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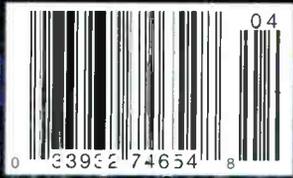
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Communications Source

Monitoring Times®

- ✓ When is a tower more than a tower?
- ✓ Oak tree dipole, J-pole, tuners, turntables, counterweights, brackets, loops, and more!

April Antennamania!



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R11 TEST RECEIVER

.....
30MHz - 2GHz
.....

Handheld Receiver

Optoelectronics is pleased to introduce the all new R11 Nearfield FM Test Receiver. Capable of sweeping 30MHz - 2GHz in less than one second, the R11 can lock onto a 5 watt UHF signal as far away as 500 feet in less than one second, demodulate the signal through its built-in speaker, and display the general band the frequency is transmitting in on its LED indicator. The R11 Test Receiver presents all new performance, features, and capabilities.



Instruction Indicators:
LED's will illuminate which mode the R11 is configured for.

Built - in Speaker :
Instantly demodulate any receiver frequency between 30MHz - 2GHz (Cellular Blocked).

Power

Volume & Squelch Control Knobs

CI-V and Headphone jacks:
CI-V jack allows for connection to the Scout for Reaction Tune. The Headphone jack connection also allows for external speaker.

Frequency Band Indication:
Displays what band the received frequency is transmitting on.

Hold / Mute Button:
The Hold button allows the R11 to stay locked on the received signal.

Lockout / Lockouts on-off:
The R11 allows for 1000 user activated lockouts.

Shift / Off:
The Shift button controls all of the R11's secondary functions.

Skip / Clear Lockouts:
Press the Skip button to continue sweeping. Clear Lockouts will empty the lockout memory.

U.S. Patent No. 5,471,402

\$299

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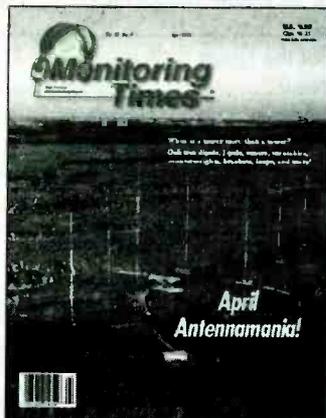
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Cover Story

AM Transmitter Sites

By Patrick Griffith

Antennas are the topic of interest in this issue. Some of the largest antennas that dot our countryside belong to AM broadcast stations. At these sites the tower does not support the antenna: The tower *is* the antenna. And you thought one tower was just the same as another !

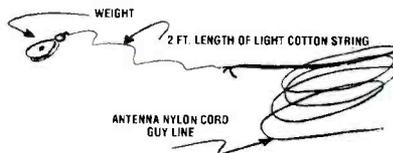
The author introduces you to ways to identify an AM radio tower and some of the technical considerations that go into engineering a broadcast site. *MT* readers also get treated to an inside look at the construction of KLTT's antenna site in Commerce City, Colorado.

Story starts on page 8. Cover photo: A multiple-antenna array near Miami, Florida (shown on horizon), photographed by Ross Cobb, Aerials, Inc.

<http://www.aerialsinc.com>

C O N T E N T S

(Re)Installing the Oak Tree Antenna 11



By Arthur Lee. There used to be a saying among hams that a tree was an integral part of a dipole antenna, says the author. But what if that dipole has been downed for a couple of years, the tree has grown too high, and the guy wires keep snapping under severe weather? Shortwave listeners will appreciate these simple solutions born of experience!

The Quickie, Snap-on Tower Bracket 14

By A.W. Edwards. Is your tower under-utilized because it's too much difficult or dangerous to climb up and install mounting hardware? Is there a tower available at your DX camp? Whether you antenna is wire or mast-mounted, this bracket support is so quick and easy you'll wonder why you didn't think of it first.

Two Varicap Tuned Receiving Loops 16

By William Rhodes. Unlike the multi-turn loops popular for their directional properties, these tunable, single-turn, half-wave loops have no null. Instead, they provide consistent, noise- and fade-free listening.



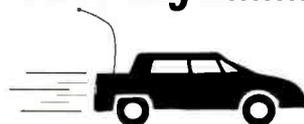
A Simple Turntable for Loops 18

By Richard Marris. If you *are* using a directional loop or ferrite antenna to zero in on a signal by rotation, this homebrew turntable is a perfect companion to your monitoring post.

Dual-Band VHF/UHF J-Pole 20

By James Williams. Simplicity itself, this portable version of the time-honored transmitting or receiving antenna design is constructed of readily-available twinlead.

CAR DXing 22



By Hans Johnson. You *can* escape interference at home and go on a DXpedition every day. How? By turning your car into a go-anywhere monitoring post!

Dealing with Strong Signals 24

By A. W. Edwards. Learn how to construct two basic antenna tuner circuits, plus an RF protection circuit.



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New addresses for the email hobby forums formerly hosted by GroveNet:

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code3list	majordomo@qth.net
code30users	majordomo@qth.net
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milcom	majordomo@qth.net
scan-dc	majordomo@qth.net
trunkcom	to be announced
wun	to be announced

Note:

The Grove Enterprises internet address is changing. To find all your favorite pages follow the links from www.grove.net, or try the new address www.grove-ent.com to find the *Monitoring Times* web pages and updates on these email forums.

Bearcat Intercepts Trunked Radio

COMMUNICATIONS ELECTRONICS INC.

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SAVE \$45 on one BC895XLT

Save \$45 when you purchase your Bearcat 895XLT scanner directly from Communications Electronics Inc., PO Box 1045, Ann Arbor MI 48106 USA. Telephone orders accepted. Call 1-800-USA-SCAN. Mention offer UNITM8. TERMS: Good only in USA & Canada. Only one coupon is redeemable per purchase and only on specified product.

Bearcat® 895XLT-A Radio Scanner

Mfg. suggested list price \$729.95/Special \$319.95
300 Channels • 10 banks • Built-in CTCSS • S Meter
Size: 10-1/2" Wide x 7-1/2" Deep x 3-3/8" High
Frequency Coverage: 29,000-54,000 MHz., 108,000-174 MHz., 216,000-512,000 MHz., 806,000-823,995 MHz., 849,0125-868,995 MHz., 894,0125-956,000 MHz.

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

Bearcat® 3000XLT-A Radio Scanner

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FREE - Get an extra BP2500 battery pack, a \$51.95 value when you order a Bearcat 3000XLT. Hurry...offer expires 4/30/98.
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Frequency Coverage: 25,000-549,995 MHz., 760,000-823,995 MHz., 849,0125-868,995 MHz., 894,0125-1,300,000 MHz.

The Bearcat 3000XLT is the ideal handheld radio scanner for communications professionals. This handheld scanner scans at 100 channels per second and searches at a rate up to 300 steps per second. A selectable attenuator eliminates annoying intermodulation from adjacent frequencies in highly populated areas. Selectable AM, Wide FM and Narrow FM modes allow you to change the default receiving mode of the BC3000XLT. For maximum scanning pleasure, order the following optional accessories: UA502 Cigarette lighter power cord for temporary operation from your vehicle's cigarette lighter \$14.95; LC3000 Deluxe swivel leather carrying case \$49.95; BP2500 rechargeable nickel-cadmium battery pack for up to five hours of dependable use \$39.95; ANTMNBNC Magnetic mount scanner antenna with BNC jack and 12 feet of cable \$29.95. ANTSGBNC Glass mount scanner antenna with BNC cable \$29.95. The BC3000XLT comes with AC adapter, belt clip, flexible rubber antenna, earphone, owner's manual and one year limited Uniden warranty. Order today.



TrunkTracking Radio

DISTRIBUTOR'S COUPON EXPIRES 4/30/98 #980202

SAVE \$45 on one BC235XLT

Save \$45 when you purchase your Bearcat 235XLT handheld scanner directly from Communications Electronics Inc., PO Box 1045, Ann Arbor MI 48106 USA. Telephone orders accepted. Call 1-800-USA-SCAN. Mention offer UNITM2. TERMS: Good only in USA & Canada. Only one coupon is redeemable per purchase and only on specified product.

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Mfg. suggested list price \$429.95/CEI price \$269.95
300 Channels • 10 banks • Trunk Scan and Scan Lists
Trunk Lockout • Trunk Delay • Extra battery & charger
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The Bearcat TrunkTracker BC235XLT, is the world's first scanner capable of tracking a selected radio transmission as it moves across a trunked radio system. Now it's easy to monitor fleets and subfleets in analog trunked radio systems. The BC235XLT can also work as a conventional scanner. This 300-channel, programmable handheld scanner provides scanner users with uninterrupted monitoring capabilities of Type I, II, III and hybrid trunking systems. One of the biggest obstacles in the scanner industry has been the increasing use of trunking radio systems in business and public service agencies throughout the United States and Canada. This makes it nearly impossible to track a conversation as it moves within a trunk system from frequency to frequency. According to Ken Ascher, WBBLT, Chairman & CEO of Communications Electronics, "The Bearcat 235XLT is a revolutionary breakthrough in scanner technology. Now it's easy to continuously monitor conversations even though the message is switching frequencies." The BC235XLT comes with AC adapter, CRX120 battery charger, two rechargeable long life ni-cad battery packs, belt clip, flexible rubber antenna, earphone, owner's manual and one year limited Uniden warranty. Not compatible with AGEIS, ASTRO, EDACS, ESAS and LTR systems. Call 1-800-USA-SCAN to order your scanner now.



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- RELM RH256NB-A 25 watt VHF mobile transceiver \$284.95
- RELM MPV32-A 5 watt VHF handheld transceiver \$299.95
- Uniden GRANTXL-A SSB CB Mobile \$124.95
- Uniden PRO538W-A CB & Weather \$54.95

Save up to \$995.00

It pays to be a *Monitoring Times* magazine reader. Order any scanner or transceiver from CEI. Send or fax this coupon with your order and save even more.

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 - 29WXST Cobra CB with sound tracker technology Save \$15.00
 - LCMP RELM swivel deluxe leather carrying case Save \$20.00
 - BCMP RELM rapid charge ni-cad battery charger Save \$10.00
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 - ANTSGBNC glass mount antenna with BNC Save \$10.00
 - ANTMNBNC magnet mount antenna with BNC Save \$10.00
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- Bearcat 860XLT-A2 100 channel base \$149.95
- Bearcat 760XLT-A base/mobile \$179.95
- Bearcat 230XLT-A handheld/SPECIAL \$194.95
- Bearcat 235XLT-A TrunkTracker scanner \$269.95
- Bearcat 178XLT-A base with weather alert \$99.95
- Sportcat 150-A handheld with 800 MHz \$144.95
- Bearcat 80XLT-A handheld with 800 MHz \$129.95
- Bearcat BCT7-A information mobile \$149.95
- Bearcat BCT12-A information mobile \$169.95
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- ReIm HS200-A handheld CTCSS/800 MHz \$224.95
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you'll get a complete package deal including antenna, 700 ma battery (add \$20.00 to substitute a 1000 ma battery), battery charger, belt clip and user operating instructions. Other useful accessories are available. A heavy duty leather carrying case with swivel belt loop part #LCMP is \$49.95; rapid charge battery charger, part #BCMP is \$69.95; speaker/microphone, part #SMMP is \$54.95; extra high capacity 1000 ma. ni-cad battery pack, part #BPM1 is \$79.95; extra 700 ma. ni-cad battery pack, part #BPM7 is \$59.95; 64 channel option, order #64MP is \$79.95; cloning cable part #CCMP is \$29.95; PC programming kit, part #PCKIT030 is \$224.95. A UHF version with a frequency range of 450-480 MHz, part #MPU32 is \$349.95. The radio technician maintaining your radio system should order dealer programming instructions part #PIMPV for \$18.00 to activate this radio.



Buy with confidence

It's easy to order from us. Mail orders to: Communications Electronics Inc., P.O. Box 1045, Ann Arbor, Michigan 48106 USA. Add \$18.00 per weather station or radio product for UPS ground shipping, handling and insurance to the continental USA unless otherwise stated. Add \$12.00 shipping for all accessories and publications. Add \$12.00 shipping per antenna. For Canada, Puerto Rico, Hawaii, Alaska, Guam, P.O. Box or APO/FPO delivery, shipping charges are two times continental US rates. Michigan residents add state sales tax. No COD's. Satisfaction guaranteed or return item in unused condition in original packaging within 61 days for refund, less shipping charges. 10% surcharge for net 10 billing to qualified accounts. All sales are subject to availability, acceptance and verification. Prices, terms and specifications are subject to change without notice. We welcome your Discover, Visa, American Express or MasterCard. Call anytime 1-800-USA-SCAN or 800-872-7226 to order toll-free. Call 734-996-8888 if outside Canada or the USA. FAX anytime, dial 734-663-8888. Dealer and international inquiries invited. Order from Communications Electronics Inc. today and save.

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By Fred Maia, W5YI
fmaia@internetMCI.com

Consumer Top 10 Telecom Concerns

During the final six months of 1997, the Federal Communications Commission (FCC) completed a survey and determined the Top 50 consumer telecommunications concerns. The data was collected based on nearly half a million telephone contacts from the public to the FCC's National Call Center (NCC) located in Gettysburg, PA.

NCC, the central clearing house for incoming consumer inquiries involving telecommunications, is operated by the FCC's Compliance and Information Bureau. Their toll free number is: 1-888-CALL-FCC or 1-888-325-5322.

- 1) **The number one issue was telephone "slamming."** This is the unauthorized switching of long distance telephone service. Callers are asked to file a complaint with the FCC's Common Carrier Bureau and to contact their local telephone company and place a "PIC freeze" on their account. This locks in the Primary Interexchange Carrier (PIC) of their choice and prevents an unauthorized change.
- 2) **The number two inquiry concerned the status of radio licenses, grants and permits** issued by the FCC's licensing facility in Gettysburg. Amateur radio operators in particular are interested in getting their call sign as soon as possible so they can get on the air. But many of the inquiries concern licenses in other radio services as well.
- 3) **Disputed telephone billing and service is the number three issue.** Most are complaints about charges for services not requested or telephone calls not made. Those callers who complain about telephone service or calls made within their home state are advised that intrastate calls are not regulated by the FCC and are given information about how to contact their state regulatory agency.
- 4) **The number 4 consumer issue concerns the Telephone Consumer Protection Act of 1991.** Consumers are annoyed with numerous telemarketing calls and unsolicited fax messages and want to understand the law.
- 5) **How to obtain a Private Land Mobile (Business Band) Radio license** is the number 5 issue. The NCC provides information on eligibility, appropriate forms and fees and how to contact Frequency Coordinators.
- 6) **Interference complaints to television reception** ranks number 6. Most are about broadcast TV reception, but some are about cable and satellite services.
- 7) **Many callers inquire whether they are still required to hold a radio station license** for their recreational boat or aircraft. The NCC advises that the licensing requirements for most recreational stations have been eliminated.
- 8) **Callers with questions about telephone interference** are advised to contact the tele-

phone manufacturer. Interference to television or radio reception from a nearby AM/FM broadcast station may constitute a violation of FCC rules. Callers are asked to provide specific information that is referred to the FCC field offices for investigation.

- 9) **How to become a ham radio operator** or to renew or modify an existing license is next. Prospective licensees are provided with information about obtaining an application Form 610 and how to contact an Amateur Volunteer Exam Coordinator. Information on reciprocal licensing arrangements with other countries and the new vanity call sign program is also available. The NCC can also provide information requirements, qualifications, and how to apply for a GMRS (General Mobile Radio Service) license.
- 10) **Many callers are upset about the methods used by telephone companies** to solicit business. The majority of these complaints concern telephone solicitations for switching long distance service.

Other Issues of Major Concern to Callers:

Commercial Radio Operator Licensing: ...especially the Restricted Radiotelephone Operator's Permit (RP) and the General Radiotelephone Operator's License (GROL)...who needs it and how to get the required forms. Where an examination is required, NCC provides a list of COLEM's (Commercial Operator License Examination Managers). **How to Obtain FCC Forms:** These are available from the FCC Forms Contractor who can be reached at 202-418-FORM.

Operator Service Providers (OSP): NCC receives many complaints about rates charged at payphones and telephones in public places. Most callers are not aware that Federal rules allow customers to choose a long distance carrier when making calls from public phones. The Telecommunication Reform Act gives the FCC power to take control over pay telephone pricing from state regulators.

Cable Service Complaints: ...especially inability to contact their cable company, poor customer service and delays in making service calls. There are many complaints about rate increases, charges for equipment and changes in cable programming.

CB Violations: Callers complain about interference to television reception or telephones caused by a CB operator. Many CB operators also call to report violations on the CB channels.

International Telephone Calls: ...including 809 (Caribbean) area. Many complaints have been received from callers charged exorbitant rates for calls that were unknowingly placed to international locations. They may have responded to a pager or message which instructed them to dial a number in

the 809 area code. NCC can provide callers with information on how to resolve disputes about such calls.

Questions about Telephone Charges on Bill: ...especially the \$3.50 telephone subscriber line charge billed by local telephone companies to recover the cost of connecting individual phone lines to the interstate telephone network. NCC also receives many about the use of calling cards ...especially cards that have no long distance credit or did not have the amount of credit purchased.

Broadcast Related issues: ...including reports of indecent or obscene material or how to start a broadcast station. NCC has two bulletins that address these issues which can be forwarded to consumers.

The NCC also receives many calls for information about broadcast programming rules on issues such as newscasts, loud commercials, free speech, talk shows, programming changes, etc. Information is provided on how to file a complaint with the FCC's Mass Media Bureau.

The NCC receives many calls from people asking why the FCC will not allow them to receive local network broadcast programming on their satellite system. Callers are advised that Copyright law (not FCC rules) pursuant to the Satellite Home Viewer Act prevents their satellite provider from carrying local network broadcast stations.

Telephone Harassment by Bill Collectors: The practices of debt collectors on the telephone are subject to regulation by the Federal Trade Commission. Information on how to contact the FTC Regional Office is available from the NCC.

Telephone Dial-a-Porn: Hundreds of parents and other concerned citizens have contacted the NCC about the issue of Dial-A-Porn services, especially in relation to children. Many of these operate outside the United States beyond the reach of the U.S. Government. The NCC also receives inquiries and complaints about pay-per-call telephone services. Consumer bulletins on these matters are available from the National Call Center.

Licensing Refunds, Duplicate Licenses: Information is available on how to obtain a fee refund from the Wireless Telecommunications Bureau and how to obtain a duplicate license.

How to Order a Copy of FCC Rules & specific Rule Questions: Information is available from the Government Printing Office and ordering information is provided to the caller.

Tower issues: The NCC receives many calls about rules concerning tower markings, lighting and restrictions.

Interference to Amateur Radio: (according to the NCC) should be reported to the American Radio Relay League (Tel. 860-594-0265 or e-mail: hq@arrl.org) or similar organization. These organizations will coordinate with FCC should the situation warrant.

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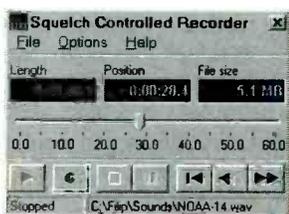
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Prayer: Personal Communications Service?

The frequencies between 930 and 931 MHz belong to the narrowband personal communications services (PCS) for paging and messaging applications. While looking up what Kobb had to say about this band in his authoritative *Spectrum Guide*, assistant editor Larry Van Horn stumbled across the following anecdote—appropriate for an April issue! We quote here from Bennett Kobb:

“The strange Space Shot service once tried to get access to this band. Space Shot called itself ‘The Interplanetary Communication System That Links You To The Universe.’

“Space Shot helped customers ‘search for extraterrestrial life’ by sending love notes or peace messages into space on 903.0125 MHz for \$5 per ‘launch.’ Its purveyors held a temporary, experimental license. The FCC declined its request for permanent status at 930 MHz in 1985 ... industry commenters

“How gratifying it is to have such a fine turnout for our weekly UPLINK!”



called it ‘a radio version of the Pet Rock.’

“A Vermont company has resurrected this concept. Its Prayers Heavenbound service transmits religious messages into space for a fee.

“Our exact communications frequency to

God’s Heaven is the result of much research and is therefore proprietary,” the company told us. “Our prayer uplinking facility is not located on United States soil, or within any of its possessions. As such, its existence or RF emissions are of no jurisdictional concern of the FCC.”

Sky Repeater

This idea strikes us as a real castle in the air, but Angel Technologies is a small company in St. Louis with very high hopes. They envision making high-speed Internet and data access available to everyone within a 50 to 75 mile radius by means of *specially-equipped aircraft circling 24 hours a day.*

Angel Technologies doesn’t plan to bid for auctioned spectrum, but hopes to team up with other companies that hold frequency licenses. Likewise, they don’t plan to design the services being delivered, but hope to team up with other companies that hold the licenses to provide wireless services.

BULLETIN BOARD

April 3-4: Marietta, GA

2nd annual Southeastern VHF Society Technical Conference at the Atlanta Marriott Northwest. Technical presentations, antenna measurements, noise figure testing, flea market (Fri evening), banquet, auction. Conference fee \$35 at door. SVHFS, PO Box 1255, Cornelia, GA 30531 or Bob k4sz@stc.net, 706-864-6229.

April 4: Fredericksburg, PA

Appalachian Amateur Radio Group hamfest at Northern Lebanon High School (I-81 exit 30, PA72 south to US22, E on 22 3 mi). Talk-in 146.04/64. 8am-?, admission \$4. VE testing, forums, concessions. Contact AARG, 105 Walnut St, Pine Grove, PA 17963, 717-345-3780.

April 25: Special Event Station

Special Event Station N4C commemorates the only US boundary in which four States share a common point—Arizona, Colorado, New Mexico, and Utah. Event coincides with the NorCal QRP Club’s field theme “Run to the Borders.”

Times: Apr 25, 2200 UTC to Apr 26, 1700 UTC. See <http://www.swcp.com/~n5zgt/> or email wa5whn@rt66.com for updated information. #10 SASE & QSL requested to N4C, c/o WA5WHN, Jay Miller,

PO Box 6552, Albuquerque, NM 87197-6552

April 24-25: Little Rock, AR

1998 Little Rock Hamfest at the Expo Center, 2 mi. southwest of Little Rock on I-30. Huge, inside flea market, Morse competitions, homebrew contests, VHF fox hunt, banquet, weather spotter certification, technical assistance, prizes, etc! Talk-in 146.850. Admission \$7; 4-9pm Fri, 8am-5pm Sat. Contact Little Rock Hamfest, 1008 Pine St, Arkadelphia, AR 71923-4919 or visit www.aristotle.net/~n5xay/lrh98.html

May 2: Cedarburg, WI

Ozaukee Radio Club 20th Cedarburg Swapfest at Circle-B Recreation Center, Hwy 60 and Co. I (20 mi. north of Milwaukee). Talk-in 146.37/97 and 146.52. Admission \$4, 8a.m. to 1p.m. VE testing, forums, concessions. SASE to ORC Swapfest Chairman, W58 N985 Essex Drive, Cedarburg, WI 53012-1439, 414-377-2784.

May 2: Owensboro, KY

Owensboro ARC 6th Annual Hamfest at Sportscenter, 1215 Hickman Ave. Talk-in 147.81/21, 146.265/865 alt. Admission \$5, 8a.m.-? VE testing, forums, concessions, surplus auction at close of hamfest. Contact

George Stokes KD4CKT, 1218 W. 3rd St, Owensboro, KY 42301, 502-683-2169, w4nh0@occ-oky.campus.mci.net

May 3: Hagerstown, MD

Antietam Radio Association’s Hagerstown Hamfest Bold and Computer Show at Hagerstown Junior College Community Center, I-70 exit 32B to Edgewood Drive, right at Federal Bank, college 1.4 miles on left. Talk-in 147.090+. Admission \$5, 8a.m.-3p.m. VE testing 9a.m. (no charge, walk-ins accepted), forums, concessions. Contact Don Jones KB8WHW 304-728-7769.

Club News:

- Radio Monitors of Maryland has an online chat room on the club’s page www.arrowweb.com/RMM. Look for “RADIOCHAT” on the opening page. Ron Bruckman (“Editor”) will be online occasionally, or you can visit anytime for general discussion.
- The radio email forums which have been hosted by GroveNet have been moved, since the internet service has been sold and Grove is now a customer, not a provider. See page 2 for new addresses, or visit www.groveent.com/majordomo.html for the latest update.

Does this remind you of a certain plan (called Sky Station) to use blimps as towers in the sky?

Apparently a prototype of the special plane is being built by Scaled Composites—the same company that created the *Voyager* which successfully circled the earth without refueling. Test flights are expected this year.

Hm-m-m, is that cloud starting to look like a castle to you?

Scanner for a Reason

“Now that this happened,” says Roxanna Sheets, “I’m glad that I bought it.” What she bought was a scanner, purchased as a Christmas present for her husband David out of her meager earnings.

Even in California the nights can get cold, and on one of the coldest nights last winter in Lemon Grove near San Diego a homeless mother called the Sheriff’s Department, asking them to take in her two children, aged 7 and 4.

Deputy Randy Visconti met the family as they huddled near the pay phone. “She was desperate and didn’t know what to do,” he said. But as shelter after shelter reported no room to take them in, the officers and dispatchers were running out of options.

Less than a mile away, the Sheets listened to the situation unfold on their scanner, and suddenly the solution seemed clear. Still dressed in their nightclothes, they drove to the phone booth to offer what food and shelter they had. “Like they say,” says Roxanna, “God makes everything happen for a reason.”

DJ Without a Voice

“I guess it’s like a blind race car driver,” typed Dan Lawrence, explaining the attention he gets as a disc jockey on radio station KHUM-FM in Ferndale, California. Dubbed “Digital Dan,” he’s the only known DJ in America without a voice.

Perhaps due to exposure to Agent Orange while serving in Vietnam. Dan lost his vocal cords, teeth, tongue, muscles and lymph nodes to cancer. While doing some carpentry at the local station, Dan acquired a new toy: a digital synthesizer which connected to his laptop computer. Station co-owner Cliff Berkowitz taped an interview with Dan using the mechanical voice, and the community response was overwhelming.

Dan now hosts the DMZ show (Digital Music Zone) and Frankly Zappa (two hours from his collection of 1,194 selections). and shares his often controversial opinions. Sometimes new listeners will think the voice is

gimmick, and sometimes they don’t agree with his views, but, says local store-owner Ralph Miller, “He takes them all on. Listen, he has no voice. It was either do this or die. He found something to do.”

“100-Year-Old Hobby Takes on New Life”

So reads a press release from Dr. Paul Shuch, Executive Director of the SETI League. The headline refers to the league’s call for amateur radio volunteers in its search for extra-terrestrial intelligence (SETI).

So, the hams are getting involved in SETI—YUM, I like the sound of that!”



According to Shuch, “hams have contributed to virtually every breakthrough enjoyed by the telecommunications industry, including the development of the Internet. ... Now the amateur radio community is revitalizing itself by applying its members’ talents in search of other life in the cosmos.”

“Searching for life in space requires the kind of radio skills which hams possess...It involves the design and construction of antennas, receivers, and signal analysis hard-

ware and software—which is what ham radio is all about.”

Hams (and technically-inclined radio monitors!) are invited to contact Dr. Shuch to learn more about how they can support what is now a private, nonprofit effort since Congress terminated SETI’s funding in 1993. Call the membership hotline at 1-800-TAU-SETI, fax 201-641-1771, or email join@setileague.org. Their website is www.setileague.org.

The May issue of *Satellite Times* will feature a construction article on how to build a simple SETI monitoring station.

“100-Year-Old Hobby Votes No”

So might read the bottom line from the most recent Board of Director’s meeting of the American Radio Relay League. The Board, which last fall came out against eliminating the Morse code requirement for HF (short-wave) privileges, this winter voted not to support restructuring of the amateur radio license classes to create fewer classes, and not to grant increased privileges to the Novice and Technician classes.

The Board did vote yes to renaming the Technical Excellence Award the “Doug DeMaw Technical Excellence Award. Now, there’s something we can support.”

We welcome news clippings from your world of radio. Send to editor Rachel Baughn at *MT* headquarters, or e-mail to mtditor@grove.net.

Thanks to this month’s reporting team: Anonymous, FL and NY; Rafe Barber, MI; Dennis Drissi, CA; Kenneth Dupuis, NY; A.B. Frasco, IL; R.Glenn Jones, GA; Kevin Klein, WI; Don Loving, OK; James MacDonald, NH; Maury Midlo, TX; Doug Robertson, CA; Mike Roth, IL; Richard Sklar, WA; Larry Van Horn, NC; Elmer Wallesen, IL; *W5YI Report*

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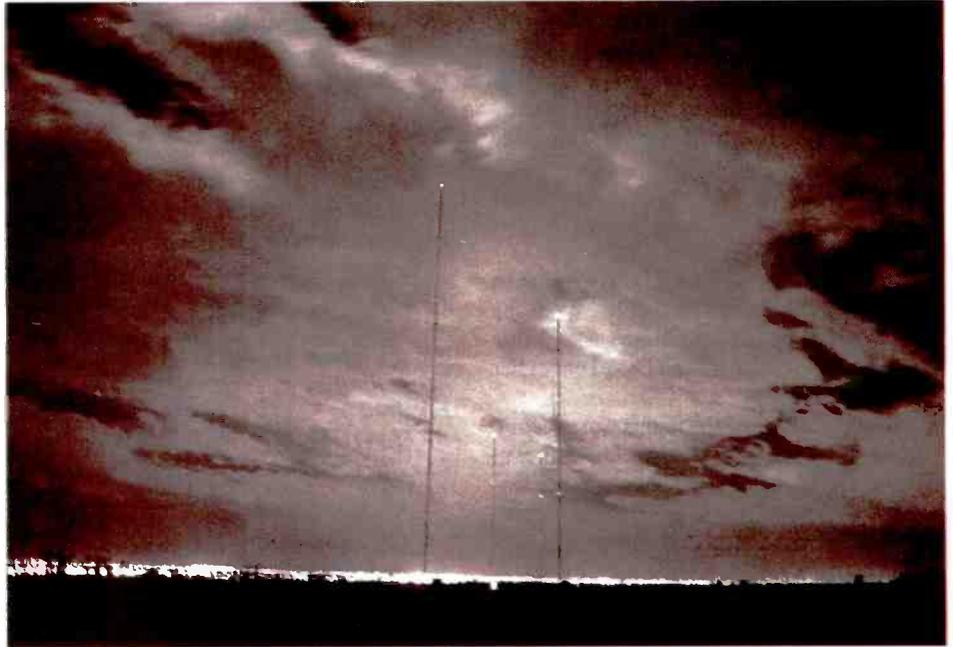
AM

Radio Transmitter Sites

By Patrick Griffith
NONNK@webtv.net

One of my hobbies is identifying and photographing AM radio station transmitter sites. I always find it impressive to look at the antenna towers and think about how many people, over vast distances, may be listening to the signals emanating from the site I am viewing.

I have found that many people, especially



The completed tower array at KLTT, 670 kHz, Commerce City, CO.

those new to the hobby, aren't aware that at an AM radio station the towers don't support the antenna, they *are* the antenna. This is because of the extremely long wavelengths at these frequencies. For comparison, a 1/4 wavelength antenna at the 450 MHz public safety band is about 6 inches long. At the 27 MHz CB frequencies, 1/4 wavelength is about 9 feet long. But a 1/4 wavelength antenna at 540 kHz at the bottom of the AM band is about 450 feet long!

It is usually easy to spot an AM radio

station tower. If it is a tower that uses guy wires, the wires will be insulated from the tower near the attachment points. The guy wires will also be divided into several nonresonant sections by insulators. This prevents the guy wires from interfering with the signals coming from the tower.

In most cases the tower will be sitting on a large insulator (see photo below, left) at its base. That is a sign of a "series fed" tower which is the most common type of AM broadcast tower. The exceptions to this are "shunt fed" towers which have a grounded base. Another clue is multiple towers in close proximity to each other. Multiple tower arrays (see photo above, a simple example) are AM directional antenna systems.

■ Antenna Design on a Grand Scale

Many considerations are involved in determining the size, number, and orientation of the towers. These factors are determined by broadcast engineers who specialize in this aspect of radio station design. Some of the items which must be considered are the station's frequency, its power, and the directional pattern(s) required. Many broadcast engineers today rely on computers to make these complex determinations.

In its most basic form, a low power, nondirectional, local service AM station on



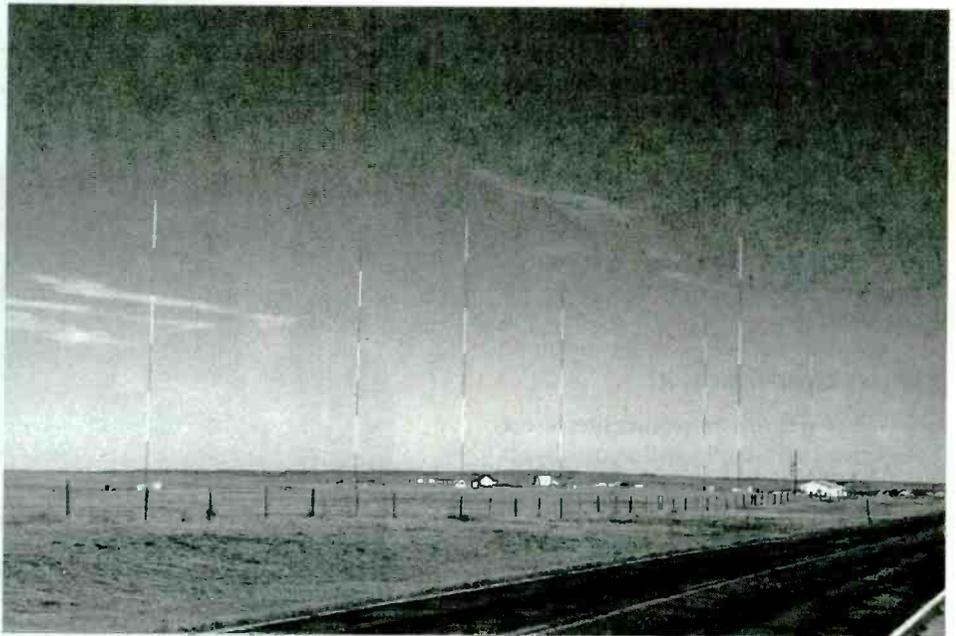
The base insulator and tuning/matching unit for an AM tower.

one of the higher frequencies may employ a single, short tower. From there things can become quite complicated. Many stations are required to “protect” the signals from one or more distant stations on the same frequency by directing their signals away from the other station’s coverage area. Or a station’s transmitter site may be located at the edge of its intended coverage area, requiring it to concentrate more signal into that area.

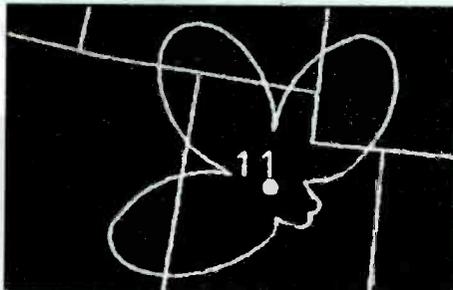
These problems are resolved by using directional antenna systems. These patterns can be quite basic and require only two towers, or they can be very complicated with many lobes and may necessitate anywhere from three to 12 or even more towers.

Because of the changes that occur in the ionosphere when the sun is no longer visible at the antenna site, signals in the AM band tend to travel much farther at night. This factor requires many stations to use different power levels and antenna patterns at night from those used during the daytime hours. Some stations also have different antenna patterns and power levels during the “critical hours” — two hours before local sunset and two hours after local sunrise.

Or, a station may have a pre-sunrise or post-sunset authorization that requires still another set of power and pattern settings. For example, a particular station may operate with 50,000 watts and a nondirectional antenna during the day, then switch to 1,000 watts with a directional pattern during the critical hours, then switch to 50 watts with a still different directional pattern at night.



This complex seven-tower array near Cheyenne, WY, is actually two AM stations. Three towers are for a station on 650 kHz and the other four are for a station on 1530 kHz. Below is a nighttime radiation pattern for a Utah station on 1060 kHz. Courtesy National Radio Club.



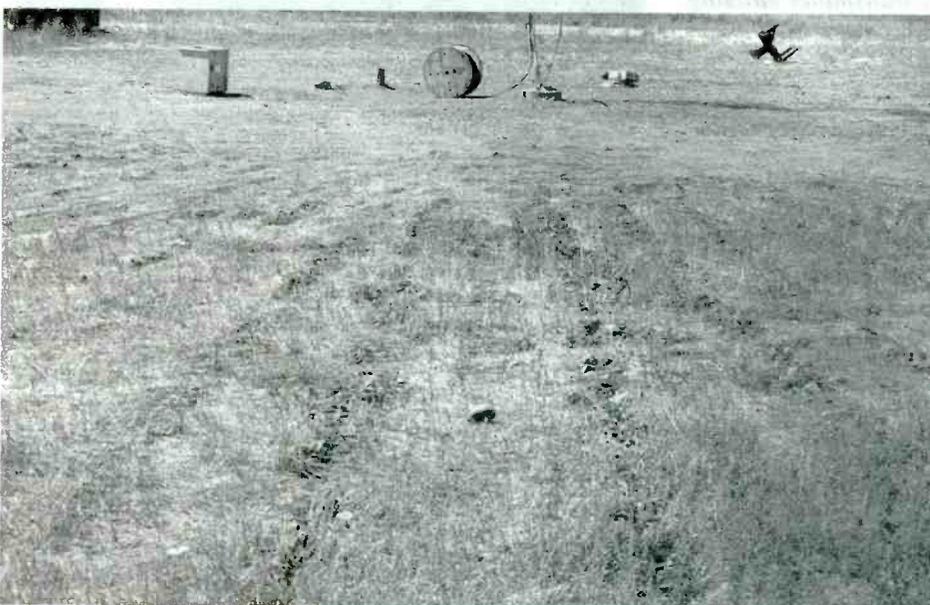
■ Prime Siting

Another unusual aspect of AM radio station construction is that the transmitter sites are frequently built on low, wet ground rather than the high ground preferred by FM stations. That is because the ground becomes an important aspect of the antenna system at these low frequencies and the wetter the ground, the more conductive it is.

In fact, the ground is so important to the operation of AM stations that they are required to place a system of ground wires under each tower whenever possible. This ground system must, at minimum, consist of 120 wires spaced at 3 degree intervals and extending at least 150 feet from each tower base. These radials are usually heavy copper wire buried just below the ground (see photo at left) to protect them from damage.

Because of the importance of a highly conductive ground system, many AM stations go to extremes in the placement of their towers. That is why these sites are often placed near, or sometimes *in*, streams, rivers, creeks, marshes, swamps, lakes or oceans, and are frequently remote from the actual station location.

I recently had the opportunity to observe the construction of a new AM station being built near Denver. Thanks to Bill Johnson of Rocky Mountain Erection Company in Oklahoma City, I was given an inside view of the many aspects of building such a facility. This



The series of trench marks barely visible in the foreground are where buried radial wires emanating from the base of the KLTT tower have been buried.

particular station was to become KLTT on 670 kHz licensed in Commerce City, Colorado. It uses a directional antenna system (see photo on p. 8) with four 363 foot towers. KLTT's license requires it to use different directional patterns during the day and night coverage periods. The daytime pattern utilizes three of the towers with a transmitter power of 50,000 watts. The night pattern requires all four towers with a power of 1,400 watts.

■ **Whose Transmitter is it?**

In most cases AM transmitter sites do not have signs identifying the station, usually for security reasons. One method I have found to determine which station I am looking at is to park near the site, remove the antenna for my car radio from the vehicle, turn off the DX or distance switch, then place the radio in the seek position. The radio will usually "find" only the nearby transmitter. Of course the station must be on the air when you do this.

It is also a good idea to scan past the station to see if the radio might find another one. With the expense of real estate and antenna towers increasing on a daily basis, many stations are now sharing towers with other stations by means of multiplexers which allow more than one station to use the same antenna at the same time.

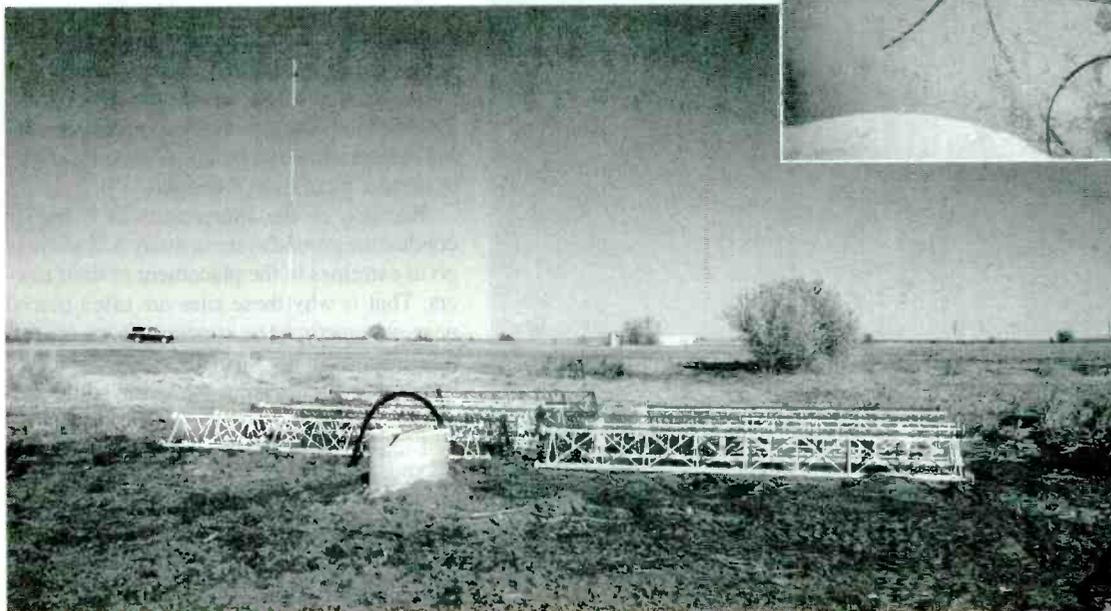
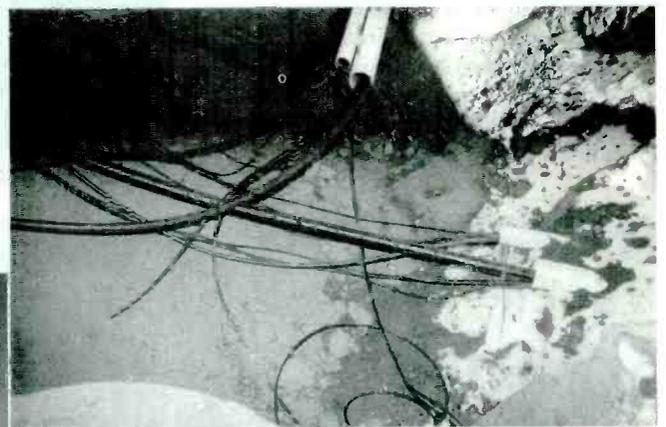
Above all, remember to *never* trespass onto the radio station's property. Aside from being illegal, it can also be hazardous to your health due to the high energy RF fields surrounding the tower and its buried ground system.

Happy hunting!



Materials for an AM tower include a set of lights and a roll of wire mesh which is part of the grounding system.

The antenna, phasing and tower lighting cables for the four towers at KLTT come together in a pit behind the transmitter building during construction.



KLTT tower #1 is on the ground awaiting installation as tower #3 nears completion in the background.

(Re)Installing the Oak Tree Antenna

By Arthur R. Lee, WF6P

There probably isn't an easier antenna to put up than an old-fashioned 40 meter dipole. Of course, if it is one that has been *down* for a couple of years, that is a different story! This was the case for my son Randy, N6UZI.

With a new baby in the household, he and his wife Cybele, KC6ZQS, had been using their time for a more noble purpose, that of the care and feeding of a young infant son (No, the son does not have his ham ticket yet!). When they told me of their need to have the wire back up, friend Stuart Keller, K9WNU, and I flew to their assistance.

■ What we found

Originally strung between two large trees, the antenna had been down since last winter. The nylon guy lines had been damaged by the ultra violet (UV) rays of the sun, plus the swaying and wear action of the trees. One of the old guy lines—the one in the *highest* tree, of course—had parted. Additionally, it had somehow gotten wrapped up in the rotor blades of the lawn mower in the first spring mowing. Oh well, things like this happen!

We carefully examined the antenna and lead-in. After we straightened out a kink or two in the stranded copper wire, it was intact. No problem here. All we had to do next was to run a couple of new guy lines in the tree to get the antenna back up in the air where it belonged.

■ The task

The first item on our list was to toss a guy line up over the highest tree branch in the oak tree. It turned out that the tallest tree had grown even taller during the ensuing year.

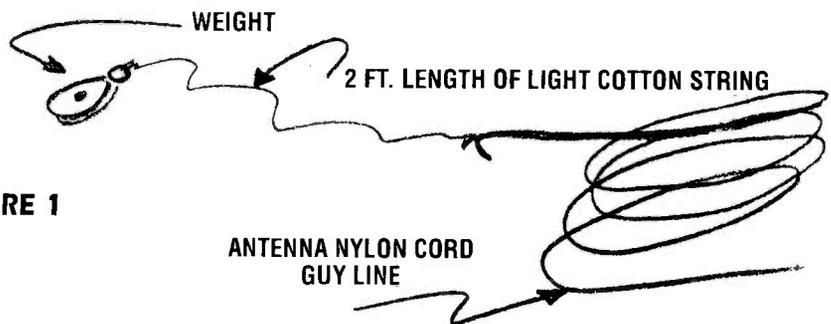


FIGURE 1

The casual *toss* was now to be a full-blown throw of about 50 feet up to loop the line over a desirable branch of the height required. Son Randy, being the youngest and with the best pitching arm, was elected to do that.

The perfect weight was an old pulley we found in the junk box. To this we tied one end of some light-weight nylon cord. My son tried a few throws but was thwarted when his dog decided to take a nap on the loose coils. With this limiting restraint on the nylon cord, back dropped the weight, missing the poor hound by an uncomfortably close margin. We then set in place Rule #1: keep pets, children, and other people clear of the area. Rule #2 is good also: wear protective helmets if you have them.

On the third try, the weight found a lower limb instead of the one we had voted on as ideal. As the laws of physics dictate, the weight—acting in somewhat of a “bolo” fashion—wrapped the guy line firmly twice around the limb.

No problem, we could handle that. Taking a defensive position behind the house, we pulled and pulled on the cord, trying to either break the line or pull the pulley free of the clutches of the branch.

We misjudged both the strength and the stored potential energy in the stretched nylon cord. We had expanded the length of the cord another third of its length before the narrow branch broke. The pulley shot out of the tree at an amazing speed. With a resounding “crack,” it struck a hard blow to the side of the house,

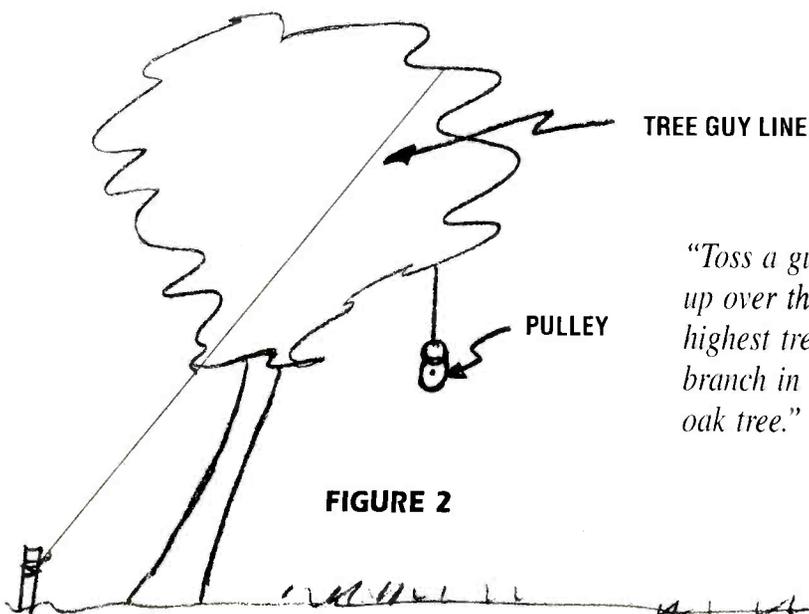


FIGURE 2

“Toss a guy line up over the highest tree branch in the oak tree.”

leaving a scar in the wood. We were all well clear, but Stuart jokingly said, "Well, that little damage is something that could be easily covered by a 4 by 8 sheet of plywood, nailed in placed and painted!"

Thus the "breakable link" was reinvented (figure 1), where a two foot length of light cotton string was made to join the weight and the throwing line. A sharp tug would easily break the string and allow the weight to return to earth for another try.

Another throw put the guy line successfully in place over the correct branch. We then attached a small pulley to the antenna (figure 2). Through the pulley we passed the antenna guy line, then hauled up the tree guy line to the highest point.

To the end of the antenna guy line we attached a plastic bucket filled with just the right number of rocks to hold the antenna in a horizontal position. Holes in the bucket precluded it from acting as a rain-catcher (see figure 3 and side bar story on counterweights). By adding or subtracting the weight in the bucket, we were able to keep the bucket suspended. Its weight exerted the proper tension on the antenna to allow a "rain loop" in the coax feed-line (figure 5).

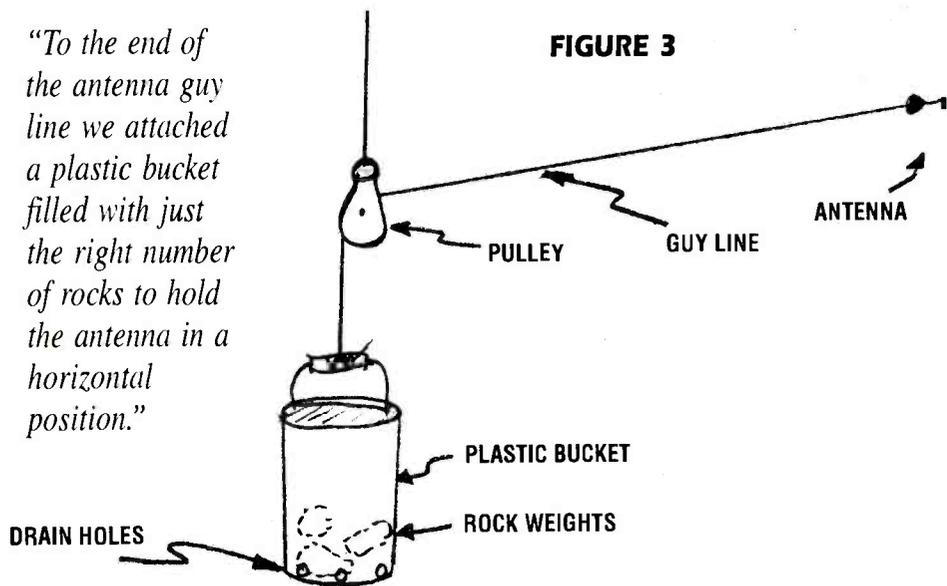
■ The finished job

With the antenna back in place, we checked the guy line in the smaller tree. A tall ladder allowed us to get up into the smaller branches to cut away new growth branches and leaves that were in contact with the antenna wire. Not having a professional tree-trimming tool, we made our own (figure 4).

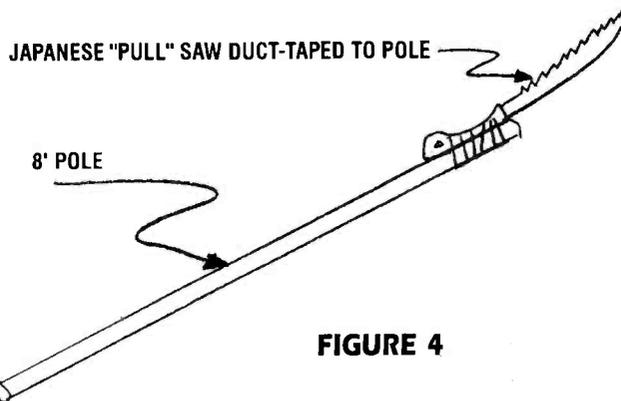
■ The proof of the pudding

To test the standing wave ratio (SWR) of the antenna, Stuart plugged the antenna

"To the end of the antenna guy line we attached a plastic bucket filled with just the right number of rocks to hold the antenna in a horizontal position."

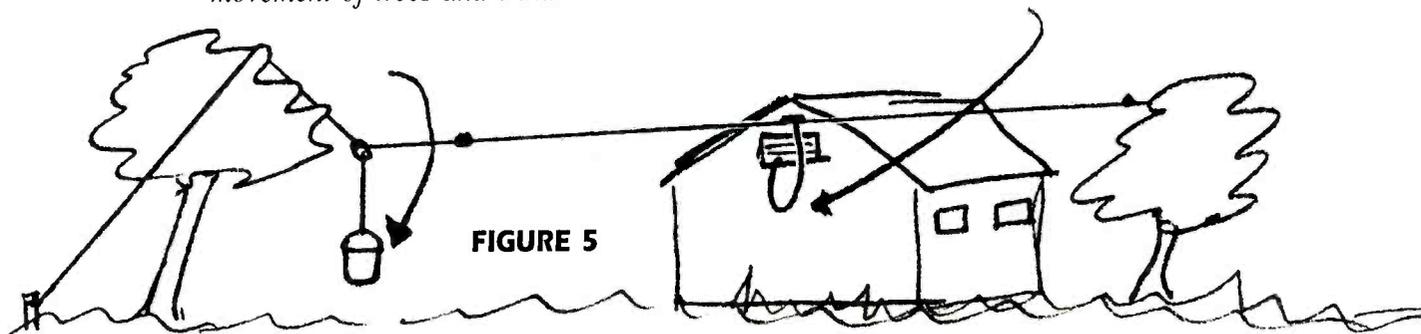


feedline coax at the transmitter end into his MFJ Model 259 SWR Analyzer. According to the analyzer's readings, the antenna was trimmed correctly and read about 1:1.5 on the desired frequency of 7.155 MHz. We couldn't ask for much better than that. Now my son and his wife are set for some nice long QSOs! Who knows? Maybe soon we can also talk to our grandson, Beckett.



Weighted bucket maintains tension on antenna, compensating for movement of trees and wind.

Feed-line "rain-loop" prevents water from flowing down the coax and entering attic.



Two Counterweights for Tree-Supported Dipoles

There is more than one way to skin a cat—or hold up an antenna.

There used to be a saying among hams in the early years that a tree was an integral part of a dipole antenna. This was probably the result of a universal absence of funds for purchasing the towers, rotors, and beams we now have in abundance. Even today, however, we find that many hams still use convenient trees to support one or both ends of their dipoles.

I own a 40 foot tower which supports its own three element beam and 40 meter dipole. It does this without the aid of a tree, but does depend upon a fence post and porch rail to secure the end guys. My 80 meter antenna, however, is another story. Due to its great length (125 feet) it extends from my garage to the large tree on the edge of my property.

The standard method of attaching the guys to a tree works quite well — there is nothing new here. Yet, if the counterweight is not “just right,” the raging winds of winter may cause the trees to sway heavily, pulling and ripping your antenna away from the mast and other support.

After experimenting with a few counterweights which weren’t “right,” old mother nature beat me two winters in a row. The wildly swaying limbs of the giant Eucalyptus tree were too much for the metal retaining mast I had constructed on my garage roof. The jerking and pulling easily snapped a wire cable after collapsing the supporting mount.

One of my early attempts at making a counterweight was that of using a green log. I cut it to the right weight and ran an eyebolt through it. Fine. It looked and worked well for a while, until the log dried out and lost its weight. My 80 meter wire then sagged down onto my rooftop, snagging under my shingles. Heavier logs put too much of a strain on the antenna. A sack of rocks was tried next, but after a while the sack rotted out, spilling the rocks out onto the ground. My antenna ended back on my roof. Hmmm ... what to do?

■ The old oaken bucket

A method that is not so new presented itself when I was struggling with the problem of setting up my son’s 40 meter dipole (see accompanying article). Voilà! A plastic bucket was near at hand. More specifically, it was a bucket in which a potted plant had arrived at his household. Conveniently, drain holes were already present.

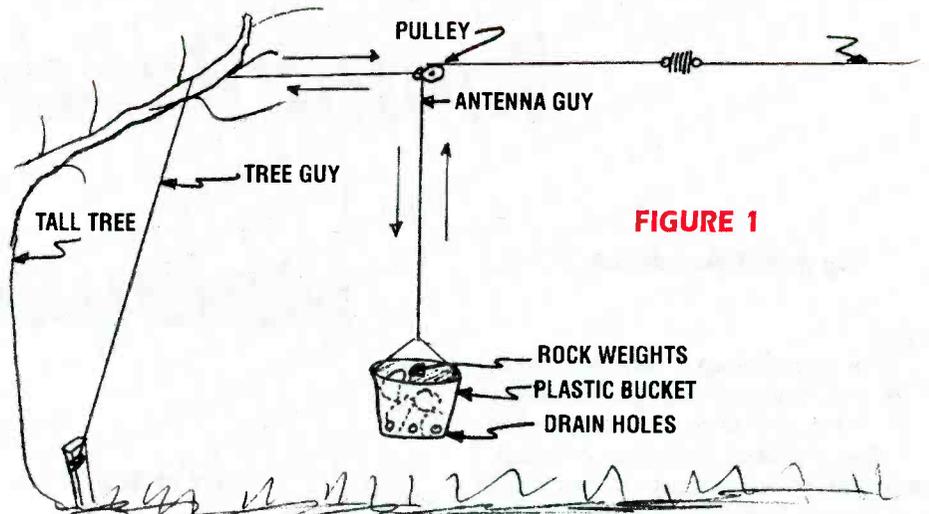


FIGURE 1

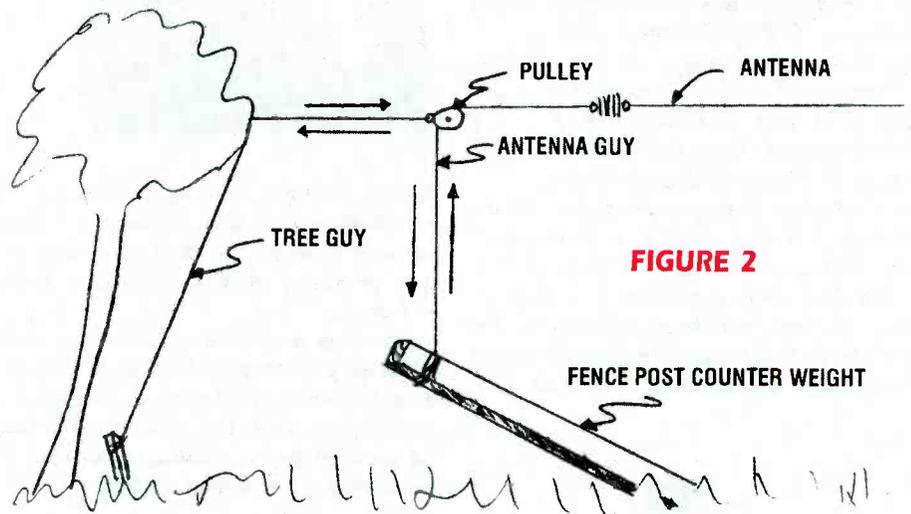


FIGURE 2

By adding a rope handle, it could be attached to the counterweight line of the antenna. The addition or subtraction of a few rocks would balance the weight of the antenna nicely. The drain holes would serve to prevent any accumulation of rainwater (figure 1).

■ The old fence post trick

The bucket full of rocks worked nicely when dealing with a relatively short 40 meter dipole. However, the location, length and weight of my 80 meter dipole was a different case and called for a different strategy. When setting up this counterweight, the materials at hand were limited until I came across an old fencepost.

The heavy post was perfect! I simply tied

the antenna guy to one end of the post, varying the attach point until the post was at a 35 to 40 degree angle with the ground (figure 2). The weight exerted by the post kept the antenna at the desired height. The swaying of the tree branches lifted the post, then returned it to its angular position. In any case, the antenna was free to move without putting undue strain on the end guys.

These two easy solutions to keeping your tree-supported antennas “tight” and without damage cost nothing. Moreover, they certainly have proved to be effective. No more walking out onto my back deck after a storm to see my 80 meter wire draped across my wet roof, useless and inoperable. Let the April winds blow!

