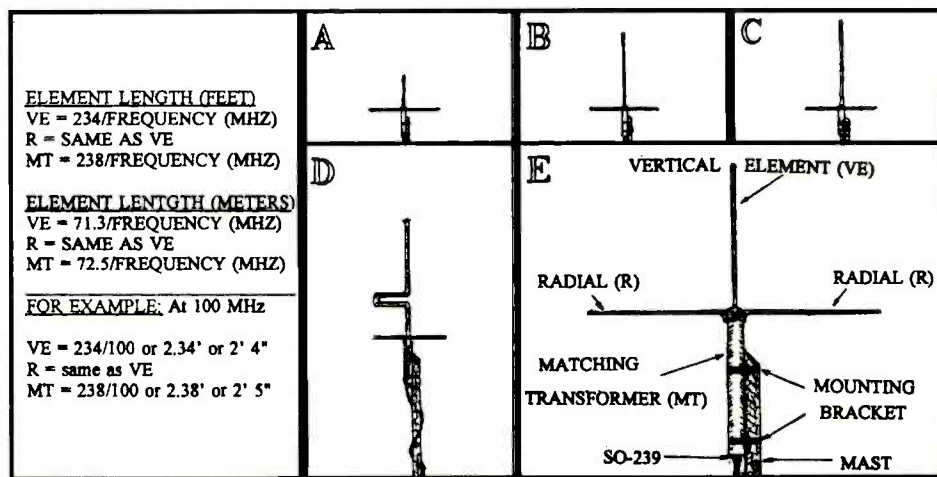
THE HALFWAVE

Extending a groundplane antenna's vertical element to a full halfwave (fig. 1B) in length gives the antenna more gain by flattening its vertical directivity pattern (fig. 1). This gives greater coverage than the quarterwave groundplane; however, the antenna now needs a matching device of some sort to match the halfwave's endfeed impedance to the 52-ohm cable in common use today.

THE 5/8 WAVE

When the length of the vertical element of a groundplane antenna is extended to 5/8 wavelength (fig. 1C) the antenna gives even greater gain than the

FIGURE 1: Various groundplane antenna configurations: quarterwave (A & E), halfwave (B), 5/8 wavelength (C), and collinear (D). Also included are equations for elements lengths for the quarterwave groundplane antenna.



halfwave design. And just as with the halfwave design, some sort of matching is required if this antenna is to give a good match to 52-ohm feedline. Compared to the halfwave design, the vertical radiation pattern of this antenna gives more low-angle radiation, a fact which makes it useful for working both weak, local signals and DX.

THE COLLINEAR GROUNDPLANE

By adding halfwave sections to a vertical quarterwave groundplane antenna, we have a collinear antenna (fig. 1D) which gives even more low-angle directivity and gain than the 5/8 wave design. With several halfwave sections this antenna is capable of impressive gain and is quite useful on VHF and UHF for extended "beyond-local" coverage of weak signals from outlying stations. With a collinear antenna some means of keeping radiation from all elements in-phase is required. Usually this is done with phasing stubs or phasing coils.

Let's Make a Groundplane Antenna

The steps below cover building a basic quarterwave groundplane with matching

quarterwave transformer for the repeater portion of the 2-meter ham band; however, by using the table in fig. 1 you can make your antenna for whatever frequency you wish. In a future column I'll cover how to "upgrade" this quarterwave to a collinear 3/4 wave antenna for added low-angle directivity and gain.

1. Cut a piece of 1/2" hard-tempered copper water pipe to 19.6" long.
2. Next, select a piece of 1/4" rod or tubing to go through the 19.6" pipe. For use with two-meter repeaters a good length for this rod is 38-7/8", but use 36" if that's the longest you can find and we'll add a bit to it. Mild-steel rod gives a stronger antenna and must be used if you are planning on "upgrading" the antenna as mentioned above; otherwise, you can use 1/4" copper tubing if you are very careful to make it as straight as possible, especially where it is inside the 1/2" tube.
3. If you use steel rod, drill a small diameter hole about 3/8" in the center of each end. Screw a small metal screw (#4 or so) into one end of the rod, clip

- its head, and trim it to extend 1/8" from the rod.
4. Solder the screw into the rod. Soldering on this antenna may require a propane torch.
 5. Take an SO-239 coax socket and trim its center connection to just accept the screw extending from the rod.
 6. Insert the screw into the socket and solder the socket and rod together via the screw.
 7. Take a 1/2" flat plastic water faucet washer with a 1/4" hole and trim its outer edge as necessary so that it just fits inside the tube. Slip this washer onto the rod and slide it down to the socket. If you are using 1/4" copper tubing instead of steel rod put more similarly trimmed washers spaced every 4" or so along the tube and use super glue to keep them in place on the tube.
 8. Put the 1/2" tube over the rod, push it over the washer(s) tight up against the metal of the socket base and solder the tube and metal socket base together.
 9. Cut three or four 20-1/4" lengths of 1/4" copper tubing for radials and bend their ends to make their length about 19-1/4" as shown in fig. 1. Flatten the short, bent portion of the 1/4" tubing so it will fit snug against the 1/2" tube. Solder the radials equally spaced around the top of the tube as shown in fig. 1. If you can't solder the radials, they can be attached with small metal screw-tightened hose clamps.
 10. Take one last 1/2" plastic washer, trim it and push it over the rod to just enter the open top of the tube.
 11. Take a plastic 1/2" end cap, as is used for 1/2" PVC water pipe, and drill a 1/4" hole in the center of its top. Then cut three deep notches in its sides to allow it to slip over the rod and down onto the tube end at the radials. As you slip the cap in place, seal all around, under, and on top of it with coax sealant. This completes the quarterwave matching transformer. The rod end extending from the transformer is the antenna's vertical quarterwave element.
 12. If you used a 38-7/8" long 1/4" copper tubing for the vertical element, put a screw in the top-end of this tubing and solder it to close the tubing to the weather. If you used a 36" steel rod, you must now add a 2-7/8" length of 1/4" rod to the rod extend-

