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Cover Story

Solar Storm Alert

By Philip Chien

Already we are nearly two years into the upswing of the next eleven-year solar cycle. The higher sunspot count is raising the ceiling for shortwave propagation. But the increase in solar activity has its dangerous side as well. For those who operate spacecraft in orbit or a power grid on earth, a major solar flare can be devastating.

Even a hour's advance warning of such a major solar storm could allow protective or back-up measures to be put in place. That is exactly the purpose of the ACE satellite, launched in August to monitor the evolution of Solar Cycle 23. See page 10 to see how radio monitors can also take advantage of the data returned by the ACE observer..

C O N T E N T S

Nigerian Troubles Spawn New Clans 15

By Hans Johnson

Clandestine stations are relatively rare catches in North America, but current, unsettled conditions in Nigeria may offer a unique opportunity. Within the past year four separate anti-government stations have emerged, broadcasting to Nigeria from locations audible to us.



The Future According to COMDEX 18

By John Catalano

COMDEX Fall '97

COMDEX is where cutting-edge computer technology is introduced with glitter and glitz, and Las Vegas is its perfect setting, since companies are gambling big with each new offering. Catalano picks a few highlights, a few potential winners, and makes a few predictions.

Use Your Mobile Scanner Antenna 22

By Douglas Blakeslee

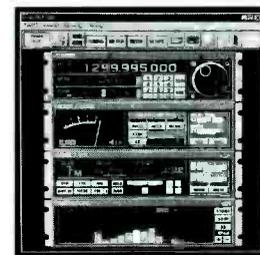
You're taking a family trip and, for safety, would like to be able operate CB and amateur radio and keep your scanner handy, too. But your teenager refuses to be seen riding in a car that looks like a porcupine. This is only one of many familiar scenarios that can be resolved by reducing your installation down to one scanner antenna. Here's how.



Reviews:



The new Europa version of the Lowe HF-250 is touted as a higher performance replacement for the HF-250. Magne's test results find it a mixed bag (see p. 86). Catalano puts the Icom IC-PCR1000 wide-coverage computer receiver through its paces in the first of a two-part review (p. 90).





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

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

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A Bittersweet Milestone

In January 1984, *Monitoring Times* made the decision to reward the faithful support of its readers by taking the leap from bimonthly to monthly publication — and here we still are, beginning our seventeenth year!

I am glad to congratulate our sister publication, *Satellite Times*, now in its fourth year, for going to monthly publication with its January 1998 edition. The step was a critical one in the life of *MT*, and we fully expect the move to be just as beneficial to *Satellite Times*. If you haven't seen the magazine in a while, you owe it to yourself to call for a sample copy. Printed on coated stock, the eye-popping pictures and professional, yet accessible level of writing may surprise you!

The "down" side of *ST*'s good news is that *Monitoring Times* will be losing a writer who has been a cornerstone of the magazine, although we won't be losing his expertise. Editor Larry Van Horn just can't find enough hours in the day to edit and write for a monthly satellite publication and still keep current in the dc-to-daylight coverage of *Monitoring Times*.

Larry's byline has been in *MT* since that same January '84 issue in which *MT* went monthly. This February issue also completes his tenth year as Utility World columnist. *ST*'s going monthly will take his name out again as a department author, though his name will still be in the masthead as Assistant Editor.

Utility readers don't have to be nervous that nonbroadcast transmissions will get short-changed with Larry's absence, however. We are proud to announce that Hugh Stegman will be assuming the column (and Larry's files!). With his own respectable longevity as utilities editor for the Radio Communication Monitoring Association (RCMA), Hugh will move the column forward while maintaining its integrity. He will resume the utility logs next month as well. Welcome, Hugh!

You'll see a few other changes in this issue and the next; these shifts are a slight redistribution in our coverage of various aspects of the radio hobby. It is not our intent that any niche be short-changed, and we have retained coverage of all our traditional listening targets ... except for one. It seemed time to drop *MT*'s coverage of satellite TVRO, now that *Satellite Times* comes out with greater frequency.

It's hard to believe that July would have marked Ken Reitz' tenth anniversary with the "Satellite TVRO" column! Ken will be increasing his writing for *Satellite Times*, but like most hobbyists, he doesn't limit his interest to his specialty. Ken has written features

for *MT* on weather and ham radio topics, and we expect to see his name on more feature articles in the future. No editor wants to let this good a writer go away entirely!

Website Corrections

Steven Domanski called our attention to an error in the web page cited for CSP Technologies, creator of the ScannerBase product review in the November "Computers & Radio" column. For frustrated people wanting to get to the site, the correct address is www.csp-tech.com.



John Mayson, author of December's "Beacon, Beacon, Who's Got the Beacon?" feature article on QDLing nondirectional beacons, says some of the URLs listed are no longer valid. You can go to his longwave page, also referenced in the article, for the updated links: <http://www.spacecoast.net/users/jmayson/longwave.htm>



An Open Letter to Radio Shack

Following are excerpts from a letter written by Bob Kozlarek of Elmwood Park, NJ, to Radio Shack regarding the sale of service manuals to the public.

"I'm a member of a group of scanner and radio enthusiasts located throughout Northern New Jersey. Our group numbers about 300 and we've been in existence since 1984.

Our members represent a wide range of the electronics industry, from the hobbyist to corporate management of several leading consumer electronics companies. Radio Shack store managers are also represented.

"As you are aware, Radio Shack has intentionally suspended the sales of service manuals for scanners capable of receiving 800 MHz. Radio Shack management tried to justify this action to its customers by suggesting the FCC requested this action. Several members of our group have contacted the FCC and have confirmed that no such request was ever made. In their words, 'the possession of a service manual is not illegal and not affected by any FCC legislation.'

"In fact, an 'off the record' comment from one of those calls strongly suggested that Radio Shack's actions were in part influenced by the recent sales partnership between Radio Shack and Sprint. Knowingly supporting a product that might compromise the privacy of a phone you sell could jeopardize this business endeavor. ...

"Via Internet postings, several memos originated by your office suggested that the sale of manuals would be resumed. These memos concluded by directing all store managers to 'say nothing' and 'make no promises' as to when or if the manuals would be available. ...

"As the provider of a product you are expected to support your products for a period of seven years. This includes service parts and literature. Being in the consumer electronics industry for more than 20 years, I've never seen such an irresponsible action taken by a company as large as Radio Shack. ...

"Your actions also demonstrate the lack of research that was actually done on this issue. The reception of cellular telephone transmissions is very low on the pick list. 800 MHz coverage is desirable as many large cities have converted or are in the process of converting to 800 MHz. Your recent introduction of the 'trunking scanner' is nothing more than the Uniden model with a slightly different look, priced significantly higher than its look-alike cousin. Our recommendation: buy the Uniden, pass on the Radio Shack.

"I'm hoping to get a written response on this issue which will be posted on our pages. Using the right 'spin,' Radio Shack could regain public support...."

On page 8 you can read Radio Shack's now-official statement. What do you think? Did they use "the right spin"?

Send your "Letters to the Editor" to Rachel Baughn, PO Box 98, Brasstown, NC 28902 or email mteditor@grove.net

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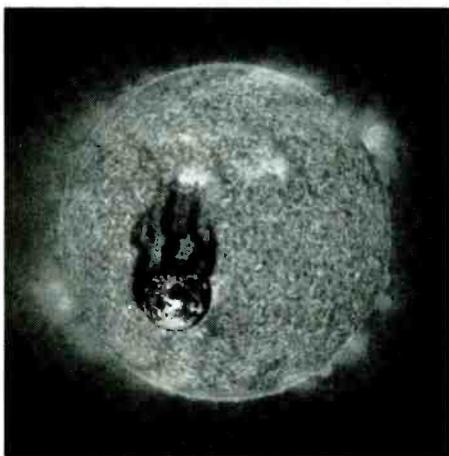
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Are We Toast Yet?

During a November interview with radio host Art Bell, "remote viewer" Maj. Ed Dames predicted our sun would, within the next couple of years, experience a massive solar event that would bombard the earth with enough radiation to virtually destroy life on Earth. Only those with the foresight to be living deep underground will survive, says the psychic.

Dames predicted a "precursor" flare would occur—possibly as early as December 1998—which, though not deadly, would be enough to harm anyone looking at the sun at the time and, hopefully, be sufficiently large to get our attention. He also said we'd have a day or two advance warning of the precursor ... via the ACE satellite?

He expects "the big one" to arrive around Easter 1999. Meanwhile Ed Dames is packing his bags and "digging in" at an unnamed location in Polynesia!

Building Codes for Radio-Friendly Structures

Radio hobbyists are all too familiar with the impossibility of radio reception from inside the steel structures of today's construction. But Chicago's city council is recognizing there are circumstances in which such reception is a matter of life and death.

The council is proposing an ordinance that will require builders of large commercial structures to change building materials, alter electrical systems, or install "bilateral amplification systems" costing \$3-5,000 in order to pass city inspections. The object is to ensure that fire fighters inside the building will be able to receive transmissions from the commander on the city's 800 MHz emergency radio system ... and, one would assume, vice versa.

BULLETIN BOARD

Bob Grove to Speak at HamCation in Orlando, Fla, Double Event

Friday, Feb 13, 1-6pm:

Amateur Satellites, Today & Tomorrow
Central Fla Fairgrounds, Social Hall

Five-hour workshop on everything you need in order to get "on the birds." Barry Baines, WD4ASW and other AMSAT experts, and ARRL's Steve Ford, WB8IMY. Arrive early to get materials. Topre-register write or call Rosalie White, WA1STO, at ARRL HQ (tel 860-594-0237, fax 860-594-0259) before February 3. Price is \$20 for ARRL members and \$25 for non-members. You can also purchase *Satellite Experimenter's Handbook* from ARRL, beforehand, for \$20 + \$5 UPS shipping/handling. This continuing education workshop is sponsored by AMSAT and ARRL Educational Activities Department.

Feb 14-15: Orlando HamCation and Computer Show

Central Fla Fairgrounds, East entrance

Bob Grove, W8JHD, publisher of *Monitoring Times* and *Satellite Times*, will deliver two exciting and informative talks spanning shortwave and scanning topics such as: Who's on the spectrum; how to choose a good receiver or scanner; the truth about antennas; and of course, the perennial favorite, what are the laws about listening? Saturday - Tent #1 at 11:00 a.m. and Sunday - Tent #1 at 11:00 a.m.

Many other forums and events. Contact Tim Starr AE4NJ, PO Box 547811, Orlando, FL 32854 (470)850-9258; <http://www.oarc.org/hamcat.html>

Sunday, Feb 15: Brighton, CO

Aurora Repeater Assoc. annual Swapfest at Adams County Fairgrounds, 9755 Henderson Road, 8am to 2pm. Refreshments and VE testing. Talk-in 147.15(+). Contact Wayne Heinen N0POH, P.O. Box 473411, Aurora, CO 80047-3411; 303-699-6335, email: nrclog@aol.com.

Sunday, Feb 22: Freeport, NY

Long Island Mobile Amateur Radio Club (LIMARC) indoor hamfest at the Freeport Armory on Babylon Turnpike. Includes radio and tv equipment, computers, dealers, VHF tune-up clinic. 7am, admission \$6. Call LIMARC 24-hr infoline (516) 520-9311 or Richie Seltzer, N2WJL, PO Box 370, Malverne, New York 11565, n2wjl@juno.com or check out the LIMARC web page at <http://members.aol.com/RaySk/LIMARC1.HTML>.

LIMARC will be running its next Weekend Ham Radio Course on **March 21-22**. Preregistration is required. Write LIMARC Weekend Class, P.O. Box 392, Levittown, New York 11756, or e-mail George Tranos, N2GA at N2GA@aol.com for details.

Sunday Feb 22: Castle Shannon, PA

South Hills ARC 3rd SHARCfest and Computer Show at Castle Shannon VFD Memorial Hall, Rte 88 (Library Rd), 8am to 3pm. Indoor, handicapped-accessible facility, free parking. Admission \$4. Talk-in 146.955(-). Contact Steve Lane N3RNY (412) 341-1043, sharcfest@juno.com or <http://www.hky.com/~sanfordb/index.htm>

Saturday, March 7: Absecon, NJ

Shore Points ARC Hamfest at Holy Spirit High School, Route 9, approx. 3/4-mile south of Route 30. Talk-in 146.985/-6 (146.2PL), 8am. Admission \$5. Contact Eva Mangeri KB2QXU (609) 407-2923 or P.O. Box 142, Absecon, NJ 08201.

Club News:

- The address for the Assoc. of North American Radio Clubs (ANARC) chairman Mark Meece is now 529 Sandy Lane, Franklin, Ohio 45005-2065.
- Signal Surfer DX Club has moved web site to <http://www.swl.net/signal/>
- British DX Club new web site: <http://www.mac.co.umist/BDXC>

Fill 'er Up By Radio

The same technology being used on the turnpikes and toll bridges to make paying tolls quicker and easier will soon facilitate paying at the gas pump. The technology, called Speedpass, uses radio waves to transmit an identification number (not your credit card number), allowing a computer to charge your credit card with the purchase.

Two options exist: if you have a Speedpass transmitter in a little wand on your keychain, you wave it at the pump to turn it on; if you have a window tag you just drive up to the pump.

Mobil Corporation initiated the service in metropolitan areas in November, but says all Mobil's stations will have the capability to offer the service by June 1998. The cost to a dealer to set up the system is \$5,500; Mobil says it does not plan to charge customers for the transmitters or the service.

Additional services could be added for a charge, such as reminding customers when an oil change or car maintenance is due, but so far there has been little customer interest, company spokesman Chris Tessier said. "Most of the customers just want to drive in and out."