The Quickie, Snap-on Tower Bracket

By A.W. Edwards, K5CN

The antenna bracket described here offers a quick and easy method to support a shortwave antenna or multiple antennas off your existing tower. You could add a center-fed antenna or configurations of single wire antennas—whether slopers, trapped antennas, or verticals—at various angles to the tower. It may also support small, mast-mounted antennas—VHF/UHF scanner antennas, discons, small yagis, etc.

The bracket was developed to take most of the work out of attaching an antenna support to the upper sections of a tower, where working conditions often are difficult and uncomfortable, and the hardware you carry along is subject to dropping. This installation uses no hardware.

The dimensions shown are for a Rohn 25 tower, but these may be changed so that the slots will fit other towers. The finished bracket drops neatly into place and locks fairly well,

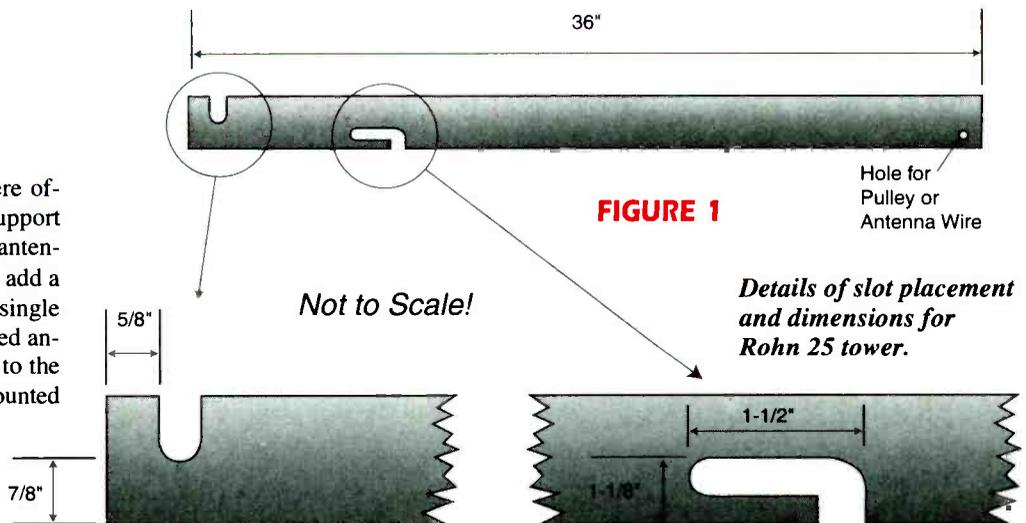


FIGURE 1

Details of slot placement and dimensions for Rohn 25 tower.

so long as there is a downward pull and reasonable tension from the antenna. One can use wire to secure the bracket to one or two legs, providing additional insurance against movement.

The legs of a dipole will act as guy wires, effectively securing the bracket. If you install a small mast-mounted antenna, the additional securing is a must. The required U-bolt may be installed on the ground, reducing work operations performed on the tower.

Construction

I used 3/16 inch by 2 inch mild steel stock. An overall length of 36 inches gives a two-foot clearance from the tower. You may drill a suitable hole at the far end to attach a pulley and insert a halyard. When you climb the tower, you may haul up the bracket assembly with that line; or you may dispense with the pulley, attach the insulator directly and use the wires to hoist the assembly.

The bracket fits levelly across the tower and snugles up to one tower leg.

It is optional whether you secure it further, but it is good safety practice and installation procedure to wire each end to the associated tower leg (see figure 2).

The steel cuts easily with a hacksaw. The Rohn tower uses 5/16 inch rod for structural bracing, so for the end slot, drill a slightly larger hole—I recommend 11/32 to 3/8 inch. Then saw out to intersect the hole at the sides and remove the excess metal. You may need to dress the slot with a file. See figure 1.

To make the elongated slot, drill adjacent holes with the same drill to about 1-1/4 inch length. Saw a 3/8 inch access slot as before, removing excess metal. Refer to figure 1. You will need to file or grind out the rough spots along its length. This work is more than compensated by the snug fit and ease of installation later.

Some may regard the elongated slot as too much work. The bracket, with only the end slot, may be installed, but it will angle up slightly. Though not as attractive, it does give a few inches more height at the end of the bracket. Without the elongated slot, however, *this bracket definitely must have additional securing to be safe.*

Either design is great for emergency or temporary use, such as for Field Day or a DXpedition, increasing the tower use for supporting antennas. It also may be considered about as permanent as any other antenna assembly. It may be installed or removed with a minimum of time and fuss.

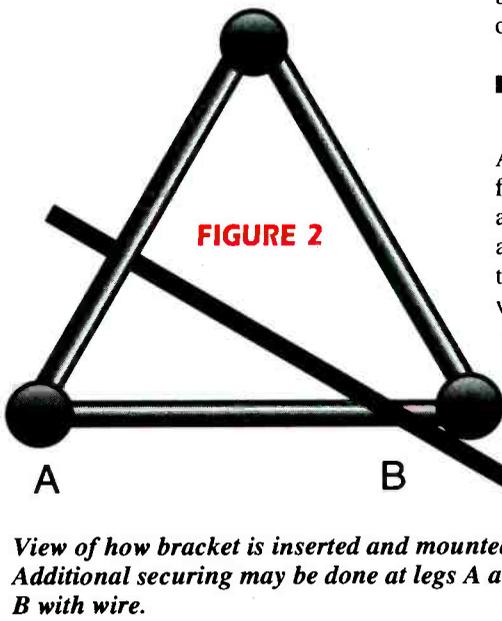


FIGURE 2

View of how bracket is inserted and mounted. Additional securing may be done at legs A and B with wire.

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Two Varicap Tuned Receiving Loops You Can Build

By William A. Rhodes, W7KLA

High-Q Tunable Loop Antenna (receiving only)

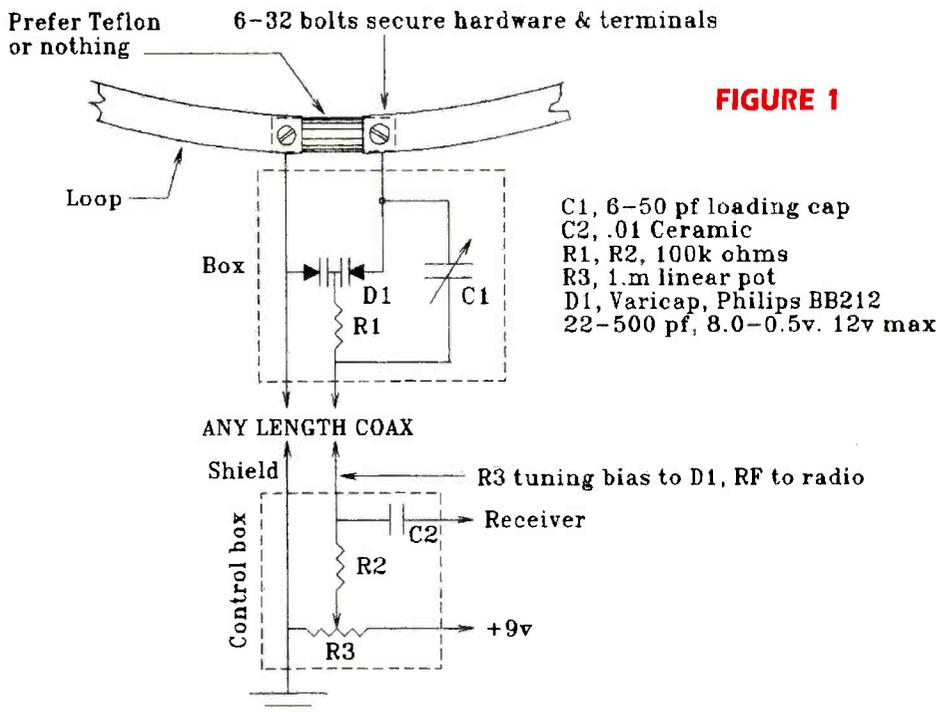


FIGURE 1

C1, 6-50 pf loading cap
 C2, .01 Ceramic
 R1, R2, 100k ohms
 R3, 1.0m linear pot
 D1, Varicap, Philips BB212
 22-500 pf, 8.0-0.5v, 12v max



ing and feeds the radio through the coax wire that also conducts tuning bias from the control box to D1.

The sole duty of this loop is now weather-fax. The sharpest selectivity (highest-Q) is at the low frequency end and covers the 5 - 10 MHz band. However, Q decreases by the amount of coupling introduced through C1. Less coupling improves Q, selectivity and gain — up to a point.

In a half-wavelength, single turn loop, current varies in phase and amplitude and assumes entirely different properties than a null-seeking, multiturn, fractional wavelength loop. *The capacitor-tuned single turn shows no performance change vs. geometric shape.* Length of tubing forming this loop is not critical since the burden of tuning a specific frequency falls on D1.

Unlike a half-wave dipole, there is no direction in which radiation from a capacitance loaded half-wave loop is zero. There is considerable radiation (or response) in the direction broadside to the plane of the loop, and significant field strength along its plane.

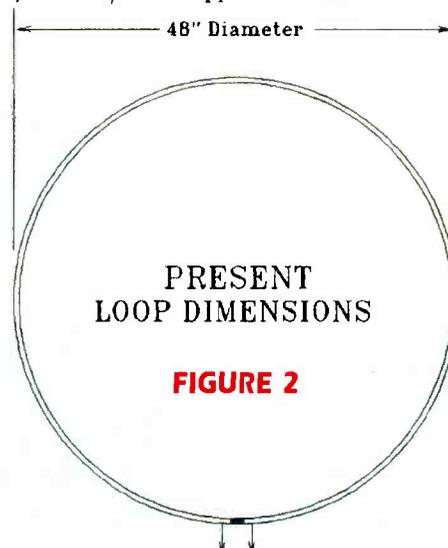
If the radio has its own blocking capacitor, C2 could be eliminated. The penalty of this simple circuit is Q reduction toward the high end. Q peaking ability is limited to about 10 - 12 MHz, dependent on C1 setting. Dip-meter tracking at the loop's current center exhibits an odd phenomenon where sharp resonance spikes are noted throughout its 4.5-15 MHz

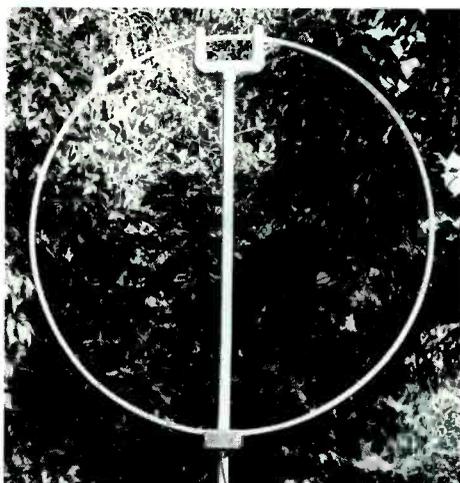
In an earlier *Monitoring Times* issue (April 1993), I described building a circular high-gain TV loop antenna capable of receiving snow-free channel 5 signals from Phoenix some 80 miles distant over the mountains; the design was the creation of Edward Noll.

When varicaps became available, I made my first tuned loop. Following is a description of a varicap version of the original loop, plus a desktop model. These were two exciting projects that over the years more than proved their worth.

Remote tuning and bias for the big antenna (Figures 1, 2) uses a single coax. The original TV loop is of 1/2" hard-drawn copper tubing. (Dimensions shown in Fig. 2.) Bare bones, it is a halfwave at 79 MHz, the center of the Channel 5 allocation. D1 is a Philips dual varicap. C1 controls unbalanced voltage load-

1/2" Hard drawn copper or aluminum tubing





band. Through the receiver, tuning the upper area with the varicap finds peaking noise absent.

With such limitation was it worth the effort? Absolutely! If you live in an electrically noisy area, signals bang through virtually noise free. Also, looking ornamental and mounted only six feet above ground, zoning snoops are not likely to notice.

Another trait of the single-turn loop is broadsiding arriving waves; all angles of polarization are additive at the terminals. In contrast, straight conductors are plane-of-arrival sensitive and respond to variations with fading. Ionospheric fading can involve both polarization and reflection angle changes. The only remedy when using straight conductors would be three antennas oriented on X,Y,Z axes with a switching arrangement.

Silicone Sealing the Component Box

All box entrances including the panel and bolts are sealed against weather with G.E. Silicone II. This is an ammonia curing compound that never corrodes internal parts. (Small tubes are available.) Avoid substitutes because some contain acetic acid and its vapor will silently destroy metal parts, especially iron. Sealing both sides of the ends against the box completes the job.

Performance vs. Height

There doesn't seem to be any advantage when mounted higher than a few feet above ground. It certainly reduces lightning hazard. Since R3 is the only component drawing current, it requires three years to decrease the 9 volt battery to 5 volts. Voltage is checked across the female coax socket with pot R3 set maximum where a fraction of a volt error exists.

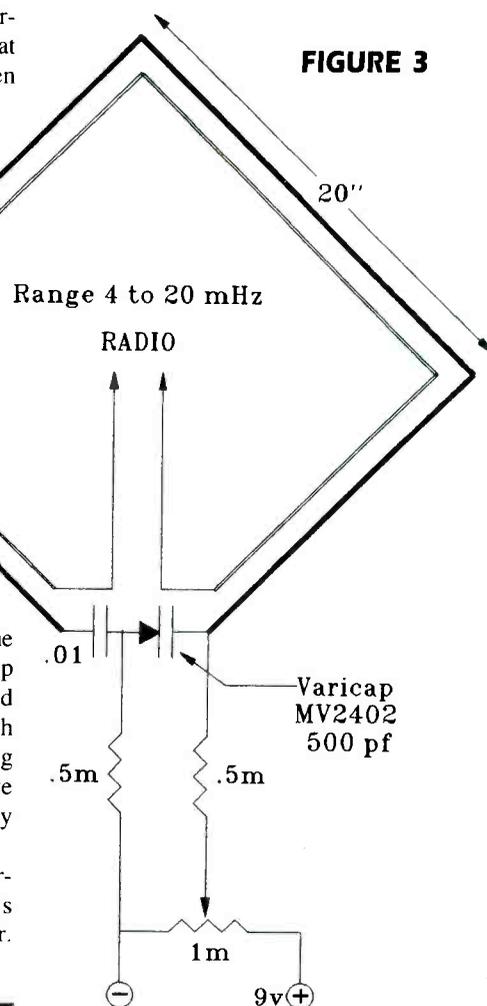
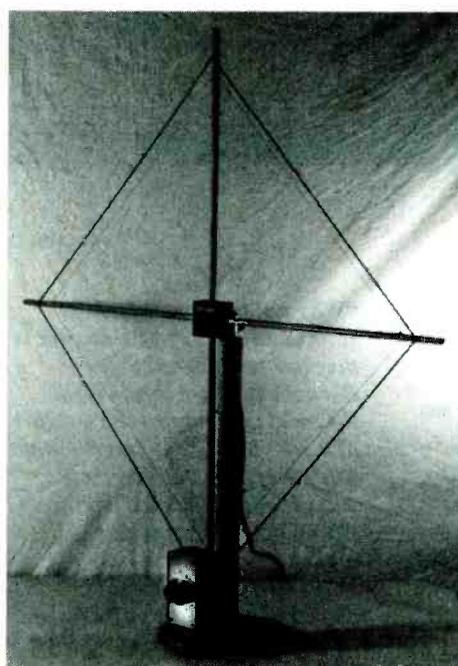
The Original Desktop Loop

The circuit shown in Figure 3 is a supermouse. It is quick to make and not cranky at all to complete and operate. 5/16" wooden dowels for the frame have 6-32 brass screws through the dowel ends with 1/8" or 1/16" X 20" bronze brazing rods soldered to them. Did I calculate dimensions? Nope, just estimated!

The secondary can be made of any bare or insulated wire and threads through holes in the dowels and anchor at the cross-hub. The secondary could also be a rod duplicate of the main loop. Any feed wires are okay. Experimenting with zip-chord and audio cable found no difference.

Secondary spacing from the main loop can be anywhere from 1/2" to 1" without noticeable performance changes. The drawing is schematic only. The main loop ends should be brought toward each other and soldered to two brass screws that pass through the usual Radio Shack project box connecting components and 9 volt battery. Do observe proper polarity because varicaps are cranky about reversals.

Sitting on my desk, always ready to perform during storm approaches, the loop's response to lightning discharges is very poor.



It has sharp nulls when rotated while surrounded with house wiring. This shouldn't be, but it doesn't know that! Maybe nulls will be absent in your home, but do move it around if your antenna's performance seems suspect. The high end of its range of course suffers from a loss of sharp resonance peaks as with the big loop.

One day my mind snapped and I named this little desktop the "RHOTENNA." I would enjoy hearing from those daring to make one!

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A Simple Turntable for Loop Antennas

By Richard O. Marris G2BZO

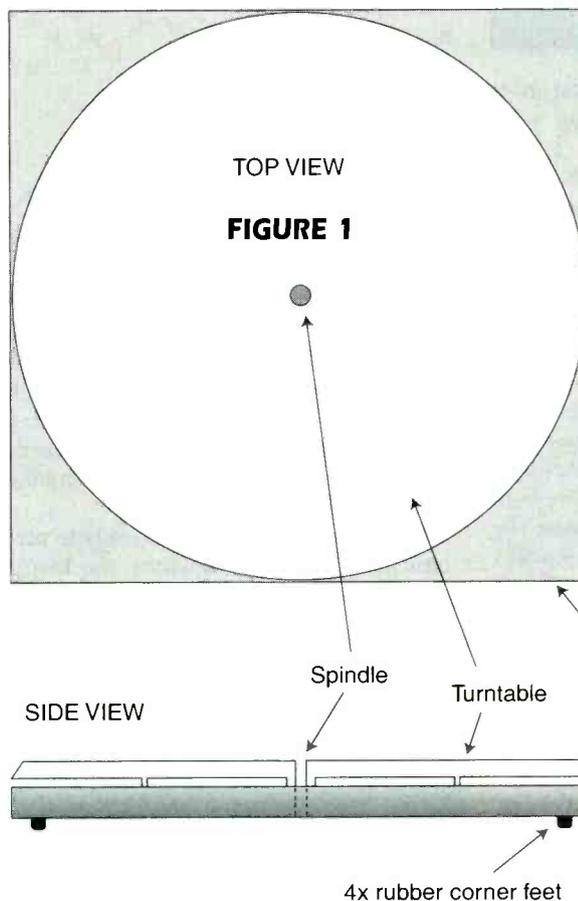
Many enthusiasts use table top frame or ferrite rod loop antennas for one reason or another. These loops are usually directional, using the peaks and nulls in their figure-eight or cardioid directional polar reception pattern to augment a weak signal or diminish an overpowering one.

Over many years the writer has designed and built table top loop antennas from VHF to VLF, and whenever any of these have been published, it is usually mentioned that the "loop is placed on a small turntable." This inevitably brings a question from a few readers, "where can I purchase a small turntable?" The answer, as far as the writer knows, is "you cannot buy one—you make it!"

A record player turntable can readily be adapted for the purpose. One of my early models (around 15 years ago), used the turntable plus motor from an old suitcase type record player, suitably boxed up, for loop rotation. It worked fine, but was really too heavy and cumbersome.

A more recent idea is illustrated, and shows a spindle located in the center of a solid wood base (figure 1) onto which a turntable is fitted.

Old record players are now very plentiful.



The turntable is usually secured to a center spindle, and held in position with a circlip, which can be pried off with a small screwdriver.

Older type turntables are usually made from metal. More recent types are of molded plastic. Either can be used. A popular size appears to be about 28 cms in diameter. The most popular spindle diameter appears to be 6 mm (1/4 inch). The underside of the turntable often has a circular raised rim (figure 3) with a diameter about 50% percent of the overall turntable.

The square wood base should be about 18 mm (3/4 inch) thick, and cut as shown in figure 1.

Rubber or plastic feet are fitted at each corner.

An appropriate diameter brass or steel spindle should be tapped into a hole drilled in the center of the wood base (figure 2). Great care must be taken when drilling the hole to ensure that the spindle is true vertical.

The turntable fits over the spindle with its under rim resting and rotating on the wood surface. The spindle should be cut so that it is flush with the turntable upper surface. The baseboard top should be stained and polished with a silicone wax polish to aid in smooth turntable rotation. The frame or ferrite loop stands on the turntable top, and is easily rotatable.

Note: Some plastic turntables have a center hub protruding below the under edge of the turntable. This excess protuberance can be cut back as required, using a short length of a hacksaw blade.

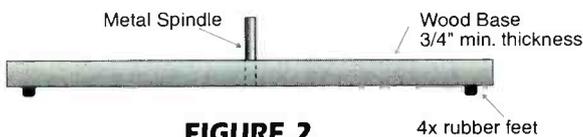


FIGURE 2

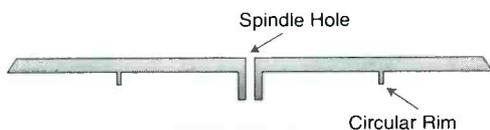
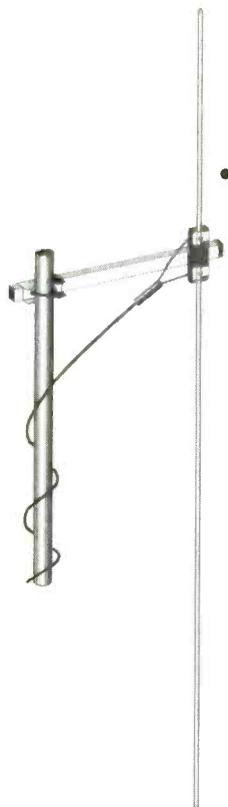


FIGURE 3

"Why not buy a turntable at your local store?" The answer is they are just not suitable. Because they are lightweight, they will not support the weight of a 36" by 36" (or larger) loop. Moreover, the store turntable will probably be fitted with free-running bearings, making it almost impossible to keep the loop turned in a particular direction, given the stiffness of the coax. A homebrew solution is the best compromise.

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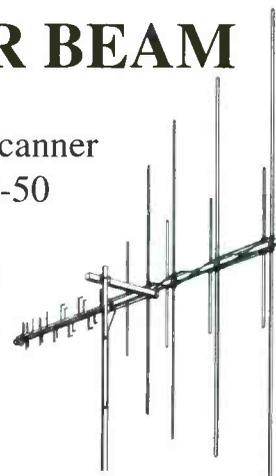
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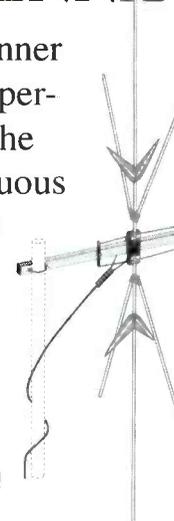
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Dual-Band VHF/UHF Twinlead J-Pole Antenna

By James A. Williams

Want to get more range out of that handheld transceiver that just can't quite make that distant repeater all your friends brag about? Or how about an emergency antenna that you can easily put up and use when a tornado or other natural disaster takes down your main antenna, or lightning causes you to have to disconnect that beam you have 60 feet in the air? Or do you live in an apartment or deed restricted subdivision that will not let you have outside antennas?

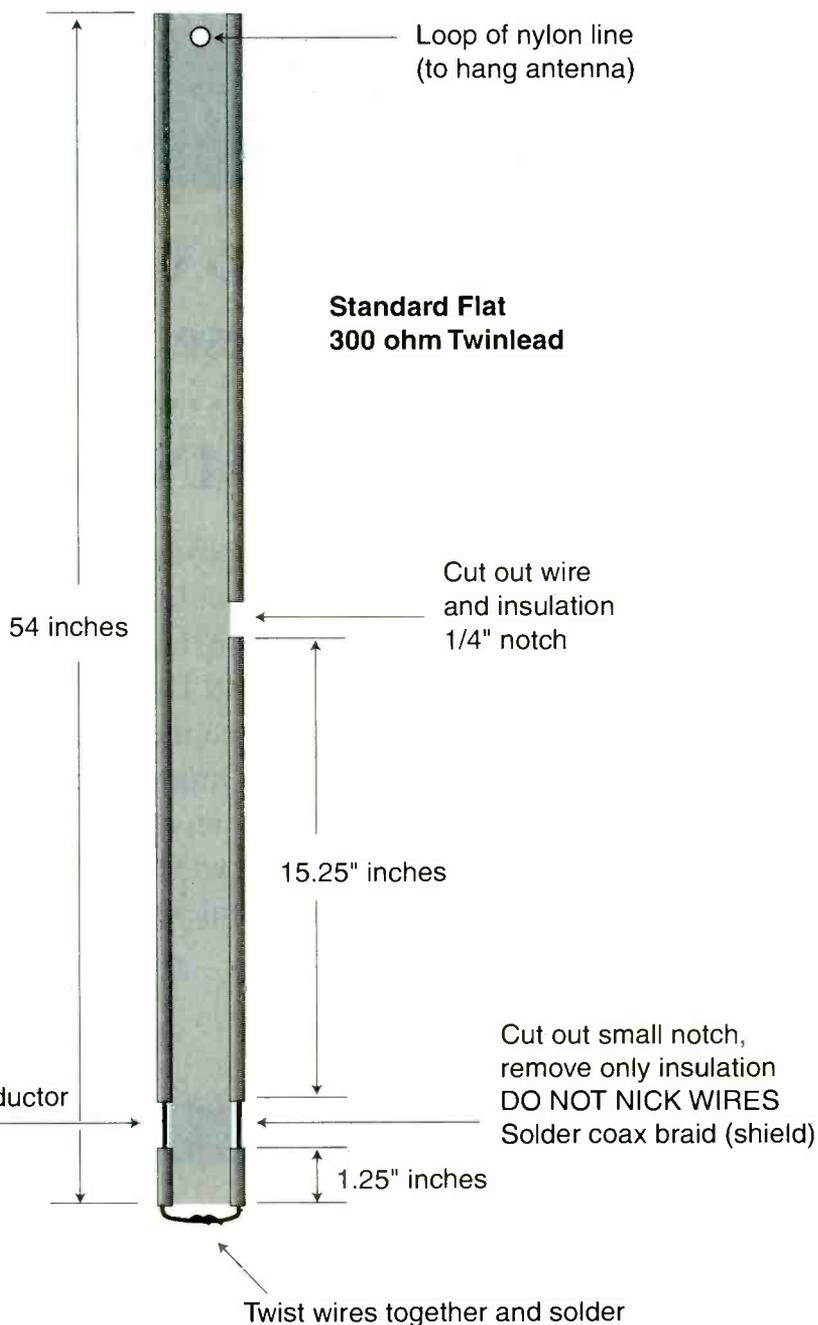
If you have 30 minutes to spare, you can build a Dual-Band VHF/UHF J-Pole antenna that is guaranteed to get you on the air quickly, outperform the rubber duck antenna that came with your handheld, and solve all the above problems and then some.

It will serve not only as an emergency antenna, but as a portable antenna system for anyone needing an easy-to-set-up antenna, such as travelers who want to monitor or operate from their hotel room. The low profile antenna can be set up and taken down quickly, and it stores in the space of an eyeglass case. It can be hung in a corner of a room, attic or other out of the way location for a more permanent installation, or can be put up and taken down when needed.

The J-Pole antenna has been used by ham radio operators around the world for years. It's one of the first antennas that most new hams hear about and wish to acquire. Several commercial antenna manufacturers make and sell this type of antenna in the price range of from \$15 to \$25 dollars each; you can make it for \$3 or \$4 dollars.

Cut out small notch, remove only insulation
DO NOT NICK WIRES
Solder coax center conductor

Cut out small notch, remove only insulation
DO NOT NICK WIRES
Solder coax braid (shield)



For this article we will concentrate on the most popular bands in this country: the 2 meter band (144 MHz to 148 MHz) and the 70 cm band (440 MHz to 450 MHz). I have found the antenna to have a voltage standing wave ratio (VSWR) of less than 1.5:1 across the entire 2-meter band, and less than 1.7:1 across the 70-cm band. As a scanner antenna (non-transmit) it is usable from 30 MHz through the gigahertz bands.

I will not get into the theory or math involved in the construction of this antenna, other than to state that it is a vertically polarized antenna with two elements: a 3/4 wave-

length radiator and a 1/4 wave length matching stub that operates like an end-fed halfwave antenna. If built to exact specs listed, there is no tuning needed for this antenna. Just build it and use it.

The Dual-Band Twinlead J-Pole antenna is made from standard flat 300 ohm twinlead TV antenna wire, available from most hardware and electronic stores. Most of us oldtimers will remember this wire as the twinlead used to connect a TV to the roof-mounted antenna that almost all homes in this country displayed before the advent of cable TV. You can use an old piece of twinlead you or a friend

may have lying around or buy a new piece 6 foot long.

You will need the following:

- 6 feet of flat 300 ohm twinlead
- 6 feet or more of RG-58 coax
- PL-259 or BNC connector (your choice)
- Soldering Iron and Solder
- Wire Cutters, strippers or knife
- Plastic electrical tape or heat shrink tubing

■ Building the Antenna

Begin by carefully removing 0.75 inch of insulation from one end of the twinlead, being careful that you also do not cut the wires. Once the wire has been stripped, twist the pair of wires together and solder. This is the bottom of the antenna.

Cut the twinlead to 54 inches exactly from top to bottom. Double check the length; it needs to be exact.

Measure 1.25 inches up from the bottom of the antenna and mark the insulation. From this mark, carefully remove the insulation for .25

inches above and below the mark, being careful not to nick the wire. Repeat on the other side of the twinlead.

Measure exactly 15.25 inches from the one of the notches you have just cut and remove a .25 inch notch from this point; remove both the insulation and the wire. This is the ground side (1/4 wave stub). The other uncut side is the radiator side (3/4 wave) of the antenna.

Using a piece of RG-58 coax at least 6 feet long, carefully remove .75 inches of insulation from the coax to expose the braid. Separate the braid from the center conductor and twist together. Remove the insulation from the center conductor. Connect the braid from the coax to the ground side (stub) of the twinlead and the center conductor to the long side (radiator) of the twinlead. Try to connect the coax so that it lays in the center of the twinlead. Solder the coax braid and center conductor to the twinlead.

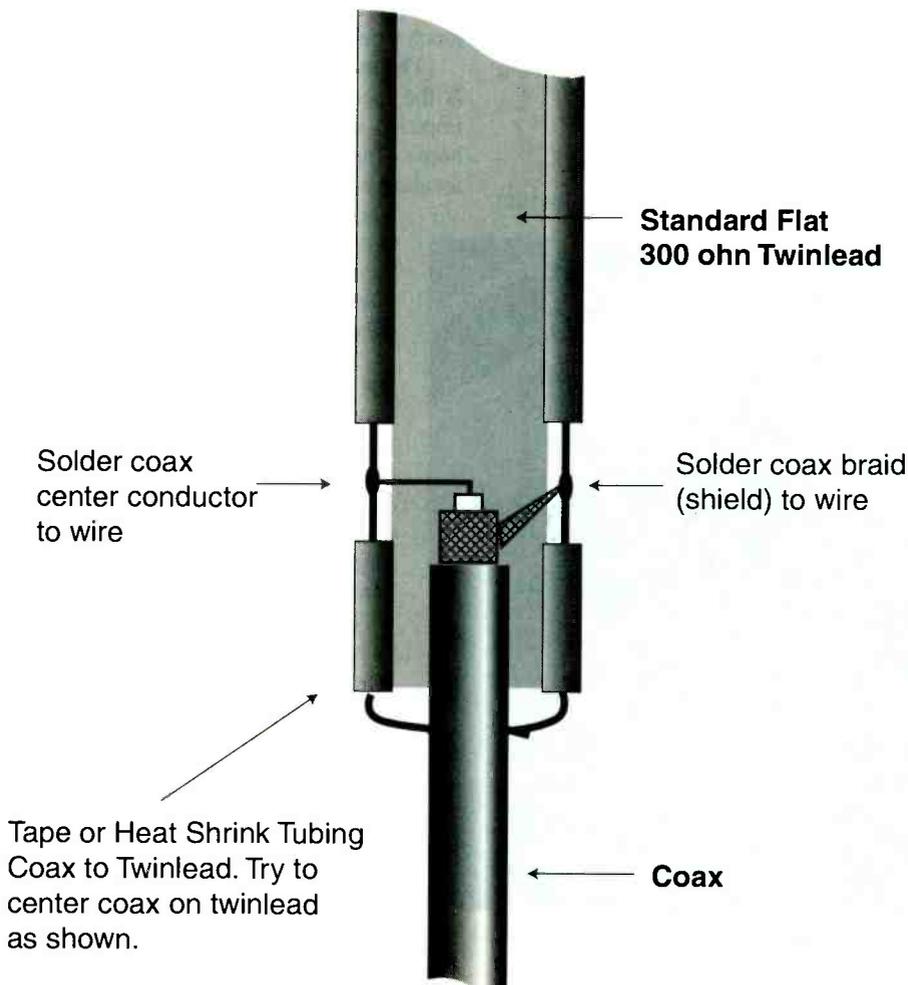
Use electrical tape or heat shrink tubing to secure the coax to the twinlead. This will help take the stress off the solder points and make the joint waterproof. Also tape or use heat

shrink tubing at the notch you cut out to make the ground side (stub) of the antenna.

Punch a hole at the top of the antenna at the center and tie a loop of nylon line (fishing) or another nonconducting line to hang the antenna from the ceiling, tree limb or other location. Install your choice of connector (PL-259, BNC, etc.) to the coax and use. You will find that the antenna will have a gain of 3 to 4 dB.

When using the antenna try to keep it away from metallic objects such as electrical wiring and plumbing. It is possible to detune the antenna if it is close to such objects. For a permanent outdoor installation, mount the J-Pole inside a piece of PVC pipe capped at both ends. Drill a hole in the bottom cap for the coax to pass through and seal around the coax with a good waterproof sealer. Mount on top of your mast or tower.

By building several of these low cost, easy to construct antennas you can keep one handy at all times—such as in your car glove compartment, briefcase or back pocket—and enjoy the improved performance of this antenna anytime.



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CAR DXING

How you can escape interference at home and go on a DXpedition every day

By Hans Johnson

You have finally escaped that QRM (manmade interference) at home and gone on your DXpedition in search of distant signals. The logbook is soon filled with all sorts of new stations, but sadly, it has to come to an end after a few days.

How can one recreate those DXpedition conditions every day?

Car DXing is the answer.

Car DXing, also known as a micro-DXpedition, is a single listening session from your car. Most of my listening in the last three years has been while Car DXing, so let me share with you some of what I learned along the way.

■ Location, location, location

One of the keys to hearing rare stations is to

try for them often. Car DXing must be as easy and convenient as possible, otherwise you aren't going to go very often because it is too much trouble.

The most important aspect of Car DXing is the location you choose. The idea is to improve upon the conditions you have at home. This is done primarily by finding a location with space for a better antenna, quieter conditions, or a combination of the two.

Remember, if it isn't easy, you aren't going to do it. A good site five minutes from the house is better than an excellent one an hour away.

A few words of caution. Don't Car DX close to houses where it might make the locals nervous. Secondly, don't Car DX from office parking lots or anywhere that is posted. Finally, choose parks with care, avoiding the ones that are rather festive in the evenings. (Yes, I have learned all this the hard way.)

There are plenty of good spots close to where you live; you simply have to scout around and be willing to try them out. Apartment dwellers, try DXing from your car right on the apartment grounds. It certainly will be quieter than inside the apartment and you might just find plenty of room for some temporary antennas.

Parks can be good, too. DXing from small, neighborhood parks will probably be an improvement on your conditions at home. One of the first things I



Everything is there: power, and antenna, and a tape recorder. Your shack on wheels is ready to go.

do when arriving in a new city is to get a good map showing all the parks.

Probably my favorite spot for Car DXing is from what I call "no-man's land." These are areas where the roads are, but there aren't any buildings. It could be a housing development that went bust early or a commercial area that never filled up with buildings. The bottom line is that no one is driving that way because there is nothing in the area for them to drive to. A bonus is that usually all of the trees and brush have been removed from these areas, so stringing antennas is a snap.

Keep it simple

The same principles of simplicity and ease apply to antennas, too. I have 500 feet of flexible insulated wire on a reel that is made for winding up extension cords. These reels are available in your local home improvement store for under \$10. I drive out to my site and secure the end of the wire in the car door. Making sure I have left enough inside the car to hook up to the radio, I then string the wire out along the ground for the next 500 feet.

When I am ready to go, I wind it back up on the spool in less than two minutes. You could call this antenna a Beverage on the ground, but I just call it my antenna—nothing fancy.

My antenna will receive off of either end, but works best if you point it in the direction of the signals you want to hear. So which way are the signals coming from?

Here is how I set mine up:

Your location	Target	Time (local)	Point antenna
to			
North America (NA)	Latin Amer.	Anytime	Southeast
East/Central NA	Asia	Evenings	Southeast
East/Central NA	Africa	Anytime	East/Southeast
Western NA	Asia	Mornings	West/Northwest
Central/West	Africa	Mornings	Northwest

My antenna is sensitive in a 60 degree cone, but use a compass to make sure you are pointing in the right direction (don't forget to take into account magnetic declination). If you don't see a particular location and target site listed, then experiment around. That is one of the beauties of my antenna: easy out and easy up.

Some final words on my antenna. You probably won't get too many 20+9 readings out of it, but the signal to noise ratio is impressive. This is a quiet antenna and it is amazing how weak a signal you can copy



In most vehicles, your radio can be tuned from the driver's seat by setting it up in the passenger seat.

once you take away all that noise.

Don't run it underneath any power lines or other electrical hazards. Having said that, don't assume that because you see power lines on the horizon a site will be noisy.

I power my Drake R8 right from the cigarette lighter of my car. I have yet to drain the car battery, even when listening for hours when it was -5 degrees F in Colorado. Some folks take along a marine battery just to operate the radio, but I don't think this is necessary in a listening session that only lasts a few hours.

All my accessories — books, headphones, tape recorder, paper and pen — all fit into a single canvas bag. When I am ready to go out, I pick up the bag and the radio, and I know that I haven't forgotten anything.

Choosing a close location, an easy to string antenna, and having my gear organized, guarantees that 5 to 7 minutes from the time I leave my house, I am Car DXing away. An even easier arrangement would be to use a portable radio and/or an active/passive antenna mounted on the car.

Several of the most active DXers in North America go Car DXing on a regular basis. Why? Because they are hearing things from their cars that they never would hear from home. Car DXing is the way to enjoy DXpedition conditions everyday.

The author's current shack is a 1996 Honda Civic.

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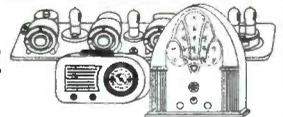
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Dealing with Strong Signals

The Receiving Antenna Tuner

By A.W. Edwards

Now that I am retired I have been going over some old notebook schematics, ideas, and looking anew at some devices I have built or purchased to enhance radio listening. These cover the radio spectrum from 10 kHz to 30 MHz.

I bought the Grove MiniTuner (TUN-3) at least ten years ago. It is a compact, well-designed unit. It is surprising to note how much performance and what a broad coverage range is packaged in that little box. I have built devices before and since I bought it, for specialized purposes. With now more than two decades of hands-on experience, I am still sufficiently impressed by the simple series-resonant L-C circuit to want to write about it.

It is a given that almost any passive item one inserts in a feedline might be expected to degrade the input signal to some extent, if only slightly. Even band-new coax has its "dB loss per hundred feet" figures published. (It would be wonderful if the opposite were true: 3 dB GAIN per hundred feet at all frequencies, for example. But life just ain't that way.)

Or is it? Anything we put into the transmission line for transmitters will present some "insertion loss," be it a balun, TVI filter, power monitor, lightning protector, etc. So when I make a series-resonant antenna tuner for some frequency span and then compare the "filter in-filter out" results, I am unfailingly amazed. It is as if I had some of that magical coax with built-in amplification!

Here's a typical example: S-meter reading connected directly to the wire antenna, S4-S7. Insert the "signal peaker" and now it is S9-plus, or some significant increase. An improvement in the clarity of sound seems to occur as well. How does it do that? All it has in it are a capacitor and an inductance resonat-

ing to accept one frequency better than all the rest.

Two Ways to Work Magic

Figure 1 shows two basic L-C resonant circuits: parallel and series. The parallel reso-

nant circuit is also called "anti-resonant" because it offers a very high impedance (rejects) the resonant frequency, but allows other frequencies to pass through. By contrast, the series resonant circuit does just the opposite, offering a very low impedance to (accepts) the tuned frequency while rejecting all others.

The current Grove MinTuner is the TUN-4A, an update of the TUN-3 mentioned by the author.



FIGURE 1

A parallel-resonant circuit rejects the tuned frequency but allows others to pass through.

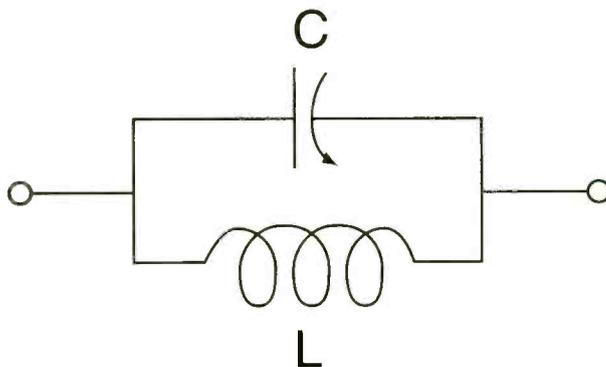
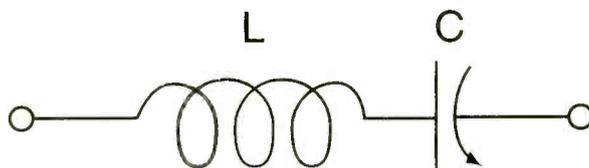


FIGURE 2

A series-resonant circuit accepts the tuned frequency and rejects all others.



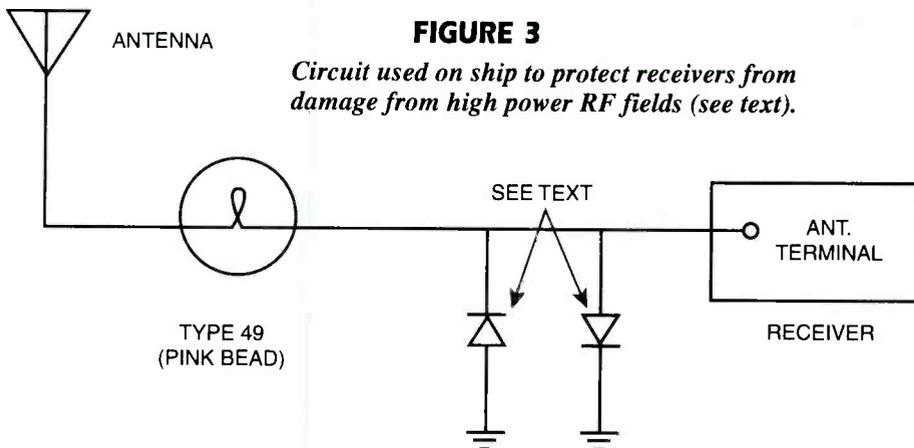


FIGURE 3
Circuit used on ship to protect receivers from damage from high power RF fields (see text).

There are good uses for both circuits.

The series-resonant filter's action relieves the receiver input of the "dc-to-light" stamper of electromagnetic signals presented by the antenna. Instead of "seeing" all the radio signals and other electromagnetic emissions impinging on the antenna, now only a narrow passband of signals emerges from the tuner and is offered for receiver processing. This is the equivalent of eliminating eight lanes of rush hour traffic from the highway, leaving only the much reduced traffic of the car pool lane.

The wide spectrum of signals and noises present without the filtering action of a simple tuner adversely affect receiver performance: either the automatic gain control mutes desired signals along with the interference, or, without it, too much gain swamps the front end tuned circuits to produce images and other spurious responses.

In one memorable instance I had been beset with noises that obscured reception on the marine and aircraft beacon and communications band between 200 and 520 kHz. There was a multitude of screechings, howlings, and rough signals that ripsawed across the weaker signals of interest.

I built a circuit of ten inductances, each with a bypass switch. These could be selectively inserted and summed with others. It was placed between the antenna and the receiver input. By experimenting with combinations of inductance only, I found settings that gave "clear channel" reception of an otherwise smothered signal.

It was truly amazing to see the "in" and "out" comparisons: The difference went literally from no discernable signal to only the desired signal. A radio ham friend of mine could not believe I was accomplishing this with inductance switching until I opened the box and showed him. I ultimately added a

series tuning capacitor for "fine tuning," which made it a series resonant device.

■ Other Tuning Tricks

Here are some other tips that are useful for general SWLing at any frequency. One trick I have found to be quite effective when trying to receive an AM shortwave broadcast through adjacent channel interference is to use the upper or lower side band (USB or LSB) functions. Often by choosing one or the other sideband and zero-beating the desired signal, remarkable improvement in isolation and clarity results.

The nulling feature of a homemade wired loop or a ferrite stick can also produce excellent rejection results if the direction of arrival of the competing signals is more than a few degrees different. Commercially available loops can eliminate or greatly reduce undesired signals on the same frequency by nulling out or greatly reducing the strength of the offending signal. Also, the judicious adjustment or RF gain (or an attenuator) can produce improvement.

■ Protection from Too Much Signal

While a seagoing Radio Officer I was obliged to protect the sensitive inputs on my personal radio from very strong radio energies (RF) from the ship's several transmitters. Once I neglected to disconnect the antenna from my receiver, and the powerful RF field literally charred some front end components. To prevent a recurrence of this disaster I designed a protective circuit which worked excellently.

Ahead of the antenna input of the receiver I put in a circuit with a 60-milliampere pilot lamp (type 49, pink bead), and back-to-back diodes. It did not affect normal incoming signals (the lamp's cold resistance is low) but

in the presence of strong RF fields the diodes conducted, placing one end of the filament to ground.

If the coupled energy were excessive it acted as fuse, opening the antenna circuit and protecting the receiver input. This necessitated replacement of the lamp, but it was much preferable to having irreplaceable components damaged.

A word about the diodes: Use common diodes such as the 1N4001, or others with 500 ma. to 1 ampere rating at 50-200 p.i.v. Do not use sensitive RF signal diodes; we don't want signal detection at this point, and they are not rugged enough.

The circuit worked so well that I was asked to make and install them for the captain and other shipmates. One time while coming into a port I noticed the lamp was flickering. The cause turned out to be an AM broadcast transmitter about a mile distant! So it sure 'nuff works.



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Why We Do What We Do

Every now and then you run into someone in the consumer electronics industry who asks, "Why would anyone want to own a scanner?" These are people in the business of selling the product and yet they can't understand why anyone would want to own, operate, listen to, or even look at a scanner. "What's the purpose of it," they ask incredulously, "why do you need to know what the police are doing?" These people see that the product is selling, so they accede to customer demand and continue to stock scanners; yet, they can't understand why the customers want them.

While there is a level of ignorance in some circles of the business (as there certainly has been in the federal government), there are many others, gratefully, who appreciate the value of the scanner. We did get to thinking recently though about why we do scan. What is it that captures our interest? What is it that keeps us coming back to that volume and that squelch knob, that scan and manual key, when we could just as easily hit the up arrow on the remote control and select a boob tube channel to keep us hypnotically transfixed?

Setting aside the Letterman-like humor, here is my Top 10 list of reasons why we scan. I would appreciate hearing your thoughts on this matter as well. Perhaps we need to have a pamphlet at the ready, or at least a ready list of answers, for those industry (or congressional) suits who question our hobby and, for many, our profession.

10. We scan because we're fascinated by communications. We're fascinated by radio technology, the challenge of finding new frequencies, piecing together radio systems, and understanding the intricacies of how it all works.
9. We're concerned about our own, and our neighbor's, safety. We're members of crime watch groups and there's value in learning about crime in our area.
8. We're in the two-way business and scanners help us determine available frequencies, tone codes, and other information that's important to our business.
7. We're rail-fans or air-fans who don't really care about scanning *per se*, but by scanning we can learn more about and better enjoy our primary hobby.
6. We're truckers and we want to keep up-to-date on road conditions and police activity.
5. We're firefighters who need to know what's happening in our community while off-duty or on-call.
4. We're news photographers and reporters who are responsible for uncovering the stories that are reported on TV, radio, and in the papers.
3. We want to know where that police car, fire truck or ambulance is going that just passed our house and why it's going there.



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2. We're auto racing fans who like to listen to the drivers talk to the pit crews.
1. We like to hear the news as it happens.

If you take all the above reasons and boil them down: we just want to know what's going on around us. We're taking a proactive approach in learning of this information practically firsthand. We're not waiting for the TV news or for the paper the next day. We're curious, sure, but that's only human nature. Businesses have done quite well appealing to human nature.

This then begs the question about how we first became interested in scanning. Was it through watching TV shows such as *Emergency* or *Cops*? Was it by seeing a scanner at a neighbor's house? This is not trivial curiosity: To encourage the industry to give more credence to scanners, develop new models, and advertise them as well, it's important to be able to present a cogent argument as to not only why we scan, but how business can entice that potential first-time scanner buyer to actually plunk down the \$100-plus dollars to scan.

Scanners first gained immense popularity during the race riots of the late 1960s. With Vietnam war protests, racial and other civil strife in the country, many people were holed up in their homes, fearful for their lives. News organizations were not as ubiquitous as they are today. There was no CNN News or local news live all day long. People were unsure what actually was happening down the block or the next neighborhood over. The scanner filled that void.

Today, with the immediacy of news on TV, cable, satellite, and the Internet, you could make the argument that there is less need to use

a scanner to learn what is happening outside the walls of one's home. We're thankful, too, that there is no widespread civil strife in the nation as there was some 25 or 30 years ago.

Why then do we scan? If you're not in public safety, in the news media, a trucker, or a race fan, there is no simple, one sentence, answer. We scan for an amalgam of reasons. So much of our time today is spent in our own homes, watching TV or surfing the Net. We drive home at night, drive into our garages, and shut out friends living next door. The scanner does provide us a way to keep in tune with what is going on in our community real-time.

In addition, it allows us to imagine ourselves in that police officer's shoes as he tracks down a suspect in an urban back-alley; to sense the heat and the pressure that firefighter is feeling as he hoses down a 3-alarm blaze. It allows us to feel the tension, prayer and hard work as that EMT works to resuscitate a dying man.

A scanner, unlike most TV, provides true-life immediacy. If only we could get that across to friends who don't scan, or to industry professionals, who don't understand why we do what we do.

■ City of Regina Trunking Radio Fleet Configuration

From George Sharp of Radio Communications Consulting comes some very interesting Canadian trunking data. Here's hoping we see more trunking information from countries other than the United States:

(Type 1, Map E1, P3)

Police		
100-0	Major Incident Com.	7A
100-1	Main Dispatch	1A
100-2	Information (C.P.I.C.)	2A
100-3	Tactical Three	3A
100-5	Bylaws and Parking	5A
100-6	Tactical Five	5B
100-7	Tactical One	1B
100-8	Tactical Two	2B
100-9	Tactical Three Bravo	3B
100-10	Detectives	6A DVP
100-11	Surveillance	6B DVP
100-13	City 1	4B
100-15	Tactical Four	4A
Fire		
200-1	Main Dispatch	1A
200-2	Fireground	1B
200-3	Fireground	2A
200-4	Fireground	2B
200-5	Fire/EMS Shared	3A
200-6	Inspectors	3B
200-7	Arson Squad	4A
200-8	Administration	4B
EMS		
200-9	Station Alerting	
200-10	Main Dispatch	1A
200-11	Patch to General Hospital	2A
200-12	Patch to Pasqua Hospital	3A
200-13	Patch to Plains Hospital	4A
200-14	Tactical One	6A
200-15	Supervisors	8A
Public Works/Engineering		
300-1		1A
300-2		1B
300-3		2A
300-4		2B
300-5		3A
300-6		3B
300-7		4A
300-10	Link to Police	
300-15	Animal Control	

Transit

400-1	Paratransit Primary	"A"
400-2	Paratransit Calling	"B"
400-3	Main	"A"
400-4	Calling	"B"
400-5	Links to other Depts./Supervisors	
400-7	City of Regina testing	
400-10	Engineering/Mechanical Devices	

500-0	SCANA Center Authority/Police and Operations
500-1	Correctional Center (outer security and escorts)
500-2	Correctional Center (inside security)

Parks and Recreation

600-1	
600-2	
600-3	
600-4	
600-5	
600-6	Transit (Link to Police 911)
600-7	Taylor Field
600-8	S.E. Leisure Center
600-9	Lawson Center

System Frequencies

853.23875	Voice, System ID
853.5375	Phone Patch
853.7875	Phone Patch
854.0375	Phone Patch
854.2875	Police
855.0375	Data and Voice
855.2875	Data and Voice
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857.0375	Voice
857.2375	Voice

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TrunkTracker Tips

Brian Cathcart, KE4PMJ—alias “The Scanner Dude,” a south Florida resident expert on scanning and trunktracking—passed on the following tip on the TrunkCom list server recently:

“At the recent Miami Hamfest a fellow TT user passed on a *great* tip that’s not in the manual (or at least not the manual I have). To go directly to a stored TT ID in memory, press the number of the trunking bank plus the number of the trunking memory and press enter, and the TT will go directly to that memory! Thus, to go to ID memory bank 5, ID channel 6, enter “5-6-ENTER” and it’ll go directly there. Another example: I have Broward County Fire-Rescue “North” channel (8208) in bank 3, channel 6. I press 36 then ENTER, and it goes directly there. You have to be in trunking mode and tracking a system, and you have to be scanning or holding on one of the ID memories. In other words, you cannot do this while in ID SRCH mode.”

[Editor’s Note: Brian left one important item out. You need to hit the Manual key first before hitting the bank and channel numbers.]

Brian also answered a question that was posed on TrunkCom about communications in the Stuart and Martin County, Florida, area.

“Martin County is on a 14-channel EF Johnson analog system. Police, fire, and local government is using it, except the units in Indiantown who use 867.0125 PL 156.7 (NPSPAC TAC 1) for operations. Also the fire department still uses their old VHF system. Trunked system frequencies:

866.2250	866.5625	867.6375	868.5375
866.2625	866.6625	867.6750	868.5750
866.3750	866.7875	867.8875	
866.5375	867.1750	868.3250	

Stuart is not licensed on a trunked system — they are either on their VHF/UHF channels or on Martin County’s system.

The nearest Public Safety system that would be trackable with the TrunkTracker is West Palm Beach, but that is too far to be received in Stuart. There are, however, several commercial trunked SMR’s in the area, but I do not have any trunking info on them, other than the fact that Nextel (who owns most of them) will be shutting off *all* analog systems February 28. Hope that helps!”

Reader Responses

Jerry Smith wrote us in response to a recent story on winter scanning. We made some suggestions on how you might wish to program your scanning for winter monitoring. Jerry has some ideas of his own:

“I read with interest your Winter Scanning article in the Dec. 97 issue of *MT*. One of the questions is in the sub-article ‘Programming Problems.’ I would like to share my setup to get around this problem. But I think a lot depends on where a person lives. I live in the western suburbs of Chicago. There are many towns that I could listen to and the amount of frequencies are plenty. Here is an idea of how my Uniden 3000 is set up.

Bank 1 – Local police bank. I program the sheriff’s office, the local police and the closest surrounding towns that border my city.

Bank 2 – All fire departments. Fire departments are not too busy in the suburbs except during a major storm or other event. So all towns of interest are plugged into here, including fireground.

Bank 3 – I work in another county. So, that county’s police and sheriff are plugged into this bank.

The first three banks are of major interest, so they are the first to be programmed. Other listeners may have a different set of priorities.

- Bank 4 – This is the bank for police departments that border out further from bank 1 frequencies. These are usually towns that are the second or more towns of interest away from my home.
- Bank 5 – This is programmed with local tactical frequencies.
- Bank 6 – Medical frequencies (MED1, MED2...154.3400, etc.).
- Bank 7 – State Police.
- Bank 8 – Trunked system in Naperville.
- Bank 9 – ComEd electric company.
- Bank 10 – Road and severe weather frequencies.
- Bank 11 – Chicago Police zone frequencies.
- Bank 12 – Chicago Police citywide frequencies.
- Bank 13 – Chicago Police tactical frequencies.
- Bank 14 – Empty
- Bank 15 – District 15, Illinois State Police Tollway
- Bank 16 – Mutual Aid frequencies.

“Monitors living in a city like Chicago could use something similar. I wouldn’t put all of the suburban and city fire frequencies in the same bank, however. Too much activity in a city like Chicago.

“The listener should decide what the priority of his listening is. In the above example in my setup, only banks 1, 2, 3 and 16 are being scanned 90 percent of the time. This is because on some frequencies, three departments are using one frequency.

“Too many frequencies being scanned at the same time may result in a very important dispatch being missed in a town of interest. If I programmed all the police into the first 5 channels in bank 1, I would be listening to 15 departments being dispatched! Experience and listening priority is the deciding factor in how to program channels and banks. I don’t think fire and police departments should be mixed together. It is too difficult for me to remember which frequency is in what bank. All I need to know is that local police is in bank 1, and fire departments are in bank 2, and turn it on.

“Hope this gives others some thoughts on how to ‘customize’ how they would like their scanners to perform. Keep up the good work. I enjoy your column every month.”

Jerry Smith

jarrett.smith@worldnet.att.net

Chicago Area Radio Monitoring Assoc. member

CARMA Web site...<http://www.theramp.net/shabec/carma.htm>

Big News in Scanner Land

Here’s a look at some of the more technical issues we’ll be addressing in the coming months:

A report on the recently reformed UHF TV band. If your scanner doesn’t cover 746 through 806 MHz, you might find yourself missing public safety transmissions soon.

A report on the new public safety and commercial “pool” licensing procedures and what that means for determining frequency usage. Within the last month (January), we’ve begun to see new and renewed licenses under this pool heading, which is akin to a local government (PL) wildcard designation. A 155.250 police frequency may now receive this designation making it more difficult to identify actual usage. The hows and the whys in an upcoming issue.

UHF trunking is on the rise. We’ll report on where it’s currently found and if there’s any way you can track it.

I’ll report on a neighbor to whom we gave a scanner as a gift. She went from never really knowing anything about scanners to becoming a budding scanner-head. We’ll ask her why she scans.

We would love to hear your suggestions on other story ideas. Please write to me care of *Monitoring Times* in Brasstown or send e-mail to me at: scanmaster@aol.com.



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Does Anybody Really Know What Time It Is?

You've heard WWV. Everyone has. It ticks away. You set your radio's clock and dial calibration, and then forget about it. Or do you?

There's something compelling about these transmissions. When I was but a young radio nerd, I loved WWV/WWVH, perhaps more than was healthy for a boy's development. In my defense, though, I was hardly the only weird kid who walked around school imitating its clockwork sounds and canned voices.

WWV always made my mother nervous, as it counted off the seconds of our lives. She grumbled and called it, "Old Mortality," but she couldn't do anything about it. We were most definitely a WWV family. I still can't imagine life without it.

WWV began transmitting from Washington, D.C., in March of 1923. NIST says that the call letters don't stand for anything, though others have suggested "World Wide Voice." The station moved to Maryland in 1943, and Fort Collins, Colorado, in 1966. Another station, WWVH in Hawaii, went on the air in 1948, and moved to its present site in Kekaha, Kauai, Hawaii, in 1971.

In the 1950s, experimental broadcasts began on very low frequencies, in an effort to increase accuracy at receiver sites by using the more consistent ground-wave propagation. This transmission continues as WWVB, on 60 kHz, also from Fort Collins.

WWV's current frequencies are 2.5, 5, 10, 15 and 20 kHz. Power is 2500 watts on 2.5 and 20 MHz, 10 kW on the rest. WWVH is co-channel, except that it no longer uses 20 MHz. Power is 5 kW on 2.5 MHz, 10 kW on the rest. WWVH was originally intended for American personnel in Asia, and all but its 2.5 MHz antennas beam away from the con-

tinental U.S.. If its low radiated power is consistently overwhelming WWV stateside, it's a good indicator that the skip has switched around to the Pacific.

WWVB has recently increased power, making it easier to receive with consumer-grade equipment. A number of very low-priced clocks are now available that synchronize themselves to the received signal. Dial in the propagation delay once, and you're in business from then on.

WWVB broadcasts no audio signal. All information, most of it digital, comes from phase or amplitude changes in the carrier. It's really catching on as a frequency standard.