ing from the matching transformer. First, screw and solder a small metal screw into the top end of the steel rod and clip off its head as before. Then drill one end of the 2-7/8" rod, slip this hole over the metal screw extending from the other rod, and solder the two together to make the total length of the vertical element 19-1/4 inches. Your quarterwave ground-plane is now complete.

RADIO RIDDLES

Last Month:

Last month I pointed out that putting your antenna high is usually good for reception. Then I asked, what relatively common applications can you think of, in which mounting an antenna higher might make reception worse?

Well, a horizontal antenna elevated 1/4 wavelength above radio ground gives considerable high-angle radiation. This supports close-in communications in the lower part of the HF band quite well. If the antenna's height is increased to 1/2 wavelength above ground it loses much of its high-angle radiation and its close-in communications advantage is lost.

For another example, consider a col-linear groundplane antenna with several halfwave sections as discussed above. When transmitting from a hilltop, this antenna's flat, horizontal vertical directivity pattern may place its transmitted signal above antennas in the valley below.

This problem is troublesome for some VHF and UHF repeaters whose antennas are mounted high in order to obtain good line-of-sight coverage. Interestingly, even if they have visual line-of-sight contact they may not have radio line-of-sight contact if their vertical directivity pattern is too flat. They may actually be "looking over the heads" of the lower antennas.

This Month:

We've recently discussed that an antenna can transmit and receive signals simultaneously. Is it possible, practical or ever desirable for two or more stations to transmit their signals from one antenna simultaneously?

We'll have the answer to this month's riddle and much more in next month's issue of *Monitoring Times*. 'Til then, Peace, DX, and 73.

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Q. Is there any way to clear all the memory channels of my Uniden BC200XLT? I've left the battery off for days, but the memory remains. (Steve Kaatz, Huntington Woods, MI)

A. With the radio switched off, hold down the MANUAL, 2, and 9 keys and switch the radio on. After a second or two you will hear a gentle "pop." The memory channels will all be cleared.

Q. What shortwave frequencies are used by the National Weather Service to transmit radioteletype weather information for the United States? (Greg Pruitt, Alpharetta, GA)

A. U.S. RTTY weather is virtually extinct now, with most agencies going to FAX. The most recent list of such frequencies is found in my *Shortwave Directory*.

Q. Why can I hear 5800-5900 kHz shortwave broadcasters in the 1600-1700 kHz range of my cheap AM/FM radio? (Jerome Kaye, D.D.S., Bayswater, NY)

A. You are probably hearing an intermodulation ("intermod") product produced by overloading the limited capabilities of your radio.

Intermod is produced by two strong signals mixing in some non-linear (driven to distortion) amplifying component in the receiver's "front end" (RF amplifier stage). Sum and difference products of the two original signals are then produced.

For example, if a strong signal were heard on 9000 kHz and another at 7400 kHz, their sum and difference products would produce spurious signals ("spurs") on 1600 kHz and 16,400 kHz, the sum and difference frequencies of the two original frequencies.

Bob's Tip of the Month

Look-Up Chart for the AR 1500

Mort Arditti of Los Angeles discovered—as many of us do with a complicated scanner—that after a brief period of non-use, he forgot a number of command routines on his AOR AR 1500 scanner. His solution: a clever look-up chart, reproduced here for fellow scanning enthusiasts.

We would suggest having it photocopied somewhat smaller, then laminated in clear plastic so that it can be carried in a wallet or glove compartment for convenience.

AR 1500 BCH & CHANNEL

- @ CLEAR MEMORY: CLEAR - ENT - BCH
- @ MANUAL FREQUENCY ENTRY: MANUAL - FREQUENT - AM/FM
- @ TUNING STEP: MANUAL - STEP - STEP FREQ - ENT

—MEMORY ENTRY—

- @ NEW FREQ: FREQ - ENT - PROG - BCH - AM/FM
- @ DISPL FREQ: DISPL FREQ - ENT - BCH (don't ENT)

—LOCKOUT—

- @ CHANNEL: MANUAL - BANK - BCH - LOCKOUT
- @ UNWANTED CHANNEL: (displayed) LOCKOUT
- @ UNLOCKING: MANUAL - BANK - BCH - LOCKOUT

—SCAN—

- @ PROGRAM BANK: SCAN - BANK - PROG - BANK No - LIMIT AUX - BANK No - ENT
- @ CLEAR BANK LOCKOUT: SCAN - BANK - PROG - 0 - LIMIT AUX - 9 - ENT