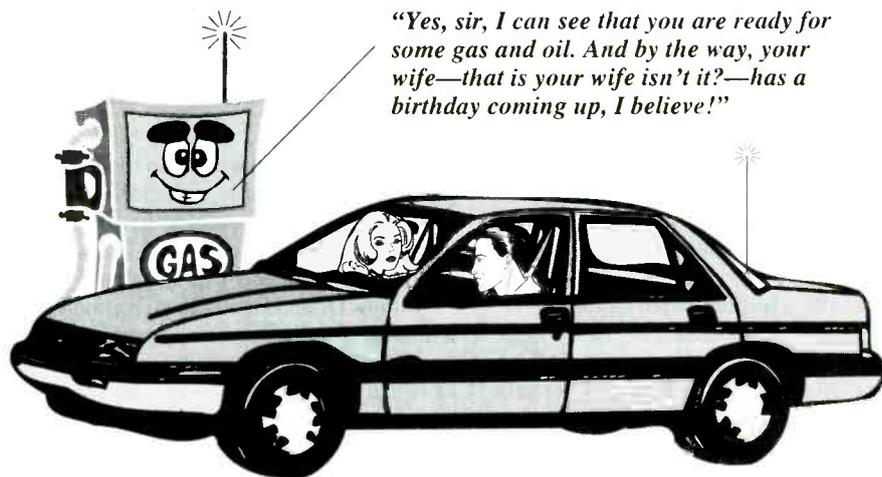
Pirates Get Busted All Over

Pirate broadcasters are being shut down not only in Tampa, Florida (see page 8), but around the world. In St. Petersburg, Russia, youngsters were inserting their commentary into local TV station broadcasts. They were discovered when local residents complained of the interference and claimed deteriorating health from the electromagnetic radiation.

In Moscow, twenty-one-year-old Ruslan Brovkin was arrested, for broadcasting on channels used by fire, police, and ambulance services. On the 850th anniversary of Moscow, Brovkin even used the airwaves to imitate President Yeltsin, congratulating Russian policemen and informing them that their salaries were being doubled. Brovkin has been sent for psychiatric analysis.

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

Thanks to this month's reporting team: Anonymous, New York; David Alpert via email; Gerald Kercher, Connecticut; Kevin Klein, Wisconsin; Sergey Kolesov, Ukraine; Doug Robertson, California; Walter Szczepaniak, Pennsylvania; Robert Thomas, II, Connecticut; Stan Wylie, Florida.



Tandy Compromises on Service Manuals

In response to a query from Bob Grove regarding the mixed messages we and our readers have received regarding the availability of service manuals for scanning receivers (see Dec p. 7 for background) *Monitoring Times* has at last received the following official reply, printed here in its entirety.

Statement from Radio Shack Computer Support Services

Early in 1997, representatives from industry, including RadioShack, met informally with the FCC to discuss current problems in the scanning hobby. Identified as a major problem was the ability of some scanner hobbyists to develop illegal modifications that allow scanners to receive cellular telephone transmissions. Among the possibilities discussed for eliminating this problem were the total epoxying of all circuit boards, which would render scanners both unmodifiable and unserviceable, or the restriction of technical information regarding scanner circuit design.

As a result of this meeting, Tandy limited the availability of scanner service manuals to Tandy Service Centers only.

While Tandy understands the desire of the do-it-yourself community to have easy access to service information, we feel the interests of the scanning hobby as a whole are best served by making it more difficult to develop illegal modifications by restricting access to some service manuals containing schematics. Therefore, in response to industry concerns, Tandy is implementing the following policy in regards to the release of service information and the servicing of scanners.

Tandy (RadioShack and TechAmerica) will withhold schematics (service manuals) for all scanners that can receive 800 MHz or above which were submitted for FCC certification after April, 1997. As of December 12, 1997, this means that service manuals for the following RadioShack scanners will not be available: 20-417 (PRO-2048), 20-430 (PRO-2050), 20-512 (PRO-67), and 20-520 (PRO-90), along with all future service manuals within the stated criteria.

To the extent that service manuals exist and are in stock, schematics (service manuals) for scanners that can receive 800 MHz or above that were submitted for FCC certification before May, 1997 will continue to be available to customers and others.

To the extent that service manuals exist and are in stock, schematics (service manuals) for scanners that cannot receive 800 MHz or above will continue to be available to customers and others.

Modified scanners (regardless of frequency or date of manufacture) will not be serviced by Tandy. These scanners will be returned to the customer with a notice indicating that the unit appears to have been modified and if the scanner is returned to its original specifications, Tandy will use reasonable efforts to repair it.

To the extent that scanner parts are available and in stock, scanner replacement parts will continue to be available regardless of the scanner's frequency range or date of manufacture.

Schematics and technical information is available in the Service Manual. You should be able to obtain a service manual from Tandy National Parts. The address and phone number for Tandy National Parts Warehouse is:

National Parts
600 Tandy Technology Center
Fort Worth, Texas 76102
Phone: 800-843-7422
Select option 3 Catalog,
Part and Accessory Order FAX use: 800-821-1959

By Fred Maia, W5YI
fmaia@internetMCI.com

• Government Takes Action Against Florida Pirates.

Following the return of civil and criminal indictments, three Tampa-area unlicensed micro-broadcasters were raided and shut down on November 19th. The plugs were pulled on low power FM stations operated by Kelly Benjamin (87.9 MHz), Arthur Kobres (96.7 MHz) and Doug Brewer (102.1 MHz). Their broadcast equipment was then seized by armed agents of the U.S. Marshal's Service and the Federal Communications Commission.

Doug Brewer, 43, operated "The Party Pirate" from his home in Temple Terrace. He and other station disc jockeys could only watch as U.S. marshals rolled station equipment into a Ryder truck parked in his driveway. Brewer said he was awakened at 6:30 a.m. by armed U.S. marshals who handcuffed him. Agents seized equipment from his home studio and gear from his remote van which bore the "102.1 FM Pirate Radio" insignia. They also brought a crane to dismantle and haul away his 150 foot tower.

But he wasn't off the air long; 102.1 returned to the FM airwaves less than a week later in conjunction with a nationwide protest against the FCC.

Kelly Benjamin, age 22, operated on 87.9 MHz as "Kelly Kombat" from Seminole Heights. He called his station "87 X." Assisted by several volunteers, his schedule consisted of such programs as "Poetic Terrorism" and "Kombat Zone." After finding marijuana and drug paraphernalia, Benjamin was arrested on drug charges and later released on \$1,000 bond.

Arthur Kobres, age 53, was charged with a 14-count criminal indictment for operating "Lutz Community Radio" on 96.7 MHz without a license. He was later released on a \$25,000 bond. Kobres said he is seeking a Congressional inquiry on the closure and a legal defense fund has been started on his behalf. The station was first visited by FCC agents in the fall of 1995 but he continued broadcasting anyway. On March 7, 1996, Federal Marshals and FCC agents raided and confiscated his station equipment. He went back on the air the following day.

The latest crackdown on unlicensed broadcasting has drawn praise from the Tampa broadcast community. Drew Rashbaum, vice president and general manager of five radio stations, including WHPT 102.5 on the FM dial in Tampa applauded the raids and equipment seizures. Citing interference and confusion to

listeners, it was Rashbaum who filed the complaint against Brewer last year. The FCC also said that illegal FM broadcasts have the potential to create a safety hazard by jamming aircraft and public safety transmissions.

Tampa, Orlando, and Miami continue to be a hotbed of unlicensed FM broadcast operation. Most broadcast industry executives believe that the raids will continue for some time to come.

• There are hundreds — maybe even thousands — of pirate micro-broadcasting stations operating around the country.

Section 301 of the Communications Act gives the FCC the right "...to maintain the control of the U.S. over all channels of radio transmission..." Up until the 1980's, most pirate radio stations used the shortwave (HF) bands. Shortwave pirates were considered dangerous because they could interfere with international broadcasting, maritime and aeronautical navigation systems, military and government communications.

Shortwave pirate radio has now given way to the unlicensed FM broadcaster. The position of micro-broadcasters is that their communities are under-served by the current broadcast licensing system. They believe that the speaker and the listener have First Amendment rights which are not conferred by FCC licenses. Apparently some high-powered lawyers agree.

Micro-broadcasters operate on the FM radio band with low power levels ... below the FCC minimum of 100 watts (see p. 32 for background info). The FCC usually deals with unlicensed broadcast stations by obtaining a permanent injunction against the station. Once the injunction is in place, any further violation puts the broadcaster in contempt of court and the equipment is seized.

The common goal of micro-broadcasters is to flood the United States with low power micro radio stations. This would overload the FCC and force them to make a decision on their right to operate. The situation is similar to the Citizen's Band when the FCC tried to license the service and then gave up when so many CB radio's were sold and were operated without licenses.

At the heart of the unlicensed stations case is the FCC's refusal to grant licenses to micro-broadcasters. A landmark court decision could be on the horizon in the San Francisco case of Steve Dunifer, operator of Radio Free Berkeley.

In a "Friend of Court" brief, the Lawyer's Guild pointed out that FCC regulations precluding 10 watt licenses make it impossible for all but the very wealthy to even apply for a broadcast license. "This," the Guild concluded, "is the equivalent of saying that anyone can speak from a soap-box in a park, but the box had to be made of gold."

• Since 1991, the FCC has been getting ready to move their administrative offices to a single large office complex southwest of downtown Washington, DC, from their eight office buildings scattered in downtown Washington. The goal was to consolidate the agency in a single new office complex at "The Portals." In the early 1990's, the government's leasing officials at the General Services Administration (GSA) signed a 20-year lease.

Practically everyone — and especially the FCC staff and telecom lawyers — opposed the move on the basis of location, disruption, and cost. The FCC's rent would increase by nearly 30 percent to \$20 million, to come right out of the FCC's annual budget, not the GSA's. A request to Congress for a boost in the FCC budget to pay for the move was denied.

The GSA tried to terminate the lease agreement after the FCC decided it did not want to make the move. A court battle ensued and a 1994 decision required the GSA to honor the original long-term lease arrangements. The FCC has been paying rent on the new facility since last summer even though the building is not yet ready. It should be ready for occupancy by May.

Now comes word that Congress is taking a hard look at the move. The *Washington Post* and the *Wall Street Journal* both disclosed that "...one of the project's lead investors paid a \$1 million legal fee to President Clinton's 1996 campaign manager for work that included amending the FCC's lease at the Portals development project." The implication is that the administration may have been involved in the decision to move the FCC to the building.

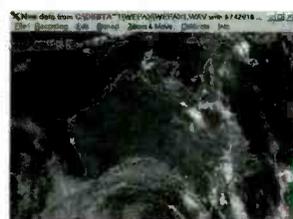
Senate Commerce Committee Chairman John McCain (R-Ariz) whose panel has jurisdiction over the FCC has now called in the General Accounting Office for a formal investigation. The high-powered GAO answers only to Congress. If the GAO recommends against the FCC's move to the Portals, McCain said he is ready to make other arrangements. Completion of the GAO report has been assigned top priority and is due by February — three months before the FCC is scheduled to move.

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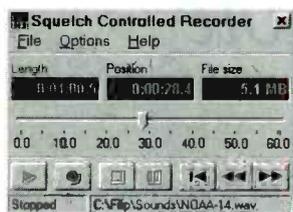
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(314) 791-1206

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(800) 558-0411

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Downsview, ON
(416) 636-3636

APW Electronics
Chatham, ON
(519) 354-2285

Dealer enquiries invited.
info@winradio.com



Solar Storm Alert

NASA's ACE in the Hole

By Philip Chien

How would you like to have a warning platform which would give you an hour's advance notice whenever a solar storm was headed towards the earth? For DXers, such notification could be valuable to know when the shortwave bands are going to open up. However, if you happen to own a spacecraft in orbit or a power grid on earth, such information is no luxury: it can be invaluable.

The loss of the hundred-million-dollar satellite Telstar 401 a year ago was attributed to a high intensity solar storm (see *Satellite Times*, March/April 1997 pg 19). Satellite viewers suddenly saw their signals go black without any advance warning. Over the next several days the many broadcasters which used Telstar 401 had to transition services to backup satellites.

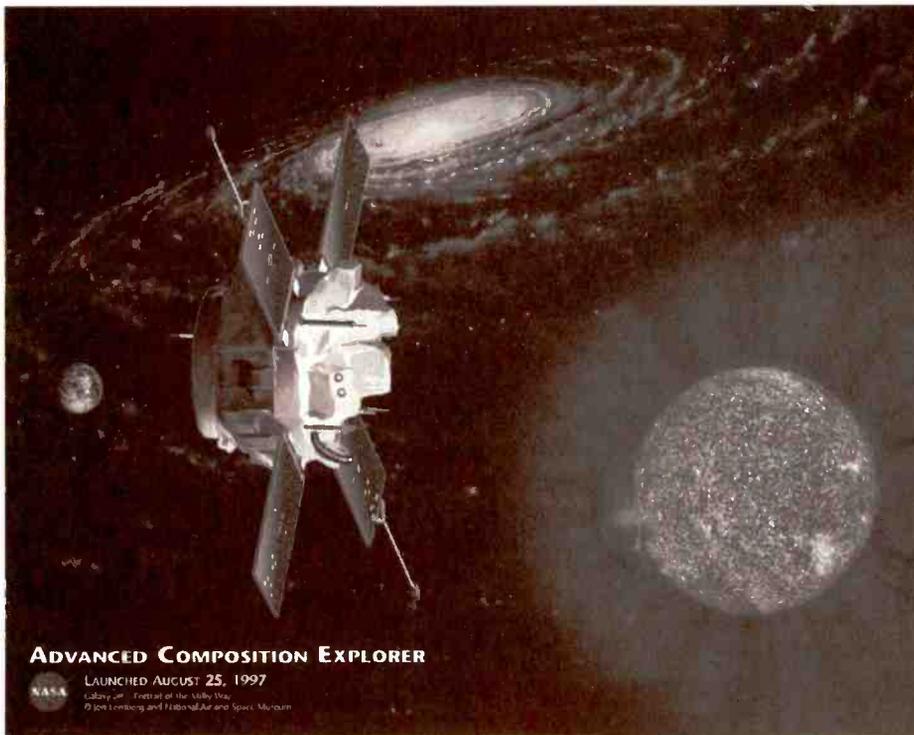
Major solar storms occur on the average of

about once per month, with more occurring towards periods of solar maximum. There are occasional "draconian" storms which can cause major effects on earth. NASA solar scientist George Withbroe said, "When you get these strong gusts, they can occasionally pump up the Van Allen radiation belts and the particles in these belts can affect spacecraft. For example, during a strong gust in April, a communications satellite [Tempo] lost 15 percent of its power.