WWV's recorded announcements always use male voices, and WWVH always uses a female. It's traditional that the lady says, "Aloha," at the end of the station identification. A few years ago, WWVH got new recordings minus the aloha. Users complained bitterly, and we got our aloha back, albeit in a slightly different voice.

These male and female voices are staggered so they don't interfere, and we often hear both. Since these are standard frequency stations, they don't heterodyne.

All of these stations verify reports by QSL card. It's about the easiest QSL you'll ever get, and it's a nice conversation piece.

Few people ever realize what a fantastic source of information WWV is. It's operated by the National Institute of Standards and Technology, an Executive agency that replaced the old National Bureau of Standards some years back. It derives its time, and all its frequencies, from several atomic standards.

All WWV's info is the best available, at least over the radio. Every little voice, tick, beep, and buzz means something extremely important to someone, somewhere.

■ Voices

WWV and WWVH maintain an hourly schedule of short announcements of interest to navigators, scientists, and shortwave radio users. Since all these have to fit into a 45-second interval, they make a quick and painless source for marine weather warnings or information on the Global Positioning System. There's also a solar-terrestrial "Geoalert" at 18 minutes (WWV) or 45 minutes (WWVH) after every hour. This Geoalert may sound like gibberish at first, but its arcane words and numbers can be sorted out into information of great interest to anyone doing short-term, HF propagation forecasts. It's probably of more interest to DXers than utility listeners, but it warrants a whole column on its own, so we'll hold off on that until some later point in the rise of solar cycle 23.

The voice schedule is available on the World Wide Web, in radio publications, or from NIST, whose phone numbers appear in the sidebar. When either station is doing an announcement, the other one mutes its audio tones.

■ Ticks

		0			45			52.5			60			0			45			52.5			60					
WWV	500 Hz	T	I	C	I	D	600 Hz	T	I	C	I	D	500 Hz	I	D	T	I	C	I	D	600 Hz	T	I	C	I	D		
	Annr Or Tick	C	K	D	C	K	Annr Or Tick	C	K	D	C	K	Annr Or Tick	C	K	D	C	K	D	C	K	Annr Or Tick	C	K	D	C	K	
WWVH	600 Hz	I	D	T	I	C	500 Hz	I	D	T	I	C	600 Hz	I	D	T	I	C	I	D	500 Hz	I	D	T	I	C	I	D
	Annr Or Tick	D	C	K	D	C	Annr Or Tick	D	C	K	D	C	Annr Or Tick	D	C	K	D	C	I	D	Annr Or Tick	C	K	D	C	K	D	C
		Odd						Even								Odd						Even						

The most obvious WWV service is the time of day. Now, everyone knows what time is. You set your watch to it. If you don't, you're late to work. Time is taken for granted more than anything else in life. Timekeeping, though, is a complex business: almost a craft.

WWV's time is UTC, Coordinated Universal Time. There's nothing fancy about this abbreviation, UTC. It's not French or anything that romantic. Timekeepers don't do romance.

What really happened was that several Universal Time scales, most popular being UT1, were devised to solve problems inherent in navigators' use of the older Greenwich Mean Time. As a local mean solar time, GMT was not equally accurate for "sun shots" anywhere in the world. UT scales, as corrected for eccentricities in the Earth's orbit, came a lot closer. When yet another UT scale was devised, the series was maintained and called UTC.

As a coordinated time, UTC is an attempt, and a pretty good one, to reconcile different needs of different users. Scientists need precise, atomic time to measure intervals, or else the universe becomes an even more bizarre place than it is already. But the problem with atomic time is that it's *too* good. It runs into that Earth orbit and rotation problem again. Its time of day drifts ever farther out of sync with UT1, and thus with the real world. Therefore, UTC provides an atomic second, which is periodically corrected to UT1 by insertion of the infamous "leap seconds."

Here's a nice trick to amaze your friends. Listen to the first sixteen seconds of each WWV/WWVH minute. Count which ones have little, double ticks. These are the correction, in tenths of a second, needed to determine UT1 from UTC. The first eight are positive, the second eight are negative. Do the arithmetic, and there's your UT1. Also, if there get to be seven or eight of these, bet your shirt that there'll be a leap second next December 31 or June 30. People will think you're psychic, or at least some kind of Government agent.

Beeps

Every tone on WWV means something. Audio frequencies, just like the radio frequencies, are as close as possible to standard. Plenty of people tune guitars and pianos to their musician's "A" at 2 minutes after all except the 0000 hour UTC. These are also used to tell automated chart recorders in labs when to make their hourly and daily marks.

NIST Phone Numbers

Computer Time Service	(303) 494-4774 (ASCII)
Engineer-in-Charge, WWV	(303) 484-2372
Engineer-in-Charge, WWVH	(808) 335-4361
Geolert	(303) 497-3235
Group Tour Information	(303) 497-5507
NIST Office	(303) 497-3294
WWV Audio Signal	(303) 499-7111
WWVH Audio Signal	(808) 335-4363
These are all toll calls, but time and Geolert checks tend to last one minute or less.	

The other audio tones, alternating 500 and 600 Hz, are used by power companies worldwide. Their subharmonics, 50 and 60 Hz, are good for synchronizing AC generators.

Each minute has a 1000 Hz (WWV) or 1200 Hz (WWVH) beep, perfect for setting watches. The tones at the top of the hour, however, are 1500 Hz, the only time these appear. They're perfect for keying receivers in broadcast stations, for a quick and dirty time beep. This explains the, "National Institute of Standards and Technology Time," announcement that immediately follows, because this must also be aired to stay legal when doing this.

Buzzes

WWV's ticks, themselves comprised of standard audio tones and intervals, are made more audible by the muting of the continuous tone, when one is present. If reception is good, and your radio is set to pass low bass, you'll probably hear a buzz of approximately 100 Hz during and just after each tick. It sounds really neat. People have used it in electronic music (but these are not the kind of people we wish to discuss here).

These buzzes are a complex computer code, in a Binary Coded Decimal (BCD) format. Each buzz contains a large number of values which can be processed by simple software to extract all sorts of information. Some people might remember the Heath "Most Accurate Clock," which did just that, receiving and decoding the HF signals. There's also an Automated Computer Time Service (ACTS), but this uses dialup modems.

Carriers

Finally, WWV is a great signal generator. Its steady carrier, itself as close to a standard radio frequency as propagation permits, is great for calibrating receivers, aligning notch filters, or just detecting any SSB (single sideband) signals on the channel.

This last one sounds kind of silly, but it

explains why so many people hear Spanish on WWV. If you think about it a bit, this unwavering carrier is the perfect BFO, the beat frequency oscillator that's more typically generated in your radio's IF (intermediate frequency) to render sideband signals intelligible. If only the BFO in my old Hallicrafters were so stable!

Now, why the Spanish speakers would use such conspicuous frequencies is one of the great mysteries, but they certainly do. Perhaps they have ham transceivers with a WWV switch for calibration. Don't laugh. Every so often, you'll hear a ham give a call on 10 or 15 MHz, usually ending with an embarrassed silence. Oops.

Anyway, one group has been camped on 10 MHz since at least 1993, and occasionally these or other Spanish speakers are heard on 15 MHz as well. They love to whistle, something of a standard procedure in Latin America, and once I even heard one of them whistle the entire French national anthem. Here is the sort of heavy-duty weirdness that helps keep our hobby so compelling.

Now, who says WWV is dull?

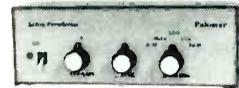
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Hugh Stegman

Abbreviations used in this column

AFB	Air Force Base	GHFS	Global High Frequency System
ARQ	Automatic Repeat Request (a digital mode)	MWARA	Major World Air Route Area
ARQ-E3	Single channel ARQ teleprinter system	NORAD	North American Aerospace Defense Command
CAMSPAC	Communications Area Master Station Pacific	Piccolo	6- or 12-tone multi-frequency shift keying teleprinter system
Canforce	Canadian Forces	RAF	Royal Air Force
CP	Command Post	RTTY	Radioteletype
CW	Continuous Wave (Morse code)	SAM	Special Air Mission
DSN	Defense Switched Network (formerly AUTOVON)	SITOR	Simplex Teleprinting Over Radio
EAM	Emergency Action Message	SITOR-A	Simplex Teleprinting Over Radio, Mode A
Fax	Facsimile	USAF	U.S. Air Force
FEC	Forward Error Correction (a digital mode)	USCG	U.S. Coast Guard
FEC-A	One-way traffic FEC teleprinter system	VIP	Very Important Person
		VOLMET	Flying Weather" (from French)

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

- 2901.0 Gander Radio, Canada, air route station working Razor 616, an FB-111 from Pease AFB. (Rick Michaels-Idaho)
- 2902.0 U1XA working YU1, VE7, GDJ at 0316. (Michaels-Idaho)
- 2973.0 Gander Radio, Canada, working Jamaican 001 and Delta Papa?? at 0331. (Michaels-Idaho)
- 4724.0 Offutt GHFS with 6 character EAM "for Jonathan," rebroadcast on 8968 and 8992, at 0945. Reach 5234 (Air Mobility Command) requesting phone patches through MacDill GHFS to Hilda East and to meteorological office at 0948. (Michaels-Idaho)
- 4880.0 ULX-Mossad, Israel, with usual female phonetic repeat of callsign, at 2300. (Jack Dix-New York)
- 5547.0 San Francisco (MWARA) working Delta 881, Singapore 1, possibly Southern 328, given 2869.0 as secondary freq at 1009. (Michaels-Idaho)
- 5574.0 San Francisco (MWARA) working Connie(?) 975, New Zealand 1, and United 841. Gave 3413.0 as secondary and 5643.0 at 0705. (Michaels-Idaho) "*Connie*" is a group callsign for the cargo airline owned by ex-drag racer *Connie Kalitta*. -Hugh
- 5673.0 Beijing-Beijing Radio, China, with VOLMET weather using "female" synthesized voice at 1139. (Jerry Brookman-Alaska)
- 5800.0 Applicant-USAF calling Nightwatch on Z150 for radio checks. Also mentioned Z125 (4495.0) at 0425. (Michaels-Idaho) Nightwatch 01-USAF airborne command post working WAR 46 and Furlough, then went to Z211, at 1509. (Jeff Haverlah-Texas)
- 6697.0 MKL-RAF, Scotland, radio checks with 6Z1, then "immediate" grade traffic at 2253. (Haverlah-Texas)
- 6712.0 Offut GHFS-US Air Force, NE, with a 25 character EAM broadcast at 0556. Andrews AFB (MD) with two EAMs 25/26 characters at 0733. (Michaels-Idaho)
- 6715.0 Nightwatch 01, USAF, setting up data links with McClellan AFB, California. Ground asked if aircraft was in sync, was advised that the "new system is computer controlled and does all that for us," at 0655. (Haverlah-Texas)
- 6716.0 Primero and Radio Segundo-unid Spanish stations with personal comms, whistling, and calling Carolina Maria Loretta at 0209. Yes, this is Mystic Star F-090. (Michaels-Idaho) *Doesn't sound like Mexican army, probably more bootleggers*. -Hugh
- 6960.0 Unid-English "counter" female numbers, then 3/2 groups at 2317 (Dean Burgess- MA) *These are from the same station as the Spanish 4-digit number counter* - Hugh
- 7726.0 Unid-Spanish female 5 digit numbers at 0530. (Michaels-Idaho)
- 8492.0 P-Russian Navy channel marker, Kaliningrad, in CW at 0859. (Ary Boender-Netherlands)
- 8532.0 LZW 42-Bulgaria, with CW traffic list at 0908. (Boender-Netherlands)
- 8968.0 Offut GHFS with patch from ECHO PAPA 766 to DSN 476-2352 (Brunswick meteorological office) at 2202. (Michaels-Idaho)
- 8983.0 CAMSPAC Point Reyes-USCG, CA, working Rescue 1705 with position check. East Pacific Rescue Coordination Center asked to speak to the person who caused the Medevac patient's injuries. The Lieutenant would be at the airport to talk to the flight nurse. Heard at 0309. (Michaels-Idaho)
- 8968.0 Stingray 891-US Customs patrol vessel, with patch through McClellan Global (CA) to Nightwatch, given Z190 (10204.0) and Z120 (3295) for further patches. (Michaels-Idaho)
- 8989.0 Canforce-Canadian Forces and RAF, working Aussie 024 and 025, changing to "84 Delta" (6730). (Michaels-Idaho)
- 9010.0 Charlie Oscar 415-Canforce working Vancouver Military, advised to close radio watch at 0004. (Michaels-Idaho)
- 9016.0 Nightwatch 01-USAF, working WAR 46, WAR 46 Mobile, and Mandatory at 1918. (Haverlah-Texas)
- 9023.0 Sidecar-Canadian NORAD op center, working Alpha 4 Yankee with tracking comms, advised to change a track to "friendly." Also Spanish female 5-digit numbers in AM, at 0812. (Michaels-Idaho) *Agreed that those Cuban (?) "ladies" do come up on interesting freqs.* -Hugh
- 10204.0 Stingray 891-US Customs Patrol Vessel, calling Nightwatch (Airborne CP) on Z190, no joy, from 8968.0 at 2112. (Michaels-Idaho) Foghorn-USAF, working Nightwatch 01 at 2258. (Haverlah-Texas)
- 11175.0 Roller 20-USAF, with patches through Hickam AFB, Hawaii, to Lockheed and Allison technical support for abnormal engine indications on C-130 tail number 612361. Ground had trouble finding anyone who could advise, at 1830. (Dick Dillman-California) Thule Global-USAF GHFS, Greenland, with 161233, who had tried to call Albrook on 11176. Thule advised the aircraft that Albrook was off air, and the GHFS frequency was now 11175, all at 2342. (Michaels-Idaho)
- 11181.0 Nightwatch 01-USAF, working Red Apple at 2346. (Haverlah-Texas)
- 11244.0 King 33/Air Force Rescue 33-USAF Aerospace Rescue and Recovery Service fixed-wing aircraft with numerous patches to Rescue Ops concerning British crew of ship in distress. Massive op with AF Rescue 31 and 32 (helos), and Coast Guard 6033, all at 1622. (T. Vlismas-Wales, UK)
- 11181.0 SAM 202-USAF VIP flight, working possibly Andrews at 1745. Knight 01 (or NIGHT 01)-USAF, with patches through Andy to Raymond 24 (Tinker AFB, OK) regarding radar maintenance, at 1818. (Haverlah-Texas)
- 11232.0 Bandsaw Golf-Canforces, with several patches through Trenton Military to Deer Hunter (NORAD, Canada) regarding "battlestaff format training." (Haverlah-Texas)
- 11246.0 Lockheed 5016 (?) trying to raise MacDill on its old frequency, tried both upper and lower sidebands, at 1812, no joy. (Haverlah-Texas)
- 11460.0 SAM 202 and SAM 375-USAF VIP flights, probably same mission, working Andrews AFB at 2019. (Haverlah-Texas)
- 12070.0 Nightwatch 01-USAF, working Furlough and Railroad, at 1512. (Haverlah-Texas)
- 13444.0 RFQP-Russian Embassy, Djibouti, using ARQ-E3 (96/400) at 1530. (Bob Hall-RSA)
- 13953.0 RFGW-Russian embassy, Paris, with 5 letter code groups to several stations, in FEC- A (192/400) at 1602. (Hall-RSA)
- 16084.0 Unid-Lincolnshire Poacher, UK numbers station, with musical tune and female giving 5 number groups, at 1507. (Dix-New York)
- 16148.0 Unid station using Piccolo at 1125. (Hall-RSA) *Could be British military traffic.* - Hugh
- 16976.0 LSD 836-Buenos Aires Radio, with SITOR-A idler and CW identification, at 1415. (Dix-New York) *Globe Wireless' new station in Argentina. Trippy callsign.* -Hugh
- 17427.8 9VF209-Kyodo News Service, Singapore, with newspaper Fax (60/576) in Japanese at 1636. (Hall-RSA)
- 17428.7 SAM-Swedish Ministry of Foreign Affairs, Stockholm, with traffic, some in 5-number code groups, to Moroccan embassy, in Swed-ARQ (100/400), at 1230. (Hall-RSA)
- 19724.7 UIW-Russian Navy, Kaliningrad, busy with RTTY (50/170) ship traffic at 1322. (Hall-RSA)
- 22390.0 NMO-US Coast Guard, HI, with CW markers at 2238. (Brookman-Alaska)
- 26441.7 KFS-Globe Wireless, CA, with CW marker at 1830. (Brookman-Alaska) *Huh? An out of band spurious or image?* -Hugh



Mode of the Month — SITOR-B

Last month we focused on the SITOR Mode A of the Simplex Telex Over Radio (SITOR) code. SITOR B (a.k.a. FEC - Forward Error Correction) is a continuous stream of 100 Baud data bits and has a characteristic singing sound associated with its transmission. Signals typically have a short idling phase and move directly into traffic and then terminate abruptly.

SITOR Mode B is a broadcast-only mode from one station to several other stations. Error correcting is done automatically at the transmitting station (hence the designation "Forward Error Correction") and there is no feedback from the receiving stations. Each character is actually sent twice, with four control characters occurring between the first and second transmission of a single character. Not only is each character sent twice, but special error-correcting tests are done on each character sent.

The Collective B format is most common. A special phasing signal is sent at the beginning of the transmission and at the end of each line. The Selective B format is less common in which the phasing signal is sent only at the beginning of the transmission. SITOR transmissions are generally about 95% error free.

Unlike SITOR A, Mode B is generally used as a broadcast mode by coastal maritime stations transmitting news, weather and traffic roll calls to all vessels in their area. Most coastal stations tend to use their own local languages, but many repeat their transmissions in English as well.

This mode is also used by the Ministry of Foreign Affairs (MFA) and embassies of Egypt, Tunisia and Pakistan. PAP Warsaw, the Polish Press Service, also uses Mode B for some of its transmissions. When used by amateur radio operators, it is often referred to as AMTOR (Amateur Microprocessor Teleprinting Over Radio).

■ GMDSS—Global Maritime Distress and Safety System

In 1979, a group of experts drafted the International Convention on Maritime Search and Rescue, which called for development of a global search and rescue plan. This group also passed a resolution calling for development by

the International Maritime Organization (IMO) of a Global Maritime Distress and Safety System (GMDSS) to provide the communication support needed to implement the search and rescue plan. Other SITOR-B related parts of this system include NAVTEX and DSC, as follows.

■ NAVTEX (Navigational Telex)

NAVTEX provides navigational and meteorological warnings and other urgent information from coastal stations on a frequency of 518.0 kHz. The modulation and teleprinter system used is NBDPT (Narrow-Band Direct-Printing Telegraphy) SITOR-B.

■ DSC—Digital Selective Calling

Digital Selective Calling is a variation of SITOR-B's 100 baud 170 shift, but uses a special set of 127 symbols with a 10 bit error correcting code. It is used for transmitting distress alerts from ships and for transmitting the associated acknowledgments from coast stations.

Each call consists of a packet of digitized info of one of four priorities: Distress, Safety, Routine or Urgency. Messages can be routed to "all stations" or to selected stations by using their selective calling (selcal) code. Distress messages are automatically broadcast to all stations. Terrestrially there are a number of channels allocated, one on MF (2187.5 kHz), five in the maritime HF bands (4207.5, 6312, 8414.5, 12577, 16804.5 kHz), and one in VHF

(Ch. 70 - 156.525 MHz). All these channels are simplex.

DSC is further used for establishing ship-shore communication. A number of paired (duplex) HF channels have been allocated in the maritime bands for this purpose.

■ Decoding SITOR-B

As with SITOR-A, almost all decoders include the SITOR-B mode, from the most rudimentary to the most sophisticated. NAVTEX is easily decoded as well, but to decode GMDSS/DSC transmissions, you will require one of the newer decoders, since the alphabet and error-correcting protocol is different.

■ Coastal Station SITOR-B Frequencies

The maritime bands are divided into frequency bands for fixed coastal stations and mobile bands for ships. A good place to easily locate SITOR-B transmissions are in the coastal station bands. Tune between the following frequencies: 6314.0 to 6330.0 kHz, 8415.0 to 8437.0 kHz and 12579.0 to 12658.0 kHz. There may be several stations from different countries on the same frequency, so you may see several languages. Frequency spacing is generally .5 kHz apart. Since most of these broadcasts are scheduled in nature, they tend to take place at the same time past the hour. Their duration may be from two to five minutes in length.

Good luck and good hunting until next month.

Where to find SITOR-B

Ship / Shore DSC Frequency Pairing

Coast Frequencies

1621.5 (rptd Norway), 1624.5 (rptd Denmark/Faeroes), 2177.0, 2177.5, 4219.5, 4220.0, 4220.5, 6331.0, 6331.5, 6332.0, 8436.5, 8437.0, 8437.5, 12657.0 (rptd used by WLO), 12657.5, 12658.0, 16903.0, 16903.5, 16904.0, 19703.5, 19704.0, 19704.5, 22444.0, 22444.5, 22445.0, 26121.0, 26121.5, 26122.0 kHz

Vessel Frequencies

2156.5, 2159.5, 2189.5, 4208.0, 4208.5, 4209.0, 6312.5, 6313.0, 6313.5, 8415.0, 8415.5, 8416.0, 12577.5, 12578.0, 12578.5, 16805.0, 16805.5, 16806.0, 18898.5, 18899.0, 18899.5, 22374.5, 22375.0, 22375.5, 25208.5, 25209.0, 25209.5 kHz

Distress and Safety Communications HF Freqs for GMDSS

DSC

2187.5, 4207.5, 6312.0, 8414.5, 12577.0, 16804.5 kHz and 156.525 MHz

NBDP

2147.5, 4177.5, 6268, 8376.5, 12520, 16695 kHz



Glenn Hauser, P.O. Box 1684-MT, Enid, OK 73702
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More Catholic than the Pope?

According to an article in the January 30, 1998, *National Catholic Reporter*, Los Angeles cardinal Roger Mahony has filed an official complaint to the Vatican about Mother Angelica, the owner and operator of WEWN "Catholic Radio" and EWTN cable TV network. Mahony has accused Angelica of violations of Canon Laws which require respect for church hierarchy, and forbid inciting ecclesiastical disobedience. The article indicates that the Cardinal's actions were caused by statements made by Angelica on her November 12, 1997, live broadcast, when she accused Mahony of being a heretic, and called on her audience to practice "zero obedience" to the Cardinal's wishes. According to the article, Mahony is seeking an "interdict" on WEWN/EWTN — a sanction widely used in the Middle Ages, effectively suspending

church membership rights.

The article describes how Angelica, at a 1996 "Call to Holiness" conference in Detroit, declared that she would never turn WEWN/ EWTN over to the Catholic bishops, and would "...blow the damn thing up before you [the bishops] get it."

The nun, who has taken lifetime vows of poverty, chastity and obedience, owns WEWN/EWTN in her own name. She often criticizes church officials and institutions by name on the air, accusing them of being too liberal or unorthodox. On camera, she has claimed private revelations from God, predicting worldwide disaster in the next few years—in contrast to the Pope, who has declared 2000 AD to be a jubilee year of celebration in the Church. (Owen Williamson, *Review of International Broadcasting*)

ANGOLA VORGAN, which had been active on 6225 until 2100*, was to close down Feb. 28. Info from a UNITA representative says it started in Jamba with four mobile "containers" as studio and broadcast facilities. With 10 kW transmitters the signal covered Angola well and the government tried everything to destroy VORGAN's effectiveness. VORGAN also relayed BBC and VOA. Angolan media are strictly controlled, independent journalists harassed and even murdered. VORGAN is to become a non-partisan FM station called "Rádio Despertar." Why? To provide jobs for VORGAN personnel and help them reintegrate into Angolan society, but this remains to be seen. It's clear that UNITA was a recipient of CIA funding until mid-1993, including the "containers," which can be seen at <http://www.qsl.net/yb0rmi> (Nick Grace, DC, *Cumbre DX*)

AUSTRALIA R. Australia had to quit QSLing due to budget cuts (gh) We can now issue QSLs for RA: all reports must go to the usual RA address (John Wright, Australian Radio DX Club)

Federal government still deciding on future of Darwin SW site, including whether foreign stations should use it; or it may be sold, separately from sale of Brandon and Shepparton (Matt Francis, *Electronic DX Press*)

BANGLADESH Bangladesh Betar drifted to 4885v from 4880 +1230-1600* with English news and commentary at 1530 //15520v (Sarith Weerakoon, Sri Lanka, *Cumbre DX*) Another day varied to 4879.2 until 1600* (Steve Martin, CA, *ibid.*)

BELARUS R. Belarus International, a.k.a. R. Minsk, English programming includes paid religion on 7210, 7105: Sat 0500-0530, Wed & Fri 0530-0600, Tue 2030-2100, Tue & Thu 2130-2200. One hour earlier in summer (BBCM)

CANADA Host Marc Montgomery has asked me to do a 5-6 minute piece with him on RCI *Mailbag* once every two weeks; definitely not a DX report, but on some aspect of radio, predominantly Canadian-based (Sheldon Harvey, CIDX) Summer timings should include Sun 2030, Mon 0130 (gh)

CBC/RCI semi-harmonics have been heard on 4812.5, 4820, 4877.5 (Bob Hill, MA, *Electronic DX Press*)

CHILE Voz Cristiana is in final stages of starting up with Spanish and Portuguese to Latin America, having bought eight former La Voz de Chile transmitters near Santiago in 1996. Stumbling block is getting a broadcasting license (RN *Media Network*)

CHINA Nei Menggu PBS, Hohhot in Standard Chinese: 2150-0550 and 0950-1515 on 6045, 4620, 4000 (BBCM) And in Mongolian on 4525, 4785, 6195 (Shigenori Aoki, ABI via Tooru Yamashita, *Cumbre DX*) They were off SW for over a year, replaced by satellite (ABI via Ashimori, *Cumbre DX*)

Xinjiang PBS, Urumqi in Std. Chinese 1100-1650, 2330-0730 on 7385, 6100, 4500, 3960 (BBCM) 7385 was also used by CRI in English at 1200-1355, a big problem for RPI (gh)

CRI seems to have activated in Jan four new high-power transmitters at Kunming or some other site in southern China, not to be confused with the new ones at Urumchi in the northwest.

Kunming stands out on 12065, 9457, 7335 kHz. More and more old transmitters are being freed for jamming R. Free Asia (Olle Alm, Sweden, *DSWCI Shortwave News*) New Kunming outlets in SE Asian languages 1030/ 1200: 6010, 7350, 9440, 9870, 9880, 11825 (Bob Padula, *EDXP*) See also SERBIA

COLOMBIA R. Dif. Nacional. 4955, had English show for tourists, *On Line International*, UT Sat until 0220, pause, then *Viva Colombia*, both for listeners abroad (Henrik Klemetz, Bogotá, *DSWCI DX Window*)

The unidentified Antioquian parish broadcaster reactivated on 6201 in Feb, with mass 2300-2359* (Hans Johnson, FL, *Cumbre DX*) Also at 1112-1128, sounded like Greek Catholic mass (Dave Valko, PA, *ibid.*)

CONGO DEM. R. Kisangani has resumed, testing on 11455, per report from Congolese Radio, Kinshasa via BBCM (Dave Kenny, BDXC-UK) May have been this at 1745-1815, test loop with nonstop drumming on 11455-USB without carrier (Harald Kuhl, Germany, *Cumbre DX*)

COSTA RICA RFPI's upgrade plans as explained by James Latham on *Mailbag* starting Jan 23: For the 30 kW transmitter on 7385, going back to a very efficient quad antenna used a sesquyear ago for about 2 months, redesigned and strengthened. Should be on air within a month, much higher gain. This transmitter will also have a frequency synthesizer, allowing quick changes if needed in the 41 meter band.

15050 will change from AM to USB, and from 10 kW to 2 kW, and stay on 24 hours; increase antenna gain 10 dB. 21465 will change from USB to AM, and from 2 kW to 10 kW. Current log-periodic antenna has good gain but fixed toward north, not rotatable. Will add rotor in 6-8 weeks, so can aim toward Europe early in the day, Asia later, as well as E and W NAM on the way; and also aim toward S. Pacific.

6980 will be a backup frequency, maybe used, maybe not. It did remain in use during winter night when 15050 would not propagate.

Phase II plans: in 2.5 to 3 months, tunable curtain antenna covering 6980-7500 kHz, bi-directional N/S and broadbeam, tho aimed toward CNAm, also covering WNA, ENAm, and SAM. The entire project should be completed in about 6 months.

FM 88.3 will move to a mountaintop site owned by UFP, with a breathtaking view of the Central Valley, and greatly improve coverage within Costa Rica. Power has already been raised. (James Latham, RFPI *Mailbag*)

RFPI now has a mirror website at <http://www.belonging.org/rfpi> (Joe Bernard, RFPI)

AWR has a new "3D" QSL card for reports to any of their stations. The letters "AWR" hidden in a floral design can be seen by experimenting with eye focus (*AWR Current*)

CUBA Among the Cuban exile programming picked up by WRMI, 9955: *Foro Militar Cubano*, Sat 2000-2100, Sun 1500-1600; *La Voz del Escambray*, Tue-Sat 0400-0430, *Junta Patriótica Cubana*, UT Sun & Mon 0300-0330, as of Feb (via Jeff White, WRMI) Times may shift an hour earlier with DST, if not totally change by then (gh)

ERITREA [non] Three clandestines which seem to

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

share facilities from Sudan, in Arabic/Tigrigna on 9230 daily. 1500-1530 V. of Democratic Eritrea, which alone has an address in Germany, ELFRC, P.O. Box 200434, Bonn; 1630-1600 V. of Free Eritrea; 1600-1630, timing varies, V. of Truth (BBCM) The three were in a row, separated by time pips at 1532 and perhaps 1602 on a Friday, nothing on Saturday (Richard A. D'Angelo, PA, *DSWCI DX Window*)

ETHIOPIA [non] Rainbow Radio, 11605 via Germany, has good signal Thu 1700 past 1730 in Amharic, music (Nick Grace, DC, *Cumbre DX*) see also SÉNÉGAL

GEORGIA [non] Info about the Voice of Hope from here and elsewhere can be found at http://www.highadventure.org/voh_midd.html (Finbarr O'Driscoll, Ireland, *Review of International Broadcasting*)

GERMANY Welle West, regional station which did a Christmas SW special to NAM, plans to return in the spring for an additional service (Bill Matthews, TIAWR *Wavescan*)

GUYANA V. of Guyana, 3289.87, ID and news at 1000, good signal (Nick Grace, DC, *Cumbre DX*) Back after several weeks absence on 5949.4, 0005-0100 English music, 0032 obits, blocked by WYFR 0100-0800, then audible again (Brian Alexander, PA, *World of Radio*)

HONDURAS After an absence of almost a year, HRMI resumed Jan 25 but now on AM with a stronger transmitter on 5890, *1200-0500* (gh) Has alternating English/Spanish religious talk at 0430-0500 (Brian Alexander, PA, and gh) 1500 Watts (Hans Johnson, *Cumbre DX*)

6621.3v with evangelical programming mentioning Honduras and Nicaragua, as early as 1048 until 1255, and until 2345* (Hans Johnson, Robert Wilkner, David Crawford, Ullis Fleming, *Cumbre DX*) Could be 5 x 1324v if HRSW, La Voz Evangélica, Tegucigalpa, 1330 is off frequency (gh)

HUNGARY In Feb R. Budapest had all four English broadcasts on 9840, and one other frequency; Z-98 times should be 1900, 2100, 0100, 0230 (Budapest International via Gigi Lytle)

ICELAND Ríkissútvarpid at 1215-1302 on new 15639.86v //11402, 13860 (Wolfgang Büschel, Germany, *BC-DX*)

INDONESIA RRI Kupang, Timor, has a 1 kW RRI transmitter at the studio on 3260 at 0000-0900; and a 10 kW Harris at Tuapukan reactivated last October on 3385 at 2100-2400, 0900-1400. RRI Mataram says 3223 is still under repair and not on air; RRI Palembang says the 10 kW 1951 Gates on 4855 has been off since 1994 due to severe breakdown (David Foster, Australia, *Jembatan DX*)

INTERNATIONAL WATERS [non] M/V *Electra* was to be on its way to the Caribbean in mid-March (Anita Louise McCormick, *Cumbre DX*)

IRAN VIRI, 15084.2 at 0320-0620 puts spurs on 15441, 15167, bad for Tahiti (*Panlview*, Bulgaria)

IRAQ Republic of Iraq Radio, Main Program, Baghdad, in Arabic very irregularly on SW: 0700-1000 on 9715v, 1000-1200 11785v, 2000-2300 11292v. Mother of Battles Radio, 1715-2100 in Arabic on 9715v; Kurdish Service 0215-2030 irregular on 6560; all one hour earlier in summer (BBCM)

[non] Senate Majority Leader Trent Lott called for establishment of a R. Free Iraq to foment internal opposition in Iraq, and for jamming Iraqi broadcasts (*VOA Communications World*)

IRELAND [non] West Coast Radio Ireland got a surprise two-week extension in Feb thanks to a grant from the British tabloid *News of the World* (Finbarr O'Driscoll, Ireland, *R.I.B.*) On final broadcast said they were "fairly optimistic" they would return later in the year (Ivan Grishin, Ont.) 5905 at 0100 to NAM via Germany had interference from R. Nederland via Uzbekistan on 5904 (O'Driscoll)

KAZAKHSTAN [non] R. Almaty observed in Feb with English via Ukraine: Tue 1200-1220 on 11840, Fri & Sat 1200-1220 on 9620 (Klaus Lieberwirth, Germany, *BC-DX*) May be one hour earlier for Z-98 (gh)

KOREA NORTH During a blackout interrupting SW broadcasts from here, jamming kept up against V. of the People, VOA, and all S. Korean broadcasts as usual (Sonny Ashimori, Japan, *hard-core-dx*)

LEBANON V. of Hope, Marj Uyun is 24h on 9960, including English at 1600-2100 (BBCM)

LIBERIA Star Radio, Monrovia, resumed at 0500-0759 on 3400, 1700-2100 5880; includes News in English at 0630-0635, 0730-0735, 1830-1835, 1930-1935; in Liberian English 0620-0625, 0720-0725, 1820-1825, 1920-1925. Info at <http://www.hirondelle.org/news110.stm> (BBCM)



R. Veritas, 3425, reduced to 25 minutes at *0500-0525*, all religious; perhaps government does not want them broadcasting news (Ed Rausch, NJ, *Cumbre DX*)

MALTA [non] V. of the Mediterranean, via Khabarovsk, Russia, on 17570, UT Sun 0200-0300 in English, very good but no //15550 (Volodya Salmani, Maui)

MONGOLIA V. of Mongolia is having trouble getting an unauthorized and outdated website in its name removed from maginet.mn The official site is at <http://www.angelfire.com/biz/mrtv/index.html> (Mark Ostrowski, MRT, *DSWCI DX Window* Caught in the Web)

MYANMAR Myawaddi Broadcasting Station, 5974 at 1100-1330 is for the large contingent of armed forces in Karen state battling the KNLF, an ethnic independence movement near the border with Thailand (Sarath Weerakoon, Sri Lanka, *Cumbre DX*)

NEPAL R. Nepal, English news at 1425 on 6460 = 2 x 3230, which was not audible, along

See listing for Korea, North

Dear listeners,

On the occasion of the New Year 1998 we extend new year greetings to you who have deepened friendship with Radio Pyongyang. We wish you and your family welfare [sic]. Now the Korean people, cherishing the great honour and happiness of having the great leader Comrade Kim Jong Il as the General Secretary of the WPK, are resolved to powerfully promote socialist economic construction to decorate 1998 as a more significant and memorable year.

We hope that in 1998 our relations with you would be further deepened. Greeting the new year we would like to inform you:

This year we organize a composition competition in order to celebrate more significantly April 15, the birth anniversary of the fatherly leader Comrade Kim Il Sung and February 16, the birth anniversary of the great leader Comrade Kim Jong Il.

Believing that you would take part in the composition, paying deep interest in Radio Pyongyang, we inform you of the contents of the compositions.

1. Wishes for eternal life of the great leader Comrade Kim Il Sung and his immortal achievements in the Korean revolution and the cause of global independence.
2. Tireless efforts of Comrade Kim Il Sung for the people.
3. The policies of national reunification presented by Comrade Kim Il Sung and their validity.
4. The immortal ideological and theoretical achievements of the great leader Comrade Kim Jong Il for the times and humankind.
5. Development of the Workers' Party of Korea into an ever-victorious Party, the Democratic People's Republic of Korea into a powerful country independent in politics, self-sufficient in the economy and self-reliant in defence and the Korean People's Army into an invincible army by Comrade Kim Jong Il.
6. The singlehearted unity of the leader, the Party and masses achieved by Comrade Kim Jong Il.
7. The benevolent politics, politics of trust and love enforced by Comrade Kim Jong Il.
8. The noble personality of Comrade Kim Jong Il.
9. Superiority of the people-centred Korean socialist system led by Comrade Kim Jong Il.
10. Development of Juche-oriented culture and art of Korea under the wise leadership of Comrade Kim Jong Il.
11. Comrade Kim Jong Il's wise leadership on the cause of Korea's reunification.
12. Comrade Kim Jong Il's correct leadership of the world socialist movement to victory.
13. The world progressive people's solidarity movement supporting the Korean people's struggle for national reunification.
14. The moves of the south Korean authorities and splittists at home and abroad against the nation and reunification.

You may also choose other subjects deepening friendship with the Korean people and contributing to the independence of the whole world.

The forms of compositions are not limited. In case of impressions on the DPRK, recording tape would be better. All compositions should be sent by the end of May.

The listeners who write good compositions would be given souvenirs. We wish you to take part in the composition competition and write good works. With our best regards. (Radio Pyongyang, January 1, Juche 87, 1998, via Gigi Lytle, who notes:

"Don't think I will enter this one!")

with 5005, until after 1500 (Mahendra Vaghjee, Mauritius, *DSWCI DX Window*)

Two different sites use 3230: When on 3230.1 and with a quite readable signal on 6460.2 I suspect it is Khumaltar 100 kW; when on 3228.5 or so it's Jawalakhel (5 kW). Usualsked is *0015-, and +1200-1715* (Victor Goonetilleke, Sri Lanka, UADX via BC-DX)

NEW ZEALAND The opposition Labour party pledges to revive R. New Zealand International if and when they come to power, and the present government has closed it (RNZI news via Pete Costello, NJ) It's the minority opposition Alliance Party, along with the majority opposition Labour Party (RNZI via BBCM) Numerous Pacific island stations and governments have objected strongly to the proposed closure of RNZI (BBCM)

DX Listening Digest

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NICARAGUA R. Miskut, 5770-USB plus carrier, until 0220 fade with wide assortment of music, IDs also for FM outlet (Randy Stewart, MO)

NIGERIA [non] V. of Free Nigeria. When this started last June, the hobby and professional community tried to figure out where it was coming from. BBC Monitoring Service direction finding reports that claimed it was coming from North Africa. BBCM later opined that it was coming from Algeria, although they admitted the technical standards of Voice of Free Nigeria were rather high for Algeria.

I became interested while writing about these stations for the February *Monitoring Times*. I believe a case can be made that this station is coming from the Deutsche Telekom site at Juelich, and *not* Algeria as previously believed. Here is my evidence:

1) A well-placed source provided me with proof that it is coming from Juelich. While I can't share the exact nature of the evidence, I believe that it is credible. Remember, the first Nigerian clandestine, Radio Kudirat, set a pattern of purchasing time. This experience was shared with those who started the other Nigerian clandestine stations. Surely it would be easier for VFN to purchase time via Juelich than it would be for it to reach some sort of agreement with the Algerians, and "easy beats hard every time."

2) In its short life, VFN has switched frequencies several times to deal with interference. Juelich apparently wants to keep their customers happy by providing good reception. From what I know about the operations backed by the Algerians, they are fixed in frequency. But Juelich often switches the frequencies of the clannies they broadcast, such as the now-defunct Radio New Nigeria, Voice of Oromo Liberation, and Rainbow Radio.

3) With these in hand, I asked Kai Ludwig if it was possible that Voice of Free Nigeria (11645 kHz 1900-2000 Sat) could be from Juelich. Kai decided to let the Juelich registration speak for itself: 11645 1900 2000 JUL 100. I welcome any comments or criticisms of the above. (Hans Johnson, *Cumbre DX*)

Repeated direction-finding both before and after Johnson's report continue to show VFN from a site south of the UK, most likely somewhere in Africa (BBCM) So the Germany registration could be a cover (gh)

R. New Nigeria ended broadcasts Jan. 17. They plan on returning in the future (Hans Johnson, *Cumbre DX*)

NORWAY NRK planned to use 15735 mornings to NAM in Z-98; 9 and 11 MHz evenings (Joe Hanlon, PA)

PAPUA NEW GUINEA R. Madang, 3260, has no morning broadcasts, just 0700-1200. Has a new 10 kW transmitter, part of Australian aid package last year, but no funds to install it (Florian Kauke, Program Manager via Hans Johnson, *Cumbre DX*) Government official threatened to withhold funding from R. Madang because he didn't like what they were saying. Provincial stations are slowly going off air; equipment is wearing out and government has no coordinated plan to replace it (*The National*, Port Moresby via Hans Johnson, *Cumbre DX*)

NBC Port Moresby is to commence a new SW service, Kundu National in Pidgin and Motu, an alternative to the Karai National service in English. A trial run was held New Year's Eve on 3925, and daytime could use 11880 kHz or a 9 MHz outlet (Robert Jones, *Electronic DX Press*)

PARAGUAY R. Nacional, soccer at 1924 on 19475 = 2 x 9737.5, somewhat distorted on both (Horacio Nigro, Uruguay, hard-core-dx) Harmonic previously heard in NAM, too (gh)

PERU R. Soledad, Parcoy, Pataz, La Libertad, heard three consecutive days on 4551.0 in the 1000-1215 and 2217-2315 periods with tropical music, IDs (Pedro F. Arrunátegui, Piura)

R. Hualgayoc, 4300.0, 2300-2400 and 0255-0305, from a mining center (Arrunátegui, Piura)

R. Ilucán, Cutervo, Cajamarca, was on 3505 at 1032, Andean music, overmodulated horoscope (Fernando Viloria, Venezuela) Later that same day it was on 5657.8 at 2204-2230 with mensajes (Pedro F. Arrunátegui, Lima) 3505 also at 1010, but too distorted to copy (Hans Johnson, FL, *Cumbre DX*) Same station on 5630 until 0300* with ID (Bill Sitzmann, NY, *ibid.*) Are these really all from the same station? (gh)

R. Atlántida, 4790, Iquitos, has a *Trocha Turística* program daily except Sunday at 2300, with greetings to listeners abroad.

R. Lajas on 5414 ex-5498 at 0100 (Henrik Klemetz, Colombia, DSWCI *DX Window*) R. Ondas del Río Marañón, Aramango, Amazonas, announces 6660 and sked as 1100-1500, 2000-0100, but really varies 6674.5-6675.6. Music is well-modulated, but speech below par (Klemetz, NASWA *Journal*)

R. Chasqui, presumed on 5981.4, with same haunting flute sign-on melody heard before on ex-6087.9, fade by 1130, in absence of Union Radio, Guatemala (Hans Johnson, FL, *Cumbre DX*)

POLAND [non] R. Maryja, Catholic station via Russia on 9905 at 0600-0815, blocked by V. of Russia afterwards (Brian Alexander, PA, *World of Radio*)

RUSSIA After years of massive cutbacks, V. of Russia's most exotic language remaining, and shortest service, is Nepali, daily 1445-1500 on 9940, 7350 (from BBCM Jan sked) Mayak, Moscow, operates 0030-2200 on SW with a selection of frequencies changing almost every hour from this list: 4520, 4825, 4855, 4930, 5900, 5925, 5935,

5950-USB, 5990-USB, 6015, 6035, 6045, 7310-USB, 7330, 9470, 9500, 11785, 11985, 12065 (BBCM)

New station from January is R. RITM, Yakutsk, 0200-0300 on 7200 (*Sibirskiy DX Bulletin* via *Rus-DX* via Wolfgang Büschel)

Yuzhno-Sakhalinsk, 11840, listed only 15 kW, had local weather and time at 2229 (Volodya Salmaniw, Maui)

SAN MARINO [?] R. San Marino International QSL said they were forced to stop broadcasts due to excessive reaction of the SM government and postal authorities (Roger Chambers, NY) Still maintains it was broadcasting from SM (*Kiwi Radio Weekly*)

SARAWAK R. Malaysia bandscan around 1100-1200 found listed outlets missing: 3385, 5030, 7130, 7145, 7160; confirmed on 4835, 4895, 5005, 6050, 6060, 7270 (David Vitek, South Australia, *Electronic DX Press*)

SÉNÉGAL [non] Website says 11800 is the only SW frequency, 100 kW from *0600. Instead, V. of Peace, from Ethiopia to Somalia is heard on 11800 //9560.2 at 1950-2000* (Hans Johnson, FL, *Cumbre DX*) This is not daily, missing on Tue, Thu, Sun (Wolfgang Büschel, Germany, *BC-DX*) Seemed to be gone every day afterwards (Johnson, *Cumbre DX*)

SERBIA [non] R. Yugoslavia director Nikola Ivanovic visited Beijing and reached agreement to rebroadcast RY in English to FE, WNA, Au from transmitters in China. A new transmitting centre with 14 x 500 kW would be available. And RY plans to sign a contract with a US SW station to rebroadcast 30-minute English to NAM (Tanjung via BBCM) Not WWCR (Adam Lock)

SLOVAKIA R. Slovakia Int'l printed a series of ten beautiful multicolor stickers featuring castles (J. Bohac, *Play DX* via *The Four Winds*)

SOMALIA R. Free Somalia is still active from Galkayo on 7100 at 1000-1200 daily. A new site at Ossaso relays it on either 9415 or 9420 (Sam Voron, RFS via Hans Johnson, *Cumbre DX*)

SURINAM R. Apintie on 4990.94 at *0729:30-0750, opening with drums, brass band, old spiritual ballads. Fair at first, weak by 0750 (David Clark, Ont., *Electronic DX Press*)

THAILAND Or Sor, Royal Palace on 6149v is steady in Thai Tue-Sat +1030-1200* (Sarath Weerakoon, Sri Lanka, *Cumbre DX*) Obliterated by KNLS at 1100 (Craig Tyson, Western Australia, *EDXP*)

TURKEY V. of Turkey made two changes in February for English: 1930 on new 9540, 2300 on 7300 (Roger Tidy, UKOGBANI, *World of Radio*) Both great improvements; but for Z-98 expected shift to 1830 on 13 MHz, 2200 on ?? (gh)

TURKMENISTAN R. Bakhara ID at 1433 on 5015, Mideast music past Ashjabat ID at 1501 (Steve Martin, CA, *Cumbre DX*)

UGANDA R. Uganda announced that its Blue Channel on mediumwave was off the air and listeners should use SW: 0300-1230 on 5026, 1300-2100 on 7110 (BBCM)

URUGUAY CXA30, R. Nacional, 6035 planned to reactivate in March once a 20 kW MW transmitter had been converted to SW, but likely delayed (Horacio Nigro, Uruguay, *hard-core-dx*)

U S A R. Free Asia also plans weekly broadcasts in Wu, the Shanghai dialect, and Uighur (VOA *Communications World* via BBCM)

WGTG planned a new time for *WORLD OF RADIO* from March, UT Sun 0030 on 5085-USB (this would shift to Sat 2330 during DST) and also find a daytime slot on 9400. *W.O.R.* on WWCR with anticipated DST time shifts: Thu 2030 15685, Sat 0600 3210, 5070, Sat 1130 5070, Mon 0400 3210, Tue 1230 15685 (gh)

In Feb, a heavily-armed militiaman was arrested at WEWN as he tried to warn priests about Communist infiltration of the Catholic clergy (*Birmingham News* via Mike Cooper)

WJCR reactivated 13595.1 //7490 at 2000. Plans to put Spanish on the former and use a terminated rhombic to Latin America. May buy a third transmitter. Time for sale, but only for Christian programming and not much interest. New website is <http://www.wjcr.com> (Gerri Powell, WJCR via Hans Johnson, *Cumbre DX*)

WINF, 970, Waynesboro, VA, heard from 1120 past 1550 with splattering audio on harmonics 1940, 2910, 3880, 4850, 6790, 8730, 9700, 10670 (Mark Mohrmann, VT, *Cumbre DX*)

[non] WYFR still has one relay via UKOGBANI, Arabic at 1800-1900 on 11665 (Dave Kenny, BBCM, *World of Radio*)

ZAMBIA ZNBC Radio 1, multilingual at 0245-2205 uses 4910 at 0245-0530, 1430-2205; 7220 at 0500-1430; alternate 6265. Includes English news relay from Radio 2 at 0500-0510, 1115-1127, 1800-1810. Radio 2 in English: 0245-2205 on 6165, unconfirmed on 7235. M-F at 0320-0345 is *Rise & Shine*, reports from provincial correspondents, and news on the hour (BBCM) 6265 was quite active both at 0300 and 2040, with usual 4910 empty (Jay Novello, NC)

Christian Voice, near Lusaka, 0359-1559 on 6065, 1559-2159 3330; news headlines on the hour (BBCM)

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



Gayle Van Horn

0000 UTC on 5047

TOGO: Radio Togolaise. Tune-in for station ID/frequency quote and national anthem. (John MacDonald, Poulsbo, WA/*Hard Core DX*)

0010 UTC on 7385

AUSTRIA: ORF. German service of domestic programming. Female announcer's program of classical music program featuring Austrian composers. ID and news at 0200 for three minutes. (Stokes Schwartz, Madison, WI)

0014 UTC on 4845

GUATEMALA: Radio K'ekchi. Male announcer's text in Kekchi language, including several IDs and music bridges. Guatemala's **Radio Buenas Nuevas** noted on 4799.7 with IDs, Latin pops and talk. SINPO=33443. (Mark Vendhuis, Borne, Netherlands)

0030 UTC on 5885

GERMANY: Radio Vilnius. English to North America, // 5902 with 5885 drifting to 5883. Severe utility QRM on 5905. (Lee Silvi, Mentor, OH)

0030 UTC on 6027

BOLIVIA: Radio Illimani. Spanish. Fair quality on local commercials to "Illimani" ID. (Vladimir Sarychev, Tashkent, Uzbekistan) Bolivia's **Radio San Miguel** heard on 4926 at 2335-2342. (Brian Bagwell, St Louis, MO)

0035 UTC on 4940

INDIA: AIR-Gawahati. Station ID to English news. **AIR-Kurseong** noted with sitar music on 4895 at 0110. Additional AIR outlets monitored as; **AIR-Lucknow** 4880 at 0112; **AIR-Jaipur** 3345 at 0159; **AIR-Bophal** 3315 at 0203; **AIR-Chennai** 4920 at 0222; **AIR-Jaipur** 4910 at 0225; **AIR-Mumbai** 4840 at 0231. (Francesco Clemente, Udine, Italy/*Radio DX Net*)

0054 UTC on 15167.3

TAHITI: (Tentative) RFO/Radio Tahiti. Only a weak carrier noted and nothing heard during my week in Hawaii, on several attempts. Should have been an easy catch owing to the short distance to French Polynesia. Has this transmitter finally expired? (Walter Salaniw, Victoria BC Canada/*Hard Core DX*)

0213 UTC on 4980

CHINA: Xinjiang PBS Urumqi. Mongolian service for Asian features and text, station noted on 5060//4980 at 0215. Kazakh service on 4970 at 0220; 4330//4970 at 0222. (Clemente, Italy) China's **Radio Lhasa** heard in Tibetan on 4835 at 2330. (Sarychev, UZB)

0235 UTC on 5260

KAZAKHSTAN: Kazakh Radio. Local melodic music to ID format. Station noted on // 4820 at 0236. (Clemente, Italy)

0245 UTC on 11710

ARGENTINA: RAE. Argentine music to sports roundup report. (Howard J. Moser, Lincolnshire, IL)

0253 UTC on 4820

BOTSWANA: Radio Botswana. Station sign-on with cow bell/barnyard interval signal and identification. R&B music tune to 0316. Good signal quality. (MacDonald, WA)

0425 UTC on 4890

GABON: RFI relay. French news update from reporter with mentions of Libreville. Tune-out at 0440, SINPO=34333. (Jim Evans, TN/*Cumbre DX*) French service for Gabon's Africa **Number One** heard on 9580 at 0710. (Schwartz, WI) 2000-2010 on 9580 at 0710. (Schwartz, WI); 2000-2010 on 9580 in French. (Gabor Szucs, Budapest, Hungary/*Cumbre DX*)

0519 UTC on 6110

CANADA: NHK. Radio Japan relay. Top 30 music countdown program of pop/rock hits. (Moser, IL)

0610 UTC on 9810

KIRIBATI: Radio Kiribati. "Ten minutes past six" time check, in definite AM mode with LSB suppressed, with transmitter cutting out intermittently, probably to save power and boost signal, //846 AM is heard at 0836 (fair to good). (Salmaniw/CAN)

0702 UTC on 7265

GERMANY: Sudwestfunk. Male DJ's pop/rock music program from Eric Clapton, Men at Work and Bob Marley. Fair signal hampered by static and fading. (Schwartz, WI)

0800 UTC on 9740

PARAGUAY: Radio Nacional del Paraguay. Spanish. Announcer's ID to regional music, frequency quote and good morning greetings. Good signal with minimal interference from Germany's **Deutsche Welle** on 9735. (Schwartz, WI)

0907 UTC on 4919

ECUADOR: Radio Quito. Female announcer's station ID and program noted on 3285 at 1100 with ID and frequency quote. (Frank Hillton, Charleston, SC)

0950 UTC on 6085

BOLIVIA: Radio San Gabriel. Male/female host in regional language (Aymara?) with several mentions of station. Signal wiped out at 1006 by WYFR on frequency. Bolivia's **Radio Eco** noted on 4410 at 2245 in Spanish as, "estan en la gratisima compania de Radio Eco en Borgia transmitiendo desde San Borgia en la republica de Bolivia." (Fernando Vilorio, Venezuela/*Cumbre DX*)

1015 UTC on 4756.7

PERU: Radio Huanta Dos Mil. Peruvian huaynos to announcer's segment, sounding like an ID format but not positive. Peru's **Radio Altura** tentatively logged on 3340 at 1020. Canned ID for Peru's **Radio Frecuencia** on 4885 at 0020. (Hillton, SC)

1015 UTC on 4915

COLOMBIA: Armonias del Caqueta. Spanish. Colombian folk music to local time checks and comments. National anthem at 1100 with station ID/ location and frequency. (Vilonia, VEN)

1015 UTC on 5955.1

GUATEMALA: Radio Cultural. Rustic guitar vocals, //3300 better, but heavy interference (Don Moore, IA/*Cumbre DX*) Tentative ID on Guatemala's **Radio Coatan** on 4779 at 1310 in Spanish. (Steve Keithley, NM/*Cumbre DX*)

1030 UTC on 4990

PERU: Radio Ancash. ID at the half-hour tune in with music intros. Fair signal to poor by 1045. Tentative ID for Peru's **Radio Soledad** on 4571 at 1140. (Hillton, SC)

1040 UTC on 4840

VENEZUELA: Radio Valera. Spanish. ad "string" for several commercials, followed by ID/frequency quote and fair signal quality. (Bagwell, MO)

1120 UTC on 4959.7

VIETNAM: Hanoi Home Service. Tentative logging of Asian music and unknown dialect. (Bagwell, MO) **VO Vietnam** noted in English at 1242 on 12019. (Schwartz, UZB) 2225 UTC on 4957.7. (Bernardini, Italy; Mark J. Fine, Remington, VA)

1216 UTC on 5975

UZBEKISTAN: Radio Tashkent. English service with operatic music program, noted on // 5060, 9715 kHz. Best on 5975 despite QRM from BBC on 5965. (Fine, VA)

1540 UTC on 3945

INDIA: AIR-Gorakhpur. English news to 1545*. **Air-Port Blair** in English with ID, // 4800 at 1550. (Giampiero Bernardini, Chieti, Italy/*Gatflash!*) **AIR-Chennai** 4920 at 1600; **AIR-Delhi** 4860 at 1601; **AIR-Hyderabad** 4800 at 1645 with sitar music. (Clemente, Italy)

1745 UTC on 6140

BURUNDI: Radio Diffusion Du Burundi. Tentative logging for French programming. Best heard on USB due to bubble jammer co-channel, with snippets of English news, including items about "Zambia's capital city Lusaka." Not sure what else this could be. (Salmaniw, CAN)

1815 UTC on 15505

PORTUGAL: Radio Portugal. Instrumental music to travelogue program in Portuguese to 1830*. (Moser, IL)

1957 UTC on 11805

BRAZIL: Radio Globo. Easy-listening music to religious text. Station jingles to several "canned" IDs. (Veldhuid, NLD)

2045 UTC on 6225

ANGOLA: Radio Galo Negro. Musical program to Portuguese text. No trace of Vorgan ID, heavily jammed making reception very difficult. (Mahendra Vaghjee, Rose Hill, Mauritania/*Cumbre DX*)

2156 UTC on 6130

LAOS: National Radio-Vientiane. Interval signal at tune-in. Anthem/ID by lady announcer, followed by national music at 2201, covered by Germany's **Deutsche Welle**. (Vaghjee, MAU)

2203 UTC on 5020

CHINA: Jiangxi PBS Nanchang. Chinese text to Asian music. China's **Haixia 1 Fuzhou** 5020 at 2210, //4940. **China Radio International's** Taiwanese service on 5090 at 2212. (Clemente, Italy) **CRI** 1205-1245 on 6950. (Silvi, OH)

2214 UTC on 7105

CYPRUS: CBS via BBC relay. Guitar interval signal to 2216. Station ID from male/female announcer duo in Greek. Lengthy talk on the Vatican to 2245*. (Vaghjee, MAU)

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

With a Little FREE Help From Our Friends!

Do you get frustrated looking up words or phrases to write your Spanish reception report? Perhaps you slept through French class and German has you completely *verwirrt!*

From our friends at *Cumbre DX* comes word of a free automated translation service, available through the Alta Vista search engine website.

English phrases are typed in, with translations to German, Italian, French, Portuguese and Spanish, and may be converted back to English.

To translate your own phrases, type or paste in from your saved text, and select the language pair (English to Portuguese, for example) and click on Translate. Don't forget to use proper grammar and watch for misspelled words or slang. Use of such



will result in an incorrect translation for your letter, report or article.

Translating web pages is equally as easy. However, this service is not for translating long documents,

though you can cut and paste each section to translate.

Translate news articles; they usually work quite well—or try converting the newspaper from Italian to English! Why not sample the opinions from France's many French websites?