—SEARCH—

- @ SET FREQ LIMITS: SEARCH - PROG - LOWER FREQ LIMIT - LIMIT - UPPER FRQ LIMIT - ENT - STEP - STEP FREQ - ENT - AM/FM - ENT - BANK No - ENT - SEARCH
- @ STORE SEARCH FREQ: ENTER - BCH
- @ COPY FROM BANK 9: MAN - BANK - 9CH - PROG - BCH
- @ BANK LIMITING: SEARCH - BANK - PROG - BANK No - LIMIT AUX - BANK No - ENT

Q. Is there a list of stations which use narrowband FM? (Walter Szczepaniak, Philadelphia, PA)

A. Narrowband FM is the common mode used by all VHF/UHF land mobile services such as police, fire, hams, ambulance, business and industrial, ship-to-shore, cordless and cellular telephones, and so on. Only civilian and military aircraft continue to use AM. All FM and TV broadcasting services use wideband FM.

Q. I have an ICOM R-100 wide-frequency-coverage scanner which has three antenna jacks. Can I connect one antenna to two of these jacks with a "tee" adaptor, or should I use an antenna switchbox, or separate antennas? (S.J. Edgerton, Holiday, FL)

A. One of the easiest and most effective ways to connect one antenna line to three jacks is to use a standard three-way TV splitter, available from Radio Shack and the TV accessories departments of many chain stores.

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.

But the problem is that no one antenna has good performance over such a wide frequency range. You are better off using separate antennas. Try a good HF dipole below 30 MHz, a quality scanner antenna for VHF/UHF, and a directional beam at microwave.

Q. I have noticed that when I use two or more adaptors between my antenna line and my scanner, signals are weaker than if I attach the line directly to the jack. What causes the difference? (Marc Ard, Georgetown, NC)

A. There is considerable quality difference among connector and adaptor manufacturers. While the bright, nickel-plated adaptors look the best and are certainly the cheapest, they also tend to be the worst. The best are brand-embossed, silver-plated connectors from American manufacturers like Amphenol.

Problems occur with poor machining and resulting misalignment, stiff and loose connector surfaces which should be snug and springy, and poor general design which causes impedance mismatches resulting in reflected and wasted power.

Q. I have noticed a Canadian firm advertising cellular-capable scanners in the pages of MT. What risk is there to Americans who attempt to order such a scanner? (Simon L. Scheiner)

A. The law at present prohibits the marketing of such scanners in the United States. Although U.S. Customs is not actively enforcing the regulation at this writing, the FCC is considering stepping up enforcement at the border.

If a U.S. citizen attempts to import such contraband, it may be seized by Customs and secured in a bonded warehouse; the shipper is then notified to arrange its return.

Since the FCC has no regulatory power in Canada, it is up to the discretion of the Canadian advertiser whether or not to abide by the American law. There is no prohibition against a publisher carrying the ad since the publisher is not marketing the item, and the prospective buyer has not received the merchandise.

If the prospective buyer made a prepayment by check or credit card, and the merchandise is intercepted by Customs, a refund is up to the dealer. Losing your investment on contraband merchandise is not likely to draw sympathy from a U.S. court of law!

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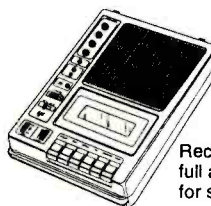
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Mike Holland sent pictures of two modified EC-130's displayed at air shows in England—this one was identified on the sign as a VOLANT SOLO. He says, "According to the flight crew, they had been used in the Gulf for radio and TV propaganda and, as you mentioned, probably in Bosnia as well." (See mention in June's 'Utility World' and September's feature on 'Radio Democracy'.)

"They both had some great antennas on the tail and some on the outer parts of the wings. I presume the extra intakes on the fuselage are either for cooling or internal generators."

(Continued from page 4)

Mike Greene's information concurs. "Scott had a state-of-the-art research and manufacturing facility in Chicago. There he and his staff would design, test, and build all sets. He would also tailor these sets for remote location, with outboard speakers and keyboard remote controls. His sets could be ordered with many different voltages and cycles. If you had the financial background, you could even order the 48 tube 'Quaranta.'

"Scott's was truly a 'custom built' radio. McMurdo Silver's were the sets assembled by Howard radio, after which they were turned over to McMurdo Silver and his staff for testing and shipment to customers."

The radio in the picture, by the way, is called the "Norwich," one of which Mike is lucky enough to own one. "The height is 4 feet, not the quoted 6 feet—big, but not that big."

A third reader, Paul Roales of Tulsa, Oklahoma, enjoyed the opportunity the article gave him to reminisce. "I recently bought a copy of the February 1927 issue of *Radio News* at a flea market and it contains an article written by Silver: 'The *Radio News* Batteryless Receiver.' It must have been quite a radio because the parts list which accompanies the article estimates that the parts will cost \$105 (in 1927!). The magazine also contains a full page ad for Silver-Marshall, Inc.

"Incidentally, the cover story for the issue is, 'Can We Radio the Planets?'"

First Amendment Dilemma

Glenn Hauser has made an occupation of shortwave broadcast listening, and (like most of us) he has strong opinions about what he hears. Glenn asks, "If you owned a radio station, especially a shortwave station audible in Germany, would you sell time to a Nazi? WINB and WRNO would, and do; WHRI and WWCW would not.