"Another effect of these gusts on the earth is when they hit earth's magnetic field, they move it around. When you move a magnetic field and you have long conductors, like pipelines and electric power lines, you generate currents. Most of the time these are just a nuisance. But occasionally, when you get a really strong gust, you can damage power transformers in electric power stations. And in March 1989, in a particularly spectacular event, Hydro-Quebec was knocked out for nine hours, affecting six million people."

NASA's Advanced Composition Explorer (ACE) is an orbiting sentinel, sitting between the earth and the sun at the gravitationally stable L1 distance. The spacecraft was launched on a two stage Delta II on August 25th, 1997. It was the highest altitude achieved by the two-stage version of the Delta and also set a record for a Delta turnaround, just five days after another Delta launched five Iridium satellites for Motorola.

L1 is one of the five gravitationally stable points in the sun-earth system. The L4 and L5 points form equilateral triangles with the sun



ADVANCED COMPOSITION EXPLORER

LAUNCHED AUGUST 25, 1997

Galaxy of Friends of the Valley Way
© 1997 Lockheed Martin Space Research Corporation

and the earth. L2 is located behind the earth, and L3 is located “behind” the sun. The L1 point is located one hundredth of the distance from the earth to the sun, at the distance where the earth and the sun’s gravitational pulls cancel each other out. If the only three objects in the universe were the sun, earth, and ACE spacecraft, then ACE could remain at the L1 point indefinitely. But in the real world, the gravitational pulls from other nearby objects in the solar system make the L1 point only semi-stable.

While it would be possible to position ACE directly at the L1 point, it isn’t desirable from an engineering point of view. Any ground station antennas would have to be aimed directly at the sun, which would result in excess heating and RF noise from the sun while trying to listen to ACE’s scientific data. So a “halo” orbit is used — an elliptical 300,000 x 250,000 km orbit which circles the L1 position.

The L1 point is far outside of the earth’s magnetic fields, permitting an unobstructed examination of the solar wind and other electrically charged particles in the solar system.

A similar L1 halo orbit is used by the NASA/ESA SOHO (Solar and Heliospheric Observatory) satellite (see *ST*, Nov/Dec 1996 pg 22).

■ A Weather Station in Space

ACE is completing a 113 day cruise from the earth to its station at L1. During the cruise away from the earth its scientific instruments were tested and collected some valuable bonus data. By the time you read this article, ACE should be on station and returning daily space weather reports.

At launch the spacecraft weighed 785 kgs, 195 kgs. of that hydrazine fuel. Its four solar arrays generate 443 watts of power.

When ACE was approved in 1991 NASA gave the team three very strict rules. It had to launch by the end of 1997; it had to come in under the \$141 million cost cap; and if there were delays or budget problems, the managers had the power to cut back the project if necessary to meet the other two goals. This placed a lot of pressure on the instrument teams to ensure that they built their instruments right — if they went over budget or got delayed then they might not get the opportunity to fly.

As it turned out, ACE came in \$30 million under budget and on schedule



An early attempt to analyze the solar wind was performed on the Apollo moon missions. Sheets of extremely pure aluminum were hung like window shades to collect particles from the solar wind. The sheets were carried back to the earth, cut into small samples, and analyzed by mass spectrometers.

times more efficient at collecting particles than similar experiments on SOHO and other spacecraft. ACE and SOHO are complementary — SOHO takes long-range measurements of the sun while ACE measures the chemical compositions of the sun’s output.

■ Measuring the Solar Wind

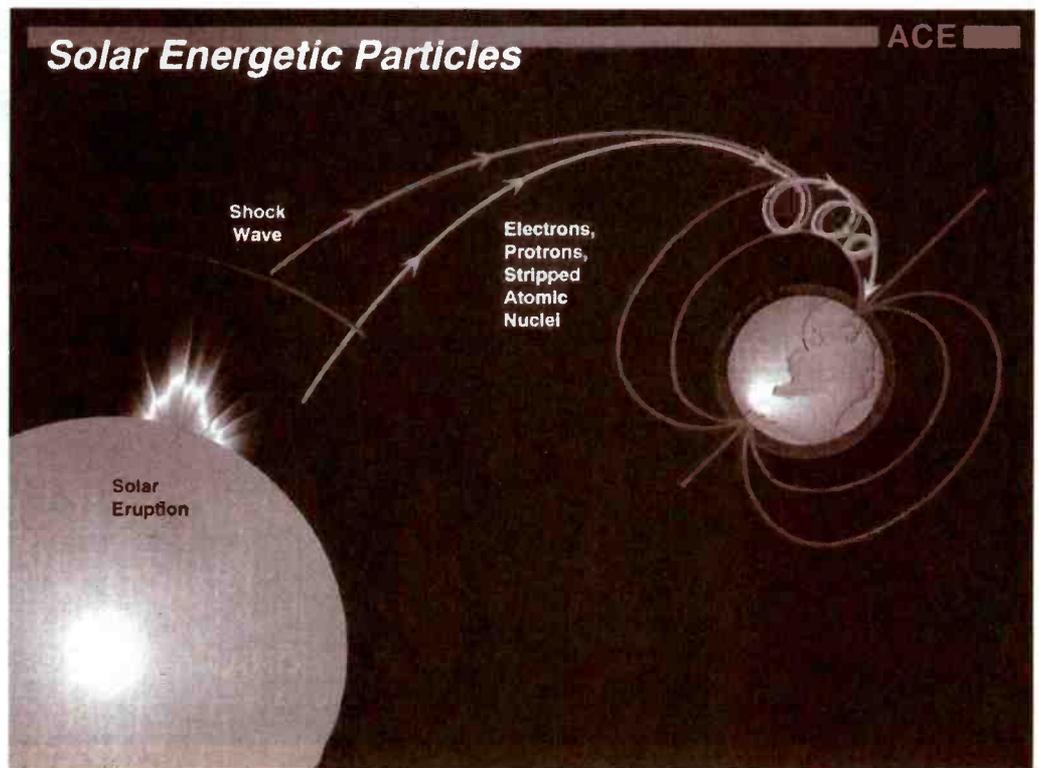
For hundreds of years, chemists thought that any two atoms of a particular element were identical. One atom of oxygen was the same as any other atom of oxygen, whether it came from the earth, the sun, or a distant galaxy. When atomic isotopes were discovered, it was thought that the percentages of any given isotope were identical for any element. But it turns out that differences in the isotope ratios can occur under unusual circumstances.

One common example is carbon 14 dating. Most carbon atoms are carbon 13, but a very small percentage are carbon 14. While a

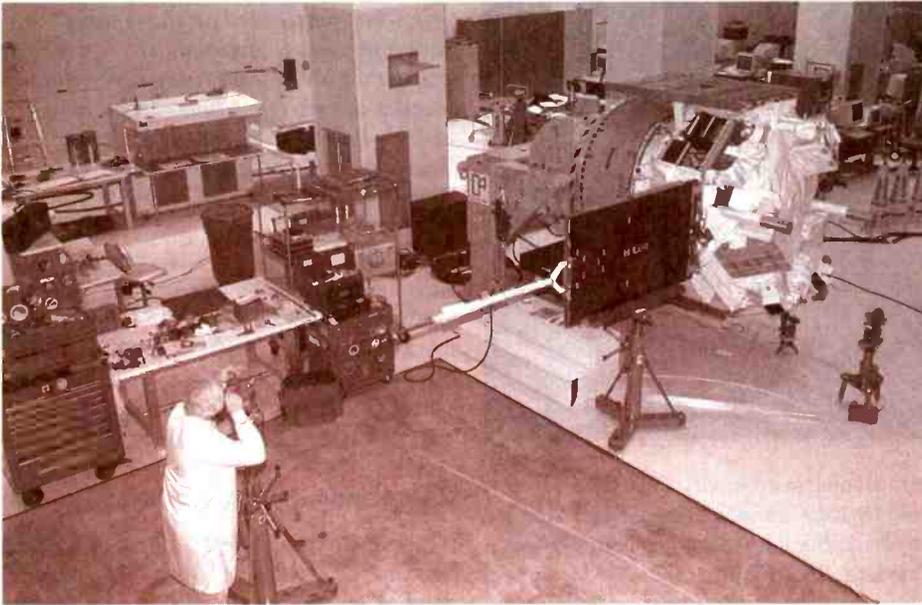
with all nine instruments. The spacecraft was built by Johns Hopkins University’s Applied Physics Laboratory and is operated by NASA’s Goddard Spaceflight Center in Greenbelt, Maryland. The science center is operated by CalTech in Pasadena, California.

One of the ways the project saved money was by reusing four spare instruments which were originally built for the Ulysses and Wind spacecraft. The nine instruments include six high resolution spectrometers, two instruments which measure the composition of the solar wind, three which measure solar energetic particles, and one which measures cosmic rays.

These instruments are ten to a thousand



Below: An engineer tests for true perpendicular solar array deployment of the Advanced Composition Explorer (ACE) which will study low-energy particles from the sun and galaxy.



Above: Johns Hopkins University engineers install solar array panels on the ACE spacecraft.

ACE Instrument Responsibilities

SIS
(Solar Isotope Spectrometer)
Caltech
GSFC
JPL

CRIS
(Cosmic Ray Isotope Spectrometer)
Caltech
Washington U
GSFC
JPL
U of Chicago

ULEIS
(Ultra Low Energy Isotope Spectrometer)
JHU/APL
U of Maryland

SEPICA
(Solar Energetic Particle Ionic Charge Analyzer)
U of New Hampshire
Max Planck Institute

SPACECRAFT
JHU/APL

SWEPAM
(Solar Wind Electron, Proton and Alpha Monitor)
Los Alamos National Laboratory

SWICS
(Solar Wind Ion Composition Spectrometer)
U of Maryland
U of Bern

SWIMS
(Solar Wind Ion Mass Spectrometer)
U of Maryland
U of Bern

EPAM
(Electron, Proton and Alpha Monitor)
JHU/APL

MAG
(Magnetic Field Monitor)
UD/Bartol Research Institute
GSFC

2948 DIL 95

living creature breathes, it builds up carbon in its tissue in the normal ratio; when the creature dies no more tissue is formed. Over time the carbon 14 gradually decays into plain Carbon 12. Using sophisticated mass spectrometers, scientists can determine the age of any sample with a very high amount of accuracy. One very famous recent example was the "Shroud of Turin." Its identity had always been suspect since there is a vast market for fake religious antiquities, and carbon dating proved that its linen dated from the 14th century — not the first century.

An early attempt to analyze the solar wind was performed on the Apollo moon missions. Sheets of extremely pure aluminum were hung like window shades to collect particles from the solar wind. The sheets were carried back to the earth, cut into small samples, and analyzed by mass spectrometers to determine what additional particles were collected, and their isotopic compositions.

Almost three decades of technology have resulted in mass spectrometers small enough to fly on spacecraft, permitting direct, on-site measurements of the solar wind's composition. In effect, the instruments "smell" the solar wind to determine what they're made of.

Besides the solar wind, the instruments can also measure interstellar particles which happen to be passing through the solar system, and even galactic cosmic rays from supernova explosions. The cosmic rays have traveled 10 to 20 million years before reaching the solar system, making them among the oldest physical objects to be collected by scientific instruments in space.

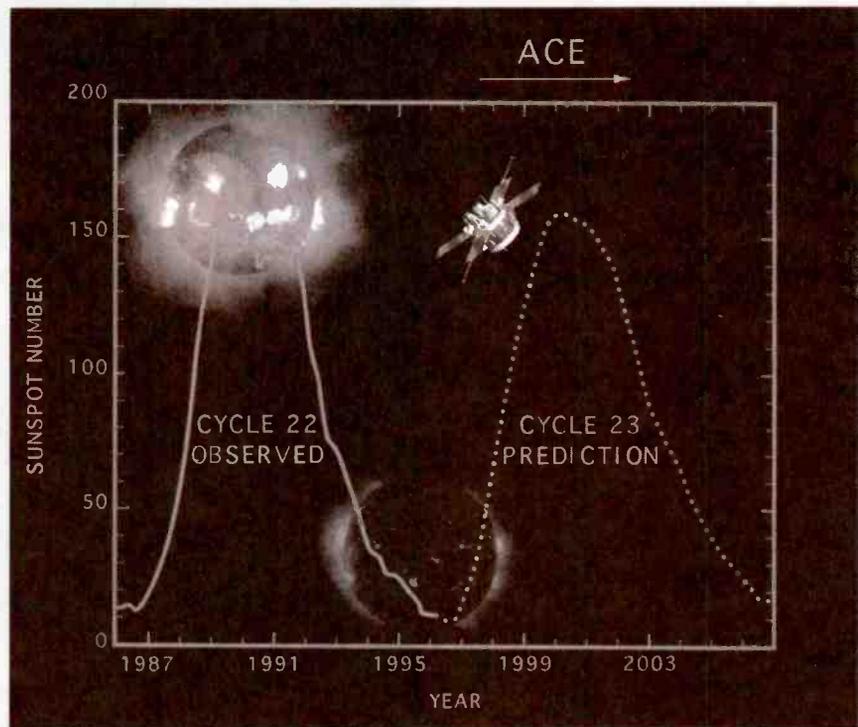
■ Monitoring the Coming Solar Cycle

ACE's normal schedule calls for it to transmit its data to the ground for about two hours each day through NASA's Deep Space Network. It has two gigabits of RAM for scientific data, configured as a solid state disk drive. But its job as an orbiting space weather sentinel requires real-time observations for rapid weather warnings. So an additional transmitter sends a subset of the data from three instruments to several ground stations positioned strategically around the world.