For your own demonstration, go to:

<<http://babelfish.altavista.digital.com/cgi-bin/translate>>

Alta Vista's *Translation Service* is a terrific aid to anyone seeking a simpler, time saving method for writing reception reports or translating your correspondence. *Magnifique* and *gracias, Cumbre!*

BRAZIL

Radio Difusora De Longrina, 4815 kHz. Partial data Londrina postal card unsigned. Received in 83 days for a Portuguese report and one IRC. Station address: Rua Sergipe 843, Londrina Parana 86010 360 Brazil. (Jose Moura, Washington, DC)

BULGARIA

Radio Bulgaria, 9700 kHz. Full data QSL card unsigned. Received in 28 days for an English report. Station address: P.O. Box 900, 1000 Sofia, Z Bulgaria. (Ed Luntley, Portland, ME)

ECUADOR

HCJB, 9745 kHz. Full data QSL card signed by Glen Volkhardt, plus calendar. Received in 26 days for an English report and mint stamps. Station address: Casilla 17-17-691 Quito, Ecuador. (Tom Banks, Dallas, TX; Luntley, ME)

FM/TV

CIQB-FM 101.1 Full data prepared QSL card verified, plus station stickers and several profile sheets from Tom Atkins-VP/General Manager. Received in one month for an English FM report and mint stamps. Station address: Box 101, Barrie, ON Canada L4M 4V1. (Robert S. Ross, London, ON Canada/amfmrvdx)

KNSR-FM 88.9 Minnesota Public Radio. Full data prepared QSL card signed by General Manager (no name). Received for an English FM report and mint stamps. Station address: Box 7011, Collegetown, MN 56321. (Hank Holbrook, Dunkirk, MD)

WPOC-FM 93.1 Full data letter signed by Lang Sturgeon., plus station bumper sticker. Received in 39 days for an English FM report and an SASE. Station address: 711 W. 40th Street, Baltimore, MD 21211. (Holbrook, MD)

KRUE-FM 92.1 Full data prepared QSL card signed by Pamela J. Kars. Received for an English FM report and mint stamps. Station address: Box 505, Waseca, MN 56093. (Holbrook, MD)

WAKW-FM 93.3 Partial data letter signed by Gerald Croucher-General Manager, plus program schedule and bumper sticker. Did not return my prepared QSL card. Received in three weeks for an English FM report. Station address: Box 24G, Cincinnati, OH 45224. (Ross, CAN)

WXMI-TV 17 Grand Rapids, MI. Full data prepared QSL card verified plus business card from Dale Scholten-Director of Engineering. Received in three weeks for a TV reception report and mint stamps. Station address: 3117 Plaza Drive NE, Grand Rapids, MI 49505-2999. (Ross, CAN)

GERMANY

Deutschlandradio, 6005 kHz. Full data logo card, decal and personal letter from Ulrich Reuter. Received in 30 days for a taped report and two IRCs. Station address: Hans-Rosenthal-Platz, 10825 Berlin, Germany. (Randy Stewart, Springfield, MO)

GREECE

VOA-Kavalla, 7205 kHz. Full data Greenville antenna card unsigned. Received in 14 days for an English report. Station address: 330 Independence Avenue SW, Washington, DC 20547. (William Wilkins, Springfield, MO)

INDONESIA

(Timur) RRI-Kupang, 3385 kHz. Full data QSL letter signed by Dr. P.M. Tisera. Received in 32 days for an Indonesian report and one IRC. Station address: Jalan Tompello No. 8, Kupang, Timor, Indonesia. (A. Slaen, Argentina/*The Four Winds*)

(Timur) Radio Siaran Pemerintah Daerah Kabupaten Daerah TK II-RSPDKD Ngada, 2904 kHz. Full data QSL card signed by Dr. Petrus Tena-Kepala Studio. Received in 130 days for an Indonesian report and one IRC. Station address: Jalan Soekarno-Hatta, Bjava, Flores, Nusa Tenggara Tengah, Indonesia. (B. Gornati, Italy/*The Four Winds/Play DX*)

MEDIUM WAVE

WCCO-AM. Partial data station QSL card unsigned. Received in 11 days for an English AM report. Station address: 625 Second Avenue, Minneapolis, MN 55402. (Moura, DC)

WGN-AM. Full data verification on station letterhead signed by Ronald R. Cone, plus station bumper sticker. Received in 10 days for an English AM report. Station address: 435 N. Michigan Avenue, Chicago, IL 60611 (Moura, DC)

WHAS-AM. Full data station QSL card signed by Charles Strickland. Received in 35 days for an English AM report. Station address: P.O. Box 1084, Louisville, KY 40201. (Terry Jones, Plankinton, SD)

PERU

Radio Atlantida, 4790 kHz. Friendly personal letter signed by Sra Carmela Lopez Paredes-Directora Programa, plus tourist brochures, maps and colorful pennant. Received in 100 days for a Spanish report and one IRC. Station address: Jiron Arica 441, Iquitos, Loreto, Peru. (B.Gornati, Italy/*The Four Winds/Play DX*)

Radio Union, 6115 kHz. Date only oversized *Certificado de Sintonia* QSL card unsigned, and two station stickers. Received in 319 days for a Spanish report with cassette, one U.S. dollar and used commemorative stamps. Station address: Apartado 833, Lima 27, Peru. (Stewart, MO)

PIRATE

Up Against the Wall Radio, 6955 kHz. Full data QSL sheet unsigned with three comic collector cards. Received in 17 days for an English report. QSL maildrop: P.O. Box 28413, Providence, RI 02908. (Wilkins, MO)

SWEDEN

Radio Sweden, 7280 kHz. Full data QSL card with illegible signature, plus frequency schedule and tourist brochure. Received in 20 days for an English report and one IRC. Station address: SE-105 10 Stockholm, Sweden. (Brian Bagwell, St. Louis, MO; Luntley, ME)

TURKEY

Voice of Turkey, 7280 kHz. Full data QSL card unsigned, plus station stickers, pennant and frequency schedule. Received in 33 days for an English report. Station address: P.K. 333, TR-06.443 Yenisehir Ankara, Turkey. (Luntley, ME; Sam Wright, Biloxi, MS)

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 Times, respectively.

Note that all dates, as well as times, are in UTC; for example, a show which might air at 0030 UTC Sunday will be heard on Saturday evening in America (8:30 pm Eastern, 5:30 pm Pacific).

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

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

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

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

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

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

The frequency listing uses the same day codes as the program listings; if a broadcast is not daily, those day codes will appear before the

station name. Irregular broadcasts are indicated "tent" and programming which includes languages besides English are coded "vl" (various languages).

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

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

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

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

HOT NEWS

COMPILED BY JIM FRIMMEL

RADIO FREE EUROPE/RADIO LIBERTY provides a news service on their web site <www.rferl.org> that provides (in English) regional European news and special reports. A newslines page contains daily reports of developments in Eastern and Southeastern Europe, Russia, the Caucasus and Central Asia, and a free E-mail subscription service assures daily delivery of Newslines to your address.

A weekday magazine section includes analyses and features by the RFE/RL staff. A special reports page contains all the in-depth reports issued during the previous year. Of course there are the RealAudio programs in various Eastern European languages for students or those who can understand them. And you thought RFE/RL was only available in foreign languages!

SOUTH KOREA. In the Radio Korea mailbag program *Multiwave Feedback*, a comment

was made that Radio Korea Int'l simulcasts its 0200 and 1900 broadcasts via the internet in RealAudio. It was stated that the key to unraveling this mystery is in the frequency—both transmissions use 7275 kHz. The web site is located at <<http://210.115.193.23/>>.

NETHERLANDS. *Media Network* on April 16th will report on the National Association of Broadcasters convention in Las Vegas. Jonathan Marks and Diana Janssen are expected to examine the status of the Internet as a new force in broadcasting. You'll notice some changes to the *Media Network* format as a result of an in-depth listener survey.

You can get all the details from the RN web site <www.rnw.nl/en/prog_mediaw.html>. While you're there, check out the updated receiver shopping list section now featuring reviews of travel portables, the Drake

R8B, the AOR 7030 Plus, and the Lowe HF-250 Europa.

BBC. The March issue of *BBC On Air* hinted at the introduction of a complete new program schedule beginning in April. This suspicion was confirmed by examining the program listing in the magazine. Normally, multi-part feature programs carry over from month to month. In the March issue, however, all feature programs were scheduled to abruptly end sometime during the month of April. Look for new frequency changes as well, now that the days are getting longer and the higher frequency bands are becoming more active.

SPAIN. In its *Distance Unknown* DX program, Radio Exterior de Espana announced changes to its program lineup. The *Radio Club* was replaced by a program about the foreign press, a program about the European Union filled in for the

Wednesday edition of *Window on Spain*, and a new feature program about tourism in Spain began on Sundays.

SWEDEN. Radio Sweden's new web site <www.radiosweden.com> was not active as of this writing, but its move to a separate web site rather than one which is subordinated to a higher government authority is applauded. RS's *MediaScan* program celebrated its 50th year on the air in February, despite the fact that it is a stepchild of *Sweden Calling DXers* having little to do with shortwave radio.

SAUDI ARABIA. The Kingdom will soon be webcasting its main program, second program, and Koran Radio over the Internet. Don't bother to check out the web site, however, unless you understand a ME language. The Saudi government hasn't broadcast in English in five years.

FREQUENCIES

0500-0600	Anguilla, Caribbean Beacon	6090am				0500-0600	UK, BBC African Service	3255af	6005af	6190af	7160af
0500-0600	Australia, Radio	9660pa	12080pa	13605as	15240pa	0500-0600	UK, BBC African Service	9600af	15420af	17885af	
		15510as	17795pa			0500-0530	UK, BBC Asian Service	9740as	11955as	15280as	15310as
0500-0600 as	Australia, Radio	17750as				0500-0530	UK, BBC World Service	15360as	17760as	17790as	21660as
0500-0600 vl	Australia, VLBK Katherine	5025do				0500-0600	USA, KAIJ Dallas TX	3955eu	5975am	6175am	6180eu
0500-0600 vl	Australia, VLBT Tent Crk	4910do				0500-0600	USA, KWBH Naalehu HI	6195eu	9410eu	11760me	12095eu
0500-0600	Australia, Defense Forces R	13525as	15707as			0500-0600	USA, Voice of America	15575as	17640af		
0500-0600 vl	Cameroon, Radio Cameroon	4850do				0500-0600	USA, WHRA Greenbush ME	5810am			
0500-0600	Canada, CBC N Quebec Svc	9625do				0500-0600	USA, WHRI Noblesville IN	5770am	7315am		
0500-0600	Canada, CFRX Toronto	6070do				0500-0600	USA, WINB Red Lion PA	11950am			
0500-0600	Canada, CFVP Calgary	6030do				0500-0600	USA, WJCR Upton KY	7490na			
0500-0600	Canada, CHNX Halifax	6130do				0500-0530	USA, WRMI/R Miami Intl	9955am			
0500-0600	Canada, CKZU Vancouver	6160do				0500-0600	USA, WRNO New Orleans LA	7395am			
0500-0600	China, China Radio Intl	9560na				0500-0559 w	USA, WSHB Cypress Crk SC	7535eu			
0500-0600	Costa Rica, Adv World R	5030ca	6150ca	9725ca		0500-0559 mw	USA, WSHB Cypress Crk SC	7425af			
0500-0600 as	Costa Rica, Adv World R	4375am				0500-0600	USA, WWCR Nashville TN	2390am	3210am	5070am	5935am
0500-0600	Costa Rica, RF Peace Intl	7385am	15050am			0500-0600	USA, WYFR Okeechobee FL	5985na	9985af	11550eu	
0500-0600	Cuba, Radio Havana	6180na	9820na	9830na		0500-0600	Vatican State, Vatican R	4005eu	5883eu	7250eu	
0500-0600	Ecuador, HCJB	9745am	21455am			0500-0520	Vatican State, Vatican R	7360af	9660af	11625af	
0500-0550	Germany, Deutsche Welle	5960na	6100na	6120na	6185na	0500-0600	Zambia, Christian Voice	3330af	6065af		
0500-0600	Guyana, GBC/Voice of	5950do				0500-0530 vl	Zambia, R Zambia/ZNBC 1	4910do			
0500-0600 vl	Italy, IRRS	3985va				0500-0600 vl	Zambia, R Zambia/ZNBC 2	6165do			
0500-0600	Japan, R Japan/NHK World	6110na	6150eu	11840as	11920as	0500-0530 vl	Zimbabwe, Zimbabwe BC	3396do			
0500-0530	Japan, R Japan/NHK World	9835as	11895am	15230am		0505-0600	Swaziland, Trans World R	9500af			
0500-0600 vl	Kenya, Kenya Broadc Corp	4885do	4935do	6150do		0525-0600	Ghana, Ghana Broadc Corp	3366do	4915do		
0500-0600 vl	Kiribati, Radio	9810do				0530-0600	Austria, R Austria Intl	6015na	6155eu	13730eu	15410me
0500-0505	Lesotho, Radio Lesotho	4800do				0530-0600	Georgia, Georgian Radio	11805eu			
0500-0600	Liberia, Star Radio	3400do				0530-0600	Switzerland, Swiss R Intl	5840eu	6165eu		
0500-0600	Liberia, LCN/R Liberia Int	5100do				0530-0600	Thailand, Radio	9655eu	11905eu	15115eu	
0500-0510 mtwhf	Malawi, MBC	3380do				0530-0548	UAE, Radio Dubai	15435as	17830as	21700as	
0500-0525	Netherlands, Radio	6165na	9590na			0530-0600	UK, BBC Asian Service	9740as	11955pa	15310as	15360as
0500-0600	New Zealand, R NZ Intl	11905pa				0530-0600	UK, BBC World Service	17760as	21660as		
0500-0505	Nigeria, FRCN/Radio	3326do	4770do	4930do		0530-0600	UK, BBC World Service	3990eu	5975am	6050eu	6175am
0500-0600	Nigeria, Voice of	7255af				0530-0600	UK, BBC World Service	7150eu	7270eu	11760me	15575as
0500-0600	North Korea, R Pyongyang	11740eu	13790eu			0530-0600 as	UK, BBC World Service	17640af		6180eu	6195eu
0500-0600 vl	Papua New Guinea, NBC	9675do				0530-0600 vl	Zambia, R Zambia/ZNBC 1	12095eu			
0500-0600	Russia, Voice of Russia WS	5905na	5920na	5930na	6005na	0530-0600 vl	Zimbabwe, Zimbabwe BC	7220do			
		6065na	6150na	7175na	7330na	0545-0600	UK, BBC African Service	5975do			
		9580na	12025as	12055na	15460na			7275af	9710af		
		15470au	17495as	17570au	17795as						
		21790au									
0500-0530	S Africa, Channel Africa	9675af									
0500-0600	Singapore, SBC Radio One	6160do									
0500-0600 vl	Solomon Islands, SIBC	5020do									
0500-0600	Spain, R Exterior Espana	6055am									
0500-0600	Swaziland, Trans World R	4775af	6100af								
0500-0515	Uganda, Radio	4976do									

SELECTED PROGRAMS

Sundays

0500	Cuba, Radio Havana Cuba: International News. See S 0100.
0500	Japan, NHK/Radio: News. See S 0000.
0510	Japan, NHK/Radio: Hello from Tokyo. See S 0110.
0513	Cuba, Radio Havana Cuba: National News. See S 0211.
0518	Cuba, Radio Havana Cuba: Viewpoint. See S 0118.
0522	Cuba, Radio Havana Cuba: Music. See S 0122.
0530	Cuba, Radio Havana Cuba: News Supplement. See S 0130.
0536	Cuba, Radio Havana Cuba: The World of Stamps. See S 0136.
0541	Japan, NHK/Radio: Japan Diary. See S 0141.

Mondays

0500	Cuba, Radio Havana Cuba: Sunday Edition. See M 0100.
0500	Japan, NHK/Radio: Dateline Japan. See S 0000.
0515	Japan, NHK/Radio: Top News Asia. See M 0115.
0525	Japan, NHK/Radio: Sounds of Asia. See M 0125.
0525	Japan, NHK/Radio: Tokyo Pop-In. A sample of the Japanese music scene.
0530	Cuba, Radio Havana Cuba: Musical Corner. See M 0130.

Tuesdays

0500	Cuba, Radio Havana Cuba: International News. See S 0100.
0500	Japan, NHK/Radio: Dateline Japan. See S 0000.
0510	Cuba, Radio Havana Cuba: National News. See S 0211.
0515	Japan, NHK/Radio: Top News Asia. See M 0115.
0516	Cuba, Radio Havana Cuba: Viewpoint. See S 0118.
0520	Cuba, Radio Havana Cuba: Feature Report. See S 0216.
0525	Japan, NHK/Radio: Enjoy Japanese. See T 0125.
0525	Japan, NHK/Radio: Tokyo Pop-In. See M 0525.

0530	Cuba, Radio Havana Cuba: News Supplement. See S 0130.
0535	Cuba, Radio Havana Cuba: Feature Report. See S 0216.

Wednesdays

0500	Cuba, Radio Havana Cuba: International News. See S 0100.
0500	Japan, NHK/Radio: Dateline Japan. See S 0000.
0510	Cuba, Radio Havana Cuba: National News. See S 0211.
0515	Japan, NHK/Radio: Top News Asia. See M 0115.
0515	Japan, NHK/Radio: Top News Asia. See M 0115.
0516	Cuba, Radio Havana Cuba: Viewpoint. See S 0118.
0520	Cuba, Radio Havana Cuba: Feature Report. See S 0216.
0525	Japan, NHK/Radio: Music Reflections. See W 0125.
0525	Japan, NHK/Radio: Tokyo Pop-In. See M 0525.
0530	Cuba, Radio Havana Cuba: News Supplement. See S 0130.
0535	Cuba, Radio Havana Cuba: DXers Unlimited. See S 0234.
0550	Cuba, Radio Havana Cuba: Cuba Today. See W 0350.

Thursdays

0500	Cuba, Radio Havana Cuba: International News. See S 0100.
0500	Japan, NHK/Radio: Dateline Japan. See S 0000.
0512	Cuba, Radio Havana Cuba: National News. See S 0211.
0515	Japan, NHK/Radio: Top News Asia. See M 0115.
0515	Japan, NHK/Radio: Top News Asia. See M 0115.
0518	Cuba, Radio Havana Cuba: Viewpoint. See S 0118.
0520	Cuba, Radio Havana Cuba: Feature Report. See S 0216.
0525	Japan, NHK/Radio: Enjoy Japanese. See T 0125.
0525	Japan, NHK/Radio: Tokyo Pop-In. See M 0525.
0530	Cuba, Radio Havana Cuba: News Supplement. See S 0130.
0536	Cuba, Radio Havana Cuba: Feature Report. See S 0216.

Fridays

0500	Cuba, Radio Havana Cuba: International News. See S 0100.
0500	Japan, NHK/Radio: Dateline Japan. See S 0000.
0510	Cuba, Radio Havana Cuba: National News. See S 0211.
0515	Cuba, Radio Havana Cuba: Viewpoint. See S 0118.
0515	Japan, NHK/Radio: Top News Asia. See M 0115.
0519	Cuba, Radio Havana Cuba: Feature Report. See S 0216.
0525	Japan, NHK/Radio: Music Beat. See F 0125.
0525	Japan, NHK/Radio: Tokyo Pop-In. See M 0525.
0530	Cuba, Radio Havana Cuba: News Supplement. See S 0130.
0535	Cuba, Radio Havana Cuba: Feature Report. See S 0216.

Saturdays

0500	Cuba, Radio Havana Cuba: International News. See S 0100.
0500	Japan, NHK/Radio: News. See S 0000.
0510	Japan, NHK/Radio: Asia Weekly. See A 0110.
0512	Cuba, Radio Havana Cuba: National News. See S 0211.
0513	Japan, NHK/Radio: Asian People in Japan. See A 0113.
0518	Cuba, Radio Havana Cuba: Viewpoint. See S 0118.
0520	Cuba, Radio Havana Cuba: Feature Report. See S 0216.
0528	Japan, NHK/Radio: Business Report. See A 0128.
0528	Japan, NHK/Radio: Business Report. See A 0128.
0530	Cuba, Radio Havana Cuba: News Supplement. See S 0130.
0530	Japan, NHK/Radio: Asia Hotline. See A 0130.
0536	Cuba, Radio Havana Cuba: Weekly Review. See A 0136.
0541	Japan, NHK/Radio: Short Story. See A 0141.
0550	Cuba, Radio Havana Cuba: Feature Report. See S 0216.
0554	Japan, NHK/Radio: Asian News Summary. See A 0154.

FREQUENCIES

0900-0920 as	Albania, TWR Tirana	9685eu			
0900-1000	Anguilla, Caribbean Beacon	6090am			
0900-1000	Australia, Radio	6080as	9580pa	9770as	11880as
		17750as			
0900-1000 vl	Australia, VL8A Alice Spg	2310do			
0900-1000 vl	Australia, VL8K Katherine	2485do			
0900-1000 vl	Australia, VL8T Tent Crk	2325do			
0900-1000	Canada, CFRX Toronto	6070do			
0900-1000	Canada, CFVP Calgary	6030do			
0900-1000	Canada, CHNX Halifax	6130do			
0900-1000	Canada, CKZU Vancouver	6160do			
0900-1000	China, China Radio Intl	9785pa	11755pa		
0900-1000	Costa Rica, RF Peace Intl	7385am	15050am		
0900-1000	Ecuador, HCJB	5865eu	9640pa	21455au	
0900-1000 as	Eq Guinea, R East Africa	15186af			
0900-1000 mtwhf	Eq Guinea, Radio Africa	15186af			
0900-0930	Finland, YLE/R Finland	9760as	15225as		
0900-0950	Germany, Deutsche Welle	6160au	7380as	9565af	12055as
		15145af	15410af	17715as	17800af
		17820as	21600af		
		4915do			
0900-0915 mtwrf	Ghana, Ghana Broadc Corp	3366do			
0900-1000	Guam, TWR/KTWR	15330as			
0900-0915	Guam, TWR/KTWR	15200as			
0900-1000	Guyana, GBC/Voice of	5950do			
0900-1000 fas/vl	Italy, IRRS	7120va			
0900-0920 thfa	Kazakhstan, R Almaty Intl	9505eu	9620eu	11840eu	
0900-0930 vl	Kiribati, Radio	9810do			
0900-1000	Liberia, Radio Veritas	3425do			
0900-0915	Liberia, LCN/R Liberia Int	5100do			
0900-1000	Malaysia, Radio	7295do			
0900-0925	Netherlands, Radio	5965pa	9830pa	13700pa	
0900-1000	New Zealand, R NZ Intl	9700pa			
0900-1000 vl	Papua New Guinea, NBC	4890do			
0900-1000	Singapore, SBC Radio One	6160do			
0900-1000 vl	Solomon Islands, SIBC	5020do			
0900-1000	UK, BBC African Service	6190af	11940af	15400af	17830af
		17885af			
0900-0915	UK, BBC Asian Service	6065as	6195as	7235as	9580as
		9740as	11750as	11765as	11955as
		15280as	15310as	15360as	17760as
		17790as	21660as		
0900-1000	UK, BBC World Service	9410eu	11760me	12095eu	15190sa
		15485eu	15565eu	15575as	17640eu
		17705af			
0900-1000	USA, KAIJ Dallas TX	5810am			
0900-0959	USA, KHBI N Mariana Is	9355as			
0900-1000	USA, KTBN Salt Lk City UT	7510am			
0900-1000	USA, KWHR Naalehu HI	11565pa			
0900-1000	USA, WEWB Birmingham AL	5825na	7465eu		
0900-1000	USA, WGTG McCaysville GA	9400am			
0900-1000	USA, WHRI Noblesville IN	5770am	7315am		
0900-1000	USA, WJCR Upton KY	7490na			
0900-1000	USA, WRNO New Orleans LA	15420am			
0900-0959 th	USA, WSHB Cypress Crk SC	7335eu			
0900-1000	USA, WWCR Nashville TN	2390am	3210am	5070am	5935am
0900-1000	Zambia, Christian Voice	6065af			
0900-1000 vl	Zambia, R Zambia/ZNBC 1	7220do			
0900-1000 vl	Zambia, R Zambia/ZNBC 2	6165do			
0900-1000 vl	Zimbabwe, Zimbabwe BC	5975do			
0915-1000	Ghana, Ghana Broadc Corp	6130do	7295do		
0915-0945	UK, BBC Asian Service	6065as	6195as	7235as	9580as
		9740as	11750as	11765as	11955as
		15280as	15360as	21660as	
0915-0945 as	UK, BBC Asian Service	6065as	6195as	7235as	9580as
		9740as	11765as	11955as	15280as
		15360as	21660as		
0915-0930	UK, BBC World Service	11680eu	13745eu	15325eu	15340eu
		17695eu			
0920-0940 thfa	Kazakhstan, R Almaty Intl	9620eu	11840eu		
0930-1000	Austria, R Austria Intl	15455as	17870au		
0930-1000	Canada, CKZN St John's	6160do			
0930-1000 s/vl	Malta, VO Mediterranean	9660eu			
0930-1000	Netherlands, Radio	7260as	9810as		
0930-1000	Philippines, FEBC/R Intl	11635as			
0935-0950 s	Albania, TWR Tirana	9685eu			
0945-1000	UK, BBC Asian Service	6195as	9740as	11750as	11765as
		15360as	21660as		
0945-1000 a	UK, BBC Asian Service	6065as	7235as	9580as	11955as
		15280as			
0945-1000 smtwhf	UK, BBC Slow Speed News	6065as	7235as	9580as	11955as
		15280as			
1000-1100	Anguilla, Caribbean Beacon	6090am			
1000-1100	Australia, Radio	6080as	9580pa	11880as	17750as
1000-1100 vl	Australia, VL8A Alice Spg	2310do			
1000-1100 vl	Australia, VL8K Katherine	2485do			
1000-1100 vl	Australia, VL8T Tent Crk	2325do			
1000-1100 vl	Canada, CBC N Quebec Svc	9625do			
1000-1100	Canada, CFRX Toronto	6070do			
1000-1100	Canada, CFVP Calgary	6030do			
1000-1100	Canada, CHNX Halifax	6130do			
1000-1100	Canada, CKZN St John's	6160do			
1000-1100	Canada, CKZU Vancouver	6160do			
1000-1100	China, China Radio Intl	9785pa	11755pa		
1000-1100	Costa Rica, RF Peace Intl	7385am	15050am		
1000-1030	Czech Rep, Radio Prague	17485af			
1000-1100	Ecuador, HCJB	9640pa	21455au		
1000-1100 as	Eq Guinea, R East Africa	15186af			
1000-1100 mtwhf	Eq Guinea, Radio Africa	15186af			
1000-1030	Guam, AWR/KSDA	7455as			
1000-1100	Guam, TWR/KTWR	9865as			
1000-1100	India, All India Radio	11585au	11735au	13700au	15050au
		17387au	17840au		
1000-1100 fas/vl	Italy, IRRS	7120va			
1000-1100	Jordan, Radio	11690eu			
1000-1100	Liberia, Radio Veritas	3425do			
1000-1100	Malaysia, Radio	7295do			
1000-1100 vl	Malaysia, RTM Kuching	7160do			
1000-1100 vl	Malaysia, RTM KotaKinabalu	5980do			
1000-1100 s/vl	Malta, VO Mediterranean	9660eu			
1000-1100	Netherlands, Radio	7260as	9810as		
1000-1100	New Zealand, R NZ Intl	9700pa			
1000-1100	Nigeria, Voice of	7255af			
1000-1100 vl	Papua New Guinea, NBC	4890do			
1000-1100	Philippines, FEBC/R Intl	11635as			
1000-1100	Singapore, SBC Radio One	6160do			
1000-1100 vl	Solomon Islands, SIBC	5020do			
1000-1030	Switzerland, Swiss R Intl	6165eu	9535eu		
1000-1100	UK, BBC African Service	6190af	11940af	17885af	
1000-1100 as	UK, BBC African Service	15400af	17830af		
1000-1100	UK, BBC Asian Service	6195as	9740as	11750as	11765as
		15310as	15360as	17790as	21660as
1000-1100	UK, BBC World Service	9410eu	11760me	12095eu	15485eu
		15565eu	15575as	17640eu	17705af
1000-1100 as	UK, BBC World Service	15190sa			
1000-1100	USA, KAIJ Dallas TX	5810am			
1000-1059	USA, KHBI N Mariana Is	9355au	15725as		
1000-1100	USA, KTBN Salt Lk City UT	7510am			
1000-1100	USA, KWHR Naalehu HI	11565pa			
1000-1100	USA, Voice of America	5985pa	6165am	7405am	9590am
		11720pa	15425pa		
		7465eu			
1000-1100	USA, WEWB Birmingham AL	5825na			
1000-1100	USA, WGTG McCaysville GA	9400am			
1000-1100	USA, WHRI Noblesville IN	6040am	9495am		
1000-1100	USA, WJCR Upton KY	7490na			
1000-1100	USA, WRNO New Orleans LA	15420am			
1000-1059 mw	USA, WSHB Cypress Crk SC	6095na			
1000-1059 s	USA, WSHB Cypress Crk SC	7395am			
1000-1100	USA, WWCR Nashville TN	2390am	5070am	5935am	15685am
1000-1100	USA, WYFR Okeechobee FL	5950na			
1000-1025	Vietnam, Voice of	5940as	7270as	7400as	9840as
		12020as			
1000-1100	Zambia, Christian Voice	6065af			
1000-1100 vl	Zambia, R Zambia/ZNBC 1	7220do			
1000-1100 vl	Zambia, R Zambia/ZNBC 2	6165do			
1030-1100 mtwhf	Ethiopia, Radio	5990do	7110do	9705do	
1030-1100	Guam, AWR/KSDA	7455as	9530as		
1030-1035	Israel, Kol Israel	15640eu	15650na		
1030-1100	South Korea, R Korea Intl	9650am			
1030-1100	Sri Lanka, Sri Lanka BC	11835as	15120as	17850as	
1030-1055	UAE, Radio Dubai	13675eu	15395eu	21605eu	
1030-1045 mtwhfa	Vatican State, Vatican R	5883eu	9645eu	11740eu	
1045-1100 mtwhf	USA, WRMI/R Miami Intl	9955am			



Your Name in Lights!

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

FREQUENCIES

1400-1500	Anguilla, Caribbean Beacon	11775am				1400-1500	Singapore, SBC Radio One	6155do			
1400-1430	Australia, Radio	5995pa 11660as	6020pa 12080as	6080as	9770as	1400-1500	Singapore, R Singapore Int	6155as			
1400-1500 vl	Australia, VL8A Alice Spg	2310do				1400-1500	Sri Lanka, Sri Lanka BC	9730as	15425as		
1400-1500 vl	Australia, VL8K Katherine	2485do				1400-1500	Switzerland, Swiss R Intl	9885as	12075as	13635as	
1400-1500 vl	Australia, VL8T Tent Crk	2325do				1400-1430	Thailand, Radio	9530as	9655as	11905as	
1400-1500 vl	Canada, CBC N Quebec Svc	9625do				1400-1500	UK, BBC African Service	6190af 17830af	11860af 17885af	11940af 21470af	15420af 21490af
1400-1500	Canada, CFRX Toronto	6070do				1400-1500	UK, BBC Asian Service	5990as	6195as	9740as	11750as
1400-1500	Canada, CFVP Calgary	6030do				1400-1500	UK, BBC World Service	9410eu	9515na	9590na	12095eu
1400-1500	Canada, CHNX Halifax	6130do				1400-1500	USA, KAIJ Dallas TX	15220na 17640eu	15485eu 17705eu	15565eu 17840am	15575as
1400-1500	Canada, CKZN St John's	6160do				1400-1500	USA, KHBI N Mariana Is	13815am			
1400-1500	Canada, CKZU Vancouver	6160do				1400-1459	USA, KTBN Salt Lk City UT	9355af			
1400-1500 smtwhf	Canada, R Canada Intl	9640na	11855na			1400-1500	USA, KWHR Naalehu HI	7510am			
1400-1500	China, China Radio Intl	7160as 9700va	7260as 11825as	7405na	9535as	1400-1500	USA, Voice of America	7560pa	6160as	7125as	7215as
1400-1500	Costa Rica, RF Peace Intl	7385am				1400-1500	USA, WEWN Birmingham AL	9455na	11875na	15745eu	
1400-1430	Czech Rep, Radio Prague	13580na				1400-1500	USA, WGTG McCaysville GA	9400am			
1400-1500	Ecuador, HCJB	12005am				1400-1500	USA, WHRI Noblesville IN	6040am	15105am		
1400-1500 as	Eq Guinea, R East Africa	15186af				1400-1500	USA, WJCR Upton KY	7490na			
1400-1457	France, Radio France Intl	7110as 17560me	11910as	12030as	15405as	1400-1430 s	USA, WRMI/R Miami Intl	9955am			
1400-1430 vl	Georgia, Voice of Hope	9310as				1400-1500	USA, WRMI/R Miami Intl	9955am			
1400-1500	India, All India Radio	9545as	11620as	13710as		1400-1500	USA, WRNO New Orleans LA	7395am			
1400-1430	Israel, Kol Israel	9365eu	12080na			1400-1500	USA, WYFR Okeechobee FL	9475am	12160am	13845am	15685am
1400-1500 fas/vl	Italy, IRRS	7120va				1400-1405	Vatican State, Vatican R	13765au	15540au		
1400-1500	Japan, R Japan/NHK World	7200as				1400-1500	Zambia, Christian Voice	6065af			
1400-1500	Jordan, Radio	11690eu				1400-1500 vl	Zambia, R Zambia/ZNBC 1	4910do			
1400-1500	Liberia, Radio Veritas	3425do				1400-1500 vl	Zambia, R Zambia/ZNBC 2	6165do			
1400-1500	Malaysia, Radio	7295do				1415-1420	Nepal, Radio	3230do	5005do		
1400-1500	Malaysia, RTM Kuching	7160do				1430-1500	Australia, Radio	5995pa 9770as	6020pa 11660as	6080as	9500as
1400-1500 vl	Malaysia, RTM KotaKinabalu	5980do				1400-1500	Canada, R Canada Intl	9640na	11855na		
1400-1430	Mexico, Radio Mexico Intl	9705na				1430-1500 vl	China, China Radio Intl	6995as	8660as	9880as	11445as
1400-1500	Netherlands, Radio	9895as	13700as	15585as		1430-1500	Guam, AWR/KSDA	7400as			
1400-1500 occsnal	New Zealand, R NZ Intl	6105pa				1430-1500 mtwhf	Portugal, R Portugal Intl	21515as			
1400-1430 s	Norway, Radio Norway Intl	13800as				1430-1500	Sweden, Radio	11650au	11880as	15240au	
1400-1500 as	Palau, KHBN/Voice of Hope	9985as				1440-1500	USA, WRMI/R Miami Intl	9955am			
1400-1500 vl	Papua New Guinea, NBC	4890do				1440-1500	Myanmar, Voice of	5990do			
1400-1500	Philippines, FEBC/R Intl	11995as				1450-1500	Vatican State, Vatican R	9875au	11640au		
1400-1500	Russia, Voice of Russia WS	4730as 7115af	4940as 7130me	4975as 7235as	5925me 7245me						
1400-1455 as	S Africa, Channel Africa	7390as 9830me 9440af	9470af 9840me 17675af	9635me 9725as 17870af							

SELECTED PROGRAMS

Sundays

- 1400 France, R France Intl: News. See S 1200.
- 1400 India, All India Radio: Feature Program. A variable feature produced by AIR.
- 1400 Japan, NHK/Radio: News. See S 0000.
- 1400 Radio Mexico Intl: Mail Box. A typical mailbag program in which letters from English-speaking listeners are discussed on the air.
- 1410 Japan, NHK/Radio: Let's Learn Japanese. See S 0010.
- 1419 France, R France Intl: Asia File. See S 1219.
- 1425 Japan, NHK/Radio: Profile. See S 0025.
- 1433 France, R France Intl: Club 9516. See S 1233.
- 1445 India, All India Radio: News. International news and reports.

Mondays

- 1400 France, R France Intl: News. See S 1200.
- 1400 Japan, NHK/Radio: News. See S 0000.
- 1415 Japan, NHK/Radio: 44 Minutes. See M 0015.
- 1416 Japan, NHK/Radio: Guest Corner. See M 0016.
- 1425 France, R France Intl: Review of the French Newspapers. See M 1225.
- 1425 India, All India Radio: DX-ers Corner (2/4). India's bimonthly program for shortwave listeners.
- 1431 France, R France Intl: Sports Magazine. See M 1231.
- 1432 France, R France Intl: RFI Europe. See M 1232.
- 1433 Japan, NHK/Radio: Close Up. See M 0033.
- 1445 France, R France Intl: Arts in France. See M 1245.
- 1445 India, All India Radio: News. See S 1445.
- 1450 France, R France Intl: Insight. See M 1250.
- 1450 Japan, NHK/Radio: Tumbling Dice. See M 0050.

Tuesdays

- 1400 France, R France Intl: News. See S 1200.
- 1400 Japan, NHK/Radio: News. See S 0000.
- 1415 Japan, NHK/Radio: 44 Minutes. See M 0015.
- 1416 Japan, NHK/Radio: Guest Corner. See M 0016.
- 1426 France, R France Intl: Review of the French Newspapers. See M 1225.
- 1432 France, R France Intl: Books. See T 1232.
- 1433 Japan, NHK/Radio: Close Up. See M 0033.
- 1437 France, R France Intl: Discovery. See T 1237.

- 1445 India, All India Radio: News. See S 1445.
- 1446 France, R France Intl: Land of France. See T 1246.
- 1450 Japan, NHK/Radio: Tumbling Dice. See M 0050.
- 1451 France, R France Intl: Echoes from Africa. See T 1251.

Wednesdays

- 1400 France, R France Intl: News. See S 1200.
- 1400 Japan, NHK/Radio: News. See S 0000.
- 1415 Japan, NHK/Radio: 44 Minutes. See M 0015.
- 1416 Japan, NHK/Radio: Guest Corner. See M 0016.
- 1426 France, R France Intl: Review of the French Newspapers. See M 1225.
- 1432 France, R France Intl: France Today. See W 1232.
- 1433 Japan, NHK/Radio: Close Up. See M 0033.
- 1434 France, R France Intl: Power and Policy. See W 1234.
- 1439 France, R France Intl: RFI Europe. See M 1232.
- 1445 India, All India Radio: News. See S 1445.
- 1447 France, R France Intl: Letter from a Listener. See T 1645.
- 1450 France, R France Intl: Land of France. See T 1246.
- 1451 Japan, NHK/Radio: Tumbling Dice. See M 0050.

Thursdays

- 1400 France, R France Intl: News. See S 1200.
- 1400 Japan, NHK/Radio: News. See S 0000.
- 1415 Japan, NHK/Radio: 44 Minutes. See M 0015.
- 1416 Japan, NHK/Radio: Guest Corner. See M 0016.
- 1426 France, R France Intl: Review of the French Newspapers. See M 1225.
- 1431 France, R France Intl: Sports Magazine. See M 1231.
- 1433 France, R France Intl: The Bottom Line. See H 1233.
- 1433 Japan, NHK/Radio: Close Up. See M 0033.
- 1439 France, R France Intl: Planet Earth (biweekly). See H 1239.
- 1445 India, All India Radio: News. See S 1445.
- 1447 France, R France Intl: Letter from a Listener. See T 1645.
- 1450 France, R France Intl: North/South (biweekly). See H 1250.
- 1450 Japan, NHK/Radio: Tumbling Dice. See M 0050.

Fridays

- 1400 France, R France Intl: News. See S 1200.
- 1400 Japan, NHK/Radio: News. See S 0000.
- 1415 Japan, NHK/Radio: 44 Minutes. See M 0015.
- 1416 Japan, NHK/Radio: Guest Corner. See M 0016.

- 1426 France, R France Intl: Review of the French Newspapers. See M 1225.
- 1433 Japan, NHK/Radio: Close Up. See M 0033.
- 1434 France, R France Intl: Focus on France. See S 1234.
- 1445 India, All India Radio: News. See S 1445.
- 1450 Japan, NHK/Radio: Tumbling Dice. See M 0050.

Saturdays

- 1400 France, R France Intl: News. See S 1200.
- 1400 India, All India Radio: Feature. See S 1400.
- 1400 Japan, NHK/Radio: News. See S 0000.
- 1400 Radio Mexico Intl: Voices. See S 1500.
- 1410 Japan, NHK/Radio: Weekend Break. See A 0010.
- 1423 France, R France Intl: Focus on France. See A 1223.
- 1426 France, R France Intl: Review of the French Newspapers. See M 1225.
- 1431 France, R France Intl: Spotlight on Africa. See A 1231.
- 1444 France, R France Intl: News Update. See A 1244.
- 1445 India, All India Radio: News. See S 1445.
- 1446 France, R France Intl: French Lesson. See A 1245.
- 1451 France, R France Intl: Letter from a Listener. See T 1645.

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FREQUENCIES

1600-1700	Anguilla,Caribbean Beacon	11775am				1600-1615	UK, BBC Asian Service	3915as	5975as	5990as	6195as
1600-1700	Australia, Radio	5995pa	6020pa	6080as	9500as	1600-1700	UK, BBC Asian Service	7135as	9740as	11750as	
		9770as	11660as	12080as		1600-1700	UK, BBC World Service	6195eu	9410eu	9515na	12095eu
1600-1700 vl	Australia, VL8A Alice Spg	2310do						15485eu	15575eu		17840am
1600-1700 vl	Australia, VL8K Katherine	2485do				1600-1700	USA, KALJ Dallas TX	13815am			
1600-1700 vl	Australia, VL8T Tent Crk	2325do				1600-1700	USA, KTBN Salt Lk City UT	15590am			
1600-1610	Bangladesh, Bangla Betar	4880do	15520do			1600-1700	USA, KWHR Naalehu HI	7560pa	9930as		
1600-1700 vl	Canada, CBC N Quebec Svc	9625do				1600-1700	USA, Voice of America	6035af	6110as	7125as	7215as
1600-1700	Canada, CFRX Toronto	6070do				1600-1700	9575as	9645as	9760as	11920af	12040af
1600-1700	Canada, CFVP Calgary	6030do				1600-1700	13710af	15205as	15225af	15395as	15410af
1600-1700	Canada, CHNX Halifax	6130do					17895af				15445af
1600-1700	Canada, CK2N St John's	6160do				1600-1700	USA, WEWN Birmingham AL	11875na	13615na	15745eu	
1600-1700	Canada, CKZU Vancouver	6160do				1600-1700	USA, WGTG McCaysville GA	9400am			
1600-1630 s	Canada, R Canada Intl	9640na	11855na			1600-1700	USA, WHRI Noblesville IN	13760am	15105am		
1600-1659	Canada, R Canada Intl	6140as	7150as			1600-1700	USA, WINB Red Lion PA	13790af			
1600-1700	China, China Radio Intl	9565as	9620af			1600-1700	USA, WJCR Upton KY	7490na			
1600-1700 as	Costa Rica, Adv World R	9725am	11870am	13750am		1600-1700	USA, WMLK Bethel PA	9465am			
1600-1700	Costa Rica, RF Peace Intl	7285am	15050am			1600-1700	USA, WRNO New Orleans LA	15420am			
1600-1700	Ethiopia, Radio	7165af	9560af			1600-1659 a	USA, WSHB Cypress Crk SC	18930af			
1600-1700	France, Radio France Intl	9485af	11615af	11700af	12015af	1600-1659 a	USA, WSHB Cypress Crk SC	18930af			
		15210af	15315af	15530af		1600-1700	USA, WWCR Nashville TN	9475am	12160am	13845am	15685am
1600-1700 vl	Georgia, Voice of Hope	6290eu				1600-1700	USA, WYFR Okeechobee FL	11830na	15215na	15695eu	17555eu
1600-1650	Germany, Deutsche Welle	6170as	7120af	7225as	7305as			17760eu			
	9585as	9735af	13750as	15145af		1600-1610 a	Vatican State, Vatican R	9875va			
1600-1700	Germany,Overcomer Ministr	6175eu	11985eu			1600-1625	Vietnam, Voice of	5940eu		7400eu	9840af
1600-1700	Guam, AWR/KSDA	7455as				1600-1700	Zambia, Christian Voice	3330af	4965af		
1600-1630	GUAM, TWR/KTWR	15105as				1600-1700 vl	Zambia, R Zambia/ZNBC 1	4910do			
1600-1630	Iran, VOIRI	7215as	9780as	11790as	13605as	1600-1700 vl	Zambia, R Zambia/ZNBC 2	6165do			
1600-1700 vl	Italy, IRRS	3985va				1610-1615	Bangladesh, Bangla Betar	4880do			
1600-1630	Jordan, Radio	11690eu				1610-1700	USA, WYFR Okeechobee FL	11550as			
1600-1700	Lebanon, Voice of Hope	9960me				1615-1700	UK, BBC African Service	6190af	11940af	15400af	15420af
1600-1610	Lesotho, Radio Lesotho	4800do				1615-1645 as	UK, BBC African Service	17830af	21470af	21660af	
1600-1700	Liberia, Radio Veritas	3425do				1615-1700	UK, BBC Asian Service	11860af	3915as	5975as	7135as
1600-1700	Malaysia, Radio	7295do						9740as	9515na	9915eu	9510as
1600-1650 occsnal	New Zealand, R NZ Intl	6105pa				1615-1700 as	UK, BBC World Service	6010eu	5883eu	7250eu	9645eu
1600-1700	Nigeria, Voice of	7255af				1615-1630	UK, BBC World Service	4005eu	11810eu		
1600-1630 s	Norway, Radio Norway Intl	13800va	13805na	15570me	17720me	1630-1655	Belgium, R Vlaanderen Int	5910eu	9925eu	11680me	
1600-1630	Pakistan, Radio	9650af	11570me			1630-1659 s	Canada, R Canada Intl	9640na	11855na		
1600-1700 vl	Papua New Guinea, NBC	4890do				1630-1700	Egypt, Radio Cairo	15255af			
1600-1700	Russia, Voice of Russia WS	4920eu	5940eu	5965eu	6130eu	1630-1700	Georgia, Georgian Radio	6080eu			
	6175af	7115af	7125eu	7175af	7180eu	1630-1700	Slovakia, R Slovakia Intl	5915eu	6055eu	7345eu	
1600-1625	S Africa, Channel Africa	5955af				1645-1700	Tajikistan, Radio Dushanbe	7245as	11620as		
1600-1700 as	Sri Lanka, Sri Lanka BC	9730as	15425as			1650-1700	Eq Guinea, Radio Africa	15186af			
1600-1700	Swaziland, Trans World R	9500af				1650-1700 mtwhf	New Zealand, R NZ Intl	9810pa			
1600-1630	Switzerland, Swiss R Intl	9885as	12075as	13635as							
1600-1638	UAE, Radio Dubai	13630au	13675eu	15395eu	21605eu						

SELECTED PROGRAMS

Sundays

- 1600 France, R France Intl: News. See S 1200.
- 1600 USA, VOA Washington DC: Nightline Africa. News, correspondent reports, backgrounders, and features on world and African issues.
- 1610 USA, VOA Washington DC: Encounter. Two experts debate their contrasting views on a subject of current importance.
- 1619 France, R France Intl: Asia File. See S 1219.
- 1630 USA, VOA Washington DC: Studio 38. A bright, fast-paced show highlighting American lifestyles and culture.
- 1633 France, R France Intl: Club 9516. See S 1233.
- 1657 USA, VOA Washington DC: VOA Editorial. Comments expressing the official position of the U.S. Government on various subjects.

Mondays

- 1600 France, R France Intl: News. See S 1200.
- 1610 USA, VOA Washington DC: Development Report (Special English). See M 1340.
- 1610 USA, VOA Washington DC: Mideast Edition. News events, issues, people, and culture for listeners in the Middle East and south Asia, featuring on-the-scene reports and interviews with newsmakers.
- 1615 USA, VOA Washington DC: This is America (Special English). See M 1345.
- 1625 France, R France Intl: Review of the French Newspapers. See M 1225.
- 1630 USA, VOA Washington DC: Africa World Tonight. News, sports, correspondent reports, backgrounders, and features on world and African issues.
- 1630 USA, VOA Washington DC: Now Music USA. Rock and soul hits of today and yesterday.
- 1630 USA, VOA Washington DC: American Gold. Fifty minutes of classic pop music hosted by Ray Freeman.
- 1631 France, R France Intl: Sports Magazine. See M 1231.
- 1632 France, R France Intl: RFI Europe. See M 1232.
- 1641 France, R France Intl: News Summary. See M 1241.
- 1645 France, R France Intl: Arts in France. See M 1245.
- 1650 France, R France Intl: Insight. See M 1250.

Tuesdays

- 1600 France, R France Intl: News. See S 1200.
- 1610 USA, VOA Washington DC: Agriculture Report (Special English). See T 1340.

- 1610 USA, VOA Washington DC: Mideast Edition. See M 1610.
- 1615 USA, VOA Washington DC: Science in the News (Special English). See T 1345.
- 1626 France, R France Intl: Review of the French Newspapers. See M 1225.
- 1630 USA, VOA Washington DC: Africa World Tonight. See M 1630.
- 1630 USA, VOA Washington DC: Now Music USA. See M 1630.
- 1631 France, R France Intl: Books. See T 1232.
- 1636 France, R France Intl: Land of France. See T 1246.
- 1645 France, R France Intl: Letter from a Listener. David Page reads letters to RFI from worldwide listeners.
- 1648 France, R France Intl: Drumbeat. A slice of life from the African continent and some African music.

Wednesdays

- 1600 France, R France Intl: News. See S 1200.
- 1610 USA, VOA Washington DC: Science Report (Special English). See W 1340.
- 1610 USA, VOA Washington DC: Mideast Edition. See M 1610.
- 1615 USA, VOA Washington DC: Exploration (Special English). See W 1345.
- 1626 France, R France Intl: Review of the French Newspapers. See M 1225.
- 1630 USA, VOA Washington DC: Africa World Tonight. See M 1630.
- 1630 USA, VOA Washington DC: Now Music USA. See M 1630.
- 1632 France, R France Intl: France Today. See W 1232.
- 1634 France, R France Intl: Power and Policy. See W 1234.
- 1639 France, R France Intl: RFI Europe. See M 1232.
- 1644 France, R France Intl: News Summary. See M 1241.
- 1647 France, R France Intl: Letter from a Listener. See T 1645.
- 1650 France, R France Intl: Land of France. See T 1246.

Thursdays

- 1600 France, R France Intl: News. See S 1200.
- 1610 USA, VOA Washington DC: Science Report (Special English). See W 1340.
- 1610 USA, VOA Washington DC: Mideast Edition. See M 1610.
- 1615 USA, VOA Washington DC: The Making of a Nation (Special English). See H 1345.
- 1626 France, R France Intl: Review of the French Newspapers. See M 1225.
- 1630 France, R France Intl: Sports Magazine. See M 1231.
- 1630 USA, VOA Washington DC: Africa World Tonight. See M 1630.

- 1630 USA, VOA Washington DC: Now Music USA (Top 20 Countdown). News from the music world and the top hits of the week in the USA.
- 1632 France, R France Intl: Reach Out. Reporting on efforts to overcome world problems such as the banning of land mines.
- 1642 France, R France Intl: Echoes from Africa. See T 1251.
- 1648 France, R France Intl: Discovery. See T 1237.

Fridays

- 1600 France, R France Intl: News. See S 1200.
- 1610 USA, VOA Washington DC: Environment Report (Special English). See F 1340.
- 1610 USA, VOA Washington DC: Mideast Edition. See M 1610.
- 1615 USA, VOA Washington DC: American Mosaic (Special English). See F 1345.
- 1626 France, R France Intl: Review of the French Newspapers. See M 1225.
- 1630 USA, VOA Washington DC: Africa World Tonight. See M 1630.
- 1630 USA, VOA Washington DC: Country Music USA. Country, bluegrass, and western swing, plus conversations with country performers.
- 1630 USA, VOA Washington DC: Now Music USA (Top 20 Countdown). See H 1630.
- 1631 France, R France Intl: Film Reel. Interview with a performer or film maker.
- 1637 France, R France Intl: Drumbeat. See T 1648.
- 1645 France, R France Intl: Letter from a Listener. See T 1645.
- 1649 France, R France Intl: The Americas Magazine. Focus on a subject relating to a country of the western hemisphere.

Saturdays

- 1600 France, R France Intl: News. See S 1200.
- 1600 USA, VOA Washington DC: Nightline Africa. See S 1600.
- 1610 USA, VOA Washington DC: On the Line. See A 1510.
- 1623 France, R France Intl: Focus on France. See A 1223.
- 1626 France, R France Intl: Review of the French Newspapers. See M 1225.
- 1630 USA, VOA Washington DC: Press Conference JSA. Newsmakers are questioned by Washington journalists in the VOA studios.
- 1631 France, R France Intl: Spotlight on Africa. See A 1231.
- 1645 France, R France Intl: News Update. See A 1244.
- 1648 France, R France Intl: French Lesson. See A 1246.

GROVE

Complete Buyer's Guide

THE MOST RESPECTED NAME IN RADIO!

Save this Guide for your future product needs. We carry a complete line of radio scanners, shortwave receivers, satellite communications equipment, monitoring software, antennas, books, accessories, AND TWO GREAT MAGAZINES. Don't see what you need? Call us!

April 1998

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



NEW! FRS WALKIE-TALKIES!

Both of these tiny titans run full legal power (1/2 watt) in the new, license-free, 462/467 MHz Family Radio Service (FRS). Their outstanding 0.25 microvolt sensitivity provides reliable line-of site communications for up to two miles! Instantly select any of 14 separate channels--you can even scan them for activity--and even privacy-code them from dozens of professional CTCSS squelch tones for interference-free communications! Top-panel jacks accept convenient lapel speaker/mikes, and belt clips are included.

FR-465 Cherokee

Shirt-pocket size, offers "ring alert" for incoming calls, removable SMA-base rubber duckie, operates on five AAA alkaline or rechargeable cells (optional).

ACCESSORIES

BAT 6	AAA alkaline cells (5 required)	\$7.99
CAS 4	Leatherette carrying case	\$19.95
PWR 13	Universal Plug-In Charger	\$9.95
MIC 1	Mini Lapel Speaker/Microphone	\$19.95

ORDER TR 1 only **\$139⁹⁵**

75-510 Midland

Hand-size powerhouse has large, backlit LCD display for night viewing; four AA rechargeable batteries and AC charger included at no extra cost.

ACCESSORIES

BAT 1	AA Energizer Industrial	\$7.99
BAT11	AA NiCd cells (4 required)	\$1.95
BAT13	AA NiCd cells (4 required)	\$2.75
MIC 1	Mini Lapel Speaker/Microphone	\$19.95

ORDER TR 2 only **\$149⁹⁵**



Note: Both models may be networked with other brands and models.



Judy Bob

A casual glance through this month's new buyer's guide will reveal a number of new products, books, and accessories to improve your radio requirements. We have tested several of the charming little Family Radio Service (FRS) walkie-talkies and have chosen two models from Cherokee and Midland that we feel are particularly outstanding. Quite frankly, we don't know how they can build this kind of performance and quality into such low-cost, two-way radios. And no license is required, either.

Our new Maxon weather alert receiver offers excellent reception on all channels, and includes a weather emergency notification alarm. For fringe listening, it even has an external antenna jack. It's very inexpensive, too--what a great combination!

We have finally located an extremely effective filter for those annoying digital pagers. These units from PAR Electronics are rugged and effective against the VHF and UHF MHz paging signals. They were built for the two-way radio industry, but their extremely affordable price makes them ideally suited for scanner applications.

But we don't want to take all the fun away; look through these pages and find some more of these bargains yourself!

Bob & Judy Grove

New! WEATHER ALERT MONITOR!



Crystal controlled for superb stability, this tiny receiver allows you to select any of the seven nationwide NOAA National Weather Service channels for

immediate weather information. Listen to 24 hour voice weather broadcasts, or select flashing light or siren for severe weather alerts. Sits on your desk or nightstand, or mounts on a wall. For strong signal areas, use the adjustable antenna, and in fringe areas, plug in your outdoor antenna for reliable reception. Comes with AC adaptor, or may be operated from internal 9-volt battery (optional) during power outages.

ORDER RCV 25 only **\$39⁹⁵**

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

Improved Drake R8-B



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

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

ORDER RCV 3 only **\$1159⁹⁵**

Drake SW8



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

ORDER RCV 19 only **\$779⁹⁵**

AR7030 PLUS



PLUS
PERFORMANCE

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

Continuous 0-32 MHz frequency coverage, high-stability TCXO oscillator, all-mode reception, synchronous detection, superb audio quality, compact portability, 2.6 Hz tuning increments, interference-resistant shielding, passband tuning, noise compressor, dual VFOs, enhanced AGC, programmable attenuator, and numerous other features combine to make this one incredible, affordable receiver. See complete specifications on page "E". **Accessories: ANT 2, ANT 24, p. "D"; SPK 13, p. "K".**

ORDER RCV 17 only **\$1269⁹⁵**

Bargain-Priced JRC NRD-345

Known for their luxury, high-performance receivers, Japan Radio company (JRC) has released a high quality, double conversion receiver at a low, competitive price! The new NRD-345 offers wide frequency coverage (100 kHz-30 MHz), multimode reception (AM, synch. AM, SSB), sharp selectivity (2/4 kHz), high sensitivity (0.3 microvolts), wide dynamic range (100 dB), strong audio (1 watt), dual VFOs, scannable memory (100 channels) with channel lockout, computer control (RS232C), dual clock timer (12/24 hour), precision tuning (5/100 Hz., 1/10 kHz steps), and adjustable noise blanker. Additional features include selectable AGC timing, 20 dB attenuator, adjustable tone control, backlit S meter, large backlit LCD display, and dual-voltage (12 VDC / 120 VAC) power supply. See complete specifications on page "E". **Accessories: ANT 2, ANT 3, p. "D"; SPK 13, p. "K".**



ORDER RCV 20 only **\$799⁹⁵**

The Popular SONY ICF-2010



This is a full-featured radio for the serious shortwave listener—with a reputation of distinction among the "powerful portables." Synchronous detection allows interference-free reception on many stations difficult to hear on other radios. Narrow/wide selectivity switching; clock/timer allows up to 4 automatic on/off cycles per day for frequencies and times of your choice; 10-step LED signal strength meter, audio tone selection for speech or music; and 32 station direct-access keyboard combine to make this Sony product a remarkable value for beginners or seasoned SWLs.

Frequency range includes 150 kHz-30MHz, 76-108, and 116-136 MHz. Requires 3D/2AA cells. See specification on page "E". **Accessories: BAT 1, BAT 2 beginning on page "M"; ANT 3, ANT 32, ANT 21 and TUN 4A, pp. "C" and "D"; SPK 13, p. "K".**

ORDER RCV 2 only **\$349⁹⁵**

Need something smaller?

This tiny Sony ICF-SW100 offers continuous 150 kHz-30 MHz and 76-108 MHz FM frequency ranges, Sony's famous synchronous detection, USB/LSB reception, 100 Hz tuning steps, 50 memory presets, 24 hour clock/timer, world time computer, station name display, and much, much more. See specifications on page "E". **Accessories: BAT 1, SPK 11 beginning on page "M"; ANT 21 and TUN 4A, pp. "C" and "D"; SPK 13, p. "K".**



ORDER RCV 24 **\$359⁹⁵**

SHORTWAVE RECEIVERS

NEWLY UPDATED SONY ICF-SW7600GS

Now includes an LPI Shortwave Active Antenna and AC adaptor!



19" antenna folds to compact 7" to fit in carrying pouch. Included with RCV 11 and also available separately—see below.



This compact marvel has synchronous AM detection, SSB, and even FM stereo coverage! DX/local switch reduces "pumping" on strong SSB signals.

Continuous 150 kHz-29.995 MHz frequency coverage plus 87.6-108 MHz FM headphone stereo, pushbutton tuning, tone control, external antenna jack, clock timer with sleep function, tilt bracket, direct-entry keypad and 22 scannable memory channels keynote the high-tech features of this potent portable! See specifications on page "E". Requires 4 AA cell batteries. **Accessories:** ANT 2, ANT 3, p. "D"; TUN 4A, p. "C"; BAT 1, SPK 11, beginning on page "M".

ORDER RCV 11 only **\$249⁹⁵**

COMPACT ACTIVE LOOP ANTENNA. Sony's AN-LP1 signal booster (shown above) is also available separately. Plugs into any shortwave portable with 1/8" antenna jack. Ideal for travelers, apartment dwellers. Includes 12' remote cable, carrying pouch; requires 2 AA cells.

ORDER ANT 26 only **\$89⁹⁵**

Sangean ATS909 Multiband Radio

This portable receiver sets a new standard with continuous coverage longwave, mediumwave, and shortwave reception plus FM (stereo with earphones), alphanumeric display for station identification, 306 channel memory, USB/LSB mode with 40 Hz step tuning, 29 memory banks with automatic search, world time for 42 cities, three independent timers, signal strength indicator, wide/narrow filter selection, RF gain, and tone control. See specifications on page "E". **Accessories:** ANT 3, ANT 21, ANT 32, and TUN 4A, pp. "C" and "D"; BAT 1 (4 required), SPK 11, beginning on page "M".



ORDER RCV 8 only **\$259⁹⁵**

Versatile Sangeans

Imagine—record your favorite programs automatically with the dual-zone clock timer on any frequency from 150 kHz through 30 MHz, 87.5-108 MHz FM as well! This impressive portable has SSB and CW reception, 45 memory channels, wide/narrow filter selectivity, signal strength indicator, AC wall adaptor, and more! Requires 4 D cells. See specifications on page "E".

Receivers are the same, excluding the tape recorder specifications. **Accessories:** ANT 3, ANT 21, ANT 32, and TUN 4A, pp. "C" and "D"; BAT 2, SPK 11, beginning on page "M".