"Now another station would, and has—WRMI, Miami, which started a new transmission in August just for self-proclaimed Canadian Nazi Ernst Zundel. It airs at 1900 on 9955 for best reception in Europe, though it's beamed toward Nazis in South America (in English on Saturday, German on Sunday). The program is accompanied by WRNO-like disclaimers inviting other points of view and citing the First Amendment.

"Jeff, you didn't have to do this to prove you believe in the First Amendment. Zundel, who on CBS-TV *Sixty Minutes* objected to being called a Neo-Nazi instead of a plain old Nazi, has the right in the U.S. to try to buy airtime; U.S. stations have the right—and, many of us believe, the responsibility—to turn down lying, Holocaust-denying, Nazi propaganda. How do you feel? Write WRMI, P.O. Box 526852, Miami, FL 33152."

The Shortwave Classroom

"Your complimentary subscription to *Monitoring Times* is a valuable addition to our classroom," writes Neil Carleton of Almonte, Ontario. (Such subscriptions are available during the school year for any teacher who describes on letterhead how he or she uses radio in education.)

Neil also wrote for another reason, however. "Thank you as well for including my notice in *Monitoring Times* about the establishment of an international network of teachers that use shortwave listening in their classrooms for teaching about media studies, global perspectives, world geography, social studies and other subjects. Thanks to your support, along with the help of international broadcasters and other publications, correspondents replied from fifteen different countries."

Because not all teachers in all countries have access to new technologies, it was decided that the best way to share ideas for the time being is through a newsletter. Fabio Tagetti of Italy came up with *The Shortwave Classroom* as the name of the newsletter, which will be published three times a year: the first issue appearing December 1994, then April and August 1995.

The newsletter will depend upon volunteer effort and contributions. For example, subscription cost is \$10 plus an accompanying feature to share with other teachers in the newsletter. Sponsors for teachers not able to afford the fee for postage and printing costs are invited. For more information about the project and how to join, send an SASE or envelope plus 1 IRC to Neil Carleton, Naismith Memorial Public School, P.O. Box 280, Almonte, Ontario, K0A 1A0, Canada; 613-256-3825 fax.

From the Editor

THANKS for the compliments on the new look of *Monitoring Times*. Art director John Bailey deserves the credit for improving our image, and the columnists and feature writers deserve a word of praise for rising to the challenge. The quality of contributions from readers and subscribers continues to be top-notch. My hat is off to the entire team for making *MT* the fastest-growing magazine in the radio hobby.

I hope you are seriously considering making the trek to Atlanta to the Fifth Annual *MT* Convention, where many of that team of writers and readers get to meet face-to-face. Come revel in the company of other radio hobbyists in that perennial search for exceptional monitoring times!

Rachel Baughn, Editor

There's a new name that's on everyone's mind...

Satellite Times



...Congratulations on your first issue of Satellite Times magazine... Keep up the good work. I can hardly wait for the next issue. My friends have all seen the magazine and seem to be equally struck with it's quality and the information contained in the publication.

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Jim Condon
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Just received the premiere issue of ST. My compliments: a very informative magazine. I enjoy all the technical information it contains.

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Toll line: (704) 837-9200
Fax line: (704) 837-2216

Memphis Area Shortwave Hobbyists (MASH): P.O. Box 3888, Memphis, TN 38173, Jim Pogue (901)873-4291 or Brandon Jordan 373-8046. Memphis area; SW, MW, FM, TV, utilities, pirates, etc.

Metro Radio System: Julian Olansky, P.O. Box 26, Newton Highlands, MA 02161, (617) 969-3000. New England states; Public Safety. *M.R.S. Newsletter*.

Michigan Area Radio Enthusiasts: Bob Walker, P.O. Box 81621, Rochester, MI 48308. E-mail via Internet MARE/Ken Zichi ab415@leo.nmc.edu. Great Lakes Region. All bands. *Great Lakes Monitor*. \$9.50 annual US & Canada. \$1 sample.

Minnesota DX Club: Greg Renner, P.O. Box 10703, White Bear Lake, MN 55110, 612-822-1186 for meeting info. Minnesota. All bands. *MDXC Newsletter*. \$10 annual.

Monitoring the Long Island Sounds: Ed, 2134 Decker Ave, North Merrick, NY 11566. Primarily scanner, some SWL. 50 mi. radius of LI. Net Tues 8pm 146.805. *Monitoring the Long Island Sounds*.

MONIX (Cincinnati/Dayton Area Monitoring Exchange): Mark Meece, 7917 Third St., West Chester, OH 45069-2212, (513)777-2909. SW Ohio, SE Ind., N Ken; All bands. Meets 2nd Sats 7pm at VOA Bethany station. Net Thurs 9:30 146.835/6.235. No dues.

Mountain NewsNet: James Richardson, P.O. Box 621124, Littleton, CO 80162-1124, (303) 933-2195. Colorado statewide. Public Safety notification group. *Mile High Pages*.

National Radio Club: Paul Swearingen, Publisher,

P.O. Box 5711, Topeka, KS 66605-0711, (913)266-5707. Worldwide; AM/FM. *DX News* 30 times yearly, sample for a 29 cent stamp. Annual Labor Day convention.