The space weather watch may turn out to be ACE's most important contribution, certainly for economics.

Most of the solar weather travels well beneath the speed of light, taking as much as an hour to travel from the L1 point to earth. While an hour may not seem like much, it's enough time for satellite operators and power grid operators to react. Satellites can be commanded to activate backup systems or shut off

Cycle 23—Where Are You?



By Jacques d'Avignon

In the last few months we have seen the solar 10 cm flux climb slowly and eventually nudge over the 100 mark. Where are we located in this new solar cycle? According to the latest figures released by IPS in Australia early in December 1997, the start of the cycle was June 1996 with the 10 cm values on the upswing since then. So in February 1998, we already have 21 months of this cycle behind us.

Looking at the predicted flux values for this cycle the length of the upswing will be about 45 months with the forecasted maximum of this cycle occurring in March 2000. Thus the best DX possibilities will occur from now, in the remainder of a very short upswing, and in part of the downswing that will be more progressive.

The downward portion of this cycle is forecasted to be 80 months long with the minimum occurring in November 2006. The number of months on each side of the peak is greatly skewed as you can see by the numbers: 45 months to reach maximum and 80 months to come back to a new minimum.

If we consider the present listening conditions to be adequate, the same conditions will reappear in the cycle in March 2004. So we have a window of opportunity of 72 months starting now for "adequate to superb" and then back to "adequate" DXing conditions. Let's take advantage of all this time to reel in all the DX out there, and, more specifically, the utility stations that are disappearing at an alarming rate.

Let's hope that during this period we do not have to suffer too many major solar storms to disrupt all HF communications. I hate when that happens during a DX camp weekend!

unnecessary components to minimize the potential for damage. Power stations can fire up backup generators burning fossil fuel instead of relying on power from distant locations. And even NASA can use its own data to minimize radiation risks to astronauts during spacewalks.

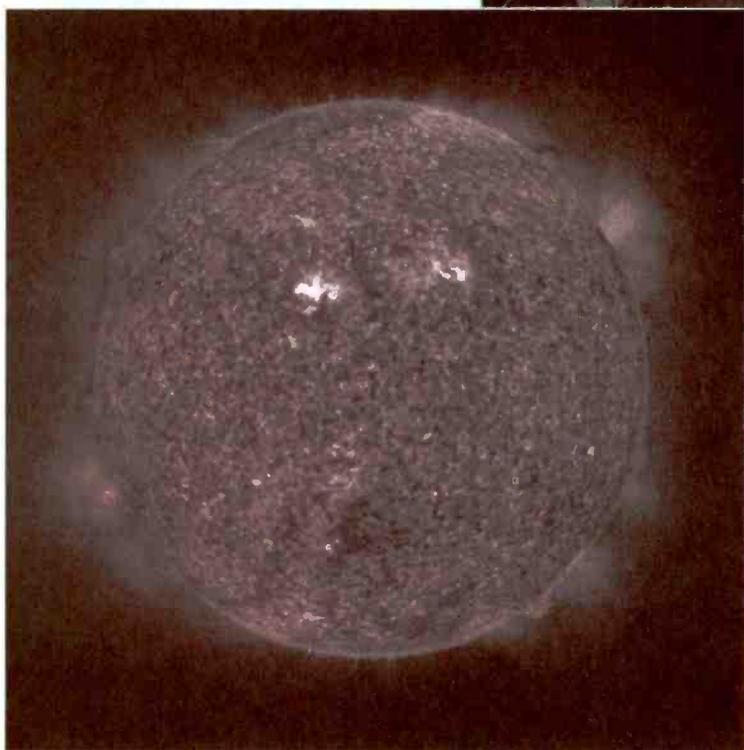
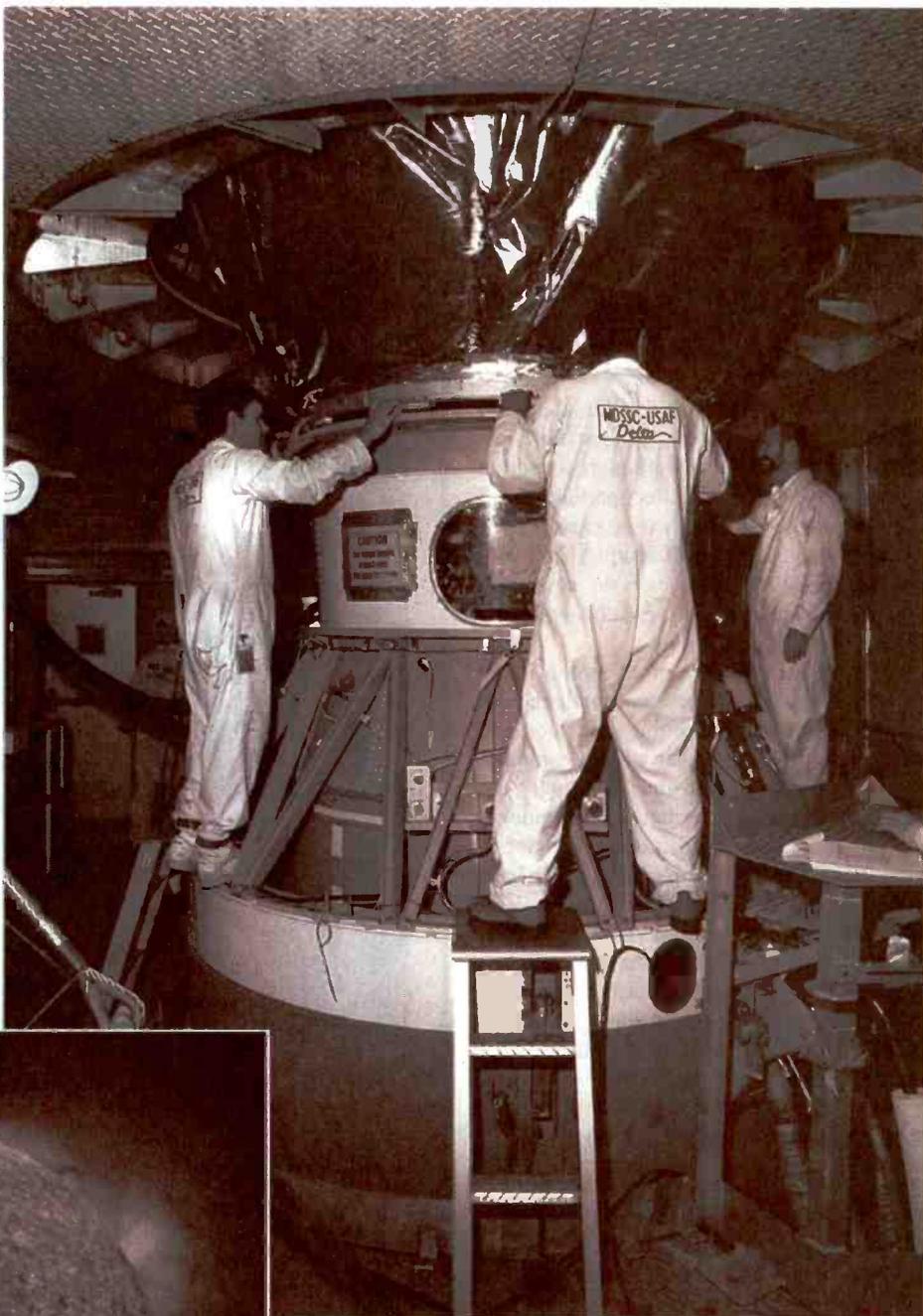
The ACE program has a requirement for at least two years in operation, but its managers and scientists have a goal of five years. There's enough fuel to keep ACE in position for about a decade if the spacecraft remains healthy and funds are available. Scientists would like to study an entire 11 year solar cycle with ACE if everything continues to work well. Ultimately, when ACE is shut off, it will fall out of its halo orbit towards either the sun or earth. It will remain in orbit indefinitely around the sun, unless some future spacecraft retrieves it and takes it back to earth for display in a museum.

ACE's home page is <http://www.gsfc.nasa.gov/ace.html>

NOAA's space weather web page:
<http://www.sec.noaa.gov/>

NOAA space environment center's page specifically for shortwave listeners - <http://www.sec.noaa.gov/radio/radio.html>

Fascinating "quick look" way to browse ACE's data - http://www.srl.caltech.edu/ACE/ASC/view_browse_data.html



Above, the ACE spacecraft is placed atop its launch vehicle. The collecting power aboard ACE is 10 to 1,000 times greater than anything previously flown to collect similar data.

At left, one of the incredible sun images captured by the SOHO satellite.

(All photos courtesy of NASA)

Nigerian Troubles Spawn New "Clans"

By Hans Johnson



Local community springs up near mobile oil rig.



A ferry at Ogulagha beach, near Forcados. (Photos courtesy of Shell Nigeria)

Clandestine radio stations can be a challenge to hear. These stations' schedules are limited, they are often jammed, and their transmissions are usually only in foreign languages.

Clandestine broadcasts to Nigeria are a good place to break into clandestine station listening, and they are a very recent phenomenon. Until the middle of 1996, there were no clandestine broadcasts directed to this country; since that time, four stations have started broadcasting to the country. Better yet, these broadcasts can be easily heard, and much of the programming is in English.

A clandestine station generally starts in this way: Country "A" will start a station aimed at its adversary, country "B"; before long, country "B" is also sponsoring one broadcasting to country "A." Broadcasting in this manner provides various political groups with stations as well as safe havens, but it makes it very difficult for them to deflect charges that they are a proxy or mere puppet of their sponsoring country.

The pattern that has brought the Nigerian stations on the air is very different. The military junta that runs Nigeria does not respect human rights nor the rule of law. It is understandable that some Nigerians would be agitated enough about the situation in Nigeria to want to do something about it. The single greatest action of each of these groups has been to establish a radio station. Only in broadcasts to Cuba do we find as many independent stations as we now find broadcasting

to Nigeria — quite a feat, particularly since it occurred in the space of one year. How was that possible?

■ A Modern Clandestine Movement?

I believe that the biggest factor was information. The first time one performs a task is always the most difficult. The first station cleared the way for the other three in two ways.

First, it demonstrated that such a thing was possible. It seems like a simple idea, that of starting a radio station, but it wasn't. Particularly when you consider that the exile groups are quite ignorant of so much of the knowl-

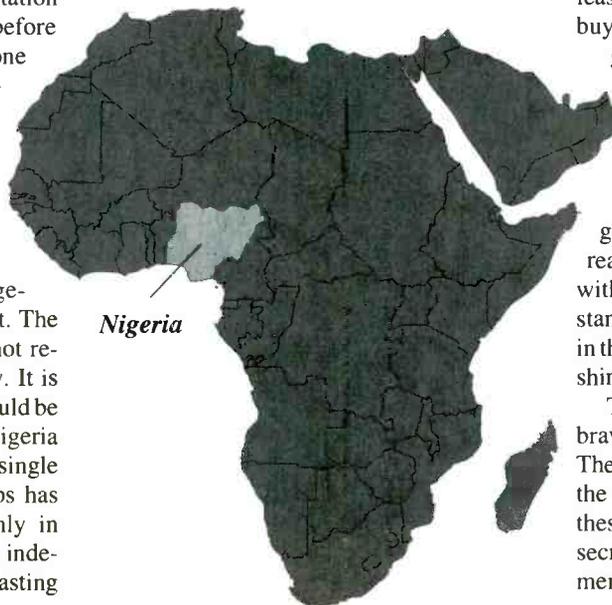
edge that is commonplace in the shortwave community (Don't lose sight of the fact that we are in a very specialized hobby that the rest of the world knows little, if anything, about.)

Second, the first station shared critical knowledge on how it started its operation with the other groups, making it easier for them to start their own stations. Such cooperation is both unusual and enviable.

The Nigerians also had some good luck. One of the most under-reported trends in broadcasting over the last decade is the rapid expansion of stations selling airtime. The phenomenon started in the U.S., but has now spread to the rest of the world. While it used to require leasing a host government's radio station, or buying one of your own, to get onto the air, a group can now purchase airtime at very reasonable rates. Not only that, but the stations selling the airtime will broadcast political programming, which government stations might not.

Also, purchasing airtime provides these groups with powerful stations capable of reaching a global audience. Contrast this with the low powered, bombed, and constantly on the run, stations of Central America in the 1980s, and you can see that lady luck has shined on the Nigerians in many ways.

This is not to say that these Nigerians aren't brave in what they are doing, for they are. There has been criticism in some quarters of the hobby press concerning the efforts by these stations to keep their transmitter sites secret. Such thoughtless and ignorant comments completely overlook a few facts.





A dancer performs at the opening of Egbema Hospital (Photo courtesy of Shell Oil).

The Nigerian government has called the people behind these stations “traitors” and has vowed to “prosecute” them. So far, the Nigerian government has not been able to stop the broadcasts nor the groups behind them. However, when Nigeria did not like the message that the Sierra Leone Broadcasting Corporation was broadcasting to the world, it had its jets bomb and destroy the station. So the people behind these stations do have legitimate concerns for their safety.

While purchasing air time is cheap, it is not free. A factor in the rise of these stations is the financial means of the groups. How they finance their stations is something they are reluctant to share. Most of their support is said to come through donations, although some may have gotten grants from nongovernmental organizations as well.

Finally, strong finances coupled with determination produced the actual radio programs. The size of some of the groups with stations is quite small, I suspect. In spite of this, and the fact that they are not radio professionals, some of their programming is quite good, with a message that resonates.

■ Radio Democrat International

Radio Kudirat

Having explained their rise, what about the actual stations themselves? Radio Democrat International came onto the air officially on June 12, 1996. June 12th is the most important date for this station. On June 12, 1993, presidential elections were held in Nigeria, but the results were subsequently annulled by the

military government. The winner of those elections, Moshood Abiola, remains in detention in Nigeria as of late 1997.