ATS-818CS w/cassette recorder

ORDER RCV 9 only **\$219⁹⁵**



ATS-818 w/o cassette recorder

ORDER RCV 7 only **\$149⁹⁵**

Other Grove Shortwave Receivers

Drake				
Drake SW2	RCV-18	Tabletop 100 kHz-30 MHz, AM, synch AM, USB/LSB 50 Hz tuning, 100 memory channels	\$489.95	BRK-12, ACC9, BRK-13, ANT-3, ANT-15, SPK-13, TUN-4A
Grundig				
Yacht Boy 400	RCV-22	Portable, 160 kHz-30 MHz, 87.5-108 MHz, AM, FM, USB/LSB 5/1 kHz tuning 40 memory channels	\$199.95	ANT-3, ANT-21, ANT-32, BAT-1, PWR-8, SPK-11, TUN-4A
Sangean				
Sangean ATS808A	RCV-13	Portable 150 kHz-30 MHz, 87.5-108 MHz, AM, FM, 5/1 kHz tuning AM, 54 memory channels	\$129.95	ANT-3, ANT-21, ANT-32, BAT-1, PWR-10, TUN-4A
Sony				
Sony ICF-SW77	RCV-10	Portable 150 kHz-30 MHz, 76-108 MHz, AM sync AM, FM, USB/LSB 50 Hz/1 kHz tuning, 162 memory channels	\$469.95	ANT-3, ANT21, ANT32, BAT-1, BAT-2, SPK13, TUN-4A, WP-4

GE Superadio III for AM/FM DXing

This receiver for AM/FM DXers features smooth vernier dial and tuned RF on both AM and FM, while a ceramic IF filter and 7 tuned IF circuits provide outstanding selectivity. The two-way speaker system with separate bass, treble, and loudness controls assure solid, clean sound, and the drift-cancelling, automatic frequency control (AFC) circuit can be switched out for weak-signal hunting. The internal AM loop and FM whip antennas provide convenient portability, while external antenna jacks accommodate your long-distance antennas.



Powered by 120 VAC or six internal D cells (optional). **Accessories:** ANT 3, ANT 21, ANT 31, ANT 32, and TUN 4A, pp. "C" and "D"; SPK 13, p. "K"; BAT 2, p. "M".

ORDER RCV 5 only **\$59⁹⁵**

GROVE TUN-4A MINITUNER PLUS

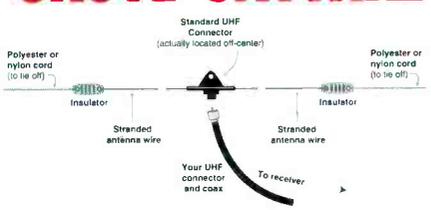


Here's a high performance, amplified, frequency-tunable antenna system for general coverage shortwave and medium wave monitoring. For indoor use, connect a short length of wire or the popular Grove ANT-6 Hidden Antenna. Connected to an outdoor antenna like the Grove ANT-2 Skywire or ANT-3 Mini Skywire, the TUN-4A MiniTuner Plus provides knockout signal strength and allows frequency preselection as well.

Continuous 400 kHz-30 MHz coverage, -20 to +20 dB gain/attenuation control, dual antenna switch, dual receiver output, amplified/unamplified preselection, band switch, fine tuning, and built-in lightning protection. Full instructions included. Requires 12VDC power (sold separately). **Accessories:** ADP 6, ADP 11, ADP 27, ADPK 15, ANT 25, and PWR 19 beginning on page "M"; ANT 2, ANT 3, p. "D".

ORDER TUN 4A only **\$99⁹⁵**

GROVE SKYWIRE



High performance and low cost. Comes fully assembled with Budwig center connector ready for your PL-259 (UHF male) equipped coaxial cable (50 or 75 ohm, see page j); includes two porcelain end insulators and complete instructions. Covers 500 kHz to 30 MHz.

HAMS! Ideal for transmitting when used with a transmatch. (1.8-30 MHz at up to 250 watts)

ORDER ANT 2 only **\$39⁹⁵**

SPECIFICATIONS:

- Length: 66 feet
- Feedpoint impedance: 50 or 75 ohm (nominal)
- Feedpoint location: 22 feet from end
- Elements: 18 AWG (16 x 30) bare stranded copper
- Connector housing: Heavy duty black phenolic

Limited Space? Try Grove's new

Mini-Skywire Similar to above, but 40-foot dual-dipole.

ORDER ANT 3 only **\$29⁹⁵**

STONER-DYMEK

If a large, outside dipole is out of the question, choose the professional Dymek DA-100E, 50 kHz-30 MHz active receiving antenna! High sensitivity, low noise, wide dynamic range, step-selectable attenuator, static-discharge-protected, weatherproof remote amplifier/whip assembly. Includes AC power supply, 50 feet RG-58/U coax, remote amplifier, 4' stainless-steel whip, receiver-interconnect cable (RCA) for radios with screw terminals; for PL-259 or 1/8" miniplug connector, order ADPK 2 (see p. "m").



ORDER ANT 24 only **\$179⁹⁵**

Select-A-Tenna

Apartment dwellers and mobile home owners, boost your 530-1700 kHz AM broadcast reception up to 30 dB with the famous Select-A-Tenna! Improves adjacent channel rejection, reduces signal fading. Tuning knob selects your listening frequency.

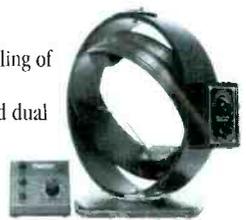
No batteries, power, or connection required; the 11", high-Q loop antenna focuses its captive signals to your radio's internal ferrite loop. If your receiver requires an external antenna, a convenient 3.5 mm (1/8") jack and plug provided.

ORDER ANT 21 only **\$59⁹⁵**

KIWA Medium Wave Air-Core Loop Antenna

Are you looking for the ultimate indoor antenna for medium wave reception on your communications receiver? Then look no more—this unique 12-inch, circular air-core antenna provides improved weak signal reception of medium wave broadcast signals and its electronically balanced circuitry minimizes pickup of electrical interference. Some of the other high performance features of the Kiwa loop include:

- Full 530-1705 kHz MW frequency coverage
- May be precisely rotated and tilted for maximum signal pickup and nulling of interfering stations.
- Equipped with local/DX pre-amp switch, variable output attenuator, and dual output amplifiers.
- May be powered by a low-noise AC supply, included, or by battery.
- Stands 17 inches (43 cm) high and weighs 16 pounds (7.25 kg).



ORDER ANT 31 only **\$349⁹⁵**

JPS Noise Canceller/Active Antenna

Enjoy Crystal Clear Sound!

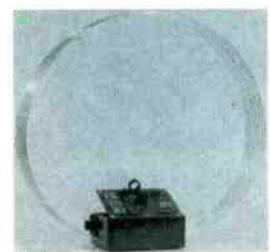


Imagine, just connect this simple device between your receiving antenna and shortwave receiver or transceiver, and null out locally-generated interference of virtually *any* kind! Computer hash, line noise, TV synch buzz—they all go away when the ANC-4 is adjusted to your receiver to receive 100 kHz-80 MHz!

Use the attachable whip (provided) or, even better, a second external antenna to sample local noise. A simple adjustment from the front panel reduces or even eliminates virtually any electrical noise interference you are likely to encounter! The new ANC-4 can even be used as a frequency-selective active antenna/signal booster! Whip, random wire antenna, DC plug and full instructions provided. Requires 12 VDC @ 300 mA power. **Accessory: PWR 13 on page "M".**

ORDER ACC-21 only **\$194⁹⁵**

Exciting New KIWA Pocket-Loop Antenna



This highly efficient signal grabber is 12" across when deployed, yet collapses to a tiny pocket size for transport! Designed to receive and

amplify signals from 530 kHz through 20 MHz in four bands, no antenna jack on your portable radio is needed; it space-couples to your radio's existing whip and internal ferrite rod!

ORDER ANT 32 only **\$119⁹⁵**

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



H800 Skymatch



Compact Active Antenna

Imagine a two-foot antenna that performs like a 100 foot antenna; and what if that compact powerhouse could receive signals from 10 kHz through 50 MHz? That's VLF, medium wave, shortwave, and even VHF low band all rolled into one! Operates either from 120 VAC or optional 9 volt batteries for portable or emergency use.

Wide dynamic range resists strong-signal-overload problems, while high sensitivity enhances weak signals. Mounts inconspicuously on a porch, outside a window, on a roof, in a tree, or even in the radio room (not recommended because of electrical noise pickup).

Includes integrated active antenna, 50 feet of coax lead-in, control box, and AC adaptor. Equipped with RCA jack. **May require adaptor ADP 32 or ADP 25, see p. "M".**

ORDER ANT 15 only **\$99⁹⁵**

RECEIVER SPECIFICATIONS



Grove's Shortwave Receiver Specification Guide Prices and specifications subject to change without notice

Receiver	AR 7030 "Plus"	Drake RBB	Drake SWB	Drake SWZ	Drake SWB	Grundig YL Byr 400	JRC HRD-345	Sangean ATS-808	Sangean ATS-818CS	Sangean ATS-909	Sony ICF-SW77	Sony ICF-SW100	Sony ICF-SW2010	Sony ICF-SW7600ES
Grove Order #	RCV 17	RCV 3	RCV 19	RCV 18	RCV 22	RCV 20	RCV 13	RCV 9	RCV 8	RCV 10	RCV 24	RCV 2	RCV 11	
Grove Price	\$1269.95	\$1159.95	\$779.95	\$489.95	\$169.95	\$799.95	\$129.95	\$219.95	\$259.95	\$469.95	\$359.95	\$349.95	\$249.95	
Frequency Range	0-32 MHz	100kHz-30MHz (5-55/108-174MHz with optional converter)	100 kHz-30 MHz, 108-118-137MHz	100 Hz-30 MHz	160kHz-30MHz, 87.5-108MHz	100 kHz-30 MHz	150kHz-30 MHz, 87.5-108 MHz	150kHz-30MHz, 87.5-108MHz	150kHz-30MHz, 87.5-108 MHz	150kHz-30MHz, 87.5-108 MHz	150kHz-30MHz, 76-108 MHz	150kHz-30MHz, 76-108, 116-156MHz	150kHz-29.995MHz, 87.6-108MHz	
Keypad Entry?	Remote control (incl.)	Yes, plus tuning dial	Yes, plus tuning dial	Yes	Yes	Yes	Yes	Yes	Yes	Yes, plus tuning dial	Yes, plus tuning dial	Yes, plus tuning dial	Yes	
Tuning Steps	2.865 Hz SSB, 20.52 Hz AM/FM	10/100Hz, 1 kHz	50 kHz FM, 100 Hz AM	50 Hz-5 kHz	1.5 kHz	5/100 Hz/110 kHz	50/100 kHz FM, 10/95/1 kHz AM	1kHz	40 Hz USB/LSB	50kHz/1kHz	100Hz/15kHz, 9/10kHz MW, 50kHz FM	100Hz/1kHz	1kHz	
Display	Backlit LCD	Backlit LCD	Backlit LCD	Backlit LCD	Backlit LCD	Backlit LCD	LCD	Backlit LCD	Backlit LCD	Backlit LCD	Backlit LCD	Backlit LCD	Backlit LCD	
Dimmer	Yes	Yes	On/Off	Yes	On/Off	No	No	Yes	AM, FM broadcast, USB, LSB	On/Off	On/Off	On/Off	No	
Receiving Modes	AM, synchronous AM, USB, LSB, CW, RTTY	AM, AM synch, WFM, LSB, USB	AM, AM synch, WFM, LSB, USB	AM, AM synch, USB, LSB	AM, LSB, FM, CW, USB	AM, AM synch, USB, LSB	AM, FM	AM, LSB, WFM, USB	AM, FM broadcast, USB, LSB	AM, AM synch, LSB, WFM, USB	AM, AM synch, USB, LSB, CW, WFM	AM, USB, WFM, synch, del.	AM, WFM, USB, LSB, synch, del.	
Memory	400 channels	1000 channels	70 channels	100 channels	40 channels	100 channels	45 channels	45 presets	307 channels	182 channels	50 channels	32 channels	22 channels	
Scan	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Banks	10	10	7	No	No	No	No	No	29	20	10	No	No	
Search	No	No	No	No	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Delay	No	No	5 sec. per step	No	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Clock	Clock timer	Dual time zone	Dual mode	No	12/24 hr. sleep	12/24 hour clock/timer	24 hour UTC/local, alarm/timer	Dual time with record	3 separate timers with alarm	12/24 hr.	24 hr. sleep	12/24 hr. alarm/sleep	w/ timer and sleep	
Audio Output (Typical)	2 W @ 8 ohms	2.5 W @ 4 ohms	2 W @ 4 ohms	No	700 mW	1 Watt	440 mW @ 10 @ THD	800 mW	Yes	138 mV	245 mV	775 mV @ 1000 ohms	Yes	
Record Audio Output	Yes	Yes	Yes	No	No	No	No	Internal prog. cassette	Yes	No	No	No	No	
Recorder Activator	Yes	No	No	No	No	No	No	No	No	Yes	No	No	No	
Signal Strength Ind.	LCD bargraph	Analog S-meter	Analog S-meter	Analog S-meter	LCD bargraph	LCD bargraph	No	Yes	LCD bargraph	LCD bargraph	No	LED bargraph	Single 'tune' LED	
Computer Interface	RS232	RS232C	No	No	No	RS-232C	No	No	No	No	No	No	No	
Conversion Scheme	Double up-conversion (45 MHz/455 kHz)	Double up-conversion	Double up-conversion	Double up-conversion	Double up-conversion	Double up-conversion	Double up-conversion	Double up-conversion	Double up-conversion	Double up-conversion	Double up-conversion	Double up-conversion	Double up-conversion	
Sensitivity (typical)	0.5 µV	0.5 µV	0.5 µV	0.5 µV	0.5 µV	0.3 µV	0.3 µV	0.3 µV	0.3 µV	0.3 µV	0.3 µV	0.3 µV	0.3 µV	
Selectable Atten.	5 level	Yes	Yes	No	Yes	20 dB	Yes	RF gain control	Yes	Yes	Yes	Yes	Yes	
IF Selectivity (-60dB)	2.2/4/5.3/8.5 kHz	6/12 kHz AM, 2.3/5 kHz SSB	6/12 kHz AM, 2.3/5 kHz SSB	6/12 kHz AM, 2.3/5 kHz SSB	4/10 kHz wide, 2/6 kHz narrow	Wide/narrow AM	Wide/narrow AM	Wide/narrow switch, 6.5 kHz AM	Wide/narrow AM	Wide/narrow AM	Wide/narrow AM	Wide 9/18 kHz, Narrow 4/18 kHz		
Passband Tuning	±4.2 kHz, all modes	No	No	No	No	No	No	No	No	No	No	No	No	
Adjustable Notch Filter	No	No	No	No	No	No	No	No	No	No	No	No	No	
Antenna Connector	SO-239 and 600 ohm	Dual, switched SO 239	SO-239, Push terminals, integral whip	SO-239 and screw terminal	1/8" mini whip	SO-239 and 600 ohm	1/8" miniplug	1/8" miniplug	1/8" miniplug	1/8" miniplug	1/8" miniplug	1/8" miniplug	1/8" miniplug	
Dimensions (WxHxD")	9.5x3.5x9	13.5x5.25x13	11.5x5.25x13	11x4.5x7.5	7.5x4.62x1.75	10x4x5/0	7.5x5x1.5/0	11.25x7.37x2.75	8.5x5x1.5	10.07x6.67x1.87	4.37x2.87x3	11.37x6.25x2.16	7.27x4.72x1.25	
Weight	4 lbs. 13 oz.	13 lbs.	10 lbs.	5.8 lbs.	1 lb. 5 oz.	7.7 lbs.	1 lb. 5 oz.	3 lbs. 13 oz.	1 lb. 12 oz.	3.25 lbs.	8 oz.	3.75 lbs.	1.25 lbs.	
Power Requirement(s)	120 VAC (supply included) or 15 VDC @ 1 A (12 VDC w/ less perf.)	100/120/200/240/500VAC, 11-160V @ 2A	6-9VDC/6 cells	12 VDC/120 VAC	6AA cells/9VDC	12 VDC/120 VAC	6 VDC @ 300 mA or 6 AA cells	120VAC/int cells, 40 cells	4AA batteries or optional AC adaptor, 6 VDC	6VDC or 4C cells	120VAC or 2AA cells	120VAC or 3D/2AA cells	120VAC or 4AA cells	
Warranty	One year	One year	One year	One year	One year	One year	One year	One year	One Year	One year	One year	One year	One year	
Accessories Incl.	Manual, AC adaptor	Manual, AC adaptor	Tele whip/AC adaptor, manual	AC adaptor, wire antenna, manual	Reel ant./case/earphones/SW Guide/6AA batteries	AC adaptor, manual antenna	Soft pouch/stereo earphones/external antenna adaptor	AC adaptor/ex. ant adaptor/SW Guide	Stereo earphones/AC adaptor/external antenna connection.	Stereo earphones/AC adaptor/SW Guide	Stereo earphones/AC adaptor/pouch/SW Guide	AC adaptor/wire ant./external antenna/adapt./SW Gd.	Carrying case/PI active antenna/AC adaptor	

ICOM R-10!



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

Wide-dynamic-range triple conversion, and sharp selectivity assure dramatic improvement in interference-free reception. Eight alphanumeric characters can be entered to identify any channel, and ten characters can be used to identify banks. Voice scan control skips unmodulated carriers. Scan memory channels by bank, mode, or program. High-contrast display and powerful, dual-function

keyboard provide incredible options to suit your listening requirements. Noise blanker and automatic noise limiter provide double noise reduction. Sleep timer and programmable attenuator are additional advantages. See specifications on page "L". **Accessories: ACC 3, ACC 4, ADPK 4, CAS 1-N, DCC 5 beginning on page "M"; ANT 8 and ANT 14 on p. "J"; SFT02 on p. "K".**

ORDER SCN 06 only **\$399⁹⁵**

AR-8000B!



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

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

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

Interchangeable NiCd/alkaline batteries (4AA NiCds and charger included); a universal external power jack for mobile use; an internal ferrite antenna for medium-wave reception; illustrated 115-page owner's manual. See specifications on page "L". **Accessories: ANT 8, ANT 14, p. "J"; CAS 2, BAT 1, BAT 13 on p. "M".**

ORDER SCN 27 only **\$589⁹⁵**

ICOM R8500

One of the World's Very Best Scanning Receivers!



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

High stability crystal oscillators and multiple tuning speeds. Alphanumeric display aids in identifying memorized frequencies. Automatic memorizing of search-discovered active frequencies, skipping of unwanted channels, three antenna connectors for optimal choices for frequency ranges, even voice scan to ignore noisy channels, and even optional voice synthesizer. See specifications on page "L". **Accessories: ACC 6, ACC 7, ACC 8, ACC 72, ACC 74, BRK 4, BRK 5, MAN 1 beginning on page "M"; ANT 2, ANT 3 on p. "D"; ANT 7 on p. "J".**

ORDER SCN 01 only **\$1699⁹⁵**

AR-5000 PLUS 3

PLUS PERFORMANCE



An upgrade of the revered AR5000, the new AR5000 PLUS III extended-frequency coverage receiver is tunable from 10 kHz through 2600 MHz (less cellular) and offers double and single sideband synchronous detection, 2000 memory channels, AM & FM automatic frequency control, 10 VFOs, 40 search banks, and more. For the first time, you can hear VLF time signals and naval communications, international shortwave broadcasting, worldwide single-sideband communications, civilian and military aeronautical transmissions, VHF/UHF public safety radio, ham repeaters, microwave earth satellites, and much, much more!

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

ORDER RCV 12-P only **\$2095⁹⁵**

AR-5000 also available. All the features of the AR-5000 PLUS 3, less synchronous detection, 1000 memory channels, AM & FM automatic frequency control, 5 VFOs, and 20 search banks. Order RCV 12, only **\$1895.95**.

Superb SDU5000 Spectrum Display



An ideal companion for your AOR AR5000 or ICOM R7100, R7000, or R9000, this colorful 3.1" spectrum display unit plugs into

any receiver with a 10.7 MHz IF output jack. Imagine seeing a visual panorama of real-time signals up to 10 megahertz wide! Tune in those signals immediately as they appear—don't wait for chance during scanning, searching, or manual dialing. Provides NTSC, PAL, and composite video to an optional monitor. **Accessories: MAN 4, p. "N".**

ORDER SDU 5000 only **\$934⁰⁰**

Computer Control your AR5000 and SDU5000!

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

ORDER SFT 08 only **\$169⁹⁵**

WINRADIO WR-1000i

The receiver of your dreams on your computer screen!

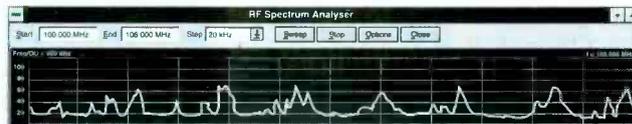


This computer-controlled, simulated receiver and spectrum display (right) appear on your computer screen!

Turn your PC into a potent, wide-coverage monitoring station! User-friendly software allows all the usual receiver controls, plus much more. Rugged shielding resists interference from the host computer. Enjoy continuous 500 kHz through 1300 MHz (less cellular) frequency coverage;

multimode reception of AM, wide and narrow FM, and SSB/CW; up to 16 memory banks with a virtually limitless number of channels; display records in memory by frequency, callsign, or comments field; scan by bank, grouping, or mode; and automatically search for activity by entering your choice of frequency limits.

Call up a full-fledged spectrum display and see signal presence on any span between 500 kHz and 1.3 GHz! Double-click the mouse on any signal spike and the receiver immediately tunes to that frequency! Storage feature allows recall of signal traces. BNC connector allows attachment of your antenna system, while a mini-jack permits connection of speaker or earphones. One-microvolt nominal sensitivity assures weak-signal pickup.



Easy installation, full instruction manual included (PC card must be installed in computer).. This unique receiving laboratory unleashes its power with Windows 3.1, requiring 386 or higher, 1 Meg RAM, 1 Meg hard disk space, VGA monitor; or Windows 95, requiring 486 or Pentium, 4 Megs RAM, and an SVGA monitor. See specifications on page "L" in this Buyer's Guide. **Accessories: TUN 4A, ANT 2, ANT 3 and ANT 15 on pp. "C" and "D"; ANT 1, 9, p. "I"; ANT 7 and CBL 50 and CBL 100 on page "J".**

ORDER RCV 16 only **\$499⁹⁵**

Expand the Capability of your WINRADIO with the WINRADIO Digital Suite, shown below!

New 1998 FCC Database on CD-ROM!

The new Grove FCC Database is a spectacular compendium of all the licensees in the FCC Master Frequency Database (current 1998)! Faster and more extensive than its rivals. Fields include state, city, county, licensee name, callsign, latitude/longitude, service, class, power, antenna height and emission type! Locate public safety, railroad, business, broadcast, paging, maritime frequencies and more. Fast, menu-driven program makes you an expert soon after you log-on. (Call for availability.)

ORDER FCC-98CD only **\$39⁹⁵**

NEW!

Digital Suite

See weather facsimile, read packet and ACARS messages, decode DTMF and CTCSS tones, find specific signal types while skipping over unwanted stations, analyze audio waveforms (0-20 kHz), and digitally record and play back transmissions! Requires Soundblaster 16 or compatible sound card, Windows 95 or NT 4.0 or later. Free on-line updates and added modes as they are released! Audio interconnect cable included.

Loaded with advanced capabilities...



Includes Weather Fax imaging!

ORDER SFT 15 only **\$99⁹⁵**

All elements of the Digital Suite appear as a new menu entry in the WinRadio receiver software after installation!

NEW! DSP UPGRADE

Simply open the case of your PCR1000 and plug in the all-mode UT-106 to add an automatic notch filter to remove annoying tones, whistles and noise cancellation as well. **ORDER ACC 16, only \$159.95.**

Trade In, Trade Up!

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

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

ICOM PCR1000 Wide-Coverage Computer Receiver Module!

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

Requires Windows 3.1 or 95, 486 or better, 10 MB hard disk, 16 MB RAM, serial interface, 640 x 480 pixel resolution or better. Accessories provided include program disk, telescopic antenna, RS232 interface cable, AC adaptor, and full instructions. See specifications on page "L". **Accessories: DCC 2, DCC 4, and DCC05 beginning on p. "M".**



Computer screen simulation.

ORDER RCV 21 only **\$499⁹⁵**

TrunkTracker BC895XLT

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

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

Powerful 2.7 watt audio with external speaker and tape recorder jacks. Ruggedly built and compact, the 3-1/2 pound scanner measures 10-7/8"W x 3-3/8"H x 7-1/2"D and is powered by an AC adaptor (provided) or your optional mobile DC. Telescoping whip, manual are included. See detailed specifications on page "H". **Accessories: ACC 15, BRK 2 and DCC 3 on page "M"; SFT2 on p. "K".**



ORDER SCN 09 only **\$349⁹⁵**

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



Wow—Lowest Price on TrunkTracker BC235XLT

Uniden's new BC-235 XLT will follow elusive conversations on your local 800 MHz Motorola trunking system from law enforcement dispatch and tactical channels, fire and rescue calls, ambulances, government agencies, and many other services. You can also listen to



conventional scanner communications in the 29-54, 108-174, 406-512, and 806-956 MHz bands (less cellular). Pre-programmed service search.

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

ORDER SCN 10 only **\$249⁹⁵**

Radio Shack Introduces Super-Value PRO-2050 Trunk Tracking Scanner

New!



Radio Shack has just released their base/mobile trunk-tracking scanner, with the features and specifications (less computer and 216-405 MHz capabilities) of Uniden's leading BC895XLT at outstanding savings! For full description, see BC895XLT on page "B" and BC895XLT specifications on p. "L". **Accessories: ACC 15, BRK 2, and DCC 3 beginning on page "M".**

ORDER SCN 16 only **\$279⁹⁵**

Other Grove Scanners, Satellite Receivers

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

AOR				
Model	Order Code	Description	Price	Recommended Accessories
PRO-90	SCN-11	Handheld Trunk Tracking Scanner, see specifications for BC-235 on p. "I". Does not include extra battery pack and drop-in charger	\$259.95	ANT-4, ANT-8
Radio Shack				
PRO-2046	SCN-7	Mobile 29-54, 108-174, 406-512, 806-956MHz 100 channel	\$239.95	ANT-20, ANT-30, ANT-13, SPK-15
Uniden				
BCT-7	SCN-21	Mobile 26.9-27.4 (CB), 29.7-54, 108-174, 406-512, 806-956 MHz factory-programmed plus 100 ch.	\$179.95	ANT-20, ANT-30, SPK-15
BC-230 XLT	SCN-24	Handheld 29-54, 108-174, 406-512, 806-956 MHz 200 channel	\$239.95	BAT-5, CAS-3, DCC-7
Universal				
SCPC-200	RCV-28	SCPC audio receiver for home TVRO satellite dishes	\$399.95	SPL-2
SC-50	RCV-29	Subcarrier FM audio receiver	\$399.95	

SCANNERS / ANTENNAS

Uniden BC9000XLT



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

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

ORDER SCN 30 only **\$399⁹⁵**

RELM HS200



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

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

ORDER SCN 08 only **\$249⁹⁵**

Relm MS 200 Mobile-Base Scanner

New!



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

Fast, 100-channel-per-second scanning/searching assures rapid signal acquisition, while PL/CTCSS and DPL/DCS squelch fine-tunes your listening requirements!

Features include priority, PC programming capability, alphanumeric display, weather scan/alert, and more! AC wall adaptor, cigarette lighter cord, attachable antenna, mobile bracket, and full instructions provided at no extra charge! See detailed specifications on page "L".

ORDER SCN 15 only **\$279⁹⁵**

SCANNER INTERMOD FILTERS REDUCE INTERFERENCE BY 40dB!

That's right--now you can restore quiet monitoring on your scanner, drastically reducing that incessant "bleep bleep" interference from local paging transmitters. Simply specify whether the interference is from a 152, 158, or 462 MHz pager, and we'll send you a unit that knocks down that interference by 40 dB! Units may be cascaded for additional interference reduction. Equipped with BNC connectors. **Accessories: ADPK16, p. "M".**



ORDER FTR152, FTR158, or FTR 462 only **\$59⁹⁵**

REACH OUT TO THE WORLD WITH GROVE SCANNER ANTENNAS

Grove OMNI II



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

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

ORDER ANT 05 only **\$19⁹⁵**

NOTE: special shipping rates apply to these antennas: ANT 1, 4, 5, 7, 9, 13, 15, 24, and 30. Please see page "o" for details.

Professional Wideband Discone



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

ORDER ANT 09 only **\$87⁹⁵**

Famous Grove Scanner Beam

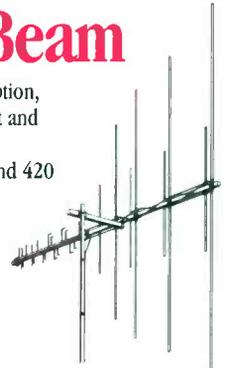
Our world-renowned Scanner Beam enhances 30-50 MHz low band reception, 108-137 MHz aircraft, 137-174 MHz high band, 225-400 MHz military aircraft and satellites, 406-512 MHz UHF, and 806-960 MHz microwave mobile.

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

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

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

ORDER ANT 01 only **\$59⁹⁵**



THE SCANTENNA

SPECIAL: Now includes 50' of coax cable plus Motorola or BNC connector!

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



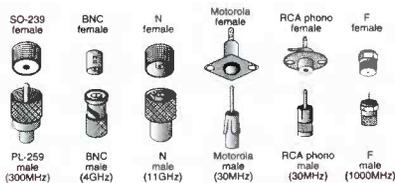
ORDER ANT 07 only **\$39⁹⁵**

RG6-U Cable/Adaptors

Have you had trouble finding the right coaxial adaptors for linking your antenna and receiver? We can help! Simply tell us what adaptors you need, or what antenna and radio you will be using. We will provide you with a cable which is ready to attach between your antenna and receiver! Up to 2 adaptors FREE with cable purchase.

CABLE

CBL 25	25' RG 59U	\$9⁹⁵
CBL 50	50'RG-6U	\$14⁹⁵
CBL 100	100'RG-6U	\$19⁹⁵



ADAPTORS AVAILABLE-\$3.99 each

- ADP 1 SO-239 Female to F male
- ADP 2 F Female to PL259 Male
- ADP 3 F Female to N Male
- ADP 4 F Female to Male 1/8" Mini-Plug
- ADP 5 N Female to BNC Male
- ADP 6 SO-239 Female to Male 1/8" Mini-Plug
- ADP 7 SO-239 Female to N Male
- ADP 9 F Female to BNC Male
- ADP 10 SO-239 female to BNC Male
- ADP 11 SO-239 female to RCA male
- ADP 12 BNC female to N male
- ADP 13 BNC/BNC (right angle elbow)
- ADP 14 F female to RCA male
- ADP 15 N female to F male
- ADP 17 BNC female to F male
- ADP 18 F female to 2 wires
- ADP 19 SO-239 female to 2 wires
- ADP 22 Motorola female to BNC male
- ADP 24 BNC female to PL259 male
- ADP 25 RCA female to male miniplug
- ADP 26 F female to F female barrel (qty.2)
- ADP 27 Banana Plug (qty.4)
- ADP 28 F female to PAL fem. Satellite700
- ADP 29 3.5mm female to 2.5mm male mini plug (qty.2)
- ADP 30 Dual BNC female to BNC male T-adaptor (qty.2)
- ADP 31 BNC female to Motorola male
- ADP 32 RCA female to male PL-259
- ADPK 10 F female to Motorola male
- ADPK 13 F male to F male 3ft.cable (qty.3)
- ADPK 14 F/Motorola cable, 3ft. (qty.2)
- ADPK 15 PL259 male to PL259 male 3ft.
- ADPK 16 BNC male/ BNC male 3ft cable

Free shipping if ordered with other products; \$2.50 for one or more shipped alone. If you are unsure which adaptor is needed, call Chanel or Sue at 1-800-438-8155 or e-mail them at tech@grove.net for assistance.

Grove PRE-5A VHF/UHF Signal Booster

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



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

ORDER PRE 5A only **\$89⁹⁵**

Universal Telescoping Scanner Antennas!

Extendable to 47-1/2 inches, the ANT-8 is made of chrome-plated brass and equipped with a standard BNC base. Receives 25-1300 MHz. ANT-19 extends to 21" and receives from 108-1300 MHz. ANT-8B has right-angle BNC adaptor. ANT-8N has right-angle N adaptor.

Order ANT 8 (47-1/2")	\$16⁹⁵
ANT 19 (21")	\$14⁹⁵
ANT 8B	\$21⁹⁵
ANT-8N	\$23⁹⁵

STEALTH Our Best-Selling Mobile Antenna

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

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

ORDER ANT 30 only **\$29⁹⁵**



High Gain Flex Antenna

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

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

HIDDEN ANTENNA

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

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

ORDER ANT 06 only **\$19⁹⁵**

High Gain 800 MHz Portable Antenna

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

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



ORDER ANT 22 only **\$29⁹⁵**

With straight connector for handhelds

ORDER ANT 23 only **\$34⁹⁵**

With right-angle connector for desktop use (right)



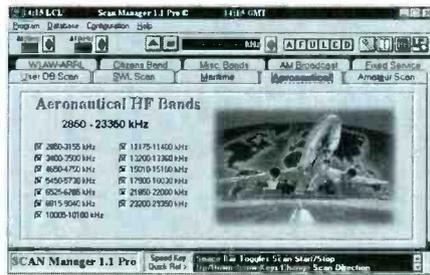
SOFTWARE/FREQUENCY COUNTERS

SOFTWARE FOR SCANNERS/SHORTWAVE RECEIVERS

Scan Manager Pro v.1.1

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

Order SFT 13, only \$68.95



Scancat-Gold for DOS

Use your 640k (or better) computer to control most AOR, Kenwood, ICOM, Yaesu, JRC, Lowe, Watkins-Johnson, Radio Shack (with OS456/535 boards) with this fast, all-new software program! Operates from the RS-232 port, and works in DOS on ANY PC Compatible computer system.*

Order SFT02, only \$94.95

Scancat-Gold for Windows®



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

Computer control (all Features of our DOS program) plus, now supports the Uniden BC895, ICOM PCR1000 and R-10. Windows program includes "Graphical Receiver Tuning" with mouse, slide rule or on-screen knob. No conversion direct support for DBASE (including Grove's FCC CD-ROM), FOXPRO, ACCESS, and BTRIEVE files. Built in import of TEXT files. Interactive database, maps and scanning features, and much more.*

Order SFT 02W, only \$99.95

Scancat-Gold for Windows® SE Upgrade

Our "SE Upgrade" for Scancat-Gold-Windows supports all of our standard windows features, PLUS - adds these unique extras.

1. Unlimited capabilities for "Spectrum Analysis." "SE" will examine your logging database, plot each frequency, and "paint" the entire analysis on your screen, displaying it from lowest to highest frequency. Even tunes or scans your radio with a click of the mouse!
2. Record individual sound transmissions databased by frequency, time stamp and airtime. Point and shoot on any record for instant "playback" of all the action as it happened. Works with any Windows compatible sound card!

Scancat-Gold for Windows 7.0 or greater required for SE Upgrade (such as SFT02W above).*

Order SFT 02-SE, only \$59.95

* Because software is easily copied, it is not refundable. Defective copies will be replaced at no charge.

SP-200B Sound Enhancer



Increase the intelligibility and sound quality of voice, music, and data on any scanner or shortwave receiver. The SP-200B combines a powerful audio amplifier, 4" speaker, bass and treble equalizers, and a variable passband notch/peak filter to reject interfering tones or boost desirable audio. An adjustable noise limiter reduces irritating pulse interference, a variable-hang 0-45 second squelch removes background noise between sound transmissions. Tape recorder activator, too! Powered by 12 VDC.

Housed in a stylish, handcrafted, oak cabinet. Accessory: PWR 4 on page "M".

ORDER SPK 13 only \$199.95

Optoelectronics Cub Frequency Counter



The Optoelectronics Cub is ideal for surveillance countermeasures, frequency hunting, ham, and CB. Wide frequency coverage (1 MHz - 2.8 Ghz) and advanced features (digital filtering, high-visibility LCD, frequency autocapture and hold, selectable gate times, 10 hour battery charge life. Rechargeable battery/AC charger incl.

ORDER CRT 9

\$144.95

Global E-Mail Capability is Right in Your Hand!



The world's first hand-held global satellite communicator, the GSC 100 gives you the ability to send and receive e-mail messages to and from anywhere on Earth.

And, with its integrated GPS receiver, the GSC 100 not only lets you know where you are, it guides you anywhere you want to go.

ORDER GPS-100

\$1499.95

Multipurpose Leatherman® Pocket Tool



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

Comes with leather belt case and 25-year warranty.

ORDER TOL 1 only \$39.95

LEATHERMAN TOOL ADAPTOR

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



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

Wide Band-Receiver Specification Guide

Prices subject to change without notice

Scanner	AR 5000	AR 8000B	ICOM R10	ICOM R850D	ICOM PCR 1000	WINRADIO
Grove Order #	DC12	SCN 27	SCN 6	SCN 1	RCV 21	RCV 16
Grove Price	\$1,895.95	\$589.95	\$399.95	\$1,699.95	\$499.95	\$499.95
Frequency Range	500kHz-1900 MHz (less cellular)	500kHz-1900 MHz (less cellular)	500 kHz-1300 MHz (less cellular)	100 kHz-1999.99999 MHz (less cellular)	500 kHz-1300 MHz (less cellular)	100 Hz minimum
Keypad Entry?	Yes, plus tuning dial	Yes	Alphanumeric	Yes	Yes	Yes
Tuning Steps	Programmable, 10 kHz-1 MHz	50 Hz-999.995 kHz	100 Hz-999.99 kHz	10 Hz-1 MHz custom	1 Hz minimum	50 kHz-1 MHz
Display	Backlit LCD	Backlit LCD	Backlit LCD	Backlit LCD, alphanumeric display	Your monitor, 640 x 480 pixels or better	On screen (PC)
Dimmer	Yes	On/Off	On/Off	Yes	Your monitor	N/A
Receiving Modes	AM/FM/WFM/USB/LSB/CW	AM/FM/WFM/USB/LSB/CW	AM/FM/WFM/USB/LSB/CW	AM/FM/WFM/USB/LSB/CW/RTTY	AM/FM/WFM/USB/LSB/CW	AM/FM/WFM/SSB
Memory	1000 channels	1000 channels	1000 channels	1000 channels	Unlimited, determined by computer	Unlimited, determined by computer
Scan	45 channels/sec. w/ priority	30 channels/sec.	6 ch./sec.	40 chan./sec.	6 ch./sec.	50 ch./sec. FM modes
Banks	20/40	20	18	20	20	16
Channel Lockout	Yes	Yes	Yes	Yes	Yes	Yes
Priority	Any channel	Any channel	Yes	Yes	Yes	Yes
Search	50 channels/sec.	30 channels/sec.	17 ch./sec.	40 channels/sec.	Yes	Yes
Delay	Programmable	Programmable	Programmable time channel	Yes	Programmable	Programmable
Clock	Yes	No	No	No, sleep timer	Yes	Yes
Audio Output (Typical)	1 W	180 mW	120 mW	2W	200 mW	200 mW
Record Audio Output	Yes	No	No	Yes	No	No
Recorder Activator	Yes	No	No	Yes	No	No
Signal Strength Ind.	Analog S-meter	LCD bargraph	LCD bargraph	Analog S-meter	Yes	Yes
Computer Interface	RS232	RS232	C1-V	RS232C and C1-V	RS232C	Expansion slot
Conversion Scheme	Triple up-conversion (622.210.7 MHz, 455 kHz)	Triple up-conversion (429.286.10.7 MHz, 455 kHz)	Triple up-conversion (429.286.10.7 MHz, 455 kHz)	Triple conv.	Triple up-conversion (266.710.7 MHz, 450 kHz)	Triple up-conversion
Sensitivity (NFM)	0.6 uV	0.3 uV	0.45 uV	0.5 uV	0.3 uV	0.35 uV
Selectable Atten.	Yes	Yes, chan. selectable	Programmable, 20 dB	-10/-20 dB	Yes	Yes
IF Selectivity (-6/-60 dB)	3.6/15.4/0.1/10/220 kHz	SSB (-6/-50 dB): 4/15 kHz, AM/NFM: 12/25 kHz, WFM: 150 kHz, 180/800 kHz	(-6 dB) SSB: 4 kHz, AM/NFM: 15 kHz, WFM: 150 kHz	5.5/12/150 kHz FM, 4/15 kHz AM/NFM, 2.2/5.5/12 kHz AM, 2.2 kHz SSB/CW	AM/SSB 6 kHz, NFM 17 kHz, WFM 200 kHz	
Antenna Connector	BNC	BNC	BNC	SO-238	BNC	BNC
Dimensions (W*H*D")	8.5x3.5x1.0	6.2x3.1x1.5	2.25x3.1x2.5	11.25x4.5x0.25	5x1.25x1.75	PC expansion slot
Weight	7.10 x 5.0 oz.	13 oz.	11 oz.	18 lbs.	2.2 oz.	N/A
Power Requirement(s)	13.8 VDC @ 1 A or 120 MAC @ 60 Hz	4AA cells (NICS supplied)	4.8-16 VDC AC adaptor included	12 VDC/120 VAC adaptor included	12 VDC @ 700 mA AC adaptor included	PC bus powered
Accessories Incl.	AC adaptor	AC adaptor (flex whip, carrying strap/belt clip, AA bat. (4)	Belt clip, AC adaptor, flex whip, rechargeable batteries, manual	AC adaptor, whip antenna, computer cable, program disk, AC adaptor	Whip antenna, computer cable, AC adaptor	3-1/2" disk, whip antenna

Grove's Scanner Specification Guide

Prices subject to change without notice

Scanner	Radio Shack Pro 2046	Rein HS 20D	Uniden BC-293XL	Uniden BC-885XL	Uniden BC-3000XL	Uniden BC-3000XL	Uniden BC77
Grove Order #	SCN 7	SCN 8	SCN 24	SCN 10	SCN 9	SCN 23	SCN 30
Grove Price	\$239.95	\$249.95	\$239.95	\$249.95	\$349.95	\$369.95	\$399.95
Frequency Range	29-54, 108-174, 406-512, 806-956 MHz (less cellular)	26-54, 108-174, 406-512, 806-956 MHz (less cellular)	29-54, 108-174, 406-512, 806-956 MHz (less cellular)	29-54, 108-174, 406-512, 806-956 MHz (less cellular)	29-54, 108-174, 216-512, 806-956 MHz (less cellular)	29-54, 108-174, 216-512, 806-956 MHz (less cellular)	29-54, 108-174, 216-512, 806-956 MHz (less cellular)
Keypad Entry?	Yes	Yes	Yes	Yes	Yes	Yes	Alphanumeric
Tuning Steps	512.5 kHz	512.5 kHz	512.5 kHz	512.5 kHz	512.5 kHz	512.5 kHz	512.5 kHz
Display	Backlit LCD	Backlit LCD	Backlit LCD	Backlit LCD	Backlit LCD	EdgeLit LCD alphanumeric	Backlit LCD
Dimmer	No	No	On/Off	On/Off	No	On/Off	High/Low/Off
Receiving Modes	AM, NFM	AM/NFM	NFM AM (zero det. by freq. range)	AM/NFM	AM, NFM	WFM, NFM, AM (selectable)	WFM, NFM, AM (AM, NFM)
Memory	100 channels	200 channels	200 channels	300 channels	300 channels	400 channels	500 channels
Scan	34 channels/sec.	100 ch./sec.	100 channels/sec.	100 channels/sec.	100-300 channels/sec.	100 channels/sec.	100 channels/sec.
Banks	10	10	10	10	10	20	20
Channel Lockout	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Priority	Yes	10 channels	10 channels	10 channels	10 channels	10 channels	10 channels
Search	300 channels/sec.	Yes, with incalls	300 channels/sec.	Yes	Yes	300 ch./sec.	300 ch./sec.
Delay	2 sec. any chan.	2 sec. any chan.	2 sec. any chan.	2 sec. any chan.	2.5 sec. selectable channel	2/4 sec. any ch.	2 sec. any ch.
Clock	No	No	No	No	No	No	No
Audio Output (Typical)	2 W	400 mW nom.	180 mW	180 mW	2.7 W	320 mW	2.2 W
Record Audio Output	No	No	No	No	Yes	Sprk. & earph. jacks	Yes
Recorder Activator	No	No	No	No	3.5 mm (1/8") earphone jack	No	Yes
Signal Strength Ind.	No	LCD bargraph	No	LCD bargraph	LCD bargraph	No	No
Computer Interface	No	No	No	No	RS232C	No	No
Conversion Scheme	Dual conv.	Double conv.	Triple conv.	Triple conv.	Triple up-conversion	Triple up-conversion	Triple up-conversion
Sensitivity (NFM)	0.7 uV	0.5 uV	0.3 uV	0.3 uV	Unspecified	0.5 uV	0.5 uV
Selectable Atten.	No	No	No	No	No	Yes, chan. selectable	No
IF Selectivity (-6/-60 dB)	2/200 kHz, -6/-50 dB	50 dB adjacent channel	N/A	N/A	Unspecified	N/A	N/A
Antenna Connector	BNC	BNC	BNC	BNC	BNC	BNC	BNC
Dimensions (W*H*D")	7x2x1.5	2.5x0.6x1.5	6.2x3.1x1.7	2.5x0.6x1.75	10.8x5.3x3.7x1.75	7.4x2.7x1.5	10.5x3.3x1.75
Weight	2 lbs. 3 oz.	15 oz.	12.5 oz.	12.5 oz.	30s. 8 oz.	13 oz.	4lbs.
Power Requirement(s)	12 VDC	Rechargeable battery, 12VDC	Rechargeable battery, 12VDC	Rechargeable battery, 12VDC	12 VDC (AC adaptor included)	6.5 VDC (AC adaptor included)	12 VDC (AC adapt. incl.)
Accessories Incl.	DC cord/Mobile mounting bracket	Flex antenna/AC charger/earphone/carrying strap	Flex antenna/belt clip/earphone/extra battery/AC charger/adaptor	Flex antenna/belt clip/earphone/extra battery/AC charger/adaptor	Flex antenna/belt clip/earphone/extra battery/AC charger/adaptor	Rechargeable battery pack/AC wall adaptor-charger/belt clip/extra antenna earphone	Mobile bracket, DC cord, cigarette lighter cord, AC adaptor, telescopic whip, mobile whip

Grove Accessories, Books and Items not Otherwise Pictured in this Guide

Listed by Grove order code, many of these items are cited in the product descriptions of items sold on previous pages of this Guide

ACCESSORIES		
ACC-1	REGENERATION MODULE FOR ANT-32	\$47.95
ACC-2	NIGHTLOGGER II TAPE RECORDER ACTIVATOR	\$69.95
ACC-3	OPC-478 COMPUTER INTERFACE CABLE, ICOM R10	\$44.95
ACC-4	OPC-474 CLONING CABLE, ICOM R10	\$17.95
ACC-6	CR-293 HIGH STABILITY CRYSTAL, ICOM R8500	\$295.95
ACC-7	FL-52A CW NARROW FILTER, ICOM R8500	\$189.95
ACC-8	UT-102 VOICE SYNTHESIZER, ICOM R8500	\$57.95
ACC-9	DRAKE SW-2 REMOTE CONTROL	\$48.95
ACC-11	MAGELLAN GPS 3000/4000 DATA MODULE/ANTENNA KIT	\$149.95
ACC-12	SWIVEL MOUNTING BRACKET, MAGELLAN GPS 2000/3000/4000	\$19.95
ACC-13	INSTRUCTIONAL VIDEO, MAGELLAN GPS-2000	\$14.95
ACC-14	INSTRUCTIONAL VIDEO, MAGELLAN GPS-3000	\$14.95
ACC-15	COMPUTER INTERFACE CABLE FOR BC-895	\$29.95
ACC-43	VHF CONVERTER, DRAKE R8A/B (33-55, 108-174 MHZ)	\$219.95
ACC-50	FAX INTERFACE, O'GARA PHN-5	\$95.00
ACC-51	DATA INTERFACE, O'GARA PHN-5	\$295.00
ACC-53	RECHARGEABLE NIMH BATTERY, O'GARA PHN-6	\$335.00
ACC-54	AC-DC CONVERTER, O'GARA PHN-6	\$175.00
ACC-55	12 VDC MINI CHARGER, O'GARA PHN-6	\$160.00
ACC-56	SOFT CARRYING CASE, O'GARA PHN-6	\$85.00
ACC-57	HARD CARRYING CASE, O'GARA PHN-6	\$325.00
ACC-58	REMOTE ANTENNA, O'GARA PHN-5A	\$1395.00
ACC-59	ADDITIONAL ACCESS CARDS, O'GARA COMPACT-M, PHN-5	\$85.00
ACC-60	ANTENNA WALL MOUNTING BRACKET, O'GARA PHN-6	\$400.00
ACC-61	ANTENNA CABLE (10 METERS), O'GARA PHN-6	\$320.00
ACC-62	ANTENNA CABLE (20 METERS), O'GARA PHN-6	\$480.00
ACC-63	INTERNAL RECHARGEABLE BAT PACK O'GARA PHN-6	\$128.00
ACC-64	UNIVERSAL AC/DC CONVERTER, O'GARA PHN-6	\$335.00
ACC-72	TV-R7100 TV/FM ADAPTER, ICOM R7100/8500	\$339.95
ACC-74	CT-17 LEVEL CONVERTER, ICOM R7000/7100/8500	\$134.95
ACC-79	AUDIO CASSETTE ADAPTER, SCANNERS/SW RECEIVERS	\$9.95
ACC-94	ADHESIVE REPLACEMENT KIT, ANT-13	\$4.95
ACC-96	CTCSS SQUELCH DECODER, BC-890	\$59.95
ACC-101	BUDWIG CH-239 SW DIPOLE CONNECTOR	\$9.95
ACC-130	CTCSS TONE BOARD, UNIDEN BC-9000&PRO-2045	\$46.95
ACC-156	SAC-8000 INTERFACE CABLE, AR-8000/OPTO SCOUT	\$34.95
ACC-157	OPTO'S LYNX COMPUTER INTERFACE, AR-8000	\$129.95
ACC-168	WEATHER-PROOF FLEX TAPE, 22 FT ROLL	\$1.95

ADAPTORS & ADAPTOR KITS		
ADP-25	RCA FEMALE TO MALE MINIPLUG, ANT-15/24	\$3.95
ADP-32	RCA FEMALE TO MALE PL-259, ANT-15/24	\$3.95
ADPK-1	ADAPTER KIT UHF/F, FTR-67/78/9 PRE-5A, ATT-1	\$9.95
ADPK-2	PL259 AND 1/8" MINIPLUG ADAPTOR KIT: ANT-24	\$9.95
ADPK-3	ADAPTER KIT BNC/F, FTR6/7/8/9 PRE-5A, ATT-1	\$9.95
ADPK-4	OPTO SCOUT TO R-10 INTERFACE KIT	\$8.95
ADPK-6	ADAPTOR KIT MOT/BNC, FTR6/7/8/9 PRE-5A, ATT-1	\$9.95
ADPK-9	ADAPTOR KIT N/F, FTR6/7/8/9 PRE-5A, ATT-1	\$12.95

ANTENNAS VHF/UHF		
ANT-10DS	AUSTIN FERRET VHF/UHF RECEIVE/TRANSMIT	\$249.95
ANT-13	22" VALOR GLAS-MASTER, 30-1200 MHZ	\$29.95
ANT-18	300-512 MHZ, 2 1/2" FLEX CLOSE RANGE ANTENNA	\$19.95
ANT-20	GROVE NO-TENNA, 1-1000 MHZ BASE/MOBILE	\$19.95

ANTENNAS SHORTWAVE		
ANT-12	ALPHA DELTA ANT KIT, SO-239 CONNECTOR, INSULATORS	\$29.95
ANT-16	23" REEL FOR SW PORTABLES	\$14.95
ANT-25	25' RANDOM WIRE W/RCA & PL-259 ADAPTORS	\$7.95
ANT-26	SONY COMPACT ACTIVE LOOP ANTENNA	\$89.95
ANT-32	KIWA POCKET LOOP 530 kHz - 30 MHZ	\$119.95
ANT-33	BUDWIG CH-239 SW DIPOLE CONNECTOR & INSULATORS (2)	\$19.95

BATTERIES		
BAT-1	ENERGIZER INDUSTRIAL "AA"	\$7.95
BAT-2	ENERGIZER INDUSTRIAL "D"	\$1.19
BAT-3	ENERGIZER INDUSTRIAL "C"	\$1.09
BAT-4	ENERGIZER INDUSTRIAL "9V"	\$2.25
BAT-5	BP-180 800 MAH CHARGEABLE, UNIDEN BC-230/235, PRO-90	\$29.95
BAT-6	"AAA" ALKALINE BATTERIES	\$7.75
BAT-9	METROWEST LONG LIFE PACK, UNIDEN BC-200/205	\$79.95
BAT-11	SAFT RECHARGEABLE "AA" NICAD, 600 MAH	\$1.95
BAT-13	RECHARGEABLE "AA"NICAD BATTERIES, RADIO SHACK	\$2.75
BAT-14	RECHARGEABLE PACK, UNIDEN BC-200/205	\$39.95
BAT-15	RECHARGEABLE PACK, UNIDEN BC-2500/3000	\$31.95
BAT-16	POWER POCKET RECHARGEABLE LEAD/ACID 12 V, 2 AH	\$59.95

BOOKS (See listings and displays on following pages)

BRACKETS		
BRK-1	HAND-HELD RADIO MOBILE MOUNT, SINGLE	\$9.95
BRK-2	MOBILE MOUNTING BRACKET FOR BC-890/9000XL, PRO2045	\$15.95
BRK-3	UNIVERSAL BELT CLIP CAN BE USED WITH BRK-6	\$4.95
BRK-4	MB12 MOBILE MOUNTING BRACKET, ICOM R8500	\$35.95
BRK-5	MB-23 CARRYING HANDLE, ICOM R7100/8500	\$12.95
BRK-6	MOBILE HANGER FOR BELT CLIPS UP TO 1"W	\$4.95
BRK-7	HAND-HELD RADIO MOBILE MOUNT, DOUBLE	\$12.95
BRK-9	WINDOW ANTENNA MOUNT KIT BNC CONNECTOR	\$28.95
BRK-12	DRAKE SW-1,2 CARRYING/TILT HANDLE	\$6.95
BRK-13	DRAKE SW-1,2 MOBILE MOUNTING BRACKET	\$14.95
BRK-14	AOR-5000 DOUBLE RACK MOUNT	\$149.95

CARRYING CASES		
CAS-1-N	ICOM R10 HEAVY-DUTY DURAS NYLON CASE	\$29.95
CAS-2	LEATHER CASE FOR AR-8000	\$29.95
CAS-3	LEATHER CASE FOR UNIDEN BC-230/235, PRO-90	\$29.95
CAS-4	LEATHERETTE CARRYING CASE FOR FR-465 CHEROKEE	\$19.95
CAS-6	LEATHER CASE FOR UNIDEN BC-3000XL	\$29.95
CAS-7	MAGELLAN GPS-2000 CARRYING CASE	\$9.95
CAS-10	DRAKE SW-8 CARRYING CASE	\$49.95
CAS-11-L	RELM HS-200 LEATHER CASE	\$29.95

CABLE		
CBL-2	50 FT 3-CONDUCTOR CABLE FOR ROT-01 ROTATOR	\$5.95
CBL-3	100 FT 3 CONDUCTOR CABLE FOR ROT-01 ROTATOR	\$8.95

CHARTS		
CHT-1	RADIO SPECTRUM COLOR WALL CHART, 1996	\$9.95

CLOCKS		
CLK-1	24 HOUR SETH THOMAS 13" WALL CLOCK	24.95
CLK-2	MFJ-108B LOCAL/UTC DUAL DIGITAL CLOCK	\$19.95
CLK-4	MFJ-112 WORLD MAP DESK CLOCK	\$24.95

COLLECTIBLES		
COL-1	SPINNING VANE RADIOMETER	\$6.95
COL-3	EDISON WALL PLAQUE	\$6.95
COL-5	RADIACMETER (1960 PERSONAL RADIATION DETECTOR)	\$9.95
COL-6DS	TWIN CYLINDER STEAM ENGINE, BUILT (\$20.00 UPS)	\$449.95
COL-7	JENSEN HOBBY STEAM ENGINE KIT	\$99.95
COL-8	VICTORIAN STYLE CARBON FILAMENT BULB	\$6.95
COL-9DS	TWIN CYLINDER, STEAM POWER PLANT (\$25.00 UPS)	\$574.95
COL-10	POST OFFICE BANK SMALL (3-5/8"x 5"Hx3-3/4")	\$39.95
COL-11	POST OFFICE BANK LARGE (5-3/8"x 6-1/4"Hx3-3/4")	\$79.95
COL-12	POST OFFICE BOX DOORS, SMALL (3-5/8"x 5")	\$19.95
COL-13	POST OFFICE BOX DOORS, LARGE (5-3/8"x 6-1/4")	\$24.95

COUPLERS		
CPL-63B	AUTO ANTENNA MULTICOUPLER, AM/FM SCANNER (BNC)	\$16.95
CPL-63M	AUTO ANTENNA MULTICOUPLER, AM/FM SCANNER (MOT)	\$14.95
CPL-SC	DUAL SCANNER MULTICOUPLER KIT (BNC, PL-250, MOT, F)	\$29.95

FREQUENCY COUNTERS		
CTR-9	OPTOELECTRONICS CUB (1 MHz - 2.8 GHz)	\$144.95

CONVERTERS		
DCC-2	3-SOCKET CIGARETTE LIGHTER ADAPTOR	\$12.95
DCC-3	MOBILE DC ADAPTOR (1.5,3,4,5,6,7,5,9,12 V, 800 mA)	\$12.95
DCC-4	OPC-131 DC POWER CABLE FOR ICOM PCR1000	\$12.95
DCC-5	CP-12 DC ADAPTOR W/ NOISE FILTER FOR ICOM R10/PCR 1000	\$29.95
DCC-7	MOBILE DC ADAPTOR FOR UNIDEN BC-3000/230/235	\$15.95

FILTERS		
FTR-152	152 MHZ INTERFERENCE SCANNER FILTER	\$59.95
FTR-158	158 MHZ INTERFERENCE SCANNER FILTER	\$59.95
FTR-462	462 MHZ INTERFERENCE SCANNER FILTER	\$59.95

GPS SATELLITE EQUIPMENT		
GPS-100	MAGELLAN GCS-100 GLOBAL E-MAIL/GPS RECEIVER	\$1499.95
GPS-2000	MAGELLAN GPS 2000XL, OUTDOOR (BASIC)	\$149.95
GPS-3000	MAGELLAN GPS 3000XL, MARINE	\$249.95
GPS-4000	MAGELLAN GPS-4000 XL, OUTDOOR (EXTRA FEATURES)	\$249.95

HEADPHONES

HDP-3	ICOM HP-4 LIGHTWEIGHT	\$22.95
HDP-4	RACETRAC CLASSIC PROFESSIONAL	\$59.95
HDP-5	RACETRAC PLATINUM PROFESSIONAL W/DOUBLE HEADBAND	\$88.95

LIGHTNING PROTECTORS

LAR-1B	GAS DISCHARGE LIGHTNING/SURGE PROTECTOR (BNC)	\$19.95
LAR-1F	GAS DISCHARGE LIGHTNING/SURGE PROTECTOR (F)	\$19.95
LAR-1M	GAS DISCHARGE LIGHTNING/SURGE PROTECTOR (MOTO)	\$19.95
LAR-1P	GAS DISCHARGE LIGHTNING/SURGE PROTECTOR (PL-259)	\$19.95
LAR-2	SINGLE OUTLET-SURGE PROTECTOR (120 VAC)	\$3.95
LAR-03	SIX OUTLET SURGE PROTECTOR (120 VAC)	\$4.95

MANUALS

MAN-1	SERVICE MANUAL, ICOM R-8500	\$57.95
MAN-2	SERVICE MANUAL, DRAKE R8B	\$39.95
MAN-4	SERVICE MANUAL, AOR SDU 5000	\$34.95
MAN-6	SERVICE MANUAL, AR-5000	\$89.95

MICROPHONES

MIC-1	MINI LAPEL SPEAKER/MICROPHONE FOR FR-465 CHEROKEE	\$19.95
MIC-3	CLIP-ON MICROPHONE, 1/8" PLUG, 10' CORD	\$4.95

PHONES

PHN-2	MAGELLAN'S MINI-M PHONE	\$4000.00
PHN-4	CALLER ID AD100	\$69.95
PHN-5	O'GARA COMPACT-M SATELLITE PHONE	\$4995.00
PHN-5A	O'GARA COMPACT-M SATELLITE PHONE W/ REMOTE	\$5145.00
PHN-6	O'GARA MOBIL-F-ONE SATELLITE PHONE	\$4495.00