National Radio Club - DX Audio Service: Ken Chatterton, P.O. Box 164, Mannsville, NY 13661-0164, (315) 387-3583. Worldwide. North American Broadcasters. *DX-Audio Service* (90-min.tape). Sample \$3.

NYC Radio Fre(ak)Qs: Joe Alverson, 199 Barnard Ave., Staten Island, NY 10307, 718-317-5556. NY boros & LI; VHF/UHF/HF utilities. *NYC Radio FRE(ak)Qs*. No dues.

North American SW Assoc.: Bob Brown, 45 Wildflower Lane, Levittown, PA 19057, (215) 945-0543. Worldwide; Shortwave broadcast only. *The NASWA Journal*. Regional meetings.

North Central Texas SWL Club: Alton Coffey, 1830 Wildwood Drive, Grand Prairie, TX 75050. North Central TX area; All bands.

Northeast Ohio SWL/DXers: Donald J. Weber, P.O. Box 652, Westlake, OH 44145-0652. NE Ohio; SWBC and utilities. Meet 3rd Tuesdays.

Northeast Scanner Club: Les Mattson, P.O. Box 458, Rio Grande, NJ 08242, (609) 423-1603 evenings. Maine thru Virginia; UHF/VHF, public safety, aircraft, military. *Northeast Scanning News (NESN)*. \$29 annual.

Ontario DX Association: Harold Sellers, General Mgr., P.O. Box 161, Station A, Willowdale, Ontario M2N 5S8, Canada, (416) 853-3169 voice & fax, (416) 444-3526 DX-Change information svce; (905) 841-

6490 BBS. Predominantly Province of Ontario; All bands. *DX Ontario*. Meet 3rd Wednesdays, Toronto; bi-monthly, Ottawa.

Pacific NW/BC DX Club: Phil Bytheway, 9705 Mary NW, Seattle, WA 98117, (206) 356-3927. Pacific NW and BC Canada. DXing all bands. *PNBCDXC Newsletter*. Irregular meetings.

Pitt Co SW/Scanner Listeners Club: L. Neal Sumrell, P.O. Box 1818, Winterville, NC 28590-1818. Eastern NC; All bands. *The DX Listener*. Irregular meetings.

Puna DX Club: Jerry Witham, P.O. Box 596, Keaau, HI 96749, (808) 982-9444; Puna, HI; SW and MW. Meet 1st Tuesdays. No dues.

Radio Monitors of Maryland: Ron Bruckman, P.O. Box 394, Hampstead, MD 21074. Maryland, (410) 239-7366; VHF/UHF/HF utilities. *Radio Monitors Newsletter of MD*. Meet irregularly.

RCMA (Radio Communications Monitoring Assn.): Carol Ruth, Gen'l Mgr., P.O. Box 542, Silverado, CA 92676. North America, Europe, Australia; All modes above 30 MHz. *RCMA Journal*.

Regional Communications Network (RCN): Jay Delgado or Public Information Unit, Box 83-M, Carlstadt, NJ 07072-0083. 50 mile radius of NY City; 2-way Radio Public safety notification group.#10 SASE for info.

Rocky Mountain Radio Listeners: Mike Curta, P.O. Box 470776, Aurora, CO 80047-0776. Metro Denver, Colorado. All bands. Meets monthly 2nd or 3rd Sundays 1-4pm, Aurora Central Library.

Scanning Wisconsin: Ken Bitter, Dept. MT, S. 67 W. 17912 Pearl Dr., Muskego, WI 53150-9608, (414) 679-9442. Wisconsin. VHF/UHF. *Scanning Wisconsin* (\$2 for sample)

Southern California Area DXers (S.C.A.D.S.): Don R. Schmidt, 3809 Rose Ave., Long Beach, CA 90807-4334, (310) 424-4634. California area; AM, FM, TV, scanner and shortwave broadcasting. **SPEEDX** (Society to Preserve the Engrossing Enjoyment of DXing): Bob Thunberg, Business Mgr., P.O. Box 196, DuBois, PA 15801-0196. Worldwide; SWBC, utilities. *Shortwave Radio Today*. \$23 annual in US. Sample \$2 or 6 IRCs. \$2 for award program info open to non-members.

Susquehanna Co Scanner Club: Alan D. Grick, P.O. Box 23, Prospect St., Montrose, PA 18801-0023. PA area; Scanning. Meets irregularly.

Toledo Area Radio Enthusiasts: Ernie Dellinger, N8PFA, 6629 Sue Lane, Maumee, OH 43537. NW Ohio and SE Michigan; Shortwave, scanning, amateur. Meets 3rd Thursdays 7pm Holland Big Boy.

Triangle Area Scanner/SW Listening Group: Curt Phillips, KD4YU, P.O. Box 28587, Raleigh, NC 27611. Central NC.

World DX Club: Arthur Ward, 17 Mospur Drive, Northampton, England NN2 6LY (in USA-Richard D'Angelo, 2216 Burkey Drive, Wyoming, PA 19610). Worldwide. All bands with emphasis on SW. *Contact*. \$20 overseas airmail. Meets every 6 weeks in Reading, UK.