Thanks to a widely distributed press release, Radio Democrat International was immediately and widely heard. Although the station tried to keep its transmitter location a secret, it only took listeners a few days to figure out that the broadcasts were coming from Sentech facilities in South Africa.



Moshood Abiola remains in detention in Nigeria as of late 1997.

The station continues to broadcast daily via South Africa, but has changed its name a few times. The station’s current name is Radio Kudirat, named in honor of Abiola’s wife, Kudirat, who was killed in mysterious circumstances in Nigeria in June of 1996. The station officially made this name change on August 27, 1996 — the day in 1993 that Moshood Abiola would have been sworn in had the results of the election been honored.

It is interesting to note that the station was initially believed to be run by the U.K. branch of the National Democratic Coalition of Nigeria (NADECO). Indeed, NADECO officials were heard on the station’s initial broadcasts. Shortly after, station personnel made it known that the National Liberation Coalition (NALICON) group was behind the station.

NALICON’s most well-known figure is Wole Soyinka, a Nigerian writer and winner of the 1986 Nobel Prize for literature. Shortly after starting Radio Democrat International, NALICON dissolved itself and became the United Democratic Front of Nigeria (UDFN), a self-described international alliance of Nigeria’s pro-democracy groups. The UDFN now runs Radio Kudirat.

■ Voice of Free Nigeria

Radio Kudirat remained the only station until June 12, 1997, when two additional stations took to the air. Once again, thanks to a press release, the Voice of Free Nigeria was heard immediately. Operated by a group called the Free Nigeria Movement (FNM), a self-described global grass-roots organization, the programs had at least one American-accented announcer. This, along with the fact that they had an Indianapolis address, led some to speculate that the station was a CIA operation.

Idle speculation soon gave way to interviews with station personnel and additional research. The station has a Indianapolis address because their Secretary-General lives there. FNM’s only source of funding is donations, a fact that is readily apparent as they have the shortest broadcast schedule of any of the stations, just one hour a week. FNM actively seeks volunteers for a variety of positions on its webpage, and has been heavily involved with American communities, such as Oakland, in urging them to cut business ties with Nigeria. These are hardly the marks of a CIA operation.

The most interesting aspect of Voice of Free Nigeria is their transmitter arrangements. Station personnel say that they have their own transmitter and that they are not purchasing time from anyone. They have also suggested that they are operating from a site within Nigeria. In spite of this claim, direction finding and station switching errors indicate that the station is broadcasting from Algeria, a nation with a history of sponsoring clandestine stations.

How FNM established this relationship with Algeria and its present state is something the FNM won't talk about, as they continue to maintain that the station could be broadcasting from Nigeria itself. Future plans for Voice of Free Nigeria include an expansion of broadcasts with the initial goal being daily broadcasts.

Radio New Nigeria



Ironically, the other station that started broadcasting on this date was not heard for several months, even though they have a much more

extensive schedule than Voice of Free Nigeria.

Radio New Nigeria's press release was simply not as widely distributed as some of the others and the station remained unheard until found by listeners in September 1997. The organization behind the station is the Nigerian Advocacy Group for Democracy and Human Rights (NAG-DHR), a Boston-based advocacy group founded in June of 1996.

Unlike the other stations that only attempt to broadcast to Nigeria, Radio New Nigeria has a world service of sorts, with broadcasts directed to North America and Europe, as well as Nigeria, albeit only on a weekly basis. Listeners quickly determined that the broadcasts were via the Deutsche Telikom site in Juelich, Germany.

The station also maintains a close relationship with a record label known as Mo-Gold Productions, and music from this label is heard on their broadcasts. Future plans include an expansion to daily transmissions.



Revenues from Shell provide 45% of Nigeria's GNP.

Radio NADECO

The Voice Of
FREE NIGERIA

RADIO NADECO

The last station on the air, Radio NADECO, started broadcasts via WWCR on June 30, 1997. Unlike the other stations, it made no effort to hide its transmitter location.

NADECO is an umbrella organization for several political action groups located both inside and outside Nigeria. Run by the U.S. branch of NADECO, this station has 15 minute broadcasts to Nigeria Mondays to Fridays. Part of the program is taped and part of it is faxed news that is read over the air by WWCR personnel.

The author would like to thank the following for their help in providing information for this article: Various sources at the stations who wish to remain anonymous, Chris Greenway and Dave Kenny of BBC Monitoring Service, Glenn Hauser's World of Radio, and Cumbre DX.

NIGERIAN RADIO Essentials

Frequencies are in kHz and times are in UTC.

Radio Kudirat 6205 1900-2000 Daily
P.O. Box 9663, London, UK SE1 3LZ
radio@udfn.com webpage <<http://www.udfn.com/uradio.htm>>
Note: NALICON no longer exists.

Voice of Free Nigeria 11715 1900-2000 Saturdays
Free Nigeria Movement P.O. Box 441395, Indianapolis, IN 46244
Phone/fax (317) 216-4590
fnm@ix.netcom.com webpage <<http://pw2.netcom.com/~fnm>>

Radio New Nigeria 11670 0600-0629 Saturdays to Nigeria, 5905 0100-0129 Sundays to North America, 6175
1500-1529 Sundays Central Europe
NAG-DHR P.O. Box 202, Boston, MA, 02131 Phone (617) 364-6301 Fax (617) 264-7362 RadioNNig@aol.com webpage <<http://www.nagdhr.com/>>

Radio NADECO 5070 0600-0615 Mondays to Fridays
Radio NADECO, 514 10th St NW, Suite 600, Washington, DC 20004
Phone (202) 347-1960 Fax (202) 347-0921 nadeco@aol.com webpage <<http://www.nadeco.org/>>

Important dates for special broadcasts, or perhaps new stations
June 12th-anniversary of 1993 presidential elections
August 27th-anniversary of date in 1993 that elected president would have been sworn in.

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The Future of Computing, According to

COMDEX

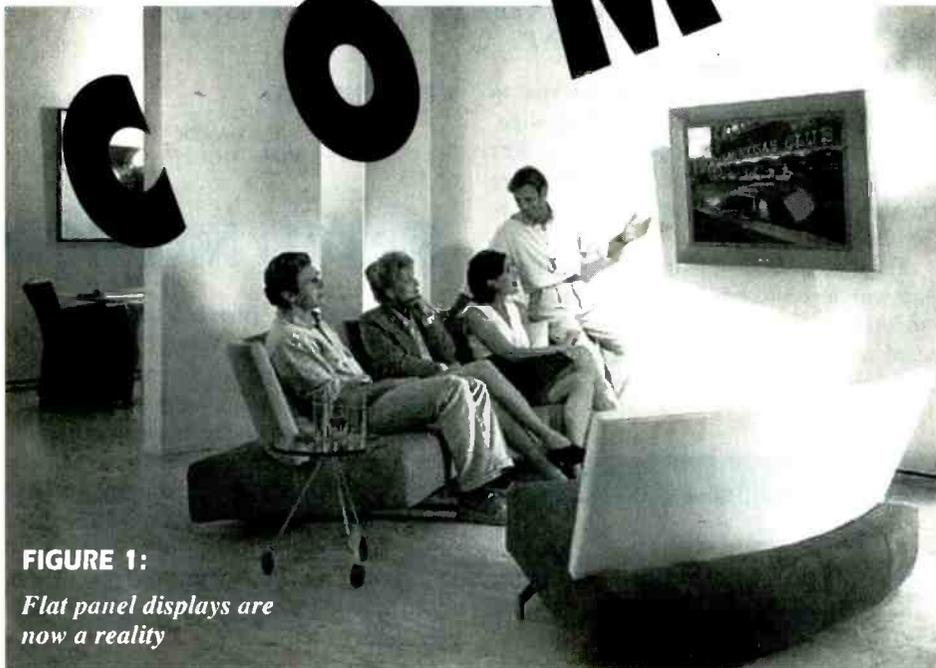


FIGURE 1:
*Flat panel displays are
now a reality*

*Nothing beats
COMDEX for the
glitter and glitz and
high-stakes gambling
of computer technol-
ogy. What setting
could be more perfect
than Las Vegas?*

By John Catalano

Las Vegas, this year's venue for one of the hottest international industrial computer shows, COMDEX - Fall 1997, is always a sensory experience. Everywhere you go in Vegas the human senses seem to be on overload. It is a mixture of Paris' opulence, Time Square's lights, a luxury cruise liner's feast, Monte Carlo's gambling and all with an ingredient of Disney World's make believe. The difference is in Las Vegas all these elements are intensified and compacted into one small area. Looking at it that way, COMDEX was held in exactly the right place this year.

COMDEX (COMputer Distribu-tors EXposition) has grown from a limited specialty industrial show to a major, six day, media news event that gets daily coverage from the US, European and Asian TV networks and newspapers. Spread over three huge locations in Las Vegas — the Las Vegas Convention Center, Sands Con-

vention Center and the Hilton Hotel — the list of COMDEX exhibitors includes every major, computer associated company. CPU manufacturers, software companies, hard drive, optical drive and tape drive manufacturers, video card companies, sound card developers, flat panel screen manufacturers, even plastic custom molders: They are all at COMDEX. The list of

COMDEX
Fall '97

exhibitors reads like the NASDQ stock market. But the exhibitor list also includes unknowns whose COMDEX-introduced revolutionary products may make them common household names in the future, while making their management and investors bundles of money. Or bankruptcy, if

the product misses a market need or is not timed to the rest of the computer market's developments. It's a real multi-million dollar bet on the roll of the dice. These computer product development investments make the betting at the casinos pale in comparison.

Interestingly enough, the people who attend COMDEX have a reputation in Las Vegas of not indulging in gambling at the casinos. Since the hotels live from their casino earnings, during COMDEX week the hotel prices go through the roof with a tiny chain motel room getting \$200 per night! (I should know.)

But renting space at the show makes this look like a bargain. COMDEX exhibitor space is in such demand that the rent starts at over \$10 a square foot for the week long event. The smallest empty booth cost over \$10,000, not exactly a tailgating flea market. Most of the medium size companies spend nearly 1 million dollars on the show with the majors



TV, PC, CD and DVD all-in-one unit is Philip's breakthrough product.

dropping many times that amount. For example, Microsoft had its own pavilion (building).

Enough about the show's background. How, if at all, will the computer industry change in the next 12 months? What new products can we expect to change our lives? Where is it all going? Let's walk around Fall COMDEX 97 together and see.

■ USB Is NOT Upper Side Band!

A new standard port is being shipped with PCs these days and its use is growing rapidly. Its name is Universal Serial Port, yep...USB. It's faster than the current serial port, can provide power to the port devices and can be configured for use with many peripherals including joystick, graphics tablet and mouse, to name just a few. Intel is pushing USB hard. So watch for it to become the only port game in town in the very near future.

■ The Nerd (oops) Need for Speed

The speed at which we can move data bits limits the applications that the computer can perform well. It came as no surprise that the big news at COMDEX Fall 97 was processor speed. Intel is making the Pentium 233 MMX MHz CPU the industry standard, and the Pentium II is coming on strong as the high-end CPU. All of the computer manufacturers—Compaq, Gateway and AST—were showing their 233 MHz MMX machines as almost entry level products! I counted fifteen separate exhibits which featured 233 MHz + processors.

The 300-500 MHz Alpha processor from Digital Equipment Corporation was on display at a number of booths, including AST and IBM. For those of you that missed the event, AST computer is now owned by Samsung and a 100+ foot banner proclaimed the takeover.

Talking about speed, many of the new software applications which utilize video now require at least a 133 MHz Pentium with 32 Meg of RAM, and suggest a 166 MHz machine. These programs include the new breed

of flight simulators, video editing/storage programs and the direct voice input wordprocessor software. We'll talk more about each later.

So, from the census I took, in order to stay current for at least the next 12 to 18 months your system should look like this:

Processor:	Pentium 233 MHz MMX
RAM:	32 Meg
CD ROM:	24 X
Video Card:	3D SVGA 4 Meg Video RAM
Hard Drive:	Total 4 to 6 Gig
Monitor:	SVGA .28 dot pitch (17 inch typical)
Sound Card:	3D Surround Wave Table 32 Bit
Speakers:	Min 3 (left/right/sub woofer) 20-20kHz
AMP:	20 watts/channel, 20-20kHz, HD < 0.5%
Joystick:	3D (twist stick axis)

...and that's just to stay current and be able to enjoy the capabilities of the new programs!

■ An Attack on the Senses

As is apparent from the "stay-current" computer specs, the audio output of the PC is growing up to full fidelity standards. Many of the traditional audio component manufactur-

ers, such as Pioneer and JBL, were showing off what realism could be added by having a full surround sound amp and speaker system.

The sound card manufacturers were in full support, with people like Creative Sound, makers of the SoundBlaster family of sound cards, showing off roof rattling and floor shaking demonstrations of 3 dimensional (3D) sound processing in their specially constructed sound theaters. These products are very impressive and add a major jump in realism to "flat" computer sound.

Although 3D sound was being shown everywhere, the latest and greatest in audio was unveiled in the form of the Digital Dolby Surround. This standard is still evolving in the home audio market where it was first introduced to the consumer. In its most advanced form, version 5.1, five separate and distinct channels of audio are defined: Front (left-right), Rear (left-right) and center channel. You should not confuse this with surround sound where the rear channels are not unique, but derived from the front channels.

■ 3D Video Cards?...Well Almost

All of the video card manufacturers had their 3D cards with lots of memory running flight simulator graphics. But 3D video cards do not produce the colored-glasses reach-out-and-touch effect. What they do is add a measure of depth to the visual such as complex



The Toshiba digital video disc player can play a full length movie with digital video and audio quality.

shading and other subtle, but visually enhancing effects.

A not-so-obvious benefit of the new generation of 3D cards is the fact that the 3D processing (added to 4 Meg of video RAM) really increases video speeds. The whole system appears to run faster when used with complex graphics. Many new programs either require, or recommend, the use of a 3D video card. The Canadian company Matrox displayed a very impressive 3D card. Diamond and others also had great products. But I'm still waiting for true 3D that jumps out of the screen.