PREAMPLIFIERS

PRE-1	GRE SUPER PREAMPLIFIER (100-1000 MHz) HANDHELD	\$49.95
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POWER SUPPLIES

PWR 1	PORTABLE POWER STATION	\$59.95
PWR-2	PSU-101, DESKTOP STAND/CHARGER, +12VDC	\$59.95
PWR-4	+12 VDC ADAPTOR, 800 MA, 2.1 mm PLUG	\$14.95
PWR-6	PLUG-IN CHARGER FOR FR-465 CHEROKEE	\$19.95
PWR-12	AC ADAPTOR, 500mA +/- 3/4.5/6/7.5/9/12V, 5 PLUGS	\$4.95
PWR-13	SAME AS WR12 BUT UL APPROVED	\$9.95
PWR-15	METRO WEST PHO-CHARGE FOR BAT-9	\$49.95
PWR-19	+12VDC APAPTOR, 200mA, 2.1 mm PLUG	\$7.95
PWR-21	+12VDC ADAPTOR, 500 mA, 2.1 mm PLUG	\$9.95

ROTATORS/ANTENNA

ROT-1	ANTENNA ROTATOR	\$59.95
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SOFTWARE

SFT-1	ICOM CS-R10 CLONING ONLY	\$12.50
SFT-3	KLINGENFUSS GUIDE TO UTILITIES CD-ROM	\$34.95

SPEAKERS

SPK-2	DRAKE EXTERNAL, DRAKE R8/8A/8B	\$48.95
SPK-4	RADIO SHACK PRO-X5 OPTIMUS, 30W MAX.	\$45.95
SPK-6	VALOR'S CLASSIC NOISE CANCELLER	\$16.95
SPK-8	RADIO SHACK PILLOW SPEAKER	\$5.95
SPK-9	RADIO SHACK CLIP-ON MINI SPEAKER	\$10.95
SPK-11	NAVAL HTS-3 AMPLIFIED SPEAKER	\$29.95
SPK 13	GROVE SOUND ENHANCER	\$199.95
SPK-15	VALOR'S SUN VISOR EXTENTION SPEAKER	\$16.95

SPLITTERS

SPL-1	TV/FM TWO WAY SPLITTER BOX, F FEMALE	\$2.95
SPL-2	UNIVERSAL SATELLITE SCPC, ICOM R7100/8500	\$64.95

SWITCHES

SWC-1	DAIWA COAXIAL TWO-WAY SWITCH	\$25.95
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TRIFIELD METERS

TST-1	TRIFIELD ELECTRIC/MAGNETIC METER	\$119.95
TST-2	TRIFIELD NATURAL EM METER	\$199.95

TOOLS

TOL-1	LEATHERMAN POCKET TOOL W/LEATHER BELT CASE	\$39.95
TOL-2	LEATHERMAN TOOL ADAPTOR FOR TOL-1	\$24.95

WHITE PAPERS BY LARRY MAGNE

WP-1	ICOM -R71A	\$5.95
WP-2	ICOM-R9000	\$5.95
WP-3	KENWOOD R-5000	\$5.95
WP-4	SONY ICF-2010	\$5.95
WP-6	FRG-100	\$5.95
WP-7	LOWE HF-150	\$5.95
WP-9	HOW TO INTERPRET SPECIFICATIONS	\$5.95
WP-10	DRAKE SW8	\$5.95
WP-11	OUTDOOR ANTENNAS	\$5.95

BOOKS (ALL LATEST EDITIONS)

(See some of our best selling books at right)

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BOK-87-18	ARRL ANTENNA HANDBOOK (ANT-A)	\$29.95
BOK58-98	1998 ARRL HANDBOOK (GEN-A)	\$32.00
BOK-32	ARRL RADIO FREQUENCY INTERFERENCE HANDBOOK (GEN-A)	\$17.95
BOK-103	ARRL REPEATER DIRECTORY (FRQ-SCN)	\$8.00
BOK-35	COLLECTOR'S GUIDE TRANSISTOR RADIOS, M. & S. BUNIS (COL)	\$15.95
BOK-72	COMMUNICATIONS RCVRS VACUUM TUBE ERA, E. RHOADS (COL)	\$19.95
BOK-4	CONFIDENTIAL FREQUENCY LIST, GEOFF HALLIGEY (SWL/FRQ)	\$24.95
BOK-37	CRUISER'S RADIO GUIDE, ROGER KRAUTKREMER, KOYY (FRQ)	\$19.95
BOK-38	CRYSTAL SET PROJECTS, PHILLIP N. ANDERSON (GEN-B)	\$14.95
BOK-88	CRYSTAL SETS (VOLUME V), PHILLIP N. ANDERSON (GEN-B)	\$9.95
BOK-1	FEDERAL FREQUENCY ASSIGNMENT MASTERFILE (FRQ)	\$24.95
BOK-64	FM ATLAS, BRUCE ELVING (FRQ)	\$14.95
BOK-81	FREQ & INTELLIGENCE DIRECTORY, JAY HARRIS (FRQ-GEN)	\$19.95
BOK-36	GPS MANUAL, PRINC & APPS, S. DYE & F. BAYLIN (SAT-A)	\$39.95
BOK-13	GUIDE TO SURVIVAL COMMUNICATIONS (GEN)	\$19.95
BOK-54	GUIDE TO UTILITIES, JOERG KLINGENFUSS (SWL/FRQ)	\$39.95
BOK-95	INSTALL AIM & REPAIR YOUR SAT. SYST., F. BAYLIN (SAT-A)	\$9.95
BOK-34	KLINGENFUSS 97 SW FREQ. DIR., JOERG KLINGENFUSS (SWL/FRQ)	\$36.95
BOK-53-97	M-STREET JOURNAL, ROBERT UNMACHT, ED. (FRQ-AM/FM)	\$48.95
BOK-78	MASTER FREQUENCY FILE, J. TUNNELL & R. KELTY (SCN/FRQ)	\$29.95
BOK-96	MINIATURE SATELLITE DISHES, FRANK BAYLIN (SAT-GEN)	\$19.95
BOK-63	MONITOR AMERICA, RICHARD BARNETT (SCN/FRQ)	\$29.95
BOK-6	3D OFFICIAL AERONAUT. FREQ DIR, ROBERT A. COBURN (FRQ)	\$21.95
BOK-18	1998 PASSPORT TO WORLD BAND RADIO, LARRY MAGNE SWL	\$19.95
BOK71	PHILCO RADIO'S 1928 - 1942, MICHAEL PROSISE (COL)	\$29.95
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BOK-48	RAILROAD RADIO FREQUENCIES, STURM & LANDGRAF (SCN)	\$16.95
BOK-74	RECEIVING ANTENNA HANDBOOK, JOE CARR (ANT/SWL)	\$19.95
BOK-85	SATELLITE EXPERIMENTER'S HDBK, MARTIN DAVIDOFF (SAT-A)	\$19.95
BOK-2	SCANNER MOD. HANDBOOK VOLUME I, BILL CHEEK (SCN-A)	\$17.95
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BOK-69	SW RADIO LISTENER'S GUIDE, ANITA LOUISE MC CORMICK (SWL)	\$11.95
BOK-59	SHORTWAVE RECEIVERS PAST & PRESENT, FRED OSTERMAN (COL)	\$24.95
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BOK-108	VISUAL DICTIONARY OF SPECIAL MILITARY FORCES (COL)	\$16.95
BOK-56	WEATHER SATELLITE HANDBOOK, RALPH TAGGART (SAT-A)	\$19.95
BOK-3	1998 WORLD RADIO TV HANDBOOK (SWL/FRQ)	\$24.95
BOK-86	WORLDWIDE AERONAUTICAL COM., R. EVANS (FRQ/SWL)	\$19.95
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Subject Codes for Books:

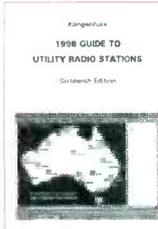
- SWL—Shortwave
- SCN—Scanners
- ANT—Antennas
- COL—Collectors
- FRQ—Frequency Directory
- GEN—General Interest
- SAT—Satellite

Intended Readership Levels:

- A—Advanced
- B—Basic



World Radio TV Handbook. Shows what's on the airwaves anywhere in the world at any time, country listings of long, medium, and shortwave stations by frequency, time and language. Also, an hour-by-hour guide to broadcasts in English, a survey of high-frequency broadcasting reception conditions for the year and much more. **Order BOK 3-98, only \$24.95.**



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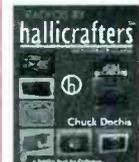
Federal Frequency Assignment Master File, Sixth Edition. Provides the most comprehensive look at federal government frequencies in print. No matter where you're located, you'll hear many of these frequencies in use. Alphabetized by department and agency and their locations, then listed in frequency order, this compendium is the most authoritative reference for armchair monitoring of "forbidden" frequencies we've ever seen. **Order BOK 1, only \$24.95.**



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Based upon the Supreme Court rulings of McLeod vs. Dillworth (1944), Bellas Hess (1967) and the proposed Brooks legislation (H.R. 2230), effective September 1, 1990, Grove Enterprises will no longer collect sales or use taxes apparently invalidly levied by states against residents when they purchase from us in North Carolina. We have neither economic presence nor nexus in these states as established by the U.S. Supreme Court.

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details below.) UPS Next Day Air is available at additional cost. Express and Priority Mail are also available; contact us for charges.

U.S. Postal Service delivery is typically within 10 days of shipment. If you do not receive your parcel by the end of this time frame, call us to put a tracer on your order.

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Return Policy: Items may be returned within 30 days of original shipment for credit against future purchases or a refund (less shipping charges). **IMPORTANT:** To return an item, call toll-free 1-800-438-8155 and ask the customer service representative for a **return authorization number** which must be printed on the returned package. Items returned without an RA number will be assessed a restocking fee based on the invoice value. Returned items not in original condition will be assessed a refurbishing charge.

Grove's simplified shipping/handling charges

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Total Order	\$1-\$99	\$100-\$499	\$500-\$999	\$1000 and up
Shipping Charges	\$5.50	\$9.50	\$15.50	\$19.50

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Payment Method: *Personal checks subject to verification.*

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Product	Stock #	Quantity	Price	TOTAL
<i>Customer Service: If you are confused about what equipment to order, call Sue or Chanel at 704-837-7081, 8:00-5:30 M-F EST</i>				
ADD SHIPPING CHARGES FROM PREVIOUS PAGE TO PRODUCT TOTAL	-----			
ADD EXTRA SHIPPING CHARGE FOR ANTENNAS (SEE PAGE "O")	-----			
Satellite Times or Monitoring Times magazine subscription	<input type="checkbox"/> MT <input type="checkbox"/> ST	_____ years	(see below)*	

* 6-month subscription to *Monitoring Times* or *Satellite Times*, \$12.95; 1 year, \$23.95; 2 years, \$45.95; 3 years, \$67.95; Canadian surface, one year \$36.50; Foreign surface, 1 year \$55.45; Foreign air mail, 1 year \$85.95.

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Phone: (800) 438-8155; (704) 837-9200;
 FAX (704) 837-2216;
 Online at www.grove.net/~grove; E-mail: order@grove.net

GROVE ENTERPRISES
 P.O. Box 98, 7540 Highway 64 West
 Brasstown, N.C. 28902-0098

Address Correction Requested

G

FREQUENCIES

2100-2200	Anguilla, Caribbean Beacon	11775am			
2100-2130	Australia, Radio	5995pa 9770as 2310do 2485do 5025do 2325do 4910do 7530eu 4850do 5010do 9625do 6070do 6030do 6130do 6160do 6160do 5925va 11945va 17820af	7240pa 11880pa	9500as 12080pa	9660pa 17795pa
2100-2130 vl	Australia, VL8A Alice Spg				
2100-2130 vl	Australia, VL8K Katherine				
2100-2200 vl	Australia, VL8K Katherine				
2100-2130 vl	Australia, VL8T Tent Crk				
2100-2200 vl	Australia, VL8T Tent Crk				
2100-2200	Bulgaria, Radio		9700eu		
2100-2115 vl	Cameroon, Radio Cameroon				
2100-2200 vl	Cameroon, Radio Garoua				
2100-2200 vl	Canada, CBC N Quebec Svc				
2100-2200	Canada, CFRX Toronto				
2100-2200	Canada, CFVP Calgary				
2100-2200	Canada, CHNX Halifax				
2100-2200	Canada, CKZN St John's				
2100-2200	Canada, CKZU Vancouver				
2100-2200	Canada, R Canada Intl				
2100-2130	China, China Radio Intl	5220va 9535af 6950eu 15050am 13605eu 5930na 12015eu 15375af 15186af 6135eu 9615af 11785as 5890eu 9835af 3975eu 7150va 9950eu 11785me 6090as 6035as 4885do 3425do 5100do 3270do 15115pa 3326do 6575eu 4890do 7110eu 9780eu 5955eu 6100eu 5020do 3970eu 9950na 7200eu 4976do 6005af 3915as 6195as 3955eu 7325eu 5905eu 6080eu	6950eu 9670va 9920eu 9635eu	7170af 9920eu	7180af
2100-2200	China, China Radio Intl				
2100-2200	Costa Rica, RF Peace Intl				
2100-2130	Cuba, Radio Havana		13615eu	13715eu	
2100-2127	Czech Rep, Radio Prague		7345af		
2100-2200	Ecuador, HCJB		21455am		
2100-2200	Egypt, Radio Cairo				
2100-2200	Eq Guinea, Radio Africa				
2100-2130	Finland, YLE/R Finland				
2100-2150	Germany, Deutsche Welle		9670as 11865af	9690af 15275af	9765as
2100-2115 t	Germany, Universal Life				
2100-2130	Germany, Adventist World R				
2100-2130	Hungary, Radio Budapest		9840eu		
2100-2200	India, All India Radio		7410eu 9950eu	9650eu 11715au	9910au
2100-2157	Iraq, Radio Iraq Intl				
2100-2130	Japan, R Japan/NHK World				
2100-2200	Japan, R Japan/NHK World				
2100-2107 vl	Kenya, Kenya Broadc Corp		13630na 4935do	6150do	
2100-2200	Liberia, Radio Veritas				
2100-2115	Liberia, LCN/R Liberia Int				
2100-2107	Namibia, NBC		3290do		
2100-2155	New Zealand, R NZ Intl				
2100-2200	Nigeria, FRCN/Radio		4770do 9345eu	4990do 11700na	13760na
2100-2200	North Korea, R Pyongyang				
2100-2200 vl	Papua New Guinea, NBC				
2100-2130 mtwhf	Portugal, R Portugal Intl		9780eu	9815eu	
2100-2156	Romania, R Romania Intl		5990eu	6175eu	7195eu
2100-2130	Serbia, Radio Yugoslavia		6185eu		
2100-2200 vl	Solomon Islands, SIBC				
2100-2130	South Korea, R Korea Intl				
2100-2200	Syria, Radio Damascus		12085na	13610na	
2100-2130	Turkey, Voice of				
2100-2110	Uganda, Radio				
2100-2200	UK, BBC African Service		6190af 5965as 5975pa	11835af	6120as
2100-2200	UK, BBC Asian Service				
2100-2200	UK, BBC World Service		3955eu 7325eu 5905eu 6080eu	6180eu 11750sa 6010eu 7420eu	6195eu 6020eu
2100-2200	Ukraine, R Ukraine Intl				
2100-2200	USA, KAIJ Dallas TX		13815am		
2100-2200	USA, KTBN Salt Lk City UT		15590am		
2100-2200	USA, KWHR Naalehu HI		7560pa 9760eu 15185as 1725af	17555pa 6070me 11870pa 15205as 15410af	7415af 9595af 13710af 15580af
2100-2200	USA, Voice of America				
2100-2200	USA, WEWN Birmingham AL		5825eu	13615na	
2100-2200	USA, WGTG McCaysville GA		9400am		
2100-2200	USA, WHRA Greenbush ME		15460af		
2100-2200	USA, WHRI Noblesville IN		9495am	13760am	
2100-2200	USA, WINB Red Lion PA		11950ca		
2100-2200	USA, WJCR Upton KY		7490na		
2100-2130 s	USA, WRMI/R Miami Intl		9955am		
2100-2200	USA, WRNO New Orleans LA		15420am		
2100-2159 s	USA, WSHB Cypress Crk SC		9355eu		
2100-2159 smwva	USA, WSHB Cypress Crk SC		7510eu		
2100-2200	USA, WWCR Nashville TN		5070am	7435am 9475am	13845am
2100-2200	USA, WYFR Okeechobee FL		7355eu	11580af 15565eu	
2100-2200	Zambia, Christian Voice		3330af		
2100-2200 vl	Zambia, R Zambia/ZNBC 1		4910do		
2100-2200 vl	Zambia, R Zambia/ZNBC 2		6165do		
2100-2200 vl	Zimbabwe, Zimbabwe BC		4828do		
2103-2110	Croatia, Croatian Radio		9590as		
2115-2145 mtwhfa	Armenia, Voice of		4810eu	9965eu	
2115-2200	Egypt, Radio Cairo		9900eu		
2115-2130 mtwhf	UK, BBC Caribbean Report		5975ca	15390ca	17715ca
2115-2130 as	UK, BBC World Service		5975am		
2130-2200	Australia, Radio		7240pa 13755pa	9500as 17795pa	9660pa 12080pa
2130-2200	China, China Radio Intl		5220va	6950eu	9670va 9920eu

2130-2200	Ghana, Ghana Broadc Corp	3366do			
2130-2200	Guam, AWR/KSDA	9495as			
2130-2200	Iran, VOIRI	6165pa	6175pa		
2130-2200	Malawi, MBC	3380do			
2130-2200 as	Sweden, Radio	6065eu	9655eu		
2130-2145 t f	UK, BBC Calling Falklands	11680sa			
2130-2200	UK, BBC World Service	5875eu	6050eu	9850eu	
2130-2200	Uzbekistan, R Tashkent	7105as	9540as		
2155-2200 smtwh	New Zealand, R NZ Intl	17675pa			
2155-2200	New Zealand, R NZ Intl	15115pa			

2200 UTC

2200-2230	Albania, R Tirana Intl	6025eu	7135eu		
2200-2300	Anguilla, Caribbean Beacon	6090am			
2200-2215 mtwhfa	Armenia, Voice of	4810eu	9965eu	15510pa	17795pa
2200-2300	Australia, Radio	9660pa			
2200-2300 vl	Australia, VL8K Katherine	5025do			
2200-2300 vl	Australia, VL8T Tent Crk	4910do			
2200-2300	Canada, CBC N Quebec Svc	9625do			
2200-2300	Canada, CFRX Toronto	6070do			
2200-2300	Canada, CFVP Calgary	6030do			
2200-2300	Canada, CHNX Halifax	6130do			
2200-2300	Canada, CKZN St John's	6160do			
2200-2300	Canada, CKZU Vancouver	6160do			
2200-2229	Canada, R Canada Intl	5995va 11705as	7235va 11945va	9735va 13690va	9805va 15150va
2200-2230	China, China Radio Intl	3985eu			
2200-2300	Costa Rica, RF Peace Intl	7385am			
2200-2245	Egypt, Radio Cairo	9900eu			
2200-2300	Eq Guinea, Radio Africa	15186af			
2200-2215	Ghana, Ghana Broadc Corp	4915do			
2200-2230	India, All India Radio	7150va 9950eu	7410eu 11620eu	9650eu 11715au	9910au
2200-2230	Iran, VOIRI	6165pa	6175pa		
2200-2225	Italy, RAI Intl	6150pa	9675pa	11900as	
2200-2215	Liberia, LCN/R Liberia Int	5100do			
2200-2300	Malaysia, Radio	7295do			
2200-2225	Moldova, R Moldova Intl	7520eu			
2200-2205 smtwh	New Zealand, R NZ Intl	17675pa			
2200-2205 fa	New Zealand, R NZ Intl	15115pa			
2200-2215	Nigeria, FRCN/Radio	3326do	4770do	4990do	
2200-2230 s	Norway, Radio Norway Intl	7570sa			
2200-2300 vl	Papua New Guinea, NBC	9675do			
2200-2215	Sierra Leone, SLBS	3316do			
2200-2300 vl	Solomon Islands, SIBC	5020do			
2200-2300	Spain, R Exterior Espana	6125eu			
2200-2210	Syria, Radio Damascus	9950eu	11775af	12085na	13610na
2200-2300	Taiwan, Radio Taipei Intl	5810eu	9985eu		
2200-2300	Turkey, Voice of	6135eu	7300eu		
2200-2300	UK, BBC African Service	11835af			
2200-2300	UK, BBC Asian Service	5905as	5965as	6195as	7110as
2200-2300	UK, BBC World Service	11955as 3955eu 7325eu 9660as	5975am 9410eu 9825am	6110am 9560am 9915sa	6175na 9590na 11750sa
2200-2300	USA, KAIJ Dallas TX	11765am 13815am			
2200-2300	USA, KTBN Salt Lk City UT	15590am			
2200-2300	USA, KWHR Naalehu HI	7560pa	17555pa		
2200-2300	USA, Voice of America	7215as 15185as 17820as	9770as 15290as	9890as 15305as	11760as 17735as
2200-2230 mtwhf	USA, Voice of America	6035af 13710af	7415af	11975af	12080af
2200-2300	USA, WEWN Birmingham AL	5825eu	13615na		
2200-2300	USA, WGTG McCaysville GA	9400am			
2200-2300	USA, WHRA Greenbush ME	13760af			
2200-2300	USA, WHRI Noblesville IN	9495am			
2200-2300	USA, WINB Red Lion PA	11950ca			
2200-2300	USA, WJCR Upton KY	7490na			
2200-2300 a	USA, WRMI/R Miami Intl	9955am			
2200-2300	USA, WRNO New Orleans LA	7355na			
2200-2259 sh	USA, WSHB Cypress Crk SC	7510eu			
2200-2259 sw	USA, WSHB Cypress Crk SC	13770sa			
2200-2300	USA, WWCR Nashville TN	5070am	7435am 9475am	13845am	
2200-2300	USA, WYFR Okeechobee FL	11580af			
2200-2300 vl	Zambia, R Zambia/ZNBC 1	4910do			
2200-2210 vl	Zambia, R Zambia/ZNBC 2	6165do			
2205-2300	New Zealand, R NZ Intl	17675pa			
2230-2225	Austria, R Austria Intl	5945eu	6155eu	13730af	
2230-2300	China, China Radio Intl	7170eu			
2230-2300	Cuba, Radio Havana	6000na			
2230-2257	Czech Rep, Radio Prague	5930na	7345na		
2230-2300	Iraq, Radio Iraq Intl	11785me			
2230-2300	Sweden, Radio	6065eu	7325eu		
2240-2250	Greece, Voice of	7480au	9425au		
2245-2300	Ghana, Ghana Broadc Corp	3366do	4915do		
2245-2300	India, All India Radio	7410as	9705as	9950as	11620as
2245-2300 mtwhf	USA, WRMI/R Miami Intl	9955am			
2245-2300	Vatican State, Vatican R	6160au 11830au	7305au 9600au	11830au	

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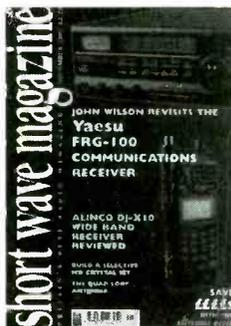


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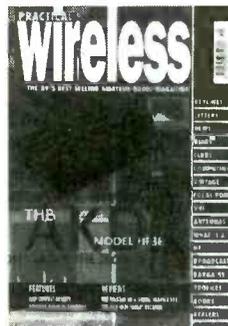


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HF Propagation Beacons

OPTIMUM WORKING FREQUENCIES (MHz)
For the Period 15 April to 14 May 1998 Flux=116 SSN=71
Predictions prepared using ASAPS for Windows®

UTC	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
TO/FROM US WEST COAST																									
SOUTH AMERICA	22	21	21	18	16	14	14	14	14	13	11	12	13	15	17	18	19	20	21	22	23	23	22	22	
WESTERN EUROPE	12	11	11	10	10	10	10	10	10						13	15	17	16	17	17	17	16	15	14	
EASTERN EUROPE (P)	11	11	12	13	14	14	13								12	13	15	16	16	16	16	15	14		
MEDITERRANEAN	16	16	16	15	15	14	13								15	16	17	18	18	19	18	17	17	17	
MIDDLE EAST (P)	14	14	16	18	17	15									13	15	17	18	18	16	16	15	14	14	
CENTRAL AFRICA	19	19	16	13	11	11	12	12							15	17	19	20	20	20	20	20	19	19	
SOUTH AFRICA	12	12	11	10	9	9	13	12	12						15	16	18	19	20	20	19	16	15	14	13
SOUTH EAST ASIA (P)	19	19	19	19	17	16				12	11	11	11	11	12	14	16	17	19	19	17	15	15	19	
FAR EAST	17	17	17	17	15	14	12	11	11	11	10	10	10	10	11	13	13	13	12	13	16	17	18	18	
AUSTRALIA	24	24	24	23	22	19	17	15	15	14	14	14	13	13	13	14	14	13			15	23	25	25	
TO/FROM US MIDWEST																									
SOUTH AMERICA	20	19	17	15	14	13	13	13	12	11	10	12	13	16	17	17	18	19	20	21	21	21	21	21	
WESTERN EUROPE	14	13	12	12	11	11	11	11	11				14	15	16	17	17	17	17	18	18	18	18	16	
EASTERN EUROPE	11	11	11	12	13	12	11						12	14	15	16	16	17	17	16	16	14	13	12	
MEDITERRANEAN	16	16	16	15	14	13	12						14	15	16	17	18	18	18	19	17	17	16	16	
MIDDLE EAST (P)	13	14	15	16	14								14	16	18	19	19	17	16	16	15	14	14		
CENTRAL AFRICA	19	19	16	13	11	11	13	12					16	18	19	20	20	20	20	20	20	19	19	19	
SOUTH AFRICA	12	12	11	10	9	9	13	13	13				16	17	18	19	20	21	21	19	16	15	14	13	
SOUTH EAST ASIA (P)	18	18	18	18	16					10	11	12	14	16	18	19	19	19	17	15	15	18			
FAR EAST	18	18	18	17	16	14	13	12	11	11	10	10	10	11	13	14	14	13	13	14	16	17	18	18	
AUSTRALIA	22	22	22	20	18	15	14	14	14	13	13	13	13	13	14	14	14			16	23	23	22		
TO/FROM US EAST COAST																									
SOUTH AMERICA	17	15	13	13	12	12	12	11	11	10	8	12	15	16	16	17	18	19	19	19	19	19	19	18	
WESTERN EUROPE	13	12	11	11	11	10	10	10	9	10	11	13	15	16	17	18	17	17	17	17	17	17	17	15	
EASTERN EUROPE	12	11	11	11	11	10						13	15	16	17	18	18	18	18	18	17	16	14	13	12
MEDITERRANEAN	15	15	14	13	12	11	11					14	15	16	17	18	18	18	18	18	18	17	15	15	15
MIDDLE EAST (P)	14	14	15	14	12							15	16	17	17	18	18	18	18	18	18	17	16	16	15
CENTRAL AFRICA	19	17	16	13	11	11	13	13	13	15	17	18	19	20	21	21	21	21	21	21	21	20	20	19	
SOUTH AFRICA	12	12	11	10	9	9	14	14	13	15	16	18	19	20	21	21	21	21	21	18	16	15	14	13	
SOUTH EAST ASIA (P)	18	17	16	14						13	14	16	18	18	18	18	18	18	18	18	17	15	15	17	
FAR EAST	18	18	17	16	14				11	10	10	12	13	15	15	14	14			14	16	17	17	18	
AUSTRALIA	20	19	18	16	14	13	13	13	13	13	13	13	14	14	14	14				16	21	20	20		

*Unfavorable conditions: Search around the last listed frequency for activity.

Propagation forecasting is like weather forecasting: there are many variables that have to be taken into account.

The ionospheric refraction qualities vary constantly, and in order to follow the changes as accurately as possible HF beacons have been installed around the world. These beacons transmit on a tight schedule a signal of varying power. Thus, by listening to these beacons from your own location you can get a very good feeling of the quality of the refraction path to the location of the beacons.

There are presently two main series of beacons being operated. The first one is a joint NCDXF/IARU operation, responsible for possibly 18 beacons around the world. These beacons operate in the ham bands and they all are equipped with the same type of equipment. Check the following Web Page for more information on these beacons: <http://ncdxf.org/>

The beacons are located in about every region of the world, so by listening to their signals on one frequency you can visualize very rapidly what the conditions are around the globe. What is interesting about these beacons is the fact that they transmit a signal of decreasing power: 100, 10, 1 and 0.1 Watts: You can hear the signal getting fainter and fainter till it finally is lost in the noise. The transmissions are continuous, on schedule, around the clock. The total transmission time during one cycle on each frequency is only 10 seconds; the timing at all stations is accurately maintained by using a GPS receiver as the clock.

Here is a partial list of the locations: United Nations HQ, USA, Canada, Venezuela, Sri Lanka, Australia and Japan. Eleven more sites are presently operational or are scheduled to become operational in the near future. The frequencies used are: 14.100, 18.110, 21.150,

24.930 and 28.200 MHz.

A second series of beacons is being installed and operated under the aegis of the ITU (International Telecommunications Union) by at least two countries. The original intent of the ITU was to have as many countries as possible install propagation beacons and gather as much information as possible from automatic receivers.

This ITU field-strength measuring campaign will eventually produce the necessary data to help improve propagation forecasting techniques and software. The specifications for the transmitting and receiving equipment to be used are fairly stringent, making it possible to compare the results between stations. The transmitted signal format is a complex one using a

CW (continuous wave) and FSK (frequency shift keying) modulation combination. The signal contains all the information necessary to automatically extract the hourly field strength at the receiving site.

To date only two countries have installed transmitters for this campaign: Norway, with station LN2A, and Australia, with station VL8IPS. The transmitters and antennas used at these stations are completely dissimilar, but the two stations use the same set of frequencies: 5.470, 7.870, 10.407, 14.405 and 20.945 MHz. As more transmitters are added to this chain, it will become necessary to find additional frequencies, since the transmission cycle of these two stations is four minutes on each frequency compared to 10 seconds for the NCDXF/IARU beacons.

The frequencies presently used by the ITU beacons are not protected, so at night on the 7 MHz frequency there is serious QRM by a fax station. Maybe when more stations are added to the network, the frequencies used by these beacons will be protected

from interfering signals. If you want to learn more about the ITU beacons, check the following web pages: <http://www.ips.gov.au/beacon/> and http://www.itu.int/itudoc/itu-r/sg3/hf_e_34502.html

Other beacons used to check propagation operate in the ham bands. A full list can be obtained by visiting the following Web site: <http://pw2.netcom.com/~ac6v/pagead.html>

The information gathered from all these beacons will, over time, help improve the quality of the radio propagation forecasting. As a weather forecaster in a previous incarnation, I compare these beacons to new weather stations that help fill the gaps in your knowledge of a specific territory.

Eavesdropping on Africa; Part One: "Out of Africa"

If its approach to international broadcasting can be taken as any indication, it is probably safe to say that Africa is a very inward looking place. No sub-Saharan African nation intentionally broadcasts on shortwave beyond the continent. This makes listening to Africa very much a matter of eavesdropping.

But, to build as complete a sound portrait as the medium will allow, the listener must eavesdrop in two directions. In addition to listening to those broadcasts which spill, however accidentally, over the continent's borders, one will need to listen to the voices that broadcast *into* Africa as well. And, even at that, the North American listener's success in conducting this eavesdropping will usually correlate with his or her proximity to the Atlantic coast.

Now just because Africa appears to be so insular, one should not make the mistake of concluding that life there has little or no significance for us here. Africa is an incredibly diverse place on a number of levels, with a growing influence on global politics, economics, science and culture.

This and next month, we'll be assessing the programming on shortwave that highlights Africa. We start here with a look at what can regularly be heard from Africa itself. In May, we'll examine the information being supplied to Africa about itself (and to us eavesdroppers) by four broadcasters with strong African services: the BBC, the VOA, Deutsche Welle and Radio France Internationale.

As usual, all days and times are in UTC; frequencies for the following programs can be had by referring to the Shortwave Guide section of this magazine.

Two "voices of Africa"—South Africa's Channel Africa and the Voice of Nigeria, representing perhaps the continent's two most powerful nations—can be heard quite readily in North America. Both countries are prominent, recognized regional powers attempting to exert a more continent-wide influence. Interesting, isn't it, that their international broadcasting strategies closely track their geopolitical objectives?

■ Channel Africa

The former Radio RSA's transmissions to

West Africa propagate quite well across the Atlantic, as the beam from Meyerton happens to have the east coast of North America in its "sights" as well. This means that daily half-hour broadcasts at 0500, 0600 and 1700 (UTC), as well as a weekend two hour block at 1300, can normally be heard—and usually at quite comfortable levels—thanks to the station's 500 kW and 250 kW transmitters.

According to Hans-Dieter Winkens, Channel Africa's Executive Editor, it is the station's stated intention (as its name would appear to suggest) to become Africa's foremost supplier of uniquely African audio and multimedia content. "The image we try to cultivate is one of...Africans telling their own stories in very much their own inimitable fashion to each other and the world."

The daily half-hour programs, called *Africa at Six* in both its morning and evening forms, consist of news, correspondent reports, interviews with newsmakers, business news, sports news and short background briefs on current events from all over the continent.

The two hour slot at 1300 on Saturdays and Sundays is currently named *Channel Africa Extra*, which serves as an umbrella title for what is a wide-ranging magazine-style program. Regular items include "EnviroAfrica," a mix of news and short snippets about ecological issues and matters of interest to travelers and tourists.

Again according to Mr. Winkens, "The rest of the program is totally flexible and is meant to reflect the most current issues that particularly concern African decision-makers in, especially, the sphere of development toward self-sufficiency, partnerships and multiparty democracy. While most of the content is (African) 'home-grown' by our staff of 40 broadcast journalists, some of it is outsourced from local private producers."

■ Voice of Nigeria

After a hiatus of several silent years owing to internal political and economic strife, Voice of Nigeria returned to the air a year or so ago. Voice of Nigeria has a range of programs that concentrate on the West African region over which Nigeria exerts considerable influence.

Of course, that also makes it possible that the station's coverage of the area will tend to serve Nigeria's national interests, requiring

the informed listener to seek out additional sources of information to assure balance and accuracy. Additionally, while the Nigerian military is now in control of the government, there are several national and regional groups—with access to international radio transmitters—which oppose the regime's policies and objectives for the country and the region. [See "Nigerian Troubles Spawn New Clans" in February's *MT*.]

Although Voice of Nigeria beams its broadcasts exclusively to western Africa, this track also favors listeners in eastern North America and the fact that the station is using 300 kW guarantees almost daily reception. Voice of Nigeria has three two-hour blocks (at 0500, 1500 and 1900) and one one-hour block (at 1000) of English language programs every day. But, at present, the station uses only one frequency—7255 kHz—which normally doesn't propagate well to North America during daylight hours. Consequently, the only broadcast that can be reliably heard here begins at 0500.

Major newscasts are carried at 0530 and 0630 daily. *VON Scope*, with news, press reviews, interviews and a sports report airs at 0530 Monday through Friday. A comprehensive newscast with commentary and a press review is broadcast at 0630 Monday through Friday with a quarter-hour *News about Nigeria* at 0645.

The periods between 0500 to 0530 and 0600 to 0630 are devoted to a number of regular and well produced musical, cultural, current affairs and educational features. A extensive preview of the upcoming week's feature programs, *This Week on VON*, airs every Sunday at 0600.

■ Other African Voices

Several other African broadcasters broadcast in English, but these local domestic broadcasts typically are transmitted on tropical band frequencies, which are not reliably received by stateside receivers at comfortable listening levels. Nonetheless, go on a radio safari! Peruse the Shortwave Guide section of *MT* for times and frequencies and create a profile of what appears to be arriving regularly at your location from Africa. Then, listen and compare what you hear!

Until May, good listening.

Get With the Amateur Program

Well, it's April, and time once again for one of Old Uncle Skip's annual "review" columns. Let's see, we've done shortwave books, scanner books, ham books, computer software, what's next? How about a look at study materials? More to the point: study materials that will help you get with the amateur radio program.

One of the traditions unique to the Boy Scout movement that is not often remembered is the "Lone Scout." A Lone Scout is someone who wants to be involved in scouting but lives too far away from an organized troop to participate. This program allows a structure for the scout to more or less go it alone with the support of a specialized program.

I often get letters and e-mail from folks who could best be described as "Lone Monitors." Many people who enjoy the hobby are hard pressed to find any nearby support. Luckily, folks have Old Uncle Skip and *MT* to get them over the rough spots as they advance in the hobby.

But even this becomes less than ideal when it comes to trying to get an amateur radio license. I've been blessed with any number of great "Elmers" throughout my radio hobby career that were always nearby and willing to help me over the next hurdle as I moved through the amateur radio licenses. I could wish the same for all folks out there, but that it is simply not always possible. Also even the rush of living and working in the modern world makes it difficult to hook up with folks even when they are nearby and willing.

Thanks to the efforts of The American Radio Relay League, it is possible to go it alone in pursuit of your ham ticket. Several excellent resources have been designed to help anyone achieve just about any amateur radio goal one might have. These tools aren't just for the "Lone Scouts" out there, either. They can become the basis of a club or group

training class to help any number of folks along in the process.

Let's take a look at what is out there to help you along. We'll concentrate on getting that first Novice or Technician's Class ticket, although materials are available for all levels of ham licensing.

Now You're Talking:

All You Need To Get Your Ham Radio Technician License

Third Edition

Edited by Larry D. Wolfgang WR1B and

Joel P. Klienman N1BKE

456 Pages

\$19.00

ISBN# 0-87259-597-8

The American Radio Relay League

225 Main Street

Newington, CT 06111-1494

1-888-277-5289



No matter what else you may do to attempt your first amateur radio license, this book should be your starting point. I've spoken with Joel Klienman many times over the years and he, along with the other staff involved in this publication, are totally dedicated to helping folks get in on the fun of amateur radio. For many people, especially those who have been reading *MT* for awhile, the *Now You're Talking* book should get you through the test with ease.

When you go shopping for this book make sure you check that you are getting the Third Edition. This edition covers new information concerning FCC RF safety information as well as the current test question pools for the Novice and Technician Class licenses through June 30, 2001. Studying with the most up-to-date information will assure you of success when it comes time to sit down with your Volunteer Examiners on test day.

While some study guides simply drill you on the question pools, *Now You're Talking* is much more comprehensive. This book divides the areas of study needed to pass the test into simple, bite-sized, sections that allow you to concentrate fully on each subject area. Each section is a series of short chapter headings relating to each aspect of the test as it relates to actual ham radio practice. Illustrations, graphs and charts are included to help make things more clear. The simple math that is required for the entry level exams is worked through in steps using practical examples from situations that a new ham may encounter in setting up their first station.

Finally, the section prompts the reader to review the appropriate study questions for that section. This is programmed learning at its best. Get the questions right, move ahead. Miss a few, go back for review. What could be easier?

I have to admit that even this old dog learned a few new tricks reading this book. Recent changes in FCC rules are directing amateur radio operators to pay more attention to RF radiation and exposure issues. This stuff never appeared on any license exam I ever took, but that does not excuse me from meeting the latest standards. Creating a ham station that is safe for my use and not detrimental to anyone in the path of my signal is important.

While some aspects of the RF exposure issue remain controversial, there is no controversy about the fact that this subject shows up on current ham exams so *Now You're Talking* devotes a whole section to this subject matter.

Once you've gone over the book cover-to-cover and successfully achieved your first amateur radio license, *Now You're Talking* helps the reader with practical aspects of getting that first station together and getting on the air. If your goal is to move beyond the basic "No Code" license, the book also gives you advice on how to get started learning the International Morse Code. The book includes an appendix of data tables useful throughout your ham experience as well as a glossary of essential amateur radio terminology.

I still keep my old ARRL "Red and Black Cover" license manual from when I took my first test many, many years ago. I'm sure *Now You're Talking* will take up the same place of

honor on your bookshelf as well.

Okay, let's say you're one of those folks who thinks one picture is worth a thousand words. Maybe you just want a little bit more help getting some of these amateur radio concepts to reside more permanently in your brain. No problem pal, we've got you covered.

The ARRL Technician Class Exam Course
Second Edition

Produced by King Schools for the ARRL
210 page text and three
VHS videocassettes.

\$99, \$129 with Computerized Exam
Review Software
The American Radio Relay League
225 Main Street
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1-888-277-5289

As I said earlier, I had lots of dedicated hams who helped me get my licenses. Now, through the educational tool of videotape you can also benefit from training by experienced amateur radio instructors. Using teaching techniques such as animation, graphics and live action video, these tapes help the student fully understand the radio and electronic concepts needed to succeed in passing the Technician Class exam. This second edition video system covers the 2001 question pool, so you will find yourself right on target when you head to the Volunteer Examiners.

I am part of that first generation that grew up with the TV screen in the living room. Learning by way of video presentation comes very naturally to most folks these days. Video training has been utilized in school rooms on a regular basis since the late seventies so this tape based learning system might just be the tool to get junior away from his video game and into a hobby with lifetime value.

The three video tapes cover all the major areas that are part of the FCC Technician Class exam. Each episode on the tape is matched with course notes in the supplied text book, making it easy to follow along as you watch. The notes are directly referenced to questions in the FCC Question Pool so it is easy to figure out what sections you have mastered and which you need to study further. The tapes do not follow the *Now You're Talking* book in perfect order, but it's fairly easy to see what goes where if you are using both resources. We are using just this two resource system to offer classes to prospective hams in our area through our county ARES/RACES group.

In addition to complete copies of the FCC Question Pools, the video course book offers

several practice tests to get you ready for your Volunteer Examination session. If you want to take things one step further you can order the ARRL Computerized Exam Review along with the video course. This program is Windows 95 and Windows 3.X compatible. The program provides sample exams and builds further exams based upon previously missed questions so you can emphasize the study of any weak areas to assure success when test time comes around.

If you're just interested in trying to master the information in the FCC Question Pools, there is another convenient resource.

The ARRL'S Tech Q&A

By Larry Wolfgang WR1B

350 Pages

\$12.95

ISBN# 0-87259-622-2

The American Radio Relay League
225 Main Street
Newington, CT 06111-1494
1-888-277-5289

This convenient paperback-sized book just gives the cold hard facts. In this book you find the complete FCC Novice and Technician Class Question Pools. These pools are the basis of any ham exam you will face. But the ARRL goes a step further, because it is the desire of this organization that you become a knowledgeable amateur, not just somebody with a license to get on the air. Each pool question is followed by a brief explanation as to the underlying theory, rule or practice that is the basis for this question. This is a good resource for study by someone with some background in electronics or who is doing their study on the go.

Okay, bottom line: Old Uncle Skip has used and referred folks to all three of these resources and they have successfully passed their Technician's Class test. But remember, my friend, you can't just buy the book and

leave it on the shelf. You will have to actually open the book and read and study its contents. In the case of the videos you will have to watch them and not have them play in the background while you discuss world affairs.

But wait a minute: you know I'm not going to let you out of this without a few words about "The Code." Lots of resources are out there to help you master the code, but a new format has come out that deserves a mention.

Your Introduction to Morse Code

Narrated by Rosalie White WA1STO

Edited by Larry D. Wolfgang WR1B

2 Audio Compact Disks

\$12.00

ISBN# 0-87259-581-1

The American Radio Relay League
225 Main Street
Newington, CT 06111-1494
1-888-277-5289

Now, I'm going to date myself. I took my first stab at learning Morse Code using a course that came on old-fashioned 33-1/3 rpm vinyl records. In the modern era the more enlightened path to code training involved cassette tapes, and the above-mentioned course is also available on cassettes.

However, the audio CD is a perfectly logical mode for code training. Audio CDs are divided into tracks. In this code training system, each track represents a lesson. This makes it fast and easy to review any particular lesson on which you need more training. Hitting the track button on a CD player is infinitely faster than trying to rewind a cassette and get it to cue up at just the right place. Simply put, these two CDs will get you to success on the five word per minute exam in high style. Why get a Tech when you can have a Tech Plus?

Well, let me wish you luck in your pursuit of your amateur radio license. I look forward to hearing you on the air. Have fun!

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New Trunk
Tracker Scanners

Q. *What would we hear if we hooked an infrared TV remote control to a speaker? (Bob Graser, Cohasset, MA)*

A. A good question; here's how you or any of our intrepid experimenters can easily find out. Connect an inexpensive infrared detector (Radio Shack #276-145, \$.99) to a shielded audio cable, plugged into the input of an audio amplifier (your stereo will work just fine); make sure the volume is turned down to avoid blowing out your speakers!

Point your TV remote at the optical surface of the detector diode and push; as you turn up the volume you should hear a sound which should pulsate or change as you press differ-

ent buttons. If not, either the experiment was a dismal flop, or the modulation is FM, or the repetition rate is ultrasonic and you can't hear it. In any case, it wasn't expensive, it gave you something to do on a chilly evening, and it kept you out of trouble if ever so briefly.

Q. *Does an automobile alternator generate AC at a particular frequency, or does that depend upon the RPM of the engine? How constant is the 60 Hz generated by power companies? (Mark Burns, Terra Haute, IN)*

A. The frequency of the AC generated by a

vehicle alternator is entirely dependent upon the RPM of the engine. To use a car alternator to run, say, a TV set which is very line-frequency-dependent, you would need a step-up transformer to bring the nominal 16 volts out of the alternator up to 120, and a frequency meter or counter to adjust the engine idle to give you 60 Hz.

Power companies generate three-phase 60 Hz at 13.2kV (13,200 volts). This is stepped up to 161 kV for distribution throughout the system. When large, regional grids interface to share power, it is done at 500 kV (half a million volts!). Frequency accuracy is maintained between 59.95 and 60.05 Hz. Power surges are prevented by huge circuit breakers which open the line rather than take the damaging hit.

Bob's Tip of the Month

Preparing Those Trade-ins

Some hints from the Grove Enterprises trade-in department should go far in netting you maximum dollar for your used merchandise. Whether you are trading in your old equipment or selling it outright, here are a few good tips:

(1) Clean it up: Dust it; spray and wipe it with a non-abrasive, non-caustic cleaner; let it air out if you are a smoker. And please, clean out the critters! Recently, when a radio came in for trade and didn't work, we opened it up to find out why. Roaches ran *everywhere!*

(2) Pack it securely so that it doesn't bump around in transit. Double boxing is recommended, as is wadded-up packing material. Be sure to separate items that may rub together and ruin surfaces. Wrapping each item separately and bagging them is a good idea. But when you use popcorn, make sure it is of the polystyrene variety. A few months ago when we recommended a customer pack his scanner in popcorn, he did—buttered, and without the bag!

(3) Finally, be sure that all the accessories are included—power supply, cables and cords, antenna, and instruction manual. Yes, I know how to program a Bearcat, but the next owner may not.

Now you're ready to step up to that new receiver!

More on Touch Lamp RFI

February's hints on curing the radio frequency interference on those notorious touch lamps brought some interesting commentary from our readers. Scott Dauphin, a nuclear logistics technician, suggests removing the module entirely (an excellent idea!), using a lower wattage bulb if you want it dimmer, and putting a diode (1N4001 or similar) in series with it to dim it further. A switch across the diode to short it restores the lamp to full brilliance.

Similarly, the primary winding of a small power transformer could be placed in series with the bulb to lower its intensity, and a shorting switch across the winding would restore full brilliance. If you wished to fully utilize the transformer, it could be placed across the line voltage, and the 12 volt output could be used to illuminate a 12 volt automotive-style screw-in lamp. The diode dimmer can be used in this scheme as well, either in the primary or secondary winding.

Emergency Power Supplies

Previously we lauded the use of computer uninterruptible power supplies (UPSs) as emergency sources of 12 volts DC during power outages. As one of our readers pointed out, however, not all of them work on 12 volts; his, for example, uses 18 volts!

Before frying your equipment, be sure your UPS uses 12 volts' worth of batteries!

Q. What frequencies do the new 900 MHz cordless phones use? Can they be heard on an ordinary scanner? (Mike Boles, Marietta, GA)

A. The actual allocation is 902-928 MHz. Since there is no formal bandplan for this low power industrial, scientific, medical, amateur, and other incidentals, frequency range, there is no standard channelization plan among manufacturers. Each has his own.

If a 900 MHz cordless phone uses conventional analog (unprotected) technology, then it is just as vulnerable to eavesdropping as a 49 MHz cordless or an 800 MHz cellular telephone, but many 900 MHz cordless phone now use digital scrambling and spread spectrum, unintelligible to the scanner listener.

Q. U.S. medium wave broadcasters are on 10 kHz intervals from 540-1700 kHz, and so are my car radio and hi-fi tuner. How can I listen to mediumwave DX stations like 585 (Pogo-Pogo), 1053 (Navy Hill), etc.? (Robert Broch, Phoenix, AZ)

A. The International Telecommunications Union (ITU) designates Region 2 (North and South America) to use 10 kHz medium wave channelization, but participation is voluntary. While the U.S. and Canada rigidly enforce the agreement, many other member and non-member countries do not.

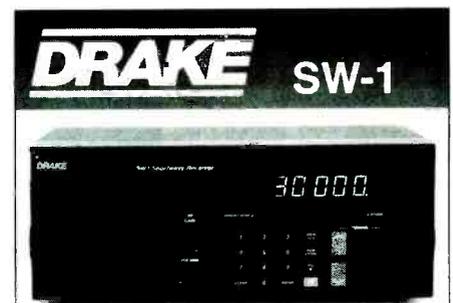
In Region 1 and 3 (Europe and the rest of the world) 9 kHz is the voluntary bandplan spacing. Most digital portables have a 9/10 kHz switch, allowing the user to select his spacing; even so, there are renegade broadcasters who pick their own frequencies. Only an analog (continuously adjustable) dial radio, or a digital radio with 1 kHz spacing, can be used to properly tune these stations. Such radios are readily available from MT advertisers.

Q. I live in Key West, right on the ocean. All my gadgets, including radios, are developing corrosion in the battery compartments. Any tip like using Vaseline to coat the contacts?

A. The corrosion problem is endemic in Florida (I lived there for decades). The problem is the humid salt air which hastens the corrosion process. It is especially troublesome near the coast, not so much inland. Once the tiniest bit of corrosion begins at the battery contact, the voltage accelerates the deterioration like an electroplating process.

Clean the contacts brightly with an eraser or something *mildly* abrasive like that (you don't want to remove the corrosion-preventive plating that is on it), then spray the contacts with a tuner cleaner like that carried by Radio Shack. This thin film retards further corrosive buildup while allowing electrical

continuity. While Vaseline (or other grease) would retard corrosion, it is likely to interfere with contact continuity.



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Questions or tips sent to "Ask Bob," c/o MT are printed in this column as space permits. If you desire a prompt, personal reply, mail your questions along with a self-addressed stamped envelope (no telephone calls, please) in care of MT, or e-mail to bgrove@grove.net. (Please include your name and address.) The current "Ask Bob" is now online at our WWW site: www.grove.net

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1912 Remembered

Perhaps the most tragic event ever played out on longwave was the April 14, 1912, sinking of the *Titanic* off the coast of Newfoundland. As the bow of the giant ship began listing in the icy waters of the Atlantic, low frequency spark signals filled the air with frantic calls from the doomed ship.

This month marks 86 years since the tragedy that claimed over 1500 lives. In this issue, we will focus on the role played by wireless, and the brave operators who refused to give up.

In 1912, confidence in technology ran high—almost to the point of smug arrogance. As the newest ships of Britain's White Star Line, the *Titanic* and its nearly identical twin, the *Olympia*, were equipped with the finest equipment and technology available, including the latest Marconi Wireless system.

The *Titanic's* station consisted of a high power spark-gap transmitter and a tuned crystal detection receiver. It was under the control of Senior Operator Jack Phillips and his 22 year old assistant, Harold Bride.

Having nearly completed its maiden voyage from Southampton, England, to New York, the *Titanic* struck a huge iceberg at 11:45 p.m. on Sunday, April 14th. Captain Edward Smith calmly told the wireless operators what had happened, and to stand by while an inspection was made of the damage. Within 15 minutes, he returned with the order for Jack Phillips to send the first distress message.

The text of the message was "CQDCQDSOS SOS CQDDE (this is) MGY MGY." The prosign "CQD" was the distress call that had been used since 1904, but it had been recently changed to "SOS" to avoid confusion with the general call, "CQ." (A recreation of this message can be heard at www.ggw.org/freenet/a/awa/)

At least seven ships responded to the *Titanic's* distress call with offers of assistance. The *Carpathia* (58 miles away) immediately started for the *Titanic's* position under the direction of Captain Rostron. Despite numerous ice warnings, the *Carpathia* proceeded at full steam, reaching the disaster site around 4 a.m.

Sadly, another ship, the *Californian*, lay just 19 miles away but could not be reached by wireless. Published accounts tell of an earlier,



Ship's wireless room from the Titanic era. Photo taken at the Antique Wireless Association Museum in Bloomfield, NY (www.ggw.org/freenet/alawa/).

on-the-air scuffle between the wireless operator of the *Titanic* and the *Californian* over interference. This resulted in the *Californian* operator shutting down his equipment for the night and retiring to bed.

When it became obvious that the *Titanic* was doomed, Captain Smith released Phillips and Bride from the Wireless Room, telling them "You have done your full duty" and that it was "Every man for himself."

Despite this, Phillips and Bride stayed at the key another 15 minutes until the wireless room floor began to flood. Using battery power, they remained in contact with the *Carpathia*, giving updates on the ship's condition and refining the location of the disaster.

In Bride's dictated story to the *New York Times*, he tells of a disturbing incident that occurred in these last few minutes. He observed "a stoker, or someone from below decks" trying to remove the lifebelt from Jack Phillips, who was feverishly sending his last wireless message. Bride, who was quite small in stature, was filled with rage at this sight, and he struck the intruder with a heavy object. In the *Times* interview he said: "I hope I finished him ... We left him on the cabin floor of the wireless room, and he was not moving."

Phillips and Bride were among the last people to leave the ship. Bride was pulled from the water into a lifeboat in an almost unconscious state. Unfortunately, Phillips was overcome by exposure and cold.

After being pulled aboard the *Carpathia*, Bride continued his wireless work, transmitting hundreds of heart wrenching messages for *Titanic* survivors. In all, 1503 people were lost in the disaster and 705 were saved by the *Carpathia*. Clearly, without the bravery and dedication shown by Phillips and Bride, the loss of life would have been far greater.

The disaster brought about major changes in maritime safety laws. Among them, ships were required to maintain a full-time wireless watch to listen for distress calls. They were also required to carry an adequate number of lifeboats for all passengers on board. Finally, the disaster spawned the creation of the International Ice Patrol on March 3, 1913.

■ For Further Study

Books:

The Story of the Titanic—As told by its survivors (Dover Publications, Inc., New York, 1960). Includes the complete story of wireless operator Harold Bride, as dictated to a *New York Times* reporter.

The Discovery of the Titanic by Dr. Robert D. Ballard (Warner Books, Inc., New York, 1987). A comprehensive book covering all aspects of the disaster including wireless topics. *Highly recommended.*

Movies:

A Night to Remember—1958. Until the recent release of the film *Titanic*, this film was widely acclaimed as the best produced film on the disaster. Well worth seeing.

Titanic—1997. This 200 million dollar production has unparalleled special effects and features painstaking recreations of the ship's interior, including the main staircase, which serves as a focal point for an engaging love story. Although the wireless room is given only brief coverage, the film is a must-see for anyone interested in the story of the *Titanic*.

Web sites:

The *Titanic Internet History Association* (TIHA) page at <http://www2.wco.com/~wseright/tiha.html> provides links to over 20 significant *Titanic* web sites and discussion groups.

■ Lower Transmitter Update

In January, I asked if there was any interest in *Below 500 kHz* presenting a simple Lower transmitter project. I am happy to report that the overwhelming vote was "YES," and I thank all of you who took the time to write me with your comments and suggestions. Look for more news on this soon.

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Ice vs. Towers

The big ice storm that hit northern New England, Eastern Ontario, and Southern Quebec is now only a faint memory for most of us, though I'm sure residents of the area are still cleaning up. The storm affected many broadcast stations in the area. At the same time, it proved the reliance we put on the media in times of emergency.

Montreal was the most hard-hit city. Internet reports indicate CBC Radio One (940 kHz) and CJAD (800 kHz) were both knocked off the air by the collapse of their towers. CBC temporarily shifted Radio One's programming to their Radio Two FM transmitter on 93.5, then rushed Radio One's planned new FM transmitter (88.5) to the air. The 940 kHz facility was also quickly returned to the air on reduced power.

CBC's French-language station on 690 kHz was not seriously affected by the storm, but they rushed its planned new FM transmitter (95.1) to the air as well. This transmitter was used to carry a special French-language program for storm victims south of the city. Remember that Canadian AM stations moving to FM generally simulcast on both frequencies for six months; expect both 690 and 940 in Montreal to go silent in July (if the frequencies aren't taken over by other Montreal stations).

CJAD used several methods to return a signal to the air. Additional newscasts were carried on their FM station "Mix 96," and time was leased from Ottawa station CFRA-580. Ottawa is only 80 miles from Montreal, and CFRA is easily heard in the Montreal area. (Especially with many sources of interference shut down by the power failure!) Finally, CJAD took over the 1410 kHz transmitter and antennas shut down when multilingual station CFMB moved to 1280 kHz last year. Numerous other radio stations throughout the region were also knocked off the air, due either to power failures or tower collapses.

Bits and Pieces

- I've never considered Wisconsin a particularly difficult state to DX on the AM band, though that may be because I'm a native of the Badger State and can claim some loggings most DXers would consider unidentified. Wisconsin will likely be much easier to DX by the time you read this. Management at



CJAD-800 was one of the stations most seriously affected by the Quebec ice storm in January.

WTDY-1480 Madison told Kent Winrich they expected to begin tests on 1670 kHz in early February, and regular broadcasts on that frequency by the end of the month. The call on the expanded-band will be WTDI.

- If you're on the Internet and interested in the domestic-band hot tips of the sort we just mentioned, **amfntvdx** is a mailing list of domestic-band DXers, where you'll see plenty of information on this subject. Go to **majordomo@qth.net** to find out how to join.
- It's rumored that December 1997 saw the most call sign changes ever filed with the FCC in one month. I can certainly believe it! Most of the changes involved TV stations on the new PaxNet network. There were, however, an unusual number of AM call changes as well. Besides the 20 changes reported in the sidebar, there were calls assigned to 11 new expanded-band permits. All 11 were assigned in alphabetical order by the FCC, and I expect all 11 to be changed before the stations begin broadcasts.

- In Oregon, KKJY has a permit to move to 1640 kHz in the expanded band. I'm not sure whether the call change applies to the 1290 kHz operation or to the one on 1640.

- Timothy Kuryla of Lexington, Kentucky, sent a few

notes on the WLW/VOA complex in Bethany, Ohio near Cincinnati. The VOA shortwave facility was decommissioned a few years ago and is now being dismantled, but WLW's 700 kHz transmitter continues to operate from an adjacent property. Timothy notes that the pole atop WLW's tower was used for 26MHz facsimile transmissions before World War II. A similar pole on WSM's tower here in Nashville was used for FM broadcasts in the old 45MHz FM band.

Kuryla also mentions a "biography" of WLW titled *More Than Just a Sound*, available in used-book stores in the Cincinnati area. Another book covering the history of this popular station is *The Trouble Is Not In Your Set*; this book contains photos of the inside of the 500kW transmitter WLW used in the mid-1930s.

- AM DXers observed phenomenal conditions shortly after Christmas, with those as far west as Manitoba claiming the best international reception ever. I can't argue; after over 10 years of trying, I finally logged my first positively identified European signals, Talk Radio U.K. on 1053 and 1089 kHz. Stations on several other frequencies would have been easily identifiable if I spoke Norwegian, Croatian, or French... Did you hear anything exotic this winter? Write: Box 98, Brasstown NC 28902-0098, or to the email address above.