Worldwide TV/FM DXers Association (WTFDA): P.O. Box 514, Buffalo, NY 14205-0514. Worldwide membership; TV DX, FM BC, VHF utilities. *VHF-UHF Digest*. Annual convention. \$20 annual in U.S. \$2 for sample.

Monitoring Clubs Outside North America

British DX Club: Colin Wright, 54 Birkhall Road, Catford, London, SE6 1TE, United Kingdom. UK and international. SW, MW, AM, FM DXing, pirate and clandestine. *Communication*. L10 UK, L12 Eur, L16 ww. Sample 3 IRCs or \$2 US cash. Meets monthly in Twickenham (London).

DX Australia: P.O. Box 422, Moonee Ponds, Victoria 3039, Australia. MW, SW. *DXers Calling*.

DX Club of India: Navin Patel, 1-Dutt Niwas, 809 - M.G. Road, Mulund, Bombay-400 080, India. India; MW/SW/Ham. *DX World* (quarterly) Rs 50/-, 30 IRCs outside India. 3 IRCs sample.

DX Club Paulista: Marcelo Toniolo Dos Anjos, C. Postal 592, Sao Carlos - SP (Brasil), 13560-970. South America. Shortwave, including utilities. *Actividade DX* (in Portuguese).

Finnish DX Association: Mr. Arto Mujunen, Suomen DX-Litto, P.O. Box 454, FIN-00101 Helsinki, Finland; +358-0-842146 fax. Finland and worldwide. SW and BC. *Radiomaailma*.

Friendship DXers Club: Ing. Santiago San Gil Gonzalez, C.DXA - International, P.O. Box 202, Barinas 5201-a, Estado Barinas, Venezuela. Venezuela and Caribbean. DXing all bands. Cadena DX, VV-2-FSW, Sunday 1130-1330 UTC on 7113 kHz. Venezuelan membership free.

International Listeners Organization: Mohsin Abbas, St. Nisar Ali Shah Ahamed Pura, Sheikhpura, Pakistan, 1-(50359) 2-(50561). South Asia. Broadcasting. *Listener Times*.

International Radio Youth Club: G.M. Mostafa Kamal, Amia Wapda Colony-1, Kushtia-7032, Bangladesh

New Zealand Radio DX League: P.O. Box 3011, Auckland, New Zealand. MW, SW, FM, TV. *New Zealand DX Times*.

New Zealand DX Radio Association: Mr. R. Dickson, 88

Cockerell St., Brookville, Dunedin, New Zealand. MW, SW, amateur and utilities. *Tune-In*.

Pakistan SW Listeners Club: Mrs. Fatima Naseem, Sultanpura, Sheikhpura, 39350 Pakistan; Pakistan; SWBC.

QSL Club de France: Patrick Frigerio, 40 Rue de Haguenuau, 67700 Saverne, France. SWBC, pirates, CB-DX, hams, etc. *Courrier* (in French), 6 bulletins, 72 FF, EEC=16 IRCs, elsewhere 20 IRCs.

Shortwave Radio Communications Club: Atiqur Rehman, Dawood Street, Khalid Road, Sheikhpura, P.C. 39350 Pakistan. South Asia; MW/SW. *The Amateur* (Urdu language). Meets 1st Fri on SW Complex, S.K.P.

Southern Cross DX Club Inc.: Stephen Newlyn, G.P.O. Box 1487, Adelaide, SA 5001, Australia. Worldwide and Pacific. All bands. *DX Post*. \$25 annual in Australia. Meets last Fridays, 8pm, Thebarton.

Stichting ScanSearch Military Aircraft Communications (SC-MAC): Gerbrand Diebels, Roer 29, 5751 TJ Deurne, Netherlands. Military aviation NW Eur (VHF/UHF) and worldwide (HF). *Airlift* (Dutch) bi-monthly. FL 35, up to FL 45 outside Netherlands.

Viamão DX-Club: Alencar Aldo Fossá, P.O. Box 101, Cunhas Road 1286, Jaguaribe Residential Park, 94400-970 Viamão, Rio Grande Do Sul, Brazil, South America. SWBC. Meets occasionally; multi-lingual.

Umbrella Organizations

Association of North American Radio Clubs (ANARC): Richard d'Angelo, 2216, Burkey Drive, Wyoming, PA 19610. 18 member clubs across North America.

European DX Council (EDXC): Michael Murray, P.O. Box 4, St. Ives, Huntingdon, Cambs PE17 4FE, England. 16 member clubs across Europe.

South Pacific Association of Radio Clubs (SPARC): Arthur Cushen, 212 Earn Street, Invercargill, New Zealand.