■ Reintroducing an Old Idea

One simulated 3D effect that was making a come-back in at least five booths at COMDEX was the liquid crystal display (LCD) shutter lens. This idea goes way back to the late 1970s when I was running an LCD business and made such devices.

The concept is to create a parallax, one eye seeing a slightly different scene than the other eye. This fools the brain into thinking that this difference is a result of depth, the third dimension (3D). The result is a sort of 3D image effect.

All of these products replace eyeglass lenses with LCDs. The user views his monitor through the LCD. When activated the LCD becomes black, acting as a shutter and blocking the view. Via a small electronics box which is connected in series with the video card monitor output, the left and right eye shutters are blinked on and off at different intervals. This confuses the brain into producing a subtle 3D effect. Unless you have to have the latest, my advice is that, 17 years later, this approach is still a waste of money.

■ 3D on a Flat Panel!?

While one end of the convention was excited about 3D video cards the other end was showing what to me was the star of the show: full motion, full color video hanging on the wall. Living room filling, flat screen video screens! They are real ... and they are here. The entire electronics industry has been working on an alternative to the traditional cathode ray tube (CRT) since the 1970's. One CRT company that I know well spent \$250 million during one year in the eighties in an effort to find a flat panel display (FPD) alternative to CRTs.

It's been a few years since small color liquid crystal displays began showing up on laptop computers, such as IBM's Thinkpad family. I'm using one to write this article. But

expanding the LCD technology to wall size (2 feet x 3 feet) displays ran into insurmountable manufacturing problems. So what was Fujitsu, Pioneer, NEC, Philips and LG (Goldstar) showing at COMDEX? See Figure 1.

■ The Fourth State of Matter

As we were all taught in school, matter can exist as a solid, liquid or gas. But if we consider which form occurs most frequently in the universe it's none of the three. The fourth state, which they neglected to teach us until undergraduate physics, is plasma. The plasma state is a highly energized gas whose properties are greatly altered by the added energy. Super heated hydrogen plasma clouds populate most of the universe.

What does this have to do with hang-on-the-wall video screens? Plenty. Pioneer's flat screen was approximately three feet tall, four feet wide and 7 inches thick! It was a plasma technology screen, not LCD. The colors were the best I have seen in any technology. You could view the screen from a wide angle without much picture degradation. And the image motion showed no blurring. Although the Pioneer demo, which was complete TV, not just the screen, was the most impressive, all the large plasma screens shown were excellent.

I didn't buy one at the show because the opening price from most companies was around the \$15,000 mark! It was predicted that in 5 to 6 years these products could be offered at the current price of a rear projector large screen TV: \$1700.

Oh yes, more than one company told me that the dot size would accommodate computer graphics.

■ DVD — The Last Piece of the Puzzle?

Compact Audio Discs (CDs) and Video Laser Discs have been in our living rooms since the eighties. More recently, Compact Memory Discs (CD-ROMs) have become part of our computer systems. Now all of these technologies have been combined into a new product which promises to be bigger than any of its predecessors.

Enter, Digital Video Disc (DVD) technology. Current DVDs are the size of an audio CD but capable of holding a full length movie with quality four times better than tape (VCR) and CD audio quality. See Figure 2.



Dictate

The Premier PC Desktop System

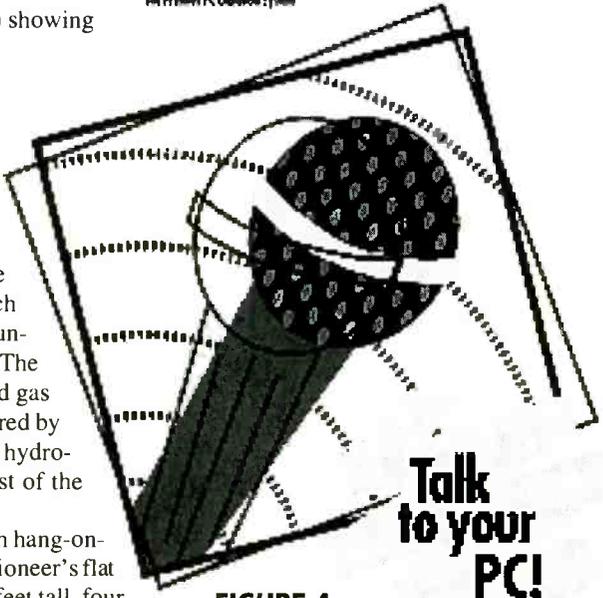


FIGURE 4

Dragon System's Dictate program was the only thing the author bought!

Toshiba seems to be leading the charge with their line of DVD players. But many other manufacturers had DVD players around the show. But it was primarily a computer show...right?

■ Goodbye CD-ROM Drives

DVDs have so much holding capacity that in some cases one DVD can have on it both the letterbox (wide screen) and the normal version of a movie. Some of this added capability is due to DVD program formatting. But DVDs have between 10 to 100 times the potential holding capacity of a CD. And what is holding capacity to a digital movie? Storage! There, I finally said it. Unlike VCR, which hold movies on tape in an analog form, DVD STORE movies in a digital form. The next natural progression is a DVD-ROM ... and they were at COMDEX.

The major CD-ROM drive manufacturers all showed their DVD-ROM products and the storage capacity in the Gigs was impressive. But so was the price of \$500+ for a read only media. But, with certainty in this business I can say, "Just wait a while. The prices will drop and the number of features will increase." Give DVD-ROMs twelve months to really start taking the CD-ROM market.

■ Is it TV/PC, PC/TV or just PC?

Computer sound systems that sound as good as home stereo systems. TV screens capable of computer graphics. Movies being stored in a digital form on a ROM-like media. Is this finally the beginning of the PC/TV convergence? ... One computer based technology that takes over all home entertainment?

This has been predicted for a number of years by people like Microsoft, but it has been very slow to develop. Now, Philips, for one, thinks it's time.

Always a leader ... rarely a winner. That pretty well sums up the Philips/Magnavox history in consumer electronics, at least in the USA. Philips, the inventor or co-inventor of the compact tape cassette, video laser disc, the compact audio disc (CD) and digital video disc (DVD), is rarely the company which commercializes the product to the point of being a household name.

Maybe their recent heavy TV advertising campaigns can change that. But, be that as it may, Philips has done it again with an all-in-one home entertainment product called DVX8000. See Figure 3. This combines all video and audio media into one box. Audio (Dolby Digital), video (DVD) and a 233MHz MMX based computer. This black squarish block has an impressive spec sheet and a \$5,000 price to match! Many people are watching to see what it does in the market.

■ "Computer, Warp 5"

We have all heard Captain Kirk or Spock give verbal commands to *Enterprise's* computer. Voice input has been a goal of the computer industry since the first computer engineer had to pick his way around a keyboard. Some pretty heavy players have been working on the problem in the US, Japan and Europe. The phone companies have been making more use of voice entry over the past three years. Many directory assistance (number information) services utilize a voice input. But these companies are using computers many times more powerful than our home PC.

IBM has had a number of PC voice input software products on the market for the past 18 months. I, and others, tried them and came to the conclusion that they were interesting, but not useful as a substitute for a wordprocessor keyboard.

■ Bill Recommended It ... and I Still Bought It!

The only program which I actually bought at COMDEX was Dragon System's voice

input program, Actually Speaking. They also have a program called Dictate. See Figure 4. The Actually Speaking Deluxe demonstration had a person reading articles that the audience provided. The words then appeared as text in a wordprocessor!

The program requires each user to "teach" the program their speech pattern. According to the manual, this takes about 20 minutes and consists of reading set passages and making corrections to the resulting text. Dragon has a number of voice input products which start around \$150. I have yet to run the program myself. But watch for the results in a future *MT*. Of all the exhibits at COMDEX Dragon's generated the most interest. Even Bill Gates, in his talk on COMDEX's first night, mentioned the Dragon product. But I decide to buy it anyway.

■ Everything You Just Read Could Be Wrong

I've saved the biggest COMDEX topic for last. The PC, as we have known it since 1983, is about to be totally redesigned. The reason is simple: to bring down the cost dramatically. The goal of a number of computer manufacturers that I spoke with, is to bring the price of a full PC down to that of a 27 inch TV: about \$500. Now, this is a *real* computer they are talking about. Not a terminal unit with a new name like the poorly conceived NC, Network Computer. No, the industry seems clearly focused on a PC with all of today's features.

The first thing that everyone agrees must change is the mechanics of the PC. The expansion slot method adds lots of cost. Therefore, watch for the new standard "mother of all motherboards" with modems, ports, video, sound and more, right on the board. The physical size of the new PC which the industry

is targeting, is about the size of a VCR.

These, plus other dramatic changes to the PC, are being designed now. When will we see the new standard PC? I don't know. My guess is 12 to 18 months. But it will probably be introduced at a future COMDEX.

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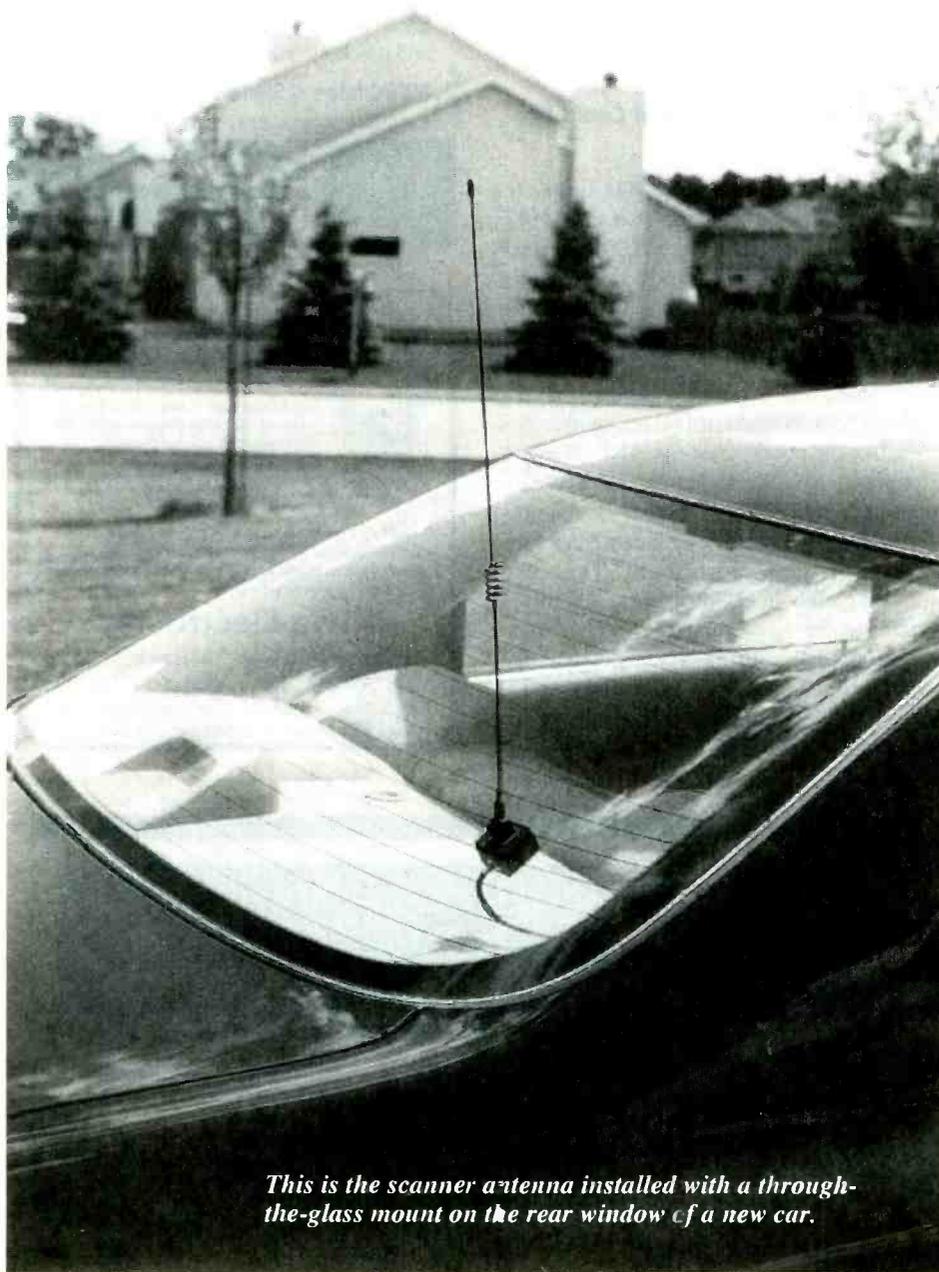
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Use Your Mobile Scanner Antenna for CB and Ham Radio, too

By Douglas A. Blakeslee, N1RM



This is the scanner antenna installed with a through-the-glass mount on the rear window of a new car.

FIGURE 1

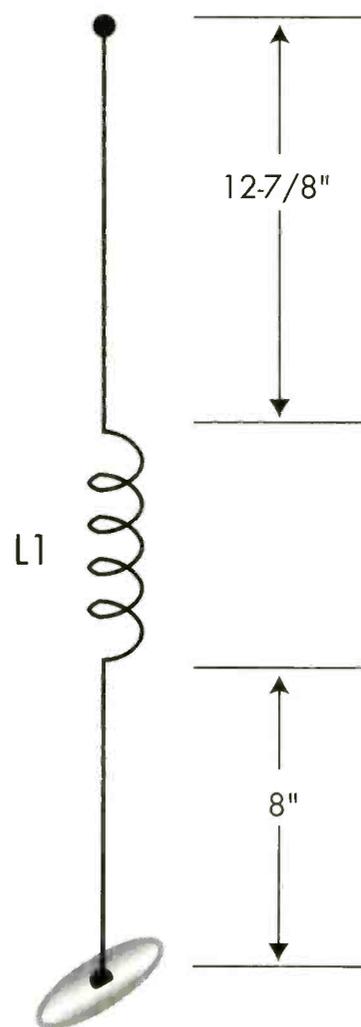


Diagram of the Radio Shack scanner antenna. The coil is 5 turns, 1/2 inch O.D., 1-3/8 inches long.