CALL-LETTER CHANGES:

The following AM stations have changed call letters in the last month:

New call & freq.:	Old call:	Location:
WEZN-610	WZZK	Birmingham, Alabama
WTBC-1230	WTNW	Tuscaloosa, Alabama
KKSC-1300	KROP	Brawley, California
KMKY-1310	KDIA	Oakland, California
KZSF-1370	KKSJ	San Jose, California
WGNR-1470	WHUT	Anderson, Indiana
WUBR-1490	WEFG	Whitehall, Michigan
WNMT-650	WKKQ	Nashauk, Minnesota
WOEG-1220	WMDC	Hazelhurst, Mississippi
KKWK-1380	WKBQ	St. Louis, Missouri
WMML-1230	WBZA	Glens Falls, New York
WDOT-1070	WZBZ	Plattsburgh, New York
WBZA-1410	WSTL	South Glens Falls, New York
WJTD-1330	WYPC	Wellston, Ohio
KTLS-1370	KKNG	Holdenville, Oklahoma
KKJY-1290	KKJC	Lake Oswego, Oregon
WWKL-1460	WCMB	Harrisburg, Pennsylvania
KWBK-1380	KJUS	Beaumont, Texas
KZMP-1540	KPAD	Fort Worth, Texas
KMRI-1550	KRGD	West Valley City, Utah

How to Hear a Clandestine Radio Station

Most of the action in unlicensed radio broadcasting comes from pirates, but numerous serious political clandestines operate on shortwave. Clandestine broadcasters, who transmit programming advocating political and social change, are generally covertly operated by governments, rebel groups, and opposition political parties who do not have access to licensed broadcasters in their target country.

Several *MT* readers have written in with a question: "How can I hear a clandestine station?" During the salad days of Western Hemisphere clandestines in the 1980's, rebel broadcasts from Nicaragua, El Salvador, and other Latin American countries were easy DX catches. But, given political settlements in the region, most of these stations have disappeared. Nevertheless, plenty of fascinating clandestine targets still broadcast regularly.

If you're trying to log a clandestine, Nick Grace's Clandestine Radio Intel internet web site is a tremendous resource. Nick frequently updates this extensive collection of clandestine information. A URL of <http://www.qsl.net/yb0rmi/targets/htm> takes you to this truly superb source of clandestine material. Nick should get an award for this great service!

A few targets that can let anybody get their feet wet in clandestine station monitoring. Hook up your antenna, turn on your receiver, and try these broadcasts:

Easy. The various Nigerian clandestines are relatively easy to hear, and since their programs are in English, they are fascinating. Try **Radio Kudirat Nigeria** (South Africa transmitter) daily at 1900 UTC on 6205 and 11540 kHz, or **Voice of Free Nigeria** (Germany transmitter) on Saturdays only using 11645 kHz at 1900 UTC.

Relays of Cuban clandestines via licensed USA stations are simple catches. Try the formerly covert **La Voz de Alpha 66** on 7315 kHz at 0000 UTC, or the CANF's **La Voz de la Fundacion** on 9955 kHz at 1100 UTC. The Cuban stations are often jammed!

Difficult. We see occasional logs of the Colombian ELN's **Radio Patria Libre**, which operates on 6250 kHz around 2200 UTC from a clandestine transmitter in Colombia. If you hear this extremely tough catch, let us know!

■ Radio 510



Switzerland's Europirate uses licensed and pirate relays.

Since he uses relay transmitters at **IRRS** in Italy, Stevie at **Radio 510** is one of the best known European pirates in North America. He forwards his current schedule as Saturday at 1200 on 7120 kHz, Saturday at 1900 UTC on 3985 kHz, and Sunday at 1400 UTC on 7120 kHz. These times are designed for European listeners, so the station is tough DX from North America. Fortunately Stevie intermittently materializes on the pirate bands.

If you hear the 510 signal, reports are welcome at PO Box 510, Basel, Switzerland. They issue the QSL that we see here. More information is available at <http://www.radio510.org> on the internet.

■ NAB Attacks Pirates

The National Association of Broadcasters, the major trade association of USA licensed radio stations, is aggressively lobbying the FCC to crack down harder on unlicensed pirates. At a meeting in Laguna Niguel, California, the NAB Radio Board passed a resolution that commends anti-pirate "enforcement efforts of the FCC and the Department of Justice and (urges) additional enforcement activities. . . We stand ready to support the government's effort to eliminate unlicensed radio broadcast stations in the United States."

An NAB news release states that the organization's attorneys are filing amicus briefs during litigation in support of FCC pirate station equipment seizures. Edward O. Fritts, President/CEO of the NAB, said that, "Pirate radio broadcasters are illegal. Period."

■ Pirate Frequencies

Dozens of our readers report that 6955 kHz (+/- 10 kHz) remains the most widely used North American pirate frequency, with transmissions concentrated on Fridays, Saturdays,

Sundays, and holidays between 1300 and 0300 UTC. About 5 percent of the pirates have experimented with 6850 kHz, preparing for the possibility that **WGTC** or another licensed station might eventually begin operations on 6955 kHz.

Joe Mama of **Radio Nonsense** notes that he has been broadcasting on 27500 kHz during daylight hours, hoping to take advantage of increasing sunspot activity as the solar cycle advances. If you hear him, reports are welcome at PO Box 1, Belfast, NY 14711. Other readers report that pirate activity can occasionally be found in the mediumwave AM expanded band between 1610 and 1710 kHz, dodging the increasing levels of activity there by licensed USA stations.

■ SRS Contest

SRS News and the *Pirate Connection* bulletin constantly team up to provide detailed coverage of European pirate stations. You may have missed their pirate DX contest that ran over the Easter holiday, but if you're trying to follow the Europirate scene, these publications are excellent resources. More information is available at the new *Pirate Connection* web site. The <http://www.ils.se/~jal/pc> URL will take you there.

■ Thanks!

Reader input is always welcome via PO Box 98, Brasstown, NC 28902, or via the e-mail address atop the column. We thank the following radio hobbyists for material used this month: Joel Alire-Kerber, Buffalo, NY; Brandon Artman, West Chester, PA; Shawn Axelrod, Winnipeg, Manitoba; Tom Bandy, Ann Arbor, MI; Graham Barclay, Napier, New Zealand; Al Batten, Wausau, WI; Dean Burgess, Manchester, MA; Michael Clark, Apex, NC; Jerry Coatsworth, Merlin, Ontario; Ross Comeau, Andover, MA; Fred Danowski, Stratford, CT; Leslie Edwards, Doylestown, PA; Harold Frodge, Midland, MI; Joe Filipkowski, Providence, RI; Gerald Gibbs, West Palm Beach, FL; Joel Gosse, St. Paul, MN; William Hassig, Mt. Prospect, IL; David Krause, Eastlake, OH; Harold Kuhl, Gressen, Germany; Zacharias Liangos, Italy; Chris Lobdell, Stoneham, MA; Greg Majewski, Oakdale, CT; Joe Mama, Belfast, NY; Bill McClintock, Minneapolis, MN; Don Moore, Davenport, IA; Kevin Nauta, Grand Rapids, MI; Gary Neal, Sugar Land, TX; Dick Pearce, Brattleboro, VT; Jesse Rose, Hampton, VA; Robert Ross, London, Ontario; Richard Schultz, Louisville, KY; Lee Silvi, Mentor, OH; Robert Thomas III, Bridgeport, CT; Jeff White, Miami, FL; Sue Wilden, Columbus, IN; Barry Williams, Enterprise, AL; Niel Wolfish, Toronto, ON; Xcitor, Washington, DC.

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PWR 13	Universal Plug-In Charger	\$9.95
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75-510 Midland

Hand-size powerhouse has large, backlit LCD display for night viewing; four AA rechargeable batteries and AC charger included at no extra cost.

ACCESSORIES

BAT 1	AA Energizer Industrial	\$7.99
BAT11	AA NiCd cells (4 required)	\$1.95
BAT13	AA NiCd cells (4 required)	\$2.75
MIC 1	Mini Lapel Speaker/Microphone	\$19.95

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nightstand, or mounts on a wall. For strong signal areas, use the adjustable antenna, and in fringe areas, plug in your outdoor antenna for reliable reception. Comes with AC adaptor, or may be operated from internal 9-volt battery (optional) during power outages.

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More Ham Software

The American Radio League recently introduced QST View CD ROM. This CD is back issues of QST magazine available in sets of ten years each. Sets from the present to the 1940s are available.

My wife purchased the set 1950 through 1959 as a Christmas present for me. I was really surprised and delighted to have it as I had discarded most of my older issues of QST when we moved or when they took up too much space.

Each issue of the magazine is complete in every detail including the cover and all the advertisements. And each page can be printed in the exact format as the original. The older issues are a real trip down memory lane for many of us and a close view of amateur radio history for newer hams.

I have already completed the antenna project pictured on the page shown, and am gathering parts for a six meter, ten watt rig that I already built once from the original article. The technical articles are very interesting and, for the most part, still valid.

QST View runs under windows 3.1 or newer and is fairly easy to run. Users of 286 through 486 SX machines will need to modify their config.sys file to run the CD in the following manner: using a text editor call up the config.sys file and find the line called SHARE. Delete SHARE, save the modified file, turn off the machine and then turn it back on. Now you are ready to run QST View.

Share is seldom used, but if you run software requiring Share the ARRL will send you, at no cost, a copy of VSHARE.386 which replaces the original Share program and runs with QST View. If you are using a 486 DX or newer machine the program runs without making this change.

After opening the box I was anxious to get into reading the magazines and I just dug into the first issue on the disk and started looking at the index of each issue. A far better idea is to print the annual index from the December issue of each year in the set; then it is possible

Two Unusual 144-Mc. Antennas

Unorthodox Designs Produce Good Results in 2-Meter Work

We get the idea, at times, that beam antenna technique is pretty well standardized, and it is true that most of us stick close to the beaten path when we put up a high-gain antenna, whether it is for 2 or 20. Here are two instances where fellows tried some different ideas, and came up with interesting departures from standard practice.

A Lightweight Flopover Array

BY WALTER F. BAIN, W2WFB

LIVING in an area where considerable activity is to be found on 144 Mc. with both horizontal and vertical polarization, the writer has spent some time working with beams that could be operated in either position. Such an array should provide a fair amount of gain and a low radiation angle, whether vertical or horizontal, and it should be light in weight and low in wind resistance. If, in addition, it can be built easily and economically, these factors will weigh heavily in its favor.

The solution to this problem, currently in use at W2WFB, consists of four extended double Zepps, arranged as shown in the photograph and Fig. 1. All elements are driven. Viewing the array in its horizontal position, it is 0.7 wavelength high, 1.3 wavelengths wide and 1/4 wavelength deep. The two sections are fed out of phase. The extra size over that of the more common half-wave H array brings its gain up to approximately 12 db, considerably more than would be obtained with the normal H design.

The elements and phasing sections are made of No. 8 aluminum wire, obtained quite inex-

pensively as clothesline. The radiators are 53 1/4 inches long and the phasing sections 57 inches. Each phasing line is mounted on three polystyrene insulators, one at each end and one in the middle. The line spacing is 1 1/4 inches. The system is fed with 300-ohm Twin-Lead, connected at the junction of two 16-inch pieces of the same material,

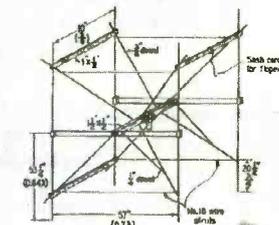


Fig. 1—Detail drawing of array described by W2WFB

to go directly to the articles you are most interested in.

The software is easy to use, but in order to read the pages they must be enlarged—easily done by using the magnifying option on the menu. I find a lot of pleasure in calling up an issue and just browsing through it and reading it from cover to cover.

QST View is available from the ARRL 225 Main St., Newington, CT 06111, price is \$39.95 plus \$5.00 s/h and worth every penny.

■ HAMCALC version 31

I had reviewed this piece of software about a year ago in this column and gave it a very high rating. The new version is excellent and worth the five dollars US charged for it by its originator George Murphy, VE3ERP.

This software runs under DOS and is super easy to use. There are five separate menus with over 200 programs for the radio enthusiast.

There are programs for antennas of all kinds, circuits, filters, inductors, propagation, great circle paths, transmission lines, traps, and many more (far too many to mention).

One particular program I like and have used is a design program for helically wound

antennas. There is a simple code training program. And a coil design program I like very much.

To receive your copy of HAMCALC v 31 send five dollars US to George Murphy, VE3ERP, 77 McKenzie St., Orillia, ON L3V 6A6, Canada. The program is available on 3-1/2 inch disk in MS DOS only.

Once you are a registered user, you will receive updates whenever they occur. George will request \$5.00 for the update. Of course, if you do not care to have the most recent issue, simply let him know.

This program is available on line and from some dealers. However, they are usually outdated and frequently do not run properly.

■ Are You on Six Meters?

This is a question often asked in this issue. If you have any kind of six meter activity in your area, please drop me a note and tell me about it. If you are using interesting equipment, antennas or modes be sure to include as much info as possible.

I would like to compile a list of six meter nets, beacons and any unusual activity on the band such as AM, SSTV, Packet, special repeaters or remote bases, six meter clubs, newsletters and special interest groups.

In an effort to promote activity I want to do an exclusive six meter column later this summer. So talk to your six meter buddies and get them involved.

73 de Ike, N3IK

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Maxon's Interesting SP-100G GMRS Handi-Talkie

Years ago, a comedian wise-cracked, "There are two kinds of people in the world: those who believe there are two kinds of people, and those who don't."

Talk to anyone who's been involved with two-way radio for a while, and they will confirm that there are two kinds of people who use radios — those who love to mess with the knobs and buttons, and those who don't.

My brother-in-law is a prime example of a person who just can't leave the buttons and knobs alone. I once saw him resurrect a digital watch that had been declared "brain dead" as the result of some mis-adventure. He patiently played with the four buttons on the watch case until — *Voilà!* — suddenly it began operating properly.

On the one hand, my brother-in-law has a gift: the patience and tenacity to mess with a piece of gear until it does something new and unexpected. But, on the other hand, my brother-in-law is the absolute last person you would want to turn loose as a communications volunteer with a user-programmable radio. Pretty soon, he'll start experimenting with the controls. A little while after that, he will be out of touch because his radio is now doing something new and unexpected.

Enter the Maxon SP100G GMRS UHF radio. Open the box, and you'll find the radio handi-talkie unit, an antenna, a belt clip, a rechargeable Ni-Cad battery pack that attaches clamshell-style to the back of the radio, a wall charger for the battery pack, and operating instructions.

Put it all together, and you can quickly see that this radio is simple but built like the proverbial brick comfort station. The molded black polycarbonate case, with battery attached, measures 5-9/16 inches high by 2-3/8 inches wide by 1-11/16 inches deep and weighs about 15 ounces. On the front of the handi-talkie there is a speaker grill and microphone. On the right side, lift a rubber flap, and you'll find two accessory jacks that accept an optional speaker/microphone, an optional mini-VOX headset, the standard wall charger, or an optional programming cable.

On the left side of the transceiver there is a push to talk button and above it, a monitor button that, when pressed, temporarily turns off the auto-squelch. On the back of the radio is a black polycarbonate belt clip and metal



Maxon's SP-100G GMRS handi-talkie delivers a lot of performance in a very simple package.

contacts for an optional drop-in charger. On the top of the radio, you'll find the antenna, a knob for selecting one of four channels, an on/off volume control, and a tri-color LED that indicates the status of the radio. That's it — there's no frequency display, no buttons for programming, not even a squelch knob.

But despite its apparent simplicity, this radio really performs. It puts out two watts of power. When working the local GMRS repeater, members of Empire Central REACT told me my signal strength and quality equalled my other two-watt GMRS hand-talkie. The audio on receive was crisp and clear. In addition, I found the standby time with the supplied battery pack was simply amazing. The factory claims eight hours standby time; I suspect it might be even longer.

The Maxon SP-100G comes pre-programmed to operate simplex on four GMRS frequencies: Ch. 1, 464.575; Ch. 2, 462.625; Ch. 3, 462.675; and Ch. 4, 462.7125. But this radio can also be programmed to operate on any GMRS or interstitial frequencies, any GMRS repeater with or without CTCSS tones and can even be programmed to scan three channels for activity.

How? With the SPK-400C programming kit. It comes complete with a cable to connect your IBM-compatible computer to the SP-100G radio, and a disk that contains software to program the transceiver.

Once the software is installed, programming the SP-100G is a breeze. Three columns pop up. The first is for the receive frequency, which can be selected from a menu list. The second column is for selecting a Continuous Tone Coded Squelch System (CTCSS) tone for receive and transmit. When a CTCSS tone is operating, that means it can only communicate with other radios on the same frequency that are also using the same tone on transmit and receive. The third column is for selecting either simplex or repeater operation. When the fourth channel is being programmed, there is also the option to designate it as a Scan channel, which will allow the radio to scan the other channels until a signal is received.

With the programming kit, you can create files of GMRS frequency sets that can be quickly loaded into the radio. So, as a result, if you needed to program six of these radios with identical frequencies, it would be easy to do so by simply loading the same frequency file into each radio. Or, if you wanted to make sure no one could get on the wrong frequency, you could program the *same* frequency into all four channels.

The bottom line: those who value simplicity in a radio and have a PC available for programming will think the SP-100G is really neat. The suggested retail price of the SP-100G is \$279.95. Suggested retail of the SPK-400C PC programming kit is \$79.95. For more information, contact Maxon at 1-800-821-7848, ext. 399, and tell 'em you read it here.

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Understanding and Building Vertical Antennas

Vertical antennas are known for their low vertical-angle radiation-and-reception patterning. At VHF and higher frequencies this kind of patterning provides good coverage out a bit beyond the horizon. Of course your antenna must be high enough to get a clear radio wave "line-of-sight" path to the horizon for this coverage.

On the HF band and upper portions of the MF band the same patterning favors low vertical-angle transmission and reception paths which skip the signal great distances around the earth. This, of course, means good DX performance on those frequencies.

For frequencies in the lower portion of the MF band and below signal propagation is more likely to be via ground-hugging waves, and vertical antennas are essential for launching and receiving this kind of signal. It's easy to see why vertical antennas are found in many installations.

How Did Vertical Antenna Designs Originate?

Hertz, the physicist who first convincingly demonstrated that electromagnetic waves could travel through space, utilized dipoles antennas for transmitting and loop antennas

for receiving these waves. Borrowing from Hertz's technology for the practical application of these waves to wireless communication Marconi utilized primarily dipoles at first. These were usually center-fed, halfwave antennas oriented horizontally.

At one point in his experimenting Marconi turned one half of a halfwave dipole to a vertical position with its bottom end at ground level. He replaced the antenna's other half with a metal plate which he placed on the ground at the antenna's base. This created a quarterwave vertical element over a ground connection (fig. 1A). The antenna was fed at the junction of the ground connection and vertical element. This was the first grounded Marconi quarterwave antenna.

Further Developments

As workers in radio came to realize that the earth around the antenna's base actually returned a good portion of the antenna's earthward-directed signal (received or transmitted) back to the antenna they understood that a low-resistance ground around the base of the antenna would mean less signal loss. And so they devised the technique of putting wires in a radial pattern (like spokes of a wheel) on, or

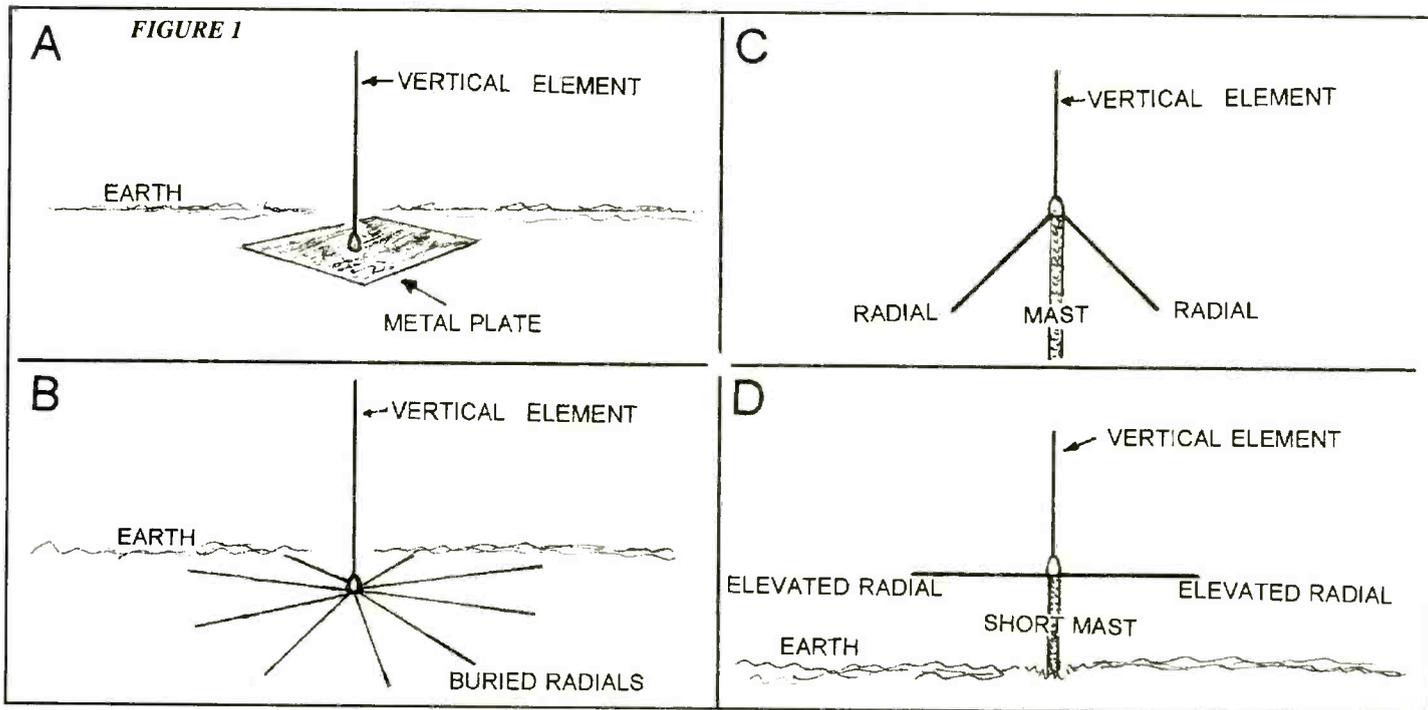
just under, the surface of the ground. These were connected to the "wheels" center at the antenna's base (fig. 1B). The more radials the lower the "ground" resistance, and the less signal loss. The less signal loss the more efficient the antenna, and the better the communication.

Across the years this Marconi grounded, quarterwave, vertical antenna became the standard design for many, many AM broadcast stations. Its performance in various kinds of communication links has made it a legend within the DX field where some DXers count it as the best single DX antenna ever.

Time Marches On

Later the brilliant and productive antenna engineer George Brown and his coworkers invented the quarterwave groundplane antenna (fig. 1C). Both the name and shape of the groundplane antenna suggest that it operates similarly to the Marconi grounded quarterwave.

But the groundplane radials of the groundplane do more than provide a return path for downward directed signals as the Marconi buried-radials do. Each quarterwave radial of the groundplane antenna, together



The original Marconi design (A), a Marconi with radials (B), a groundplane antenna (C), an elevated-radial vertical antenna (D).

with the quarterwave vertical element, comprises a halfwave resonant circuit. Buried radials are not necessarily nor often resonant.

Ground losses with the groundplane antenna are very low if the antenna is mounted a reasonable distance above ground; half a wavelength or more is best. Brown felt that two radials were sufficient for a good groundplane; current practice utilizes three or four radials. On the other hand, the optimum number of buried radials for the grounded Marconi is 120!

More recent work with the ground-mounted vertical design has indicated that, if the radials are a modest distance above the ground rather than in-or-on the ground (fig. 1D), as few as four radials can give optimum performance. I know of no formula for this height yet, but good results are reported with elevations of 10 to 20 feet at 3.8 MHz. Lower frequencies would require greater heights, and higher frequencies could do with lower heights. Note that the 10 to 20 feet at 3.8 MHz is only about a tenth or so of the half wavelength elevation (about 130 feet) recommended for groundplane elevation at this frequency.

■ Let's Make a Vertical Antenna!

1. If you are to use the antenna at VHF or higher then the groundplane antenna is the obvious choice. It can be mounted as high as you have a place to mount it. But as you go lower in frequency the height of the vertical element in particular is a limiting factor. If you can't obtain the needed height for the vertical elements plus the elevated radial height then perhaps the buried-radial model if for you.
2. For antennas from 25 MHz or so and higher, metal tubing is probably the conductor of choice for the antenna's elements. For the lower frequencies where elements are longer the vertical element can be made of larger metal tubing, such as irrigation pipe or gutter downspout. Use guy supports if the element is high. Heavy wire is OK for radials here. Wire, hung from a high tie point is also OK for the vertical element, and multiple wires can be used "cage fashion" to give the elements a larger diameter for wider bandwidth if desired.
3. PVC tubing or other non-conducting material should be used to insulate the vertical element from the mast and radials. Its OK for the radial connection to contact metal masts; this won't degrade performance.
4. For buried radials you can put in lots of shorter radials if it is difficult to get the desired number of full-length radials. Shorter radials are a compromise, and the more full-length radials the better. Buried radials should close to the ground's surface, a few inches deep at most. Just about any size and kind of

wire is OK for buried radials.

5. All elements for all the antennas discussed here should be a quarter wavelength long. This does not however preclude the use of shorter buried radials suggested above if your situation demands them. Formulas for quarterwave lengths in wire are:

$$\text{Length(ft)} = 234/\text{frequency(MHz)}$$

$$\text{Length(in)} = 2.808/\text{frequency(MHz)}$$

$$\text{Length(M)} = 71.3/\text{frequency(MHz)}$$

$$\text{Length(cm)} = 7132/\text{frequency(MHz)}$$

6. The Marconi or the elevated-radial antenna can be fed with 50-ohm cable with only a modest mismatch. The groundplane antenna's radials can tilted about 45 degrees from vertical as shown in fig. 1C to make its impedance about right for 50-ohm feedline. Coincidentally, if the radials are tilted straight down then the antenna is a vertical dipole, and has a 72-ohm feedpoint impedance just like an ordinary halfwave dipole. The "hypodermic" coaxial dipole uses this design.
7. The center of the coax feedline connects to the vertical element and the outer conductor (shield) connects to the radials.
8. If you live in lightning country the minimum protection is to never use an outdoor antenna during weather likely to produce

lightning, and to disconnect and ground the antenna when it is not in use.

RADIO RIDDLES

■ Last Month:

I said: "Tuned circuits in trap antennas do not necessarily give maximum output at signal frequency. What do they do?" Well, rather than giving maximum output (i.e., throughput) at their resonant frequency these circuits essentially block the signal from portions of an antenna. This electrically "shortens" the antenna allowing it to resonate on a higher frequency than its total length would otherwise allow.

■ This Month:

The term "propagation" refers to the travelling of a radio signal from a transmitting antenna to a receiving antenna. Do either of these antennas help in determining the propagation path which the signal takes between the two antennas?

You'll find an answer for this month's riddle, and much more, in next month's issue of *Monitoring Times*. 'Til then Peace, DX, 73

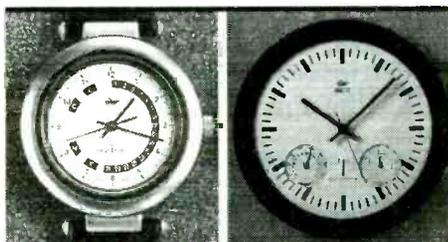
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Handheld Scanner Backlight Mods!

I'm not sure why, but interest in backlight or panel light modifications for handheld scanners has picked up. Perhaps the benefit/cost ratio of handhelds has improved enough so that more hobbyists are going portable with their radioing, only to discover the backlight is almost worse than none at all.

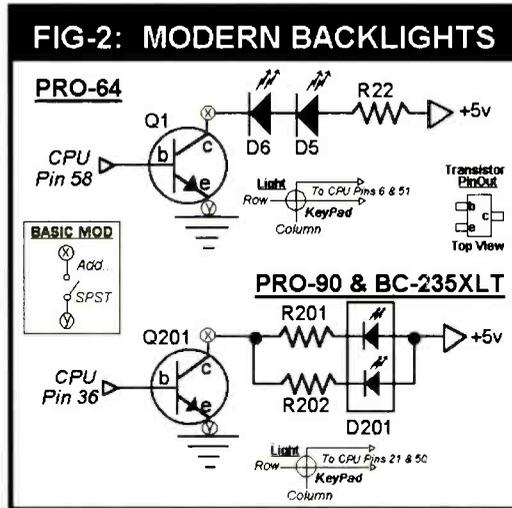
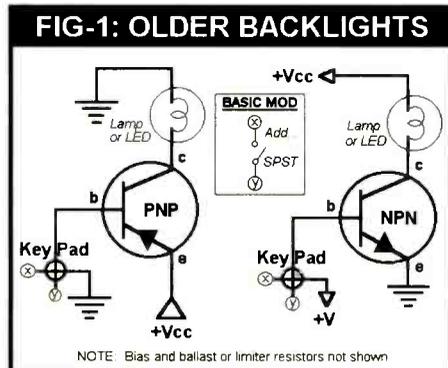
Backlighting hasn't changed much over the years. The intensity isn't all that great, but more importantly, you can't just turn the backlight on and off. Well, you can.....with a little fumbling around on the keypad for the Light button, but then about the time your eyes focus on the display, the light goes off. (Aaarrrgh!)

The manufacturers apparently design for long battery life and low overhead. Panel lighting certainly amounts to "overhead," so it's probably up to us to do something about it. Fortunately, there are several ways to improve operation of the backlight in most handheld radios.

Types of Backlighting

LCD displays in most handheld radios are backlit either by tiny incandescent bulbs or bright LEDs on the Logic/CPU board behind the display. Newer scanners use LEDs, probably because they drain less current from the batteries than incandescent lamps of the same luminance. In either case, the lighting is barely adequate, and it doesn't stay on very long, maybe 15-second at the most.

Not only are there two kinds of backlights, but there are two ways of controlling them. The time-honored method was a keypad button that applied a turn-on bias to a switching transistor. See Figure 1 for how these back-



lights work. Not shown are bias and load resistors, or any resistor-capacitor timing circuits that could serve to keep the light on for a short time.

Times have changed, with newer scanners like the PRO-26, PRO-64, PRO-90, BC-235XLT, BC-3000, etc., using a different technique to control the backlight. Figure 2 shows the latest. You'll see that the keypad button for the light isn't connected to the switching transistor. Instead, it goes to two pins of the CPU. A third pin goes from the CPU to the base of the switching transistor.

Clearly, the backlight function has become a function of the CPU's firmware. Press the light button and the CPU outputs a turn-on voltage to the base of the switching transistor for a programmed time period, typically 15 seconds. After the time expires, the CPU turns off that bias voltage, and the backlight goes off.

The Modification

For scanners where the CPU doesn't control the backlight (typified by the PRO-32, PRO-34, PRO-37, PRO-39, PRO-43, PRO-62, etc.), the simplest modification is to add an external SPST switch in parallel with the keypad contacts or traces for the light button. Turn it on and off as you please. Fig-1 also

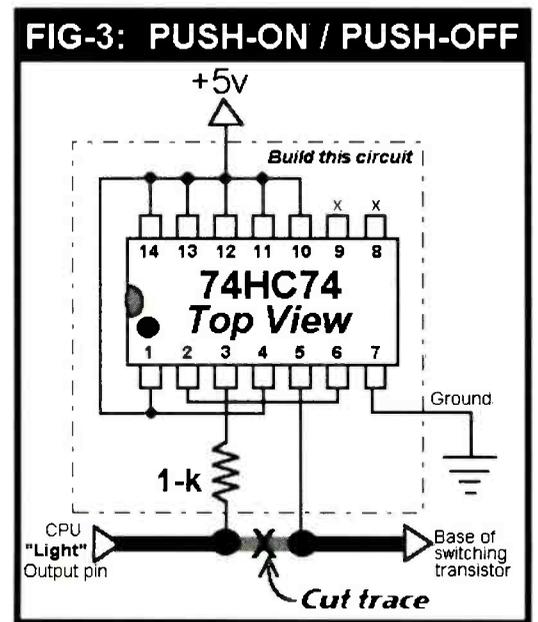
shows the "Basic Mod."

For those scanners where the CPU controls the backlight, the modification potential gets wild. The faint of heart can bypass the switching transistor with an SPST switch connected to its emitter and collector. Turn it on and leave it on, as you please. Fig-2 shows the "Basic Mod."

Going High Tech

If the idea of defacing your scanner doesn't appeal, or if the thought of using an anachronistic mechanical switch depresses you, then what about a mod that lets you push the keypad light button once to turn it on and once again to turn it off? Figure 3 shows how to do it for scanners where the CPU controls the backlight. Other scanners with light control as shown in Fig-1 require a different technique that's beyond the scope of this article. Contact me if you're interested.

The heart of this circuit is the 74HC74 CMOS Dual Flip-Flop. One other component, a 1-kΩ resistor, is required. Most of the circuit consists of jumpering pins together as shown. Four connections to the scanner are required: ground; +5v(reg); CPU-Light-Out pin



put; and base of the switching transistor. Also, cut the trace that goes from the CPU-Light-Out pin to the base of the switching transistor.

Construction isn't volatile, though if you know your stuff a surface mount 74HC74 takes less space and might be easier to install. Otherwise, use a standard DIP version of the chip. In either case, I recommend building the circuit "dead-bug" style, pins flared out to the side, with the chip glued upside down to the scanner's Logic/CPU board somewhere handy. Solder a jumper to pins 2 and 6. Then jumper pins 1, 4, 10, 11, 12, 13, and 14 as shown. Solder one end of the 1-k Ω resistor to pin 3 of the 74HC74.

Solder four wires to the new circuit: one to the 7-pin jumper strip to go to the scanner's regulated +5v; one to pin 7 to go to scanner ground; one to pin 5 to go to the base of the switching transistor; and one to the free end of the 1-k Ω resistor, to go to the side of the trace from the CPU's light control pin.

Cut that trace at some convenient point between the CPU light control pin and the base of the switching transistor. The last two wires described above go to each side of the trace cut. Use the shortest possible wire from pin 7 of the 74HC74 to ground. Length of the other three wires isn't important.

CAVEAT: indiscriminately leaving the backlight on can and probably will shorten the operating period of the battery pack. But you knew that, right?

■ Going Super Cool

If push-on/push-off doesn't trip your trigger, then how about a "squelch triggered backlight"? You know: the backlight comes on when a signal breaks the squelch; and goes off when squelch resets. The keypad light button still works as the factory designed it, too. See Figure 4.

Make a trace cut on the path between the CPU light control pin and the base of the switching transistor. Solder a 1N4148 diode across the cut as shown. Solder the cathode of another diode to the cathode of the first diode (cathodes of both diodes to the base of the switching transistor). The anode of this second diode goes via a 47-k Ω resistor to the "squelch gate," a point in the receiver where the signal is "high" (+5v) when squelch breaks and "low" (0-v) when squelch is set.

Here is the location of the squelch gate for a few scanners:

PRO-90	IC8-Pin 7 or J5-Pin 11
PRO-64	CN3/CN303-Pin 1 or IC301-Pin 13
BC-235XLT	IC8-Pin 7 or J5-Pin 11
BC-200XLT	collector-Q8; anode-D8; or R206

If in doubt, use a voltmeter to verify that a point goes high when squelch breaks and low when it sets. High is defined as +3v or greater and low is 0v, give or take a few hundredths. The squelch gate can usually be found on or near the NFM discriminator chip, too, typically pins 12-16, depending on the chip, of which there are only a few kinds: MC3359, MC3361, NJM3359, TA7787, TK10420, TK10421, TK10427, TK10489, TK10930. Your scanner will almost certainly have one of these somewhere on the analog board.

You can also find the squelch gate on a connector that carries a wire bundle or hard pins from the analog board down to the Logic/CPU board. For those who aren't comfortable with checking IC pins, this may be the safest place to look. Use a voltmeter with the black (-) lead grounded, and an alligator clip on the end of the red (+) lead. Slip a sewing needle in the jaws of the alligator clip and use it as a probe to test for squelch signals at the connectors and jacks in the scanner. Tune to an inactive frequency, and rotate the squelch control back and forth as you test for the squelch gate at various pins and points.

■ Wrapping Up

If your scanner's backlight is like those shown in Fig-1, you're limited to just the "Basic Mod" shown in that drawing. If your scanner's backlight is like those shown in Fig-2, then you can do the more esoteric mods shown in Figs 3 & 4. To determine which type your scanner has, you just about have to have

a service manual, though I can tell you in some cases, if you inquire by e-mail. I can't do much else for you if you don't have the service manual, however. It's a "must." Service manuals are available as shown in Table 1.

MANUFACTURER	PHONE
Radio Shack	(800) 442-2425
Uniden/Regency	(800) 554-3988
AOR	(703) 938 8105
Yaesu	(562) 404-2700
Icom	(425) 454-7619

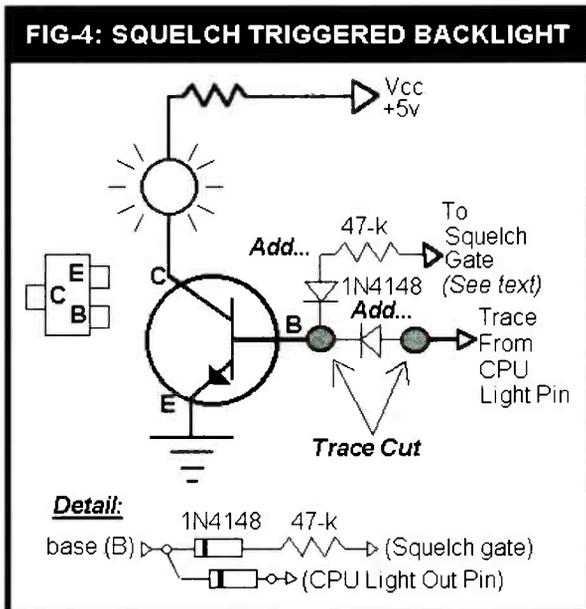
CAUTION: Specify Service Manual!

■ Support Note

Although I have a cheap, 10-Mb/sec, full-time connection to the Internet, one nasty side effect is that my site addresses change from time to time without my knowing it. By the time I find out and tell our Editor, a couple of columns might well be in the works with the wrong address. (Aarrgh!) But here is a solution: I maintain a fixed site at Compuserve that never changes. If you can't hit my published sites, go to <http://ourworld.compuserve.com/homepages/bcheek>; at the top of the page will always be listed my current addresses for the better web site and the FTP site. You can always e-mail for my latest addresses, too.

I'm happy to freely provide e-mail support for all my articles and projects. Make questions pertinent and focused and I'll respond in short order.

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 WWW: <http://204.210.10.52>
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 phone: (+49) 7525/451 fax: (+49) 7525/2382
 e-mail: bogerfunk@t-online.de

Marketing Strategies

How much does a cellular telephone cost? Advertisements entice new wireless consumers with promises of a telephone for one cent, or even free. Obviously the phone costs more than a penny to manufacture, so how can a cellular carrier afford to give away a phone?

The original marketing plan for analog cellular telephones required the customer to sign a service contract at the time of sale, obligating him or her to a lengthy term of service, typically one year. The cost of the telephone was built into the minimum monthly fee and airtime rates and was paid for over the course of the contract. If the customer chose to end the contract early, he or she would be charged a termination fee of \$300 or more.

This practice of combining the phone and service is called "bundling" and was prohibited in many areas of the United States. These days if you read the fine print closely, most analog cellular phones are available without activation for essentially the hefty contract termination fee.

From the beginning, PCS carriers have chosen to market their services and phones differently. As covered in the October 1996 *PCS Front Line* column, the nation's first PCS provider, Sprint Spectrum, does not require the subscriber to sign a service agreement or obligate them to any length of service. Handsets are sold as a consumer item at retail outlets for prices ranging from \$100 to \$200, and activation is done via a toll-free 800 number. Although substantially more than a penny, these prices are on average about half the actual cost of the phones. The other half is subsidized by the network operator, and with one notable exception PCS service providers using the PCS-1900 GSM format are using another method to "lock in" their customers and recover that subsidy.

■ SIM Cards

As in Europe where GSM began, PCS-1900 phones in the United States contain a removable Subscriber Identity Module, referred to as a SIM card. There are two kinds of SIMs: a credit-card-sized "Plug-



in SIM" and thumbnail-sized "ID-1 SIM," and every GSM handset is designed to accept one kind or the other. Regardless of size, a SIM card communicates with the handset through a series of electrical contact pads which follow an international standard.

The main purpose of a SIM card is to authenticate the user to the GSM network, and to do so each SIM is actually a type of smart card, containing a tiny microprocessor and up to eight kilobytes of modifiable, non-volatile memory storage. The SIM card performs a number of cryptographic security functions and holds a variety of information relating to the subscriber, including short messages, speed dial numbers, and other personalized features.

It also contains an International Mobile Subscriber Identity (IMSI), the first five digits of which identifies the "home" network on which the user has subscribed. Every GSM service provider issues a SIM card for each of their subscribers, and when the user plugs in the SIM the subscriber-specific information is made available to the handset. This allows the network to verify the status of the subscriber and authorize various levels of access.

The SIM card was originally designed so

■ SIM Locking

However, all but one of the US GSM providers has implemented a feature known as "SIM Lock" where a handset is electronically locked to operate only with SIM cards from their own network. Inserting a SIM card from another network into a SIM-locked handset results in an error message on the display and a phone that will not operate. If a customer had a SIM from Network A and wanted to use the services of Network B, he or she could not simply buy or borrow a Network B phone and insert the Network A SIM. The customer would either have to use a Network A handset and pay roaming charges, or purchase a new handset and SIM from Network B.

Network providers give two main reasons for SIM-locking. First, they claim it helps prevent the use of stolen phones since an out-of-network SIM will not allow the handset to operate. This seems a bit far-fetched due to another GSM identifier associated with each phone. Separate from the SIM, each GSM handset has an International Mobile Equipment Identity (IMEI) preset at the factory.

This unique 15 digit code is transmitted

when the handset is turned on, and the original GSM plan was for network operators to "blacklist" stolen and missing hand-

sets in their Equipment Identification Register (EIR) database and deny service to any suspect IMEI. For those of you wishing to look, entering *#06# on the keypad of most GSM handsets will display the IMEI.

The other, more likely reason is that network operators want to protect the handset subsidy that they pay to dealers for selling the handsets to customers at low prices. Since PCS operators avoid long-term contracts, SIM-locking a phone provides another means of retaining customers and effectively prevents the phone from being used outside of the network service area.

Soon after SIM-locked phones appeared in Europe the European Commission ruled that such handsets would be harmful to competition and would prevent the establishment of a common market for goods. The EC warned

TABLE 1 International Mobile Subscriber Identity (IMSI)

Mobile Country Code (MCC)	Mobile Network Code (MNC)	Mobile Subscriber Identification Code (MSIC)
3 digits	2 digits	up to 10 digits

TABLE 2:

GSM network codes of selected PCS-1900 providers.	
Aerial	310-31
BellSouth	310-15
Omnipoint	310-16
Powertel	310-27
Sprint Spectrum	310-02
Western Wireless	310-26
Wireless 2000	310-11

that a handset could work with different SIM cards to access different GSM networks. A GSM subscriber in Europe, for instance, could take his or her SIM card to the United States, plug it into a rented or borrowed PCS-1900 phone, and place and receive calls just as if he or she were still in Europe.

TABLE 3: International Mobile Equipment Identity (IMEI)

Type Approval Code (FAC) 3 digits	Final Assembly Code (FAC) 2 digits	Serial Number (SNR) 6 digits	Spare (SP) 1 digit
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all European handset manufacturers and network operators not to produce or sell SIM-locked handsets and requested that the GSM standards committee remove a proposed SIM-lock modification from the standards.

In the United States, it appears that every PCS-1900 GSM network operator except Western Wireless sells SIM-locked phones. Voicestream-brand customers are almost guaranteed to be using an unlocked handset, but subscribers of every other PCS-1900 GSM service have handsets that are locked into their provider's network. Most operators are extremely reluctant, if not openly hostile, to reveal the code that will unlock a particular handset.

If you're in the market for a used PCS phone, be sure that the phone you're considering purchasing is either from the network in which you wish to use it, or is not SIM-locked. Otherwise you find yourself unable to use the phone with your own SIM.

Issues of handset operation and compatibility are increasingly important as PCS networks continue to grow. No PCS provider covers all of the United States, and roaming is not guaranteed, since no single wireless digital standard is available everywhere.

TABLE 4**Cellular technologies available in the United States.**

800 MHz	1900 MHz
AMPS (analog)	GSM
TDMA	TDMA
CDMA	CDMA

■ Dual Solutions

PCS providers are working to plug gaps in their coverage areas by signing roaming agreements with existing analog cellular providers to allow their customers continuous service while moving between different kinds of networks. Subscribers will have the newest digital features while in the PCS service areas and can still place and receive calls while in the extensive analog networks that are already in place.

Such seamless roaming requires handsets capable of operating in two different frequency bands and utilizing more than one transmission technology. Dual-band phones can transmit and receive in both the original

800 MHz cellular channels and in the 1900 MHz PCS frequencies. Dual-mode phones can operate in two different types of networks, switching between one of the three digital standards (TDMA, CDMA, or GSM) and AMPS analog.

■ Sprint PCS

One such provider is Sprint PCS, which announced the availability of dual-band, dual-mode AMPS/CDMA phones near the end of 1997. Dual-mode AMPS/TDMA phones operating on 800 MHz frequencies have been available for years, and GSM carriers have announced dual-band AMPS/PCS-1900 handsets. Sprint PCS and PrimeCo both report that customer demand for dual-mode handsets have been strong since the first of the year.

Sprint PCS also introduced a flat-rate roaming charge when customers are outside the Sprint PCS coverage area. As long as a subscriber is using a provider with whom Sprint has a roaming agreement, incoming and outgoing calls are charged at 69 cents a minute, plus any long distance charges, anywhere in the country.

Sprint PCS announced a number of industry milestones in the first quarter of 1998. They reported a combined total of more than one million customers for their primary and affiliate operations, with an average revenue per subscriber in 1997 of \$64. Sprint PCS provided one billion minutes of PCS calling in 1997 and attributes their success in attracting customers to emphasizing the benefits of PCS over analog cellular: voicemail, caller ID, digital security, first incoming minute free, and no contracts.

Several hundred thousand of those one million customers subscribe to Sprint Spectrum, the PCS service started in the Washington, D.C./Baltimore area in late 1995. The JD Power and Associates *1997 Wireless Customer Satisfaction Report* ranked Sprint Spec-

TABLE 5

Representative PCS subscriber counts	
Aerial	125,000
Omnipoint	136,000
PacBell	340,000
PowerTel	119,000
PrimeCo	387,000
Sprint PCS	1,000,000
Western Wireless	466,000

trum above the two analog cellular providers in the area, despite being in operation less than two years, suffering billing problems, and having spotty coverage in many locations.

Sprint PCS has also built nearly 6000 cell sites since 1995. Even though PCS cell sites are generally smaller and easier to install, it took the analog cellular industry six years to establish that many sites.

■ Cellular and 911

Emergency calls made from cellular telephones should go through, regardless of whether or not the phone is currently under a service agreement. The Federal Communications Commission (FCC) ruled last December that 911 calls placed from any cell phone with a valid mobile identification number (MIN) should be completed, even if service has lapsed. Cellular carriers had resisted the implementation of such rules, upset over people being able to use their networks without paying a monthly service charge or other type of fee.

The California Highway Patrol (CHP) is testing a communications center in Sacramento with new wireless 911 capabilities, including a caller ID display that will show the cellular telephone number to the emergency operator in case the call is disconnected and the operator must call back.

Cellular companies are also under an October, 2001, deadline to provide the location of cellular callers to emergency operators. Under the FCC's Phase II requirements service providers must track callers to within 125 meters two-thirds of the time and report that information to emergency operators. Recent tests in Oakland using "location fingerprinting" technology tracked callers to within 50 meters of their actual position. Tests last year in New Jersey using a technique called Time Difference of Arrival (TDOA) also met the Phase II requirements. Although the FCC requirements are for 911 calls, keep in mind that whenever your cell phone is on, the cellular provider knows where you are.

■ New Website

That's all for this month, but for those of you wanting more information from the *PCS Front Line* website, we've moved! You can now follow the links to it at <http://www.decode.com>. I'd like to thank GroveNet for hosting it for many months, and look forward to hearing from you at dan@decode.com. Until next time, happy monitoring!

Smoky Mountain Monitoring

If you have ever traveled to the area of the Great Smoky Mountains, you will have come across a quasi-government agency known as the Tennessee Valley Authority (TVA). This was a cooperative program between the government and private industry to provide electricity to rural areas in the South. One of our loyal readers, Matthew Sadler, KF4LHP, of Chattanooga, Tennessee, has provided us with some pictures of a TVA repeater site and some insight on the radio usage in his area.

Pictured is a microwave relay site located on Montlake Mountain, just west of Soddy Lake, TN.

The TVA frequencies in use around Chattanooga are:

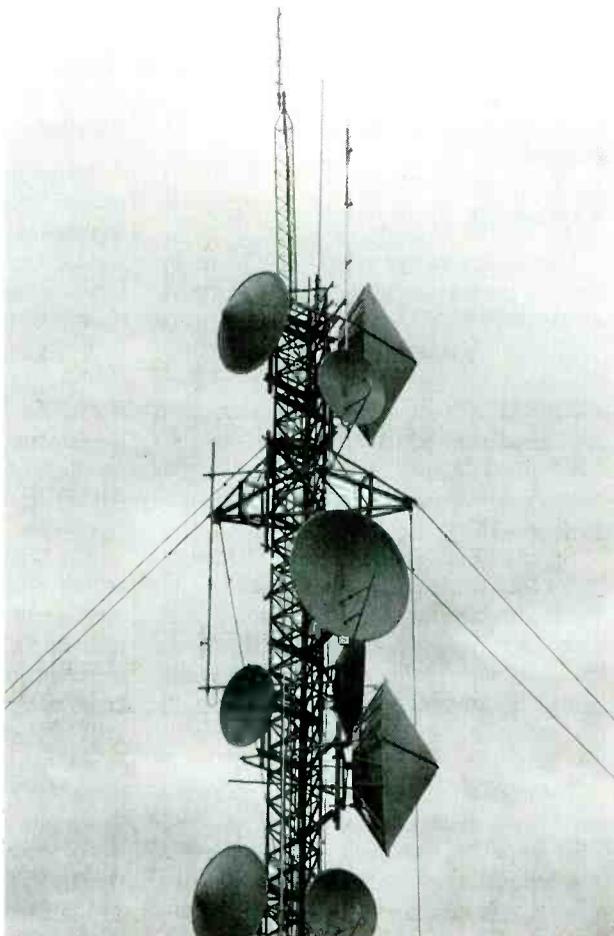
30.98	Administrative traffic and police (old allocation)
40.03	Old administrative channel
40.62	Work Crews
168.575	Repeater out--call sign KID812, p/l 1A (in 166.6375) Knoxville Dispatch (English Mt repeater)
172.425	Digital paging (various locations - East TN)
172.650	Nuclear Emergency Planning--phone patch traffic evacuation sirens that do not work--p/l ZA
415.075	OLD public safety channel
415.450	Downtown Chattanooga office complex maintenance

Other TVA frequencies that come from the FedFile data bank include:

166.275	Railroad operations
166.325	TVA Police

There have been several reports of the TVA Police in Chattanooga going to a digitally encrypted UHF system, but no discrete frequencies have been submitted. Information please!

Several years ago, while vacationing in the Great Smoky Mountains, I noticed a van that



Relay site at Montlake Mountain (courtesy of Matthew Sadler).

passed me on the interstate just west of Knoxville. Since this van had a big sign on it that said TVA and had a lot of antennas on it, I became quite interested. When the van pulled off for gas at a rest stop, I made contact with the van's occupants. They were employees of the TVA radio shop and provided me with a lot of information.

The antennas that drew my attention were the *shortwave* antennas on the van. It seems the TVA people have shortwave access. The channels in use are assigned to the marine radio service and are (frequencies kHz):

Ch1	2093
Ch2	4146
Ch3	6224
Ch4	8294
Ch5	12359

Other shortwave frequencies that have been monitored in use by TVA include:
3238.5, 3296.4, 5289.0, 26900, 27575, 27585 kHz

I do not know if the shortwave network is still in use, but it might be interesting to monitor. Thanks again to Matthew Sadler, KF4LHP, for most of the above. For a complete directory of federal information in the Chattanooga area, check out his website at <http://www.kf4lhp.home.ml.org/>

■ Military Trunking

While up in the mountain area, readers have reported that Ft. Campbell, Kentucky, has begun to use its UHF trunked radio system. Lorin Winchester of MilCom provided an intercept of two of the frequencies in use there. They are 412.5 and 406.350 MHz. The 406.350 channel is carrying a lot of military police traffic. The 412.5 channel was carrying traffic related to a C-130 air drop exercise and administrative phone patches. It might be a good time to check out *your* local military site for trunked use.

The United States Air Force is the leader in setting up trunked radio systems on its bases, worldwide. For example, most of the base traffic on Air Force bases in the United Kingdom has been in the 66-88 MHz band. This band has been all but vacated for assignments in the 406/420 band.

Here is the federal government band plan for trunking groups nationwide—and perhaps worldwide—on U.S. installations:

GROUP 1:	
Output	Input
406.3500	415.1500
407.1500	415.9500
407.9500	416.7500
408.7500	417.5500
409.55	418.3500

GROUP 2:	
Output	Input
406.7500	414.7500
407.5500	415.5500
408.3500	415.3500
409.1500	417.1500
409.9500	417.9500

GROUP 3:	
Output	Input
406.5500	415.3500
407.3500	416.1500
408.1500	416.9500
408.9500	417.7500
409.7500	418.5500

GROUP 4:

Output	Input
406.9500	414.9500
407.7500	415.7500
408.5500	416.5500
409.3500	417.3500
410.1500	418.1500

These frequencies are good for both on base military systems and for federal government systems in a geographic area. Unfortunately, the TrunkTrackers will not follow this trunking format. Maybe next time...

FEMA

I had an anonymous contribution of the Federal Emergency Management Agency (FEMA) VHF and UHF operations. These are not the normal FEMA frequencies, but are for auxiliary operations. They are:

Multi Agency Shared VHF Nets:

164.8625/165.6625 163.1000 168.3500

The National Emergency Training Center operates on 166.225 and 169.600 MHz.

National Emergency Warning System:

Regional Net 1: 173.1875rptr input
167.9750rptr out

Regional Net 2: 167.9750simplex

Regional Net 3: 169.8750simplex

Regional Net 4: 167.9250simplex

Urban Search and Rescue Teams:

408.5125 409.4875 410.4875410.5125
413.2125 416.0375 416.8125416.9375
417.5875 417.6625 418.5750418.075
418.0500 portable rptr output
418.0500 portable rptr input

Federal Emergency Response Support:

143.0000/142.3750 142.2350/142.9750
142.4250/143.0000 142.9750/143.0000
142.3500/143.0000 166.6125/168.4000
170.4250/168.0750 170.4500/168.1000
170.9750/168.7000

The first frequency is the input to the repeater, the second frequency is the repeater output.

Drug Enforcement

The Drug Enforcement Administration has been busy the past month. There has been a lot of activity in the Houston, Texas, area. The frequency of 418.825 has been handling much of the traffic. The main DEA player in this operation has been identified as FLINT 818 talking to his base. There has been a lot of Over-The-Air-Rekeying (OTAR) on this channel.

This frequency has been in use a lot in the northeast also. Reports have come in of numerous operations on this channel with a tracking transmitter on 418.6500 MHz.

FBI Quiet on All Bands

The FBI radio system is a difficult one to monitor. Numerous frequencies have been published, and I monitor all of the known FBI channels here in South Florida, but I have heard only one (1) clear voice transmission in the past year. This agency must be congratulated in their handling of radio security procedures.

The FBI radios are set up in banks of channels, usually labeled A through D, with 8 or 12 channels assigned to each bank. The banks of A,B, and C are set up for their individual field office needs. The D bank is generally standard throughout the country. Here is the breakdown of their channel assignments for the D bank:

Chan	Frequency	Use
D1	168.8625	Rptr input-Nationwide
	164.5500	Rptr out
D2	164.5500	Organized Crime and Drug Enforcement Task Force--simplex
		Treasury Common
D3	166.4625	FBI Nationwide common
D4	167.5625	Special ops--simplex
D5	167.5375	Rptr input-Nationwide
D6	163.8625	Rptr out--Special ops
	167.5375	Dept of Energy
D7	163.1000	Nationwide
		Nationwide police common
D8	155.4750	

The p/l for the above is 6Z. These might be interesting to add to your radio.

The FBI also has an interoffice high frequency (shortwave) backup system. These frequencies are (kHz):

5058.5	7903.5	9311.5	10.498.5
12138.5	14493.5	15953.5	16376.0
17403.5	18666.0	20348.5	

The net is tested every Monday at 0900 hours local time. The equipment is a Harris shortwave base station running one thousand watts. They also use automatic link establishment and voice encryption.

Here is a list of the known field offices that have shortwave capability and their associated call signs:

KAG70	KANSAS CITY
KAG82	MINNEAPOLIS
KAG98	OMAHA
KEC71	BUFFALO
KEC96	NEW YORK
KIG67	ATLANTA
KIG73	BIRMINGHAM
KIG81	CHARLOTTE
KIG91	KNOXVILLE
KIH67	LOUISVILLE
KIH98	MOBILE
KIJ22	MIAMI
KIJ44	SAN JUAN
KKI99	SAN ANTONIO
KKJ22	SAN FRANCISCO

KKJ67	ALBUQUERQUE
KKJ88	NEW ORLEANS
KKJ98	OKLAHOMA CITY
KMG27	SAN DIEGO
KOG55	LAS VEGAS
KOG71	PHOENIX
KOG93	SALT LAKE CITY
KOH22	SEATTLE
KSC63	INDIANAPOLIS
KSC71	MILWAUKEE
KSD61	CHICAGO
KUR27	HONOLULU

FBI offices out of the United States are generally located in the American Embassy and their radio traffic is usually handled over diplomatic circuits.

Customs

For you readers in South Florida, the hot frequency to monitor is 282.4 MHz (AM). This is the aircraft frequency Customs has been using in their antidrug operations. There have been intercepts of Customs aircraft talking to an AWAC which is flying over the Bahamas using this frequency. This ties in with the shortwave activity reported in previous columns.

That's it for this month. Happy monitoring...73's...John...WA4VPY



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Tools of the Tower

Welcome aboard, everyone. Or rather, welcome to the tower, where we are going to look at air traffic controllers' tools of the trade.

Windows - Probably the most important tool in the tower is the array of windows encircling it. Controllers are supposed to look out the tower windows to service aircraft within visual range and to observe what is happening on the ground and in the air within their domain. However, poor visibility often impairs their view. Then, radar presentations extend the controller's "eyesight."

Flight Strip Printer and computer input device (interfaced with Center Computer) - Aircraft enroute clearances are printed automatically on flight strips several minutes before estimated departure times, so the clearance delivery controller has the strip and the information on hand when pilots call.

Telephone Lines - Several lines are available at each position, depending upon requirements. For example, the flight data controller can call the center flight data operator to inquire about a specific aircraft's clearance. The local (tower) controller has a line to coordinate operations with the radar departure controller. The supervisor has a line to the airport operations people in case questions arise about the airport itself.

Controllers also have access to a red-colored telephone that serves as a hot line to airport emergency crews. The tower alerts the fire and rescue crews when an aircraft is in trouble and becomes a focal point for action.

Radio Frequencies - The clearance delivery, ground, and tower controllers each have a very high frequency (VHF: 30 to 300 MHz) radio channel at their disposal. They may share one or two ultra-high frequency (UHF: 300 to 400 MHz) channels. Navigational aids such as VORs use frequencies between 108 and 118 MHz. Frequencies between 118 and 137 are used for civil air-to-ground voice communications. The band between 225 and 400 MHz is used for military air-to-ground voice communications. The "UHF" emergency channel is 243.0 and the VHF emergency counterpart is 121.5 MHz.

Wind Speed and Direction Indicators and Altimeter Setting Indicator - Ground and Tower Controllers each have these indicators. The altimeter setting indicator works directly from an aircraft's altimeter because the height

of the tower is fixed. The indicator is based on that altitude setting. Pilots, on the other hand, who fly at varying altitudes, adjust their pressure altimeters based on barometric pressure readings for variations in existing atmosphere pressure or to the standard altimeter setting of 29.92.