SPECIAL EVENT CALENDAR

Date	Location	Club/Contact Person
Oct 2	Queens, NY	Hall of Science ARC / HOSARC, P.O. Box 131, Jamaica, NY 11415. Evenings: Arnie Schiffman WB2YXB (718-343-0172) or Charles Becker WA2JUJ (516-694-3955). Location: NY Hall of Science parking lot, Flushing Meadow Park, 47-01 111th St, Queens. Talk-in 444.20 WB2ZZO rptr; 146.52 Simplex. \$5 donation.
Oct 2	Springfield, OH	Independent Radio Assoc of Springfield / P.O.Box 523, Springfield, OH 45501. (Ron KB8JTD 513-964-8618). Location: Clark Co Fairgrounds, exit 59 off I-70. Talk-in 145.45. \$5 general admission.
Oct 16	Cambridge, MA	MIT Radio Society and Harvard Wireless Club Flea Market, 9am-2pm, Albany and Main St., \$2 admission, Free off-street parking.
Oct 1-2	Boxboro, MA	New England ARRL Convention / Federation of E. Mass. ARA, 18 Churchill Rd, Marblehead, MA 01945, (617) 631-7388. Location: Host Inn and Conference Center (formerly Sheraton)
Oct 14-16	Omaha, NE	Midwest ARRL Supervention / AK-SAR-BEN ARC / Todd LeMense KG0EJ, Supervention, P.O.B. 24551, Omaha, NE 68124-0551. Location: Holiday Inn Central I-80 & 72nd St.
Oct 21-23	Atlanta, GA	Monitoring Times 5th Annual Convention / Airport Hilton. See ad in this issue for details.
Oct 23	Sellersville, PA	Spr: RH Hill ARC / P.O. Box 29, Colmar, PA 18915, Hamfest Hotline Linda Erdman (215) 679-5764. Location: Sellersville Nat'l Guard Armory, Rt. 152, 5 mi. S. of Quakertown. Talk-in 145.31. \$5 general admission.
Oct 29	Franklin, KY	So Kentucky Amateur Radio Group / Ed Schwab KA4REF, P.O. Box 9656, Bowling Green, KY 42102, (502-843-4389). Directions: From Bowling Green, I-65 south, Exit 6, West on Ky 100, left on Ky 1008, 1 mile to Wall St., turn right. Name of location?? Talk-in 146.065/665 and 146.520 simplex. \$5 gen admission. 8am-2pm
Nov 5-6	Stone Mt, GA	Hamfest & Computer Expo, Alford Memorial Radio Club / P.O. Box 1282, Stone Mt. GA 30085-1282. Location: Gwinnett Co Fairgrounds, Lawrenceville. Sat 9-5; Sun 9-3:30. Talk-in 146.16/76, PL tone if on 107.2. \$8 gen admission. RV hook-ups.
Nov 12	Myrtle Bch, SC	Beachfest Hamfest and Computer Show, Grand Strand ARC / P.O. Box 2135, Myrtle Beach, SC 29578-2135. Robert Battle (803-236-2887) or Gordon Mooneyhan (803-293-3839). Location: Myrtle Beach High School. 9am-4pm. \$6 gen admission. Talk-in 147.120(+)
Nov 19-20	Ft. Wayne, IN	Allen Co Amateur Radio Technical Society / ACARTS, P.O. Box 10342, Fort Wayne, IN 46851, Don Gagnon (219-484-3317). Location: Allen Co War Memorial Coliseum Exposition Center. Sat 9-4; Sun 9-3. \$5 general admission. Talk-in 146.88(-)
Nov 19	Macomb, IL	LaMoine Emergency ARC / Don Johnson KA9SQB, 702 Washington, Macomb, IL 61455-2023. Location: Grand Ballroom, Western Illinois Univ. Student Union. 8am-3pm.
Nov 19	Socorro, NM	Socorro ARA, Tech ARA / Dave N1IRZ (505-835-1218). Location: Finley Gym, 9am-5pm. Talk-in 146.68 (-) Free admission.

Monitoring Times is happy to run brief announcements of radio events open to our readers. Send your announcements at least 60 days before the event to:

Monitoring Times Special Events Calendar
P.O. Box 98, Brasstown, NC 28902-0098

DX Radio Tests

Information on more tests such as these can be found in *DX Monitor*, the publication of the International Radio Club of America (IRCA, P.O. Box 1831, Perris, CA 92572-1831, USA) and *DX News*, the publication of the National Radio Club (NRC, P.O. Box 5711, Topeka, KS 66605-0711). Both clubs are devoted to the hobby of hearing distant stations on the standard AM and FM broadcast bands. For a sample copy of either publication, send one 29 cent stamp (\$1 US or 1 IRC overseas) to the addresses above.

Monday, October 3, 1994 - KWEY-1590, P.O. Box 587, Weatherford, OK 73096 will conduct a DX test between 5:00 & 5:30 AM EDT. The test will include Morse code, voice ID's, and an unspecified selection of music. Reception reports may be sent to: Mr. Ray Bagby - Chief Engineer. (Arranged by J.D. Stephens for the IRCA)

Monday, October 10, 1994 - KA2XAU-1620, P.O. Box 500, Richland, PA 17087 will conduct a DX test between 2:00 & 2:30 AM EDT. The test from this experimental station will include tones and Morse code ID's. Reception reports may be sent to: Mr. Irv Fidler - Engineer. (Arranged by J.D. Stephens for the IRCA)

Monday, October 17, 1994 - WPMR-1590, P.O. Box 132, Mount Pocono, PA 18344-0132 will conduct a DX test between 12:30 & 1:00 AM EDT. The test will include Morse code ID's, test tones, and "various audio programs". Reception reports may be sent to: Mr. Jeff Woehrl - Chief Engineer. (Arranged by J.D. Stephens for the IRCA)

Monday, October 24, 1994 - WNAM-1280, P.O. Box 707, Neenah, WI 54957-0707 will conduct a DX test between 3:00 & 3:30 AM EDT. The test will include Morse code ID's, test tones, and big band/swing music. Reception reports may be sent to: Mr. David J. Miller - Chief Operator. (Arranged by J.D. Stephens for the IRCA)

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Take heed **SHORTWAVE LISTENERS**. Are you planning to deal with Mike Papagorgio's coin show "Money Makes Money"? Please contact me before you buy from him. George DiPrinzio 837 E 232 St., Bronx, NY 10466 or call collect (718)231-5638. (01-95)

Sony ICF-SW55. Like New. Complete with all accessories and original box. \$275. Evenings: (201) 927-0153.