This article could be subtitled, "Good husbands keep a low profile with antennas." Festooning your automobile with multiple antennas for various frequencies and uses is not seen as a family-friendly act, unless you have a separate vehicle that is so old and beat up that family members ignore both the driver and the mode of transportation! Purchase of a new "family" car raises the question, "Can something be done to allow use of your favorite scanner and radios that won't send the wife and kids back to mother?"

■ The First Test Antenna

For scanner reception, a RadioShack 20-011 unit was chosen for the new family car. It is a through-the-glass-mount antenna which resembles a cell-phone type, so it will call no special attention to your car or the radios therein. Any scanner antenna should be usable, although the magnetic-mount types will not provide such a "stealth" appearance.

Your author wanted to use the scanner antenna for transmission on the citizens band (CB) frequencies (27 MHz) and the ham radio 146-MHz band, the best bands for travelers, in addition to scanner reception. Other frequencies such as the 50- and 430-MHz ham bands will work with appropriate components in the matching networks described below.

The configuration of the 'Shack antenna is given in Fig. 1. (There is nothing special about the design; readers who are handy might choose to make their own.) It is very short in length for use on the CB frequencies, so you cannot expect great distance (DX) performance. A check of resonant frequencies and impedances for the RadioShack unit showed that nothing would work directly for CB or ham transmissions, so an impedance matching network for the two frequencies of interest was needed to match the antenna to the transmitter. Such matching networks are also called transmatches¹ or antenna tuners.

■ "Pi"s and "L"s

The design input and output impedance of scanners and radios is nominally 50 ohms, *nonreactive*. Reactance is when an antenna is not close to a resonant frequency, and appears to the radio as having a capacitive or inductive component rather than pure radiation resistance. There is no need here to get deep into antenna-matching theory; simply put, large reactive components make the matching problem more difficult. The connecting cable from the antenna to the radio modifies the reactive value, which can help or hurt the matching

problem.

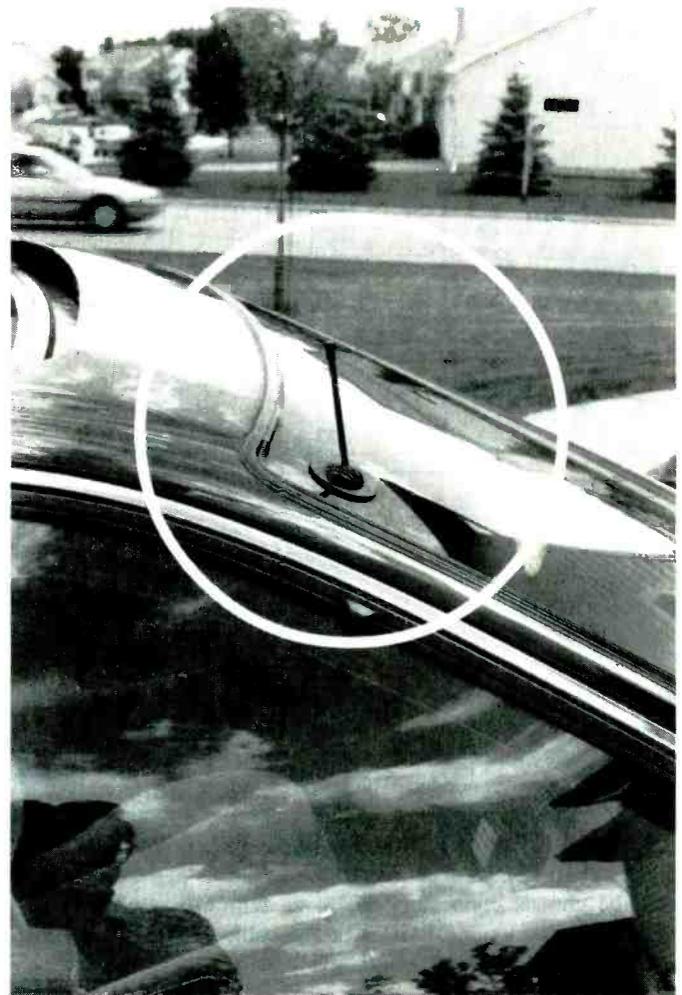
The most popular antenna matching networks are the Pi and L configurations which work well when the antenna is largely resistive, but it became clear after some cut-and-try experiments that simple matching networks were not going to work with this antenna at the frequencies of interest.

■ Practical Circuits

After a few bench tests and trips to the car, the circuits shown in Fig. 2 were found to provide an exact match. The network for 27 MHz is a miniature version of the Ultimate Transmatch¹ that has been popular with ham-radio enthusiasts for many years. Its unique feature is the use of a differential capacitor (C1 and C2) to provide matching over a wide impedance range. By differential, we mean that one section of the capacitor increases in value while the second section decreases. Thus, this special capacitor provides a capacitive divider that well accommodates very short antennas. (In the absence of a differential capacitor, two separate capacitors may be used, as in this author's model.)

While the circuit for 146 MHz may not look much different, it operates in a very different mode. Here, the radio connects to a tuned circuit consisting of capacitor C4 and its associated inductor, L2, which form a resonant circuit. The interaction of C4 and C3 provide the matching function.

Readers who only want to optimize their scanner reception will probably question whether matching networks will help. The simple answer is not usually, but sometimes. An exact match between the antenna and the radio/scanner will provide maximum transfer of signal. However, in the mobile environment, electrical noise is usually a limiting factor. The small improvement gained from a matching network for reception will usually be buried by external noise sources.



The real cell-phone antenna on this automobile is a miniature unit on the front window.

■ Construction Details

The matching networks are built into a small aluminum box, 5-1/4 X 3 X 2-1/8 inches (RadioShack# 270-238). Any small box will do. In the author's application, a low profile box was desired so that the unit would fit well under the passenger's-side front seat.

A two-pole rotary switch connects the two matching networks to the input and output connectors, as well as providing a "straight through" connection for general scanner monitoring. This switch has six positions, so three other matching networks could be added in a larger enclosure.

The coaxial connectors employed on the rear of the box are a BNC type for the connector on the scanner antenna, and a UHF type (SO-238) for connection to the radio or scanner, because most two-way radios use this connector. Most scanners use the BNC connector, so an adaptor or an alternative chassis connector can be utilized depending on the requirements of an individual's radios.

The components are soldered on a "univer-

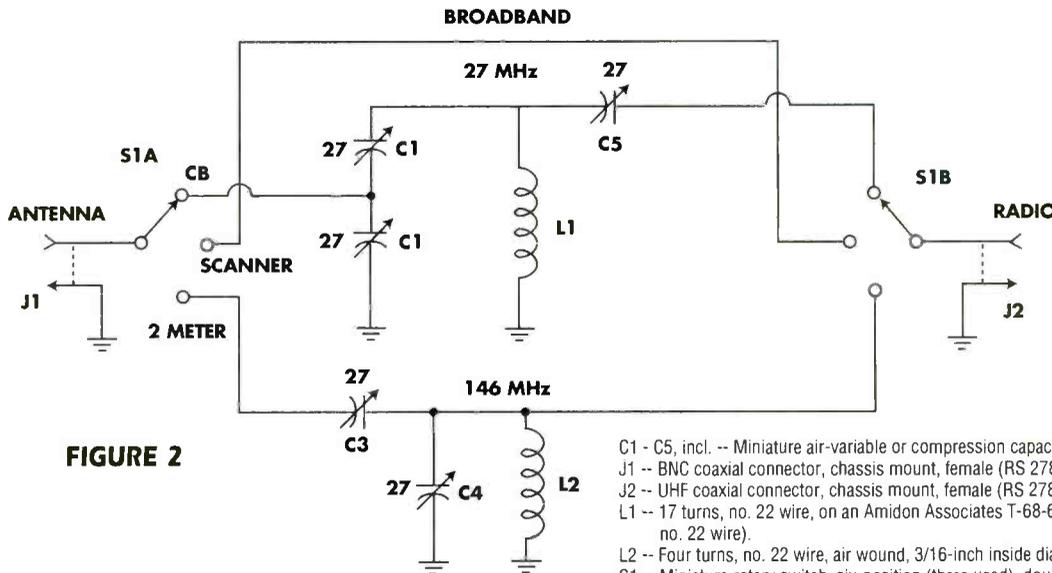


FIGURE 2

Schematic diagram of the antenna matching networks for the scanner antenna. RS numbers are parts from the RadioShack catalog. The circuit board used can be RS 276-158 (cut to size). See Footnote³ for sources of the toroid core and the variable capacitors.

- C1 - C5, incl. -- Miniature air-variable or compression capacitors, 2 - 27 pF.
- J1 -- BNC coaxial connector, chassis mount, female (RS 278-105).
- J2 -- UHF coaxial connector, chassis mount, female (RS 278-201).
- L1 -- 17 turns, no. 22 wire, on an Amidon Associates T-68-6, yellow core (RS magnet wire kit 278-1345 contains no. 22 wire).
- L2 -- Four turns, no. 22 wire, air wound, 3/16-inch inside diameter, 1/4-inch long.
- S1 -- Miniature rotary switch, six-position (three used), double pole (RS 275-1386).

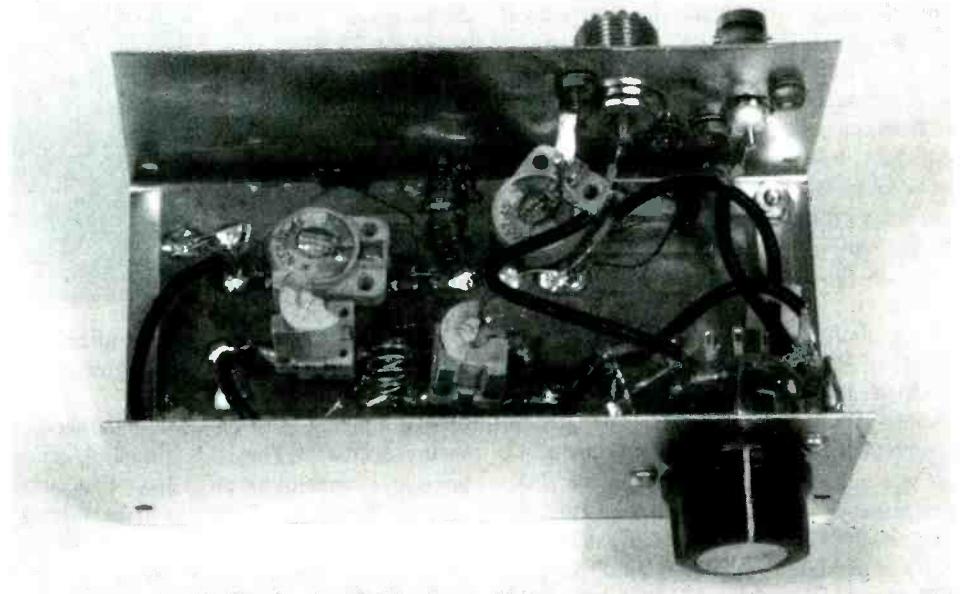
sal" etched circuit board that has a series of solder pads. These pads provide mounts for the inductors and capacitors, interconnected by jumper wires as needed. The layout is not critical, although it is good practice to keep the circuits in line following the schematic diagram (Fig. 2). Connections to the switch and the chassis connectors are made with miniature coaxial cable, RG/174U. This cable is hard to find, so the RG-58/U available at most stores including radio Shack is usable with a slightly larger enclosure.

Tuneup

Make the appropriate connections to the radio and the antenna. Connect a standing-wave ratio (SWR) bridge between the antenna and the matching unit (not needed for receive-only applications). Start with all variable capacitors set at half scale. Turn off the squelch function on the radio. Tune the capacitors with a nonmetallic screwdriver² until a sharp increase is noted in the received noise level. Try various combinations of the capacitor settings to maximize the receiver noise.

As noted above, C1 and C2 form a differential capacitor. However, a true differential capacitor does not exist in this size and value. So, two individual capacitors are employed. During the tune-up process, adjust one capacitor to increase its value while the second is decreased by the same amount, simulating the action of the differential unit. Adjust approximately 10 percent at a time. Continue the process until a match is found.

Then, key the transmitter and make final adjustments with the capacitors until the SWR bridge reads zero reflected power. With short, highly reactive antennas, the bandwidth of the antenna/matching network will generally be



The matching circuits are built into a small aluminum box. The circuits themselves are tack soldered on a "universal" circuit board. In this design, three positions are provided: CB, 146-MHz ham, and scanner.

quite narrow. Thus, the desired frequency of operation should be used during the tune-up process. Your author chose channel 19 for CB and 146-MHz in the two-meter ham band.

While a short scanner antenna does not approach the performance of a full-size whip, a mobile antenna that looks like a cell-phone whip has definite family appeal.

Footnotes:

¹ The Ultimate Transmatch was originally described by McCoy, W1ICP, in *QST* magazine. The name "transmatch" was invented at *QST* to replace the term "antenna tuner" which gave the false impression that the

antenna was tuned by the matching network. A number of variations on the basic transmatch designs have been published over the years, so the Ultimate did not prove to be the last word.

² One can make a non-metal screwdriver by inserting a small, flat, metal tab into the end of a 1/4-inch diameter wooden dowel. The best choice for the small metal piece is aluminum because it is non-magnetic.