Runway Visual Range (RVR) Indicators - Many towers have one or more RVRs. The RVR is a transmissometer located at the approach end of the runway. It measures the distance that can be seen down the runway. The readings are calculated in hundreds of feet with a maximum reading of 6,000 feet. Some airports install transmissometers at both ends of the runway. Occasionally, under poor conditions such as patch fog, it is necessary for controllers to give pilots the rollout RVR; that is, the distance they can see as their aircraft rolls down the runway after landing.

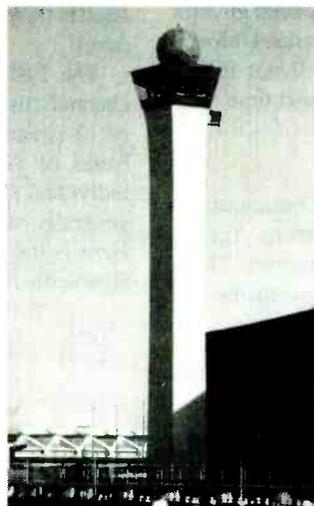
Low-Level Wind Shear Alert System (LLWAS) - This relatively new piece of equipment consists of five wind measuring stations. Four are located on the airport perimeters and one at midfield. The system detects variations in wind direction and speed, providing a warning of possible hazardous wind shear.

Navigational Aids - The tower also monitors the operation of significant navigational aids. For example, if the instrument landing system at the airport fails for some reason, an alarm sounds in the tower so the controller can advise pilots of the problem. The alert assists in a coordinated recovery, with both pilots and controllers cooperating.

Brite Display - A video presentation of the local radar situation, the display usually extends to a 15-20 mile radius. It enables the tower controller to ensure separation between aircraft, both arrivals and departures.

Airport Surface Detection Equipment (ASDE) - Some towers also employ ASDEs. They are radars that detect objects below the level of the tower. The ASDE is used during periods of reduced visibility when controllers cannot see the aircraft outside their windows.

Lighting Panels - These panels allow controllers to turn on taxiway lights, runway lights,



approach lights, and other airport lighting systems. The runway lights and the approach lights usually have several intensity settings to be used under various visibility conditions.

Light Guns - Towers still are equipped with red, green, and white light guns for use in the event of an aircraft radio failure. Each color has a definite meaning. Generally speaking, green means go, red means stop, and white conveys caution. Since radio failures happen rarely these

days, most pilots and controllers may need to be reminded of the exact meanings. The military still uses flares for the same purpose on some airfields.

National Weather Service Telewriter or Video Hookup - The meteorological information fed to the tower controllers includes cloud heights, visibility, significant weather (such as rain, snow, or fog), wind speed and direction and the altimeter setting. As noted previously, controllers have separate wind and altimeter indicators that are used directly. If the visibility is reduced below three miles, the tower controller assumes responsibility for making the official visibility observation as well. The only exception to this procedure is when, on rare occasions, the tower is actually above a fog layer.

Automated Terminal Information Service (ATIS) This is a simple, continuous-loop tape recorder. It broadcasts a message over an assigned VHF frequency. The message tells pertinent information such as departure and arrival runways, wind speed and other essentials. It is updated every hour or more frequently if the weather changes. Use of the ATIS message saves controllers from having to repeat the information to every pilot. Broadcasting the ATIS on a separate frequency removes clutter from the controller frequencies.

That's all for now. We'll continue this look at controller tools of the trade next month. Until then, 73 and out.

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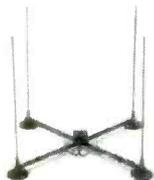
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A BNC plug connects to your radio's antenna port, and a 1/8" audio plug connects to your radio's external speaker/earphone jack. (An external speaker is required for listening to signals when the RDF is plugged into your radio's speaker/earphone jack.)



The microprocessor-controlled Agrelo RDF has an RS-232C computer interface and is GPS NEMA compatible with APRS (Automatic Position Reporting System). An advanced statistical analysis feature reduces or even eliminates error-producing multipath from being displayed.

16 bright LEDs provide an accurate compass display with +/- 12.5 degree resolution, and an optional computer or APRS can improve accuracy to within 1.4 degrees! Full instructions included.

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the antenna securely on the outside of the car window, and ten feet of mini-coax carry the signal to your handheld.

The window mount is perfect for use with a rental car, or is easily removed and stored in the glove compartment to avoid theft. The MFJ-310 HT Antenna Window Mount Clip is only \$14.95 from MFJ Enterprises; call 800-647-1800 or visit www.mfjenterprises.com for more information.

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MK-748R



MK-294R

band radio, you'll need a larger antenna, but you still may not be excited about drilling holes in the family car, or even risking the paint job with a hefty magnetic mount. Firestik has a solution for the car: the Trunk Lip Mount Mini-Kit model MK-748R, which can accept any antenna up to 36 inches long.

The "no-holes" mount bracket hooks over the rear lip of the trunk and tightens from underneath with two allen head screws. The \$18.99 kit also comes with 18 feet of RG-58A/U coaxial cable which attaches to the mount with Firestik's exclusive connector, and to your radio with a PL-259

connector. Firestik also carries a no-holes version which fits into the stake hole of a pick-up truck (model MK-294R).

For more information, or to find your nearest dealer, contact Firestik Antenna Company, 2614 E Adams St, Phoenix, Arizona 85034-1495, tel: 602-273-7151, visit www.firestik.com or email support@firestik.com

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such as in this month's article on "Car DXing." However, you can boost the pocket-loop's reception by 18 dB of frequency-selective gain with the addition of the Pocket Regeneration Module. It works on frequency ranges from 530 kHz to 10 MHz.

The Regeneration Module for the Kiwa Pocket-Loop is available from Grove Enterprises for \$47.95. The Pocket Loop itself is \$119.95. Call Grove at 800-438-8155 to order, or

for more information contact Kiwa Electronics in Yakima, Washington at 509-0453-5492 or email: kiwa@wolfenet.com

Discover DXING!

Are you fascinated with receiving distant AM, FM, and TV stations? There are many hobbyists who share this interest, and John Zondlo's second edition of *Discover DXing!* is a



good tutorial for the subject, with its faceted topics in propagation, equipment, antennas, QSLs, and logging.

For the newcomer and old timer alike, Zondlo's guide provides a handy, equipment-side reference list of VHF-TV stations by channel, a master chart of medium wave broadcasting channels, a comprehensive tally of clear channel AM broadcasters, and a capsule listing of the best bets for DX targets.

Discover DXing! is available for the bargain price of \$5.95 (plus \$2 Postal Service or \$3 UPS) from Universal Radio Research, 6830 Americana Park-way, Reynoldsburg, OH 43068; ph. (800) 431-3939.

Hands-off Antenna Tuning

Antenna matching may not be critical for the shortwave or scanner listener, but if you're



transmitting it's paramount. SGC's Smarttuner SG-231 is a compact, waterproof automatic antenna coupler which uses a microprocessor-controlled L network and is designed to be mounted at the antenna feed point.

Without any intervention by the operator, the coupler uses solutions stored in its nonvolatile memory to maximize signal strength from 1.0 to 60 MHz. The SG-231 operates with any HF or VHF transceiver, 3 to 100 watts, and requires 12vdc. The RF connection goes to your end-fed wire, center-fed dipole, inverted L, loop, mobile whip, or whatever's your pleasure! The SG-231 retails for \$595. For more information, contact your ama-

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- AOR SDU-5000 and a radio with 10.7 MHz "IF" output.

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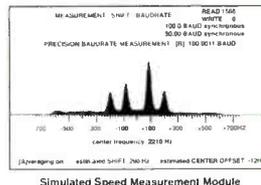
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Many radio amateurs and SWLs are puzzled! Just what are all those strange signals you can hear but not identify on the Short Wave Bands? A few of them such as CW, RTTY, Packet and Amtor you'll know - but what about the many other signals?

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- ARQ-E/ARQ1000 Duplex
- ARQ-N-ARQ1000 Duplex Variant
- ARQ-E3-CCIR519 Variant
- POL-ARQ 100 Baud
- Duplex ARQ
- TDM242/ARQ-M2/4-242
- TDM342/ARQ-M2/4
- FEC-A FEC100A/FEC101
- FEC-S - FEC1000 Simplex
- Sports info 300 baud ASCII
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An added bonus is a built-in GPS receiver which not only lets you know where on the planet you are, but can guide you where you want to go. To get in on the ground floor of this breaking technology, contact Grove Enterprises at 800-438-8155 and ask about the GSC100. Grove sells the unit for \$1499.95; basic services are available for a \$49.95 activation fee plus \$29.95 monthly.

Hands-on Experience

For antenna tuning under your control, MFJ supplies the 300 watt AirCore roller inductor antenna tuner for \$179.95. For exact inductance control, the three-digit counter is controlled by a manually-operated spinner knob. The

air core roller inductor can't burn up.

Match any antenna with the MFJ-969, from 6 to 160 meters. Before transmitting, pre-tune into a built-in 50 ohm dummy load. Other features of the tuner include a lighted cross-needle SWR/Wattmeter, 8 position ceramic antenna switch, and heavy duty 4:1 balun. For more information call MFJ Enterprises. 800-647-1800 or: www.mfjenterprises.com.

Zenith Transistor Radios

At one time, collectors of old-time radios limited their quest to vacuum tube sets, but no more; transistor radios are now fully entrenched in a rapidly-growing arena of interest. And among these, the Zenith brand evokes considerable attention.

Zenith Transistor Radios by Norman Smith is a new collector's edition luxuriant with color plates featuring the radio in ads and product shots, with accompanying text describing the evolution of this premier line of American made radios. A fascinating look at Zenith's role in World War II military applications, as well as a photo-essay of the Zenith-style knock-offs from a variety of well-known and lesser-known manufacturers is included. A pricing guide for collectors accompanies many of the consumer models.

Zenith Transistor Radios is \$29.95 from Schiffer Publishing, Ltd., 4880 Lower Valley Rd., Atglen, PA 19310; ph. (610) 593-2002, e-mail schifferbk@aol.com

Handy Log

In response to a local shortwave/scanner listeners' club re-

Frequency Data		Group/Log/Bank Data		PROBE U3.0
Status	ACTIVE	Group	**York Listening Area**	Log LOG.LGF
MHz	0155.0500	Bank	07 PSP	SmartScan On 07
CTCSS	186.2	[License Data]		
Signal	-106	Licensee	PSP Mobile Base Channel C	
Mode	NFM	Service	PP POLICE	
Priority	OFF	Address		
Alarm	0	City, St	Pa	
Log	NO	County		
Recorder	OFF	Call sign	Distance	N.A.
Delay	00:02	Latitude	Longitude	
Active	00:00:04	[DTMF Data]		
Time	05:16:02			
[Latest Activity]				
0155.9500	186.2	PSP Mobile-Base Channel C		05:15:50
0163.2000		US Marshall		L 05:15:32 1
0153.8050		City Channel 7		L 05:15:15 2
0463.1500		YORK COUNTY COMMUNICATIONS		05:15:03
0033.9000		York County Fire - Channel 1 Dispatch		05:14:53
0462.7250		York City Fire Police		05:14:30
0465.2625		Northern Regional Police		05:14:26
0453.0875		York County		05:14:21
0150.5700		York City Channel 2		05:14:12

Hyperbank activated: York Area = Home Bank [F3]

quest for some KIS (keep it simple) software, Megatrends has designed *HANDI-LOG*: "a 'universal,' easy-to-use and inexpensive logbook program with a number of useful built-in tools that anyone can use, regardless of the computer hardware involved."

If you like to do something else while your computer does the listening for you, this *Handi-Log* isn't for you. It's for the hands-on listener. It will run on any PC from 8086 to Pentium, with or without mouse. It will run under any version of DOS (sorry, Mac users!).

Handi-Log can create, edit, search, and print as many logbooks as you wish, each containing up to 500 entries. You can maintain memory files (up to 1,000 channels per file) for each of your radios, to hold data pertinent to each memory channel. You can also create notepad files to hold collection of notes on frequency information, station addresses, program schedule information, etc.

Other useful information is at your fingertips, such as assigned allocation tables, band limits for various services, and country prefix designations. *Handi-Log* is only \$19.95 from Megatrends, Box 44, Galt, Iowa 50101, email dphoto@netins.net (shipping included; Iowa residents add sales tax).

Probing the OptoScan

DataFile's computer control software designed specifically to work with Optoelectronics' OptoScan 456 and 535 computer to scanner interfaces is now in its

fourth year. *PROBE* Version 4.0 includes several enhancements suggested by its users. For example, not only can you select a priority frequency and how often it is checked, but you can select a priority *bank* to be sampled on a selected interval.

Tone control scanning includes not only breaking squelch on selected tone controls, but also breaking squelch if *no* PL tone is present. Probe's "Hyperbanks" ability to switch multiple banks quickly now also includes fast switching of up to 54 feature settings, such as tone control, squelch, speed, alarms, log files, etc.

When importing new frequency information, whether from a log file, FCC database, or a friend's list, the new "copy/compare" function will quickly show you duplicate entries or any data that differs. Not only can you add frequencies to your master list using this feature, but you can keep existing entries up to date as well.

Probe Ver. 4.0 is \$129.95 plus \$7.50/s/h. For further information and pricing, contact DataFile, Inc., PO Box 20111, St. Louis, MO 63123, email:

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The Palomar Loop Antenna System

By Clem Small

Active antennas appeal to many of us because they offer performance somewhat comparable to outdoor wire antennas and yet they require no outside wires at all. Most of them are small enough to sit out of the way on a corner of your operating desk.



The Palomar Loop Antenna is an active antenna system which covers from 10 kHz to 16 MHz. Coverage of this very sizable chunk of RF spectrum is made possible by use of a different plug-in loop antenna element for each band. These loops are mounted such that they can be rotated to null-out undesired signals or noise.

In addition, all loops, except the 5 to 16 MHz loop, can also be tilted for even greater depth to the null they provide. In some instances it is nothing short of amazing to hear interference quietly fade away as you find the proper position for the null.

The negative side of active antennas is that they are susceptible to problems of intermodulation distortion and desensitization if they are located near strong RF fields (i.e., a station's transmitting antenna is close to your house). In my experience with several active antennas over the years these problems have never plagued me, and I believe that they are relatively infrequent.

The Palomar Loop Antenna System connects to the receiver via a short coaxial cable and a PL-259 plug, or couples to it via the Palomar Loop Coupler if the receiver has no antenna-input connector. The receiver used in this review was the receiver portion of a Kenwood TS-930S transceiver. To review the antenna down to 10 kHz, which was below the bottom-end of the receiver's coverage (100 kHz to 30 MHz), a Palomar VLF converter was used.

The antennas to which the Palomar Loop Antenna was compared in this review were a shortwire (SW) of about 12 feet, hung up near the ceiling in a second-floor room of a wood house, and a longwire antenna (LW) around 250 feet in length and averaging perhaps 20 feet in height. Comparing a small table-top

loop to a longwire antenna this long is like asking little David to fight the giant Goliath. But, as you will read below, I encountered many signals for which the little loop was, like David, the more successful performer.

■ Activating the Antenna

Between 10 and 40 kHz the only signal I

found was the Omega station at 20 kHz (*This system was shut down Sept. 30, 1997-ed*). Reception of this signal via the loop was dramatically more quiet than with either of the long wires.

I did my tests both at mid-day and at late night. Noise was more of a problem during the day. In the daytime, until the receiver's noise blander was turned on, the Omega station could not be heard using either wire antenna. At night, when the noise level was lower, Omega was copyable on the LW without the noise blander. At both listening times, although the S-meter indicated that the LW gave a much stronger signal level than the loop, copy was much better on the loop due to the significantly lower noise level of that antenna.

If the receiver had not had a noise blander, there would have been very little but noise heard from either of the wire antennas during the day. For a receiver without a noise blander a loop provides the only really functional daytime antenna for those frequencies below the AM broadcast band.

In my daytime test, I found a signal at 121 kHz which was embedded in less noise than most; it was inaudible on the SW, strong and clear on the LW, and weaker but decent copy on the loop. At night the same signal was copyable on all three antennas, but the loop still gave the less noisy output. So, although the loop can't equal a really long wire for signal level, when noise is heavy, the loop can make a significant improvement in signal copy.

During both the day and night testing in the 200 to 300 kHz range I encountered several beacon signals identifying in Morse code and also some unmodulated carriers. The perfor-

mance of the loop here sometimes gave copyable signals when the wire antennas would not, and vice versa. The loop gave better copy than the really-long wire sometimes, and usually beat the shorter wire for good copy.

By both day and night on the AM broadcast band, the loop consistently outperformed the SW while the LW produced signals of considerably greater strength than those from either of the other two antennas. On the two remaining high-frequency loops (1.6 to 16 MHz) the loop gave lower signal levels than either wire antenna. The interference nulling feature remains a useful aid on these frequencies.

■ In Summary

The Palomar Loop Antenna, because of its high signal-to-noise output, gives excellent performance on the lower bands. As we move upward in frequency and into the AM broadcast band, output from the loop is significantly less than with outside wire antennas. And at these frequencies the noise level is lower and the quiet nature of the loop did not give the advantage which was found on the lower frequencies.

However, in very noisy locations the low-noise character of the loop should be more useful at the higher frequencies than was true at my relatively quiet rural site. The loop's interference nulling capabilities are an important factor in its usefulness across the entire frequency range.

The amplifier and each different loop of the Palomar Loop Antenna system are sold separately. The price of the loop Amplifier (LA-1) is \$99.95. Loops are \$99.95 each. A Loop Coupler, needed for using the loop with receivers without external antenna-input sockets, is \$49.95. The VLF converter is available at \$89.95 in two models: VLF-A for receivers covering 3510-4000 kHz, and VLF-S for receivers covering 4010-4500 kHz. Shipping and handling is \$6.00 per order.

Contact Palomar Engineers, PO Box 462222, Escondido, CA 92046; (760) 747-3343, fax 747-3346, email palomar@compuserve.com

This review is updated from an earlier "Antenna Topics."

RCA RP-6150 Scantrak Scanner

RCA, formerly Radio Corporation of America, was active in the scanner market when the crystal was king—over 20 years ago. An RCA 16S400 multiband base model is part of my old scanner collection (below).

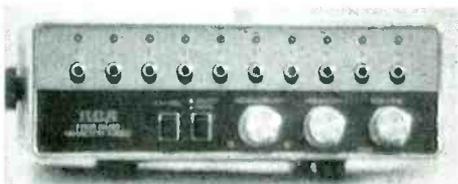
More recently, Thomson Consumer Electronics acquired rights to the RCA label and has returned to the scanner market with the new RCA RP-6150 portable (right). It closely resembles the 1994-vintage Radio Shack PRO-62 we reviewed in February 1995 *MT*. The RP-6150 is a multinational creation, made in China for French-based Thomson by General Research Electronics (GRE) of Tokyo.

We used an RP-6150 with a serial number of 004914 for this review. It tunes the conventional scanner bands, including civilian air frequencies, but excludes the 10 meter ham band and military air band (see measurements table). Its 200 channels are partitioned into 10 banks. Individual lockout and 2 second rescan delay may be selected for each of the memory channels.

Users may choose between AM and narrow band FM modes on any frequency, useful while scanning the 137 - 144 MHz range or vacationing overseas. The RP-6150 has one pair of search limits and the step sizes are factory set. Frequencies cannot be locked out during a search as they can in the newer Radio Shack and Uniden/Bearcat models.

As with most of the Radio Shack models, the RP-6150 has 10 “monitor” memories which can be written manually during a search.

Our RP-6150 scans at 26 channels per second, including empty channels, and searches at 53 steps per second. A single priority channel is checked every 2 seconds when enabled. Any channel may be designated as the priority channel.



The RCA 16S400 multiband base scanner.



A user can reset the microprocessor to restore sanity or perform a full scale initialization, which clears all memories, by actuating a pushbutton accessible through a tiny hole in the side of the case.

■ Batteries

Scanner hobbyists who prefer to select their own batteries will appreciate the RP-6150's flexibility. It requires six AA alkaline cells or NiCd cells. A GRE-style battery clip slides up into the bottom of the radio case and a separate trap door slides over it. As in the PRO-62, there are two jacks on the side, the same tiny size as in the PRO-43. The RCA scanner is supplied with an AC operated “wall wart” power supply so you won't have to buy one separately. It can power the radio or recharge NiCd batteries.

We measured our RP-6150 current drain at 89 mA while scanning, about the same as our PRO-62 and PRO-43 samples. The RP-6150 has a battery saving mode which takes effect only when the scanner is in manual mode. Most parts of the scanner circuitry shut down but “awake” every second or so. If a signal is detected when the scanner awakes, the entire circuitry is left powered on to let the user hear the signal. A few seconds after the signal ends, the power saver restarts its sampling action. While in the manual mode, the power savings are significant.

■ Mechanics

The RP-6150 is a good size for a portable scanner. It is slightly smaller than the Uniden/Bearcat 230XLT but larger than the tiny Icom R1. The top panel contains volume and squelch knobs, a 1/8" earphone jack, and a BNC antenna connector. The RP-6150 comes fitted with a plastic belt clip, fastened to the rear with two screws.

Inside, the RP-6150's three printed circuit boards are populated mostly with surface mount components and construction closely resembles a PRO-43 (right).

A semi-rigid rubberized antenna is furnished with the RP-6150 and appears to be the same as the antenna on the PRO-43.

■ RF Performance

The RP-6150 is designed around the same intermediate frequency (IF) lineup as the PRO-62: 257.5 MHz, 21.4 MHz, and 455 kHz. Who wants to hear 135 MHz aircraft images in the 156 MHz police allocations, or 441 MHz ham repeater images in the 462 MHz business band? If you buy a RP-6150 or other scanner using up conversion, you can avoid most of the image problems found in models with a lower first IF. Our RP-6150 attenuates images by a healthy 53 dB margin in the 155 MHz range.

Railfans should note that our RP-6150 experiences intermod on the VHF high band when connected to an outdoor antenna. Strong paging transmitters on 158.1 and 163.25 MHz break through on 160.3 and 161.33 MHz, respectively. We can also receive TV channel 5 audio (81.75 MHz) on 163.5 MHz. We hear cellular telephone signals mixing with other signals in the 855 MHz range when parked about 1000 feet from a cellular telephone base tower.

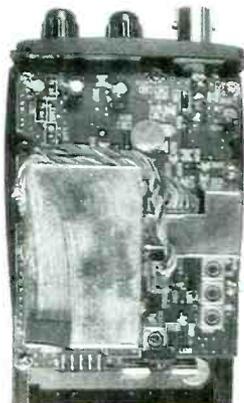
■ Improved Audio

The PRO-62 we tested back in 1995 provided mediocre quality audio output. Transmissions could not be understood using our PRO-62 in a busy restaurant. The RP-6150 audio has better high frequency response and makes itself heard above the din of passing cars and background conversation.

■ Keyboard and Display

The rubber keys have an excellent feel and the Scan key is colored a bright turquoise for easy recognition. A Keylock slide switch affords protection against inadvertent keystrokes. It disables all keys except Manual, Scan, and Light.

The liquid crystal display (LCD) resembles the display used in the PRO-43. It is smaller than the BC230XLT display but has sharper contrast. Pushing the Light button illuminates one dim lamp behind the display. It stays lit for only as long as you keep the but-



ton pressed and is not latched or timed as in the brighter Uniden models.

Summary

We're delighted to see RCA reenter the scanner market. People seeking a no frills, good performing portable and who don't need military aircraft frequency coverage should consider the RP-6150. It employs triple conversion and a flexible battery arrangement, but lacks the duplicate channel detection, search skip, and empty channel lockout features of newer designs. Our sample isn't super sensitive at 470 - 512 MHz and has some intermod around the VHF railroad channels but is generally more resistant to image problems than the BC230XLT. The RCA RP-6150 sells at a street price of about \$200.

Uniden BC235XLT Glitch?

Ron Smithberg reports that his two Uniden/Bearcat BC235XLT Trunk Trackers share the same odd glitch. Ron often uses his scanners in manual mode to monitor a single frequency. After a prolonged period of silence in manual mode, pressing the Scan, Search, or Service Search keys starts the associated action, but his BC235XLT will not hear signals or stop on active frequencies. Further, the display changes more slowly than usual.

We suspect this may be a "bug" in the battery saving logic which fails to wake up all the stages properly. Luckily, we found a simple workaround: press the Manual key or open the squelch to exit manual mode before scanning or searching.

MEASUREMENTS

RCA RP-6150, serial number 004914

Frequency coverage:

- 30 - 54 MHz (5 kHz steps)
- 118 - 136.975 MHz (25 kHz steps)
- 137 - 174 MHz (5 kHz steps)
- 380 - 512 MHz (12.5 kHz steps)
- 806 - 823.9875 MHz (12.5 kHz steps)
- 849.0125 - 868.9875 MHz (12.5 kHz steps)
- 894.0125 - 960.0 MHz (12.5 kHz steps)

Modulation acceptance: 13 kHz

Intermediate Frequencies:

257.5, 21.4, and 0.455 MHz

Image rejection due to 1st IF:

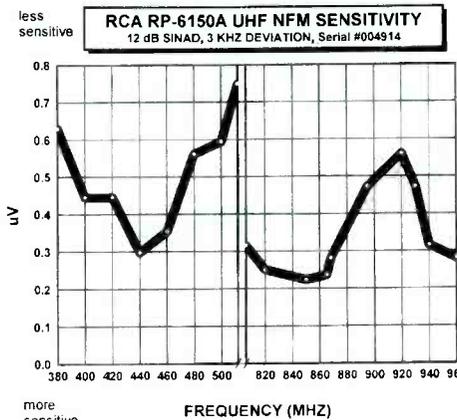
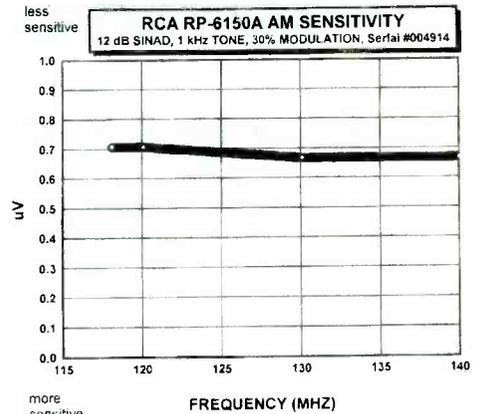
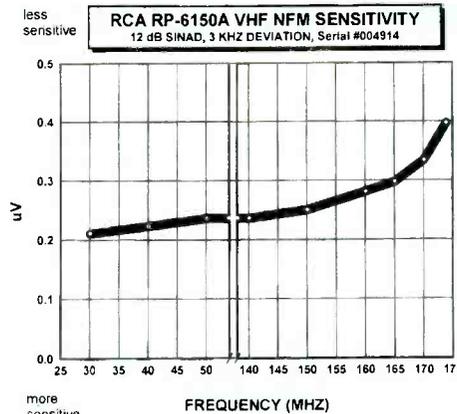
53 dB @ 155 MHz

Scan speed: 26 channels/sec.

Search speed: 53 steps/sec.

Current consumption @ 9 VDC:

- scanning: 89 mA
- full volume: 170 mA
- off: 0 mA
- Battery saver active after 5 sec.
- Low battery warning at 6.04 VDC



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

How the Third World Affects our Listening: The InterNational WR-689

It's no secret—world band radio sales in North America have been in decline since 1991. The slippage each year hasn't been considerable, or even consistent. But it's been there, and when cumulated over six years has been significant.

■ Solar cycle causes sales shift

Old timers have seen all this before, and in fact predicted it years earlier. That's because, based on the historical record, interest in shortwave listening tends to rise and fall in remarkably close correlation with the sunspot cycle, which runs roughly 11 years. When there's a peak, sales and listening crest, and *vice versa*.

We're just coming out of the trough between two cycles, and—sure enough—shortwave equipment sales now appear to be rising, if ever so slightly, just as the new sunspot cycle is just starting to nudge higher frequencies into life.

Is the sunspot cycle all there is to shortwave's ups and downs?

Who knows? In past cycles, there was no Internet to contend with, much less the end of the Cold War and its resultant "family cocooning." But at the very least, the correlation between shortwave listening activity and the sunspot cycle appears to be alive and well, to whatever degree.

Yet, eleven years is an awfully long time. Product managers, engineers and even senior managers usually weren't around during the sales rises and falls of the previous cycle. So the tendency each time radio sales drop with the sunspot cycle is to miss the big picture, and see the "death of shortwave" as coming to pass. People head for the exit doors, as they have on any number of occasions since the end of World War II.

The other problem with cyclical markets is that firms, like individual people, often live only for the good times, forgetting to prepare for the inevitable periods of turbulence. Especially in consumer electronics, where profit margins are thin-to-nonexistent even in the best of times, there is a real problem hanging in there waiting for the clouds to part. So it is that during the low point of the sunspot cycle—1997—two of America's five largest shortwave retailers went belly-up, and another (reasoning that short-



wave must be doomed), shifted the primary focus of its activities to other technologies.

Because of the lag between okaying a new engineering project and actually placing the manufactured result on the market, what we face in 1998 is the possibility of few new high-caliber portable models being introduced. Indeed, two such models from major manufacturers have been "delayed" repeatedly over the past three years, to the point where it seems unlikely that either will see the light of day until the potential market for them picks up substantially.

■ Europe affected, too

In Europe, it's much the same old story— not a fight for love and glory, but a fight for life that's gory. According to *Passport to World Band Radio* reader Harald Kuhl in Europe, the prestigious firm of Siemens completely left the consumer electronics market as of the end of 1997. For years Taiwan's Sangean-made OEM world band radios in large quantity for Siemens, which sold them throughout Europe. But now Sangean will have to slug it out in the European market on its own, sans benefit of the venerable Siemens name.

As for Grundig's operation in Europe, who knows? Right now, all that appears to be emanating from its Nürnberg headquarters is a stony silence.

■ Radios for poorer countries also sold here

This leaves us looking over new models intended mainly for other markets, notably in

poorer countries. Years ago, most of these were made in Japan; now, virtually all emanate from China. None inspires, but most are priced to move in parts of the world where most citizens can't afford to go out for a cheeseburger.

In parts of rural Cambodia, for example, it has long been customary for parents to let their children under ten go naked. This is not, as presumed in some quarters, the result of "heathen morality." Rather, it is because parents cannot afford clothes, so they put off buying clothing until their youngsters start to approach puberty.

■ \$5 equals a world of difference

Last month we reported on a model, the \$25 International R-110, that closely fits the profile of a radio that is relatively affordable in such places. Indeed, International—now the more *au courant* InterNational—is a common label on radios sold throughout the rice paddies of Asia and beyond.

This month, we have another InterNational model, the WR-689 ("WR-689" on the radio, "WR689" on the box), which at \$30 postpaid is only five dollars more than last month's International R-110. It is slightly larger than the R-110, but is still very small by any standard. Nevertheless, although both have analog frequency readout, the five dollar difference represents a major step forward in performance.

■ Volksradio for the nineties

First, the '689 covers much more of the shortwave spectrum. Last month's radio covered only 7500-16000 kHz (31, 25, 22 and 19 meters), whereas the '689 covers 5890-6250 kHz (49 meters), 7040-7570 kHz (41 meters), 9490-10000 kHz (31 meters), 11640-12160 kHz (25 meters), 15080-15650 (19 meters), 17490-18150 kHz (16 meters) and 21300-22000 kHz (13 meters) in seven segments. The biggest plus is that the important 49 and 41 meter bands, missed by the other model, are almost completely covered.

On the other hand, last month's "\$25 special" tunes the 22 meter (13 MHz) band and

9350-9485 kHz segment missed on the '689. (The 22 meter band, created in 1979, continues to be omitted on many Chinese-made radios.) Both cover the AM band from 530-1600 kHz, missing the new 1610-1700 kHz segment, and both receive the usual 87.5-108 MHz FM band in mono.

Second, each of these segments is bandspread on the '689, so they are vastly easier to tune than on last month's model. Too, you can tell roughly what frequency is being received, something utterly impossible with the other radio.

Both radios have no features, other than volume and tuning knobs and a headphone socket (the '689 also has a carrying strap). However, whereas last month's model has an antenna which neither swivels nor rotates, the '689's at least swivels.

Performance is better, too, although both models are poor by any yardstick acceptable to *MT* readers. Sensitivity to weak signals on the '689 is mediocre, but better than the other model. Selectivity and image rejection are equally bad on both, and the audio quality of the '689 is only slightly better—but good enough that it is at least acceptable. Both operate on a pair of "AA" cells, and neither comes with nor even accepts an AC adapter—hardly surprising, as many of these radios wind up in places not provided with electricity, or where electrical service is unreliable.

■ Lesson for all of us

It pays for us to come down from our ivory towers on occasion to see life from the perspective of what, after all, is the vast majority of the world's citizens. Government functionaries, academicians and others talk about the death of shortwave and how the Internet will rise triumphant in its place. Yet, quite aside from the continuing overall durability of shortwave listening within advanced countries, the idea that the Internet will replace cheap radios like these anytime soon—it's ludicrous.

Take this example. My old friend and colleague Victor Goonetilleke of Sri Lanka tried in vain at a European radio conference to explain to the assembled representatives from major Western international broadcasters how, in his

country, most urban rooftops either were bare or had bicycle tire rims mounted sideways. That's because even in the relatively prosperous cities, those who could afford television could not afford a traditional antenna, so they use discarded bicycle tire rims instead.

As listeners, we need to avoid this cultural myopia, as well. While we concern ourselves with our Drake receivers and Sony portables with selectable sideband, those who constitute the vast majority of the world's shortwave audience are delighted to own radios we

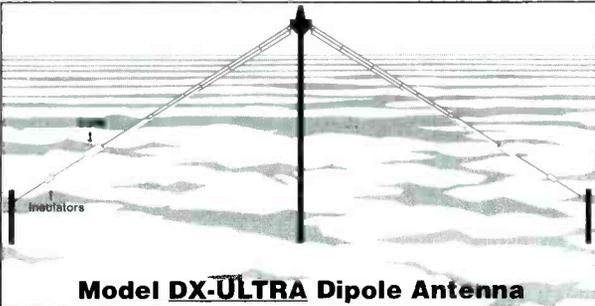
wouldn't even give to our children. Yet, if it weren't for those audiences, what we know as world band radio might not even exist—and most of our beloved DX catches wouldn't even be on the airwaves.

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WiNRADiO's 1000i vs. ICOM's IC-PCR1000

Before we start this month I'm going to turn the tables on you people and ask you some questions. Ready? OK. What's the best car? Who is the better cook: Jacques Pepin or Julia Childs? Who is the most beautiful woman? Who is the most handsome man? ... Come on people! Give me some absolute answers!

"Has John gone completely over the edge?"

It's not the first time that question has been asked. However, in this isolated instance, I can say, no, I have not. Answers to absolute questions come easily to only two kinds of people, the ignorant and the downright stupid. If you've only driven one brand of car your answer will lack...shall we say...depth? If you arrogantly say you have driven every commonly available American car, well then, you're really something ... (a strutting turkey comes to mind). But what about all the non-American cars, or limited edition custom brands? Do you see where I'm going?

Since we have been looking at the ICOM IC-PCR1000 and WiNRADiO's 1000i, I have had quite a number of requests from readers to answer the same type of absolute question: which is the best? Well, if you are looking for an egotistical, pontificating answer, look elsewhere.

On the other hand, if you are looking for one person's observations, based on simple A/B comparison usage and pointing out feature highlights, with the understanding that both products do a darn fine job, then read on. Ultimately, what makes us see beauty is a very personal prioritization of features. So, I'll try to point out distinguishing features of the two radios. Then you can answer the "big" question for yourself. As the software package agreements say, "by continuing to read, you agree to the preceding conditions": so let's do it!

■ Setting up the Tests

In order to get valid side-by-side comparisons all tests were done using the same 486DX66 computer, a B&W coaxial switch was used to switch the antenna between units, and all comparison tests were done within a minute of each other. That leveled the playing field.

Real off-air signals, from various parts of the radio spectrum, were used. Three antennas were used. In the 0.01 to 50 MHz range two antennas were connected at different times. The first was an outdoor (suspended via insulators from two trees more than 200 feet from any structure), RG-8/U coaxially fed multiband dipole, 1000 feet above sea level and fifty feet above ground level. The second was the telescoping, coaxially fed, rod antenna which is included with the ICOM. This was mounted on the interior of a window 35 feet above the ground.

For frequencies above 50 MHz a Ferret antenna, with its in-line amplifier, mounted 40 feet above ground and fed with Belden 9913 coax, was used. The Ferret has a number of vertically mounted, tuned, dipole-like elements. The ICOM rod antenna was again used in the VHF/UHF spectrum as a "short" antenna.

■ Criteria A - Minimum Frequency

The published spec sheets from both the ICOM and WiNRADiO say 0.5 MHz is their bottom end. WiNRADiO does not allow the user to tune any lower than 0.5 MHz. The ICOM not only lets the user tune lower, but actually allowed monitoring of US Navy/marine navigational signals around 0.1 MHz and digital data signals at 0.078 MHz.

■ Criteria B - Sensitivity

In the AM and SSB modes both radios worked equally well in the shortwave broadcast spectrum. Due to apparently better front end filtering, weak signal reception was better on the ICOM. Hams on 3.91 MHz LSB were readable but weak on the WiNRADiO. Meanwhile the ICOM provided strong copy.

From about 12 MHz to their upper limits, both radios appear to be very similar. However, these did not track exactly throughout the full range. The WiNRADiO seemed to do better than the ICOM in the 21 to 50 MHz range.

The ICOM seemed to be more sensitive in the wide FM mode in the 88-108 MHz range. I listened to three NOAA weather stations on

TABLE 1

Radio	Freq	Dist(Mi)	Ferret	Rod Antenna
ICOM	162.4	40	Strong	Strong
WiNRADiO	162.4	40	Strong	Strong
ICOM	162.55	60	Strong	Strong
WiNRADiO	162.55	60	Strong	Medium
ICOM	162.75	100+	Strong	Medium
WiNRADiO	162.75	100+	Medium	Weak

162.4, 162.55 and 162.75 MHz with both radios and with a combination of large and short antennas. The results, shown in table 1, show that the ICOM is the more sensitive radio, at *this* frequency. But please remember that any true evaluation is not based solely on one criteria.

■ Criteria C - Short Antenna

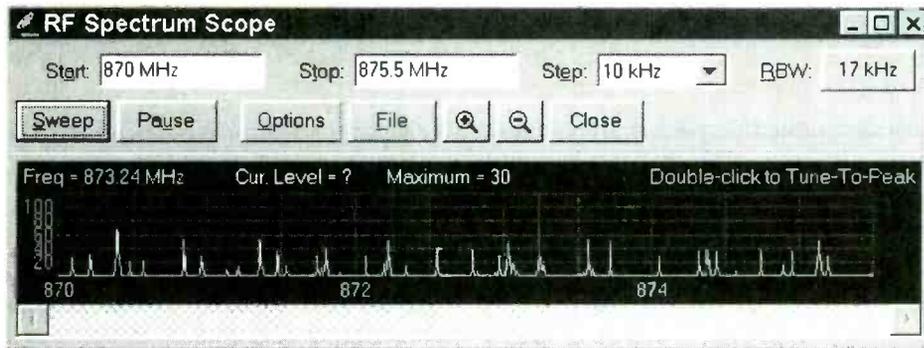
The ICOM telescoping rod antenna was used on both radios. A noticeable difference in signal strength was noted on certain bands. Both did quite well on medium to high power shortwave broadcast stations. In the civil aviation band 108 to 136 MHz, using the rod antenna, the ICOM pulled in stronger clean copy. Meanwhile, WiNRADiO's signals were quite listenable, but not as strong as the ICOM. Table one indicates similar results at 162 MHz.

■ Criteria D - Demodulation Quality

How good is the sound coming out of the signal? In all modes the demodulated ICOM signals were cleaner. Especially in the SSB modes, a "wobble" was noted on WiNRADiO's signal. But both were quite listenable.

■ Criteria E - Spectrum Scope

Here we find a real difference between the two radios. Both radios give the user a visual representation of which frequencies are active. WiNRADiO does this by performing a fast scanner-like frequency search. The limits of the search, as well as the step frequency, are set by the user. As it searches it displays activity as signal peaks on a graph. The result is a "snap-shot" view of the activity in the selected frequency spectrum.



The WiNRADiO spectrum display.

Using Rosetta Lab's VisiTune you can tune the radio to a frequency by clicking on a peak with your mouse. Holding down the left mouse button while you move horizontally along the graph tunes the range continuously; a sort of drag and scan. This method is useful when the user is interested in interrogating and searching a wide frequency range for new and unknown signals. This is also very useful for a quick measure of the actual propagation conditions.

The ICOM scope function is limited to a maximum bandwidth +/- 200 kHz. This is dependent on the tuned, or center frequency. However, its display is realtime. The ICOM user can watch signal changes as they happen, but within a quite narrow frequency interval. For checking activity around a specific frequency, or monitoring interfering signals, the ICOM scope function works well.

Overall I found the WiNRADiO scope function more useful to my type of monitoring.

Criteria F - Birdies

Birdies are signals which are heard on one frequency but are actually transmitted on another. One cause of this is poor filtering and mixing methods, a situation made worse in areas with high signal strengths. Now for wide band radios, as both of these are, getting the wide frequency range and making the signals behave is black magic. The input stages have to be wide enough to accommodate the full wide frequency range. Yet to keep down the cost and the size the number of input filters are minimized.

WiNRADiO had a strong 122.7 MHz birdie of a local commercial FM station actually at 105 MHz. This blocked any reception around 122.7

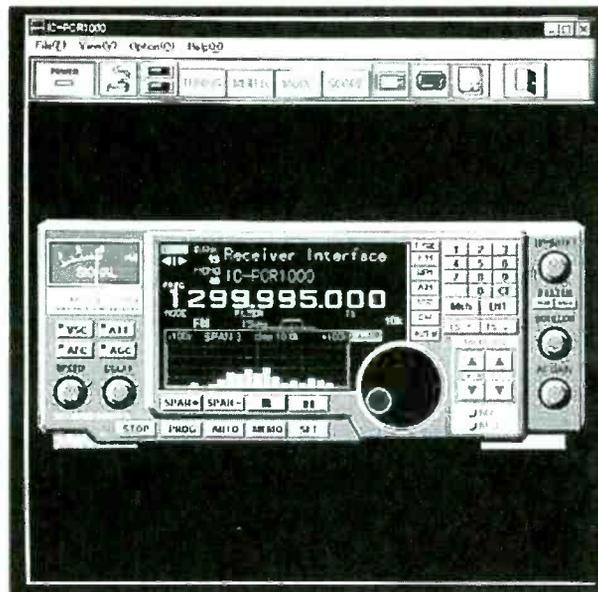
MHz. The ICOM also heard the birdie, but it was greatly reduced and it hardly interfered with reception. In general, the number and strength of observed birdies was lower in the ICOM.

Criteria G - Ease of Operation Using Software

Now this is one criteria that is very personal. I find the WiNRADiO's software very much easier to use. The fact that ICOM is rumored to be opening up its software so that outside programmers can develop new operating software and features may mean my opinion is not in the minority. The ICOM graphics are great. But in my opinion, the ICOM software has a long way to go toward simplicity of operation. WiNRADiO's software provides all necessary functions with minimal confusion.

Criteria H - Physical Differences

WiNRADiO 1000i is a PC expansion card



ICOM's frequency display (receiver mode)

which fits inside your computer. This results in a neat and clean, no hanging cables, installation. Of course this also makes it unusable with a laptop.

The ICOM IC-PCR1000 is totally external to the computer, requiring its own mains power supply and a connection to the computer via a serial port. Some hanging cables, but more portable.

What Would I Like to See?

The answer is more DSP, Digital Signal Processing. I don't believe either of these radio have full DSP. If they did, their filtering capabilities would be greatly enhanced with the filter's bandwidth and sharpness at the total command of the user.

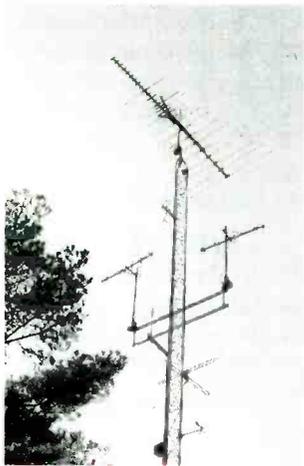
Summary

You have the observations. Now it's up to you to prioritize them to your preferences and needs. Neither wide spectrum radio will replace a dedicated radio, such as the R-71, with its bank of IF filters and specifically tuned input range. The ICOM IC-PCR1000 does have a number of filter settings. But given their performance, flexibility, features, computer control and price. I find both the WiNRADiO 1000i and the ICOM IC-PCR1000 real value for the money and useful additions to any monitoring equipment.

The Z Criteria

Rosetta Labs, maker of WiNRADiO, has produced an add-on called Digital Suite for digital signal decoding. To round out these radios, we will be asking how well does it work and what does it add to WiNRADiO? We'll take a look next time. Also we'll see if the rumor of ICOM opening up the IC-PCR1000's platform to third parties has taken place. And, so we can say we looked at these radios from A to Z, we'll define the Z.Criteria!

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Johnny Autery's impressive antenna tower.

Towering Antennas

"I have recently erected a tower with various antennas. I designed it and had my neighbor, who puts up towers, to make my dream come true! I never believed we could get that much hardware on a 60 foot tower, but we did. Let me give you a 'tour' of the tower:

"From top to bottom, a Wingard VHF/UHF TV antenna, Grove Scantenna, two opposing Grove Scanner Beams each with rotator, Diamond DI30J discone, FM antenna, sloping SW skywire, and a Davis weather station.

"Performance has been excellent; in fact, I have had to lock out a UHF ARTCC frequency because it comes in all the time. I have been very pleased with the Scantenna; it performs almost on par with the Scanner Beam."

Johnny Autery, Dixons Mills, AL

Screwy J-Pole?

"Monitoring Times is a great magazine. I've been a ham since 1957 and it is the only one I subscribe to and enjoy. I recommend it to my friends and to novices. It has something for everyone in the radio community.

"I have to point out an error: Page 98, Figure 1(c) of the December 1997 issue, the J-pole antenna is drawn wrong. It might, logically, seem the long element should be fed, but in truth it is the 1/4 wave element of a J-pole that is the fed element. You would go nuts trying to make what has been drawn work properly. I don't know how it would work for receive, but it definitely won't transmit.

"By the way, there is another misconception about J-poles that I have heard on the air, that it needs to be insulated from ground. Not true. It is a grounded antenna. I have one for 220 MHz, 52 MHz, and 29 MHz that I use and

none are insulated. Here in central Florida that is a good thing; we are in the lightning capital of the U.S.

Paul Barnes, W4YRL

Regarding which leg of the J-pole is fed by coax, I note that James Williams' J-pole design in this issue agrees with Clem Small's drawing in last December's issue. Looking for a definitive answer, I consulted the *ARRL Handbook*, which contains a J-pole design made out of copper tubing. The article is based on a design by Michael Hood, KD8JB. Here's his interesting observation:

"It really doesn't matter to which element (3/4-wave element or stub) you attach the coaxial center lead. The author has done it both ways with no variation in performance."

Though all these versions do ground the antenna, Bob Grove wondered about possible ungrounded designs: "Is it possible that, because of the elevation above ground compared with the short wavelengths, these antennas are actually insulated from an RF standpoint even though they are at DC ground?"

It's interesting that even an antenna which

is simplicity itself can pose such interesting problems in antenna theory...ed.

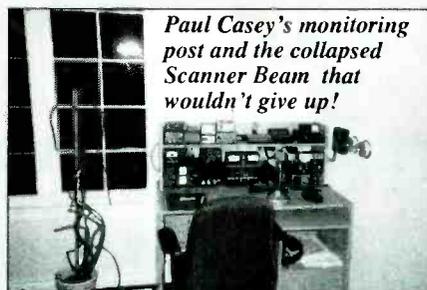
Antennas Undercover

Over the past year, both the *Ask Bob* and *Federal File* columns have contained discussions of disguised antennas. Tom Hagen says, "for undercover vehicles, you failed to mention a few other ways antennas are disguised. With many public safety agencies going to 800, we can use cell antennas. Or hide the antenna behind some of the plastic parts in the vehicles. I have seen 800 quarterwaves behind the plastic on a bumper, or in the outside rearview mirror.

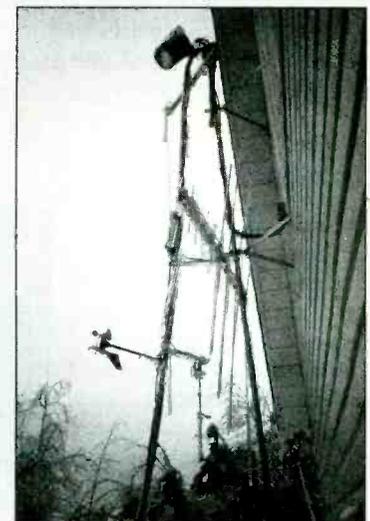
"Also seen on CSIS (Canadian Security Intelligence Service) vehicles are 1.5 GHz antennas mounted underneath the vehicle. While I agree most agencies will go with the cowl mounted AM/FM/UHF antenna (STICO in western New York makes an excellent product, but there is a company in Quebec, which makes all the disguise antennas for the RCMP), the more security conscious will go a different route."

Tom Hagen, Rochester, Mich

Takes a lickin' and keeps on kickin'



Paul Casey's monitoring post and the collapsed Scanner Beam that wouldn't give up!



"I congratulate you on the quality and performance of your Scanner Beam antenna. As you are aware, we had a major ice storm that shut down most of eastern Ontario, Quebec, and the Maritimes. On January 8th my antenna system couldn't take the ice load and down she came. The mast bent over but missed the roof, leaving most of the antennas against the side of the house.

"The Scanner Beam, although coated in 3 inches of ice and now aiming in the wrong direction fifteen feet off the ground, still performed excellently. Military, Ontario Hydro, police and other emergency personnel were coming in loud and clear! And trust me, the airwaves were bristling with activity during this emergency.

"The antenna did double duty when I ran a feed off the line to a television set when the power came back on two days later. Trees had fallen onto the satellite dish, rendering it useless. The beam brought in six local channels and yet another connection to the outside world. What a great product!"

Paul Casey, Dunrobin, ON

Changes in Internet Services or, Pardon Our Mess

If you have tried to access *MT* web pages or tried to log into the email hobby forums hosted by Grove Enterprises over the past couple of months, you probably met with some frustration. Bob and Judy Grove recently made a business decision to sell the internet server—which was the first to provide internet connection in our area of North Carolina—and the changeover was put into effect in February. The sale had two areas of most immediate impact: Our internet address changed, since Grove Enterprises is now a client of GroveNet; and it no longer has the ability to offer free webspace to nonprofit clubs and hobby groups.

Grove Enterprises is registering a new domain name: hopefully, by the time this issue of *MT* gets into your hands, you'll be able to access us again under the new address www.grove-ent.com. If not, just go to old www.grove.net address and follow the links to find the Grove catalog, *MT*, and *ST* web pages.

I am very gratified that all of the email forums we hosted have found ways to remain active. See page 2 for all new addresses known at this time. Go to the "radio hobby email forums" and "Club" web pages off *MT*'s home page for the latest information.

Here are a couple of comments from two list administrators:

"It has been a pleasure working with people that have cared for the hobby as much as you (Bob Grove) and your staff has. We recognize that ... anything that costs money hurts the profitability of the company, and it certainly isn't cheap running listservers for free!"

Mike, co-listowner, ACARS
(acars@patriot.net)

"Bob, I'd like to thank you and all the people at Grove for your help over the last few months since we came online with you in August of 1997. Without you and yours, we would still be struggling today to keep in contact with each other; your hosting the list really made the difference."

Mark Zee, Ireland, Atlantic List Admin.
(atlantic@qth.net)

Thanks: We are gratified to know we helped launch or keep afloat a number of interest groups. Part of our intent was to give the hobby a shot in the arm and to prove the tremendous potential the Internet has as a tool for the radio hobby. Now we have to say, *bon voyage!*

Webless Monitors Getting Gyped?

"I am deeply disappointed to see that you are no longer publishing the list of clubs in *Monitoring Times* as you used to. Starting a few issues ago, you have referred your readers (myself included—a long time subscriber) to a web page! Well, that's nice for those who can afford the \$20 a month fees but how about those of us who do not have the web (like myself?) I subscribe to your magazine to get all the information about radio in paper form.

"Will this trend continue with more and more information being available only on the web and less and less in the magazine? Will the paper edition of *Monitoring Times* become a web only magazine? I sure hope not."

Roland Stiner NK2U, DU1A (Don't have web access but I do have indoor plumbing!)

(Continued on next page)

Given the foregoing information that we now have to pay for our own space on the Web, you can rest easy—*MT* will never become an internet publication only. The club list is also available for a 32 cent stamp plus self-addressed envelope - ed.

"I've been an avid reader of *Monitoring Times* since December 1996. Yours is a fine publication, and I enjoy reading it from cover to cover each month. Your magazine contributes greatly to my enjoyment of shortwave listening.

"More often than not, I run across an interesting URL while reading an article, invariably while I'm away from my computer. Later, like this evening, when actually sitting in front of my computer, I spend a great deal of time trying to find the URL in *Monitoring Times*. An Index of URLs would solve this problem, which is one I'm sure pinches a great many readers."

Alan R. Spies, Devonshire, Bermuda

Sorry you didn't hunt a little harder, Alan. I've been doing exactly what you requested for the past year or more. Look for "Links to web sites referenced in *MT*" off the *MT* home page. The current URL links start with the January 1998 issue - ed.

Send in your additions, corrections, new business and old business to share with other *MT* readers to Rachel Baughn, Editor, PO Box 98, Brasstown, NC 28902 or email mteditor@grove.net

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CLOSING COMMENTS



By Bob Grove,
Publisher

Signals from the Sea ... *Whatever Happened to Hydronics?*

It's been nearly three decades since a Sarasota, Florida, scientist investigated a revolutionary form of marine communications.

Wallace C. Minto was founder and president of Sarasota Research and Development, an entrepreneurial technology firm that worked on the edge. I knew Wally, and I was fascinated by his technical exploits. Self trained, Wally didn't recognize the artificial limits frequently set by academia; instead Wally boldly set forth into pathways many mortals feared to tread.

I can recall with amazement how his home-built magnetometer would react to the slightest motion of a screwdriver some ten feet away from the sensor coils. "Wow, what a buried/submerged treasure locator!" was the thought that crossed my mind.

■ Fishy noises

But what really captured my imagination was his discovery that aquatic organisms emitted electrical signals, apparently as a means of communication. These weren't the haunting acoustical sounds attributed to the great whales, nor the high-voltage pulses produced by electric eels, nor were they related to the low frequency electromagnetic communications utilized by the Navy.

No, these were audio-frequency electrical signals emitted by fish! As I recall, the sea robin was one of the noisiest, but many denizens of the deep could be "fingerprinted" by their characteristic signals.

After I moved from Sarasota to West Palm Beach, I lost touch with Wally, but I continued to think about the implications of this mode of bioelectric communications which Wally dubbed "hydronics." As I completed my graduate degree in science at Florida Atlantic University in the mid '70s, I decided to make hydronics the topic of my thesis, and I build a hydronics receiver. My loggings were intriguing, and the gear was simple: a pair of metal

paddle electrodes connected to a high-gain audio amplifier, or even a portable tape recorder to preserve the "intercepts."

A walk to the beach was fascinating; sticking the probe into the ocean I heard some of those mystifying signals that had piqued Wally's curiosity. Even in freshwater streams and ponds I could hear sounds previously inaudible to humans. My fascination with this new mode of listening was heightened. But I laid aside my personal files for more pressing matters—until now.

■ Who will pick up the torch?

What has become of hydronics? I decided to find out. After all these years I discovered that Wally had passed away; Sarasota Research and Development is no more. I heard rumors that the U.S. Navy had classified some of Wally's work; his files are nowhere to be found. A search of the Internet fails to show the term "hydronics" used for anything but commercial convection heating systems, certainly not Wally's contribution to science.

There are so many unanswered questions. Can audio-frequency electric signals be used for submarine communications? We know that "underground radio," consisting of audio amplifiers, microphones (or tone generators), and speakers, can be utilized to intercommunicate over reasonable distances via metal rods driven into the earth.

And how about seismic research? Could the detectors be lowered into ponds, lakes, rivers, or wells to monitor electrical activity preparatory to an earthquake?

As we listen now for signals from outer space, has the passage of time erased all traces of—or interest in—these signals from inner space? What became of Wally's work? Was it all done in vain? Can we recreate those lost files? Who would pick up the banner? If any of our readers has information—or interest—I'd like to hear from you.

RG

WORLD WIDE RADIO



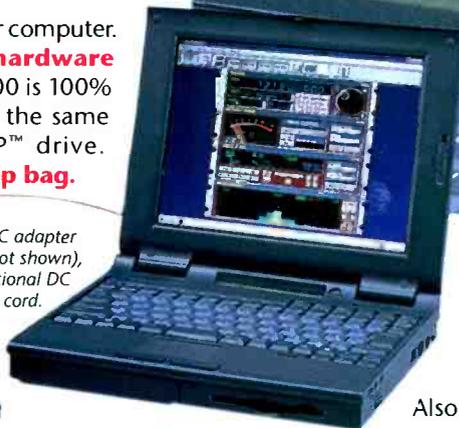
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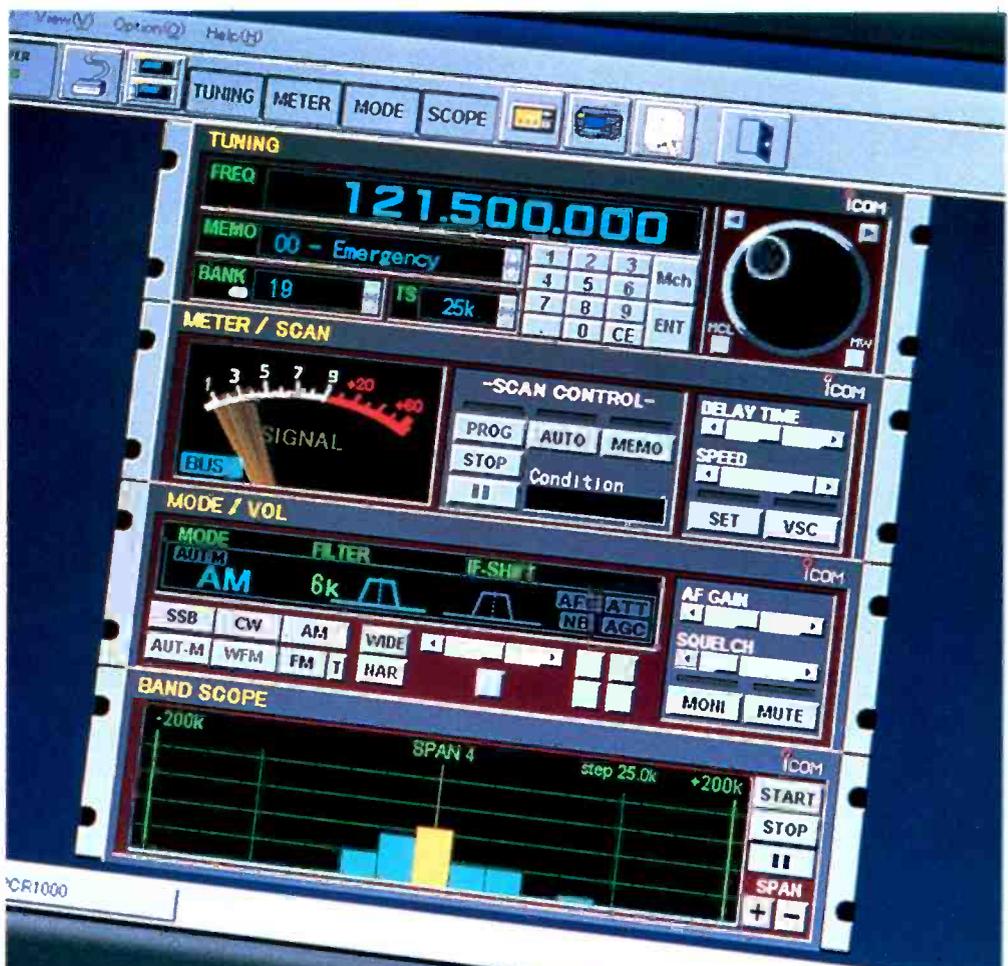
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