For Sale. AOR AR1500 full coverage scanner, 6 months old, good condition. \$325. Call (216)243-5140 weekday evenings. Dan H.

Drake R8, \$750; 1590 VHF converter for R8, \$150; MS8 speaker, \$40. All excellent, shipped. Greer, AA5HN (915) 581-5680.

MONITORING TIMES Jan 88 to Dec 93. POPULAR COMMUNICATION Jan 88 to Dec 93. \$50 each includes postage. Connie (813) 577-9493. For Sale. ZENITH-Trans-Oceanic FM-AM Multiband Royal (3000-1-). Excellent Condition. \$200. Call Ron (813) 775-5555.

Sony Receiver ICF 2010 with extras \$250 Delivered in USA. Also Zenith Trans Oceanic Receiver model 8G005, good condition \$200. Phone (619)549-4243.

ICOM R7000 28 MHz-2 GHz, mint, unused \$1000. ICOM R71A, 250 Hz Filters, excellent \$850. I pay shipping cost. K5CN, Ken 517 Monette, Corpus Christi, TX 78412-3022.

McIntosh MR-78, considered "Simply the Best" FM Tuner ever made (MT July 93, p. 48), walnut case, \$1078. Onkyo T-9090,\$270. Onkyo T-9060, \$200, Magnum-Dynalo FT101 with full "Etude" upgrade, \$795. Bill Fusfield, 335 S. Lang Avenue, Pittsburgh, PA, 15208-2749.

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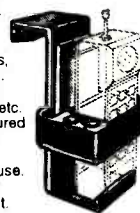
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What Can I Legally Listen To?

With recent changes in U.S. scanner restrictions, more and more radio hobbyists are confused as to what types of signals are legal to monitor. It really isn't all that bad, but let's take a whirlwind tour through history and come up to speed.

In 1934 Congress passed the Communications Act which created the Federal Communications Commission (FCC) and established the wisdom which guided listeners for nearly six decades.

Section 605 (now amended to 705) of that act stated that if you overhear a communication to which you were not entitled, you may not reveal to anyone else its contents, nor use it for personal gain.

In 1986, Congress accepted a proposal from the Cellular Telecommunications Industry Association (CTIA) banning the deliberate monitoring of any radio transmissions which were connected to a wired telephone system, including phones in cars, boats, airplanes and businesses. Cordless phones, however, are not protected.

Known as the Electronic Communications Privacy Act (ECPA), the law also prohibits monitoring pagers, scrambled transmissions, remote broadcast links and subsidiary carrier systems (SCS) like Muzak. It also prohibits the manufacture, sale or even possession of descramblers which aren't part of communications systems, but probably does not prohibit decoders for standard-format data which is not encrypted for privacy.

Since no one paid much attention to the ECPA, the CTIA lobbied Congress for more protection for its cellular customers and, on April 26, 1994, it became unlawful to import or to manufacture in the United States any scanning receiver (including transceivers) or converters which were capable of receiving, or could be easily altered to receive, cellular frequencies;

existing inventories may be sold until depleted.

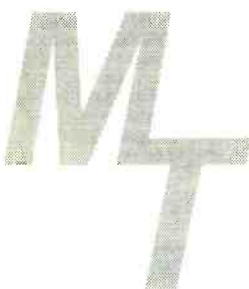
So what can you own and what can you listen to? Check local and state ordinances first, but so far as federal law is concerned, you can legally own any type of receiving equipment you can find on the U.S. market, but not a descrambler unless you are paying for that service, or using it as part of yours. As the owner of the device, you may also restore (but not listen to) the factory-censored channels on your scanner, but equipment dealers may not make the cellular modifications to equipment they sell, otherwise they are in violation of FCC certification.

You *may not* listen to any encrypted (scrambled) transmission unless you're paying for the service, or connected to a wired telephone (cordless monitoring, however, is legal), or a studio-to-transmitter (STL) link, or a paging signal. You *may* listen to domestic and international broadcasting, public safety, military, federal government, business, ham, CB, ships, aircraft, satellites and anything else not specifically protected by the ECPA.

Are you likely to be arrested for listening to things you aren't supposed to monitor? No. There is no effort to keep track of who is monitoring what, and prosecutions have stemmed from divulging (or selling) the contents of intercepted communications, not from the mere passive act of monitoring.

The cellular industry is now more interested in curbing cloning, their latest nemesis, which allows cellphone users to charge their calls to other customers.

From a practical standpoint, then, very little has changed over the years. The information highway has increased public awareness of the vulnerability to interception of private conversations and transactions, resulting in an outcry for privacy protection. But aside from that, the airwaves are still very much open for inspection.



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