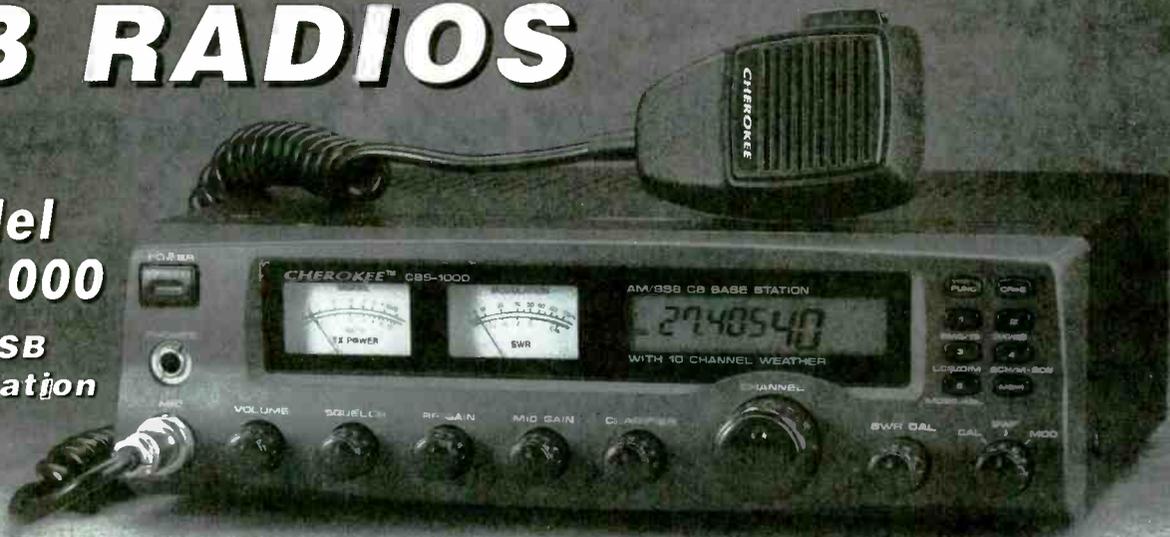
³ Component sources include: For variable capacitors, Mouser Electronics, 2401 Hwy. 287 N, Mainsfield, TX, 76063 or Buckeye Electronics, 10213 Columbus Grove Rd., Bluffton, OH, 45817. For the toroid core, Amidon Associates, 250 Briggs Ave., Costa Mesa, CA 92626.

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Even the Earth's electrical disturbances which produce the auroras (shown here in this NASA photo) can be monitored by the WR-3E VLF receiver.

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

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Police Call Bulletin and More Trunking Systems

Perhaps the most recognized name in scanning, Gene Hughes, has served as editor and publisher of *Police Call*, the nation's most venerable scanner publication, for over 30 years now. Anyone who grew up in this hobby knows how important *Police Call* was in helping to develop an interest and understanding of scanners and communications.

Whether you use the Listings by State, Listings by Frequency, the Consolidated Frequency List, or the outstanding Listener's Guide in the front of each year's edition, Gene, along with his partner George Switlyk and their staff, made sure the information was accurate, up-to-date, and filled with detail you could find in no other publication. I'm proud to say that, as editor of the "Beyond Police Call" section of the book for the last four years, I've been able to play a role in the creation of a product that has had as much to do with the success of scanning as the Bearcat 101, 250, or the Radio Shack PRO-2004, 5 and 6.

Those of you who have purchased this year's edition (the 1998 volumes 1 through 9, available from Grove and Radio Shack and now including trunking talkgroup data) may have seen an interesting item in Gene's "Channel One" introduction. I'm proud and humbled to report that Gene has named me to be editor of *Police Call*. I will now be overseeing editorial functions for both the public safety and business sides of each year's new edition. For someone who has been involved in writing scanner guides since his high school days, there is no greater honor than to attempt to fill Gene's shoes.

Luckily, I will have Gene's guidance for many years to come, as Gene will continue to serve as publisher of the guides. I want to thank Gene for his support and trust in me. I want to also thank his thousands of contributors over the years. I hope that you will continue to provide me with your suggestions and contributions to this wonderful guide so that we can continue its high standard of excellence.

■ The Upcoming Consumer Electronics Show

We plan to attend this year's Consumer Electronics Show in Las Vegas, which, as of the date of this writing, is one month off. CES is the showplace where manufacturers and distributors show their latest and greatest products. As we do every few months, we put it to you, our readers, to tell us and the scanner manufacturers what it is you would like to see in new scanner designs. Is it more channels, CTCSS and DCS, alphanumeric, computer-control, or GE/Ericsson trunk-tracking? Customer demand is what generally prompts a manufacturer to produce a new product. We saw how customer demand, in the



Police Call founder Gene Hughes speaking at the first Monitoring Times Convention

form of a coalition of concerned hobbyists, helped effect change in HR 2369, The Wireless Privacy Enhancement Act of 1997 (sorry to have mentioned that again). If our voice can be heard on Capitol Hill it can surely just as well be heard in Fort Worth, Texas, Chicago, Florida, and Japan.

The question that we must ponder is, "Do the manufacturers really believe there is enough of a scanner market out there to spend research and design funds on this niche category?" With the advent of the Uniden and Radio Shack TrunkTrackers, as well as the RELM MS-200 mobile scanner with alphanumeric, our hopes have been elevated. But what will the future hold?

Take a few moments to contact your favorite scanner manufacturer or dealer, by phone, mail, or e-mail, and let them know what it is you would like to see in the next generation of scanners. Let them know that, if they're willing to design and build it, you will come to buy it. (If it's easier for you, feel free to send e-mail to me directly at

Scanmaster@aol.com and we'll forward your mail.) We will have a report on any relevant new products seen at CES in next month's scanner column.

■ Storm Watch

One of the best ways to gather frequency information for that "storm of the century" we get every few years (don't you just love media hype?) is to practice your monitoring while local public safety agencies practice their emergency drills. The problem is learning when these drills will occur.

Hams who are involved in RACES and ARES emergency communications teams are almost always aware and involved. Certain amateur repeaters are set aside in each region of the nation just for emergency communications during disasters and storms. The *ARRL Repeater Directory* is one source of information to locate these emergency repeaters.

Monitoring drill communications, however, is your best, and most up-to-date resource. You not only can confirm which frequencies will be active during actual emergencies, you can also listen and learn how emergency communications are conducted and evaluated. Here's a recent notice from the Massachusetts Emergency Management Agency (MEMA) on an upcoming hurricane drill that they're holding in the winter. Perhaps if you contact your local state emergency management office (or if you check their web site), you can learn of upcoming drills in your area.

FOR IMMEDIATE RELEASE
 CONTACT: JOHN TOMMANEY
 DECEMBER 2, 1997

This Saturday

**MEMA and AMATEUR RADIO OPERATORS TEST SKILLS
 IN STATEWIDE HURRICANE DRILL ON DEC. 6**

Framingham, MA-The Massachusetts Emergency Management Agency (MEMA) will host a statewide amateur radio emergency communications drill this Saturday, Dec. 6, from 10 a.m. to 12 noon. This exercise, called Hurricane Drill "Zena," will take place in MEMA's Headquarters, 400 Worcester Rd, Framingham. With statewide participation, it is expected this drill will involve 351 municipalities in addition to dozens of amateur radio operators representing the Radio Amateur Civil Emergency Services (RACES), Amateur Radio Emergency Services (ARES) and the National Weather Services (SKYWARN).

"The purpose of this drill is to test the capabilities of amateur radio communications during a large, statewide emergency," says MEMA Director Peter G. LaPorte. "We will also demonstrate that statewide emergency management messages can pass through amateur radio channels."

During Hurricane Drill "Zena," numerous volunteer Amateur Radio Operators from every city and town in Massachusetts will report simulated hurricane weather conditions over amateur radio frequencies to the National Weather Service in Taunton, MA. In addition, these local volunteers will report the status of local Emergency Operations Centers to MEMA's three area offices in Belchertown, Bridgewater and Tewksbury. Amateur radio operators in these three locations will then forward their messages to MEMA's Headquarters in Framingham.

The volunteer amateur radio organizations of RACES, ARES and SKYWARN work together during state and local emergencies to assist local officials with emergency communications to state officials when primary radio communications are lost and/or a large scale disaster, such as a hurricane, takes place.

Representatives from MEMA and the aforementioned volunteer groups will be available for media interviews from 9:45 a.m. to 12 noon, this Saturday, at MEMA Headquarters. To arrange for an interview or for further information, contact MEMA's Communications Division at 508-820-1428.

Still Sounding Good in Winston-Salem

Many issues back we wrote about the enlightened Winston-Salem, North Carolina, Police Department which was re-broadcasting their own radio communications over the local cable-access channel. Recently, the department contacted us and requested a copy of the article to display at a national police accreditation conference. The W.S. PD suggested that we take a look at their web site (<http://www.ci.winston-salem.nc.us/psc>), which simply wowed us with its completeness. The site also includes an added bonus for scanner buffs: a frequency and ten-code list! It's obvious this agency seeks public involvement and we applaud all their efforts.

Winston-Salem Police Department Radio TEN CODES (common APCO set)

- | | |
|------------------------|--------------------------|
| 10-0 Use Caution | 10-7 Out of Service |
| 10-1 Weak Signal | 10-8 In Service |
| 10-2 Good Signal | 10-9 Say Again |
| 10-3 Stop Transmitting | 10-10 Negative |
| 10-4 Affirmative | 10-11 Employee Number |
| 10-5 Relay to/from | 10-12 Stand By |
| 10-6 Busy | 10-13 Weather Conditions |

- 10-14 Message / Information
- 10-15 Message Delivered
- 10-16 Reply to Message
- 10-17 Enroute
- 10-18 Urgent
- 10-19 In Contact
- 10-20 Location
- 10-21 Call by phone
- 10-22 Disregard
- 10-23 Arrived at Scene

- 10-24 Assignment Completed
- 10-25 Report to _____
- 10-26 ETA
- 10-27 Drivers License Inquiry
- 10-28 Vehicle Inquiry
- 10-29 Records Check
- 10-30 Danger
- 10-31 Pick-up
- 10-32 _____ Units Needed
- 10-33 Need Immediate Assistance
- 10-34 Current Time

Additional Codes

- 10-40 Fight in Progress
- 10-41 Beginning Tour of Duty
- 10-42 Ending Tour of Duty
- 10-43 In Pursuit
- 10-44 Riot
- 10-45 Bomb Threat
- 10-46 Bank Alarm
- 10-47 Complete Assignment Quickly
- 10-48 Detaining Suspect, Expedite
- 10-49 Drag Racing
- 10-50 Vehicle Accident, PD, PI, F
- 10-51 Dispatch Wrecker
- 10-52 Dispatch Ambulance
- 10-53 Road Blocked
- 10-54 Hit and Run Accident, PD, PI, F
- 10-55 Intoxicated Driver
- 10-56 Intoxicated Pedestrian
- 10-57 Request BT Operator
- 10-58 Direct Traffic
- 10-59 Escort
- 10-60 Suspicious Vehicle
- 10-61 Stopping Suspicious Vehicle
- 10-62 B&E in Progress
- 10-63 Prepare to Receive an Assignment
- 10-64 Crime in Progress

- 10-65 Armed Robbery
- 10-66 Notify Medical Examiner
- 10-67 Report of Death
- 10-68 Livestock in Roadway
- 10-69 Advise Telephone Number
- 10-70 Improper Parked Vehicle
- 10-71 Improper Use of Radio
- 10-72 Prisoner in Custody
- 10-73 Mental Subject
- 10-74 Prison/Jail Break
- 10-75 Wanted or Stolen
- 10-76 Prowler
- 10-77 Direct Traffic at Fire Scene
- 10-80 Fire Alarm
- 10-81 Nature of Fire
- 10-82 Fire in Progress
- 10-83 Smoke Visible
- 10-84 No Smoke Visible
- 10-85 Respond without Blue Lights/Siren

Frequencies

- PD Channel 1 - 460.300
- PD Channel 2 - 460.450
- FD Main 460.625

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■ Trunk Stuff

A couple of notes on trunking information available on the Internet: Our web site, www.trunktracker.com, is now being regularly updated thanks to the fine efforts of our contributors and, most especially, of Tom Swisher, the webmaster of the site. Tom, who certainly knows his trunks, has pledged to update the site every two weeks or so.

Also in trunking news, we want to take this opportunity to thank Larry Van Horne of Grove for his critical contribution to the development of the Trunkcom List Server. With his increased duties at *Satellite Times* we don't expect Larry to be able to devote as much time to Trunkcom as he had in the past, nor will he be able to continue the "Tracking the Trunks" column in *MT*. Thanks, Larry, without you there would be no forum dedicated to the full-time exchange of trunking-related information.

■ South Carolina Trunking

An anonymous contributor recently sent the following information on South Carolina, a state for which it has been very tough to acquire data.

"I have some updated info on the system here. What follows is about 50 to 60% of the public safety Talk Groups for Beaufort County SC. Most of the missing ones are the chat type groups and administration talk groups.

"I am leaving some holes, notably in the fire departments. There are a few fire departments that I cannot currently confirm.

"First is Port Royal. All their fire fighting is currently done by the city of Beaufort (which is under contract). Port Royal still maintains its volunteers, but the city department controls all the equipment and fire fighting.

"Second is Yemassee. Apparently in the last month or so they have moved all their dispatching to the Hampton County dispatch office (154.220 MHz). Yemassee sits astride the county line. They still have 800MHz radios, I am just not sure of their channel assignments.

"The third is the Haig Point Fire Department. They have apparently merged with the Dafuskie Island Department. I just do not know at this time if the channel assignments are in use.

"Again, Beaufort County, SC, has a Motorola Type II system. There are two towers which simulcast the same frequencies (856-860.2125 and 856-860.4375)

"All fire department and EMS simulcast in high band. All fire and EMS dispatch channels, except the Hilton Head Island Dafuskie Island you can hear both sides of the conversation on the dispatch channels. HHI and DI you can only hear the dispatch side.

"Beyond public safety almost all county and some municipal agencies are on the system. The military bases all have some 800MHz capability as do most of the gated communities that have their own security forces."

Ch	Group	User
1	336	Sheriffs, Bluffton Police and Yemassee Police DISPATCH
2	368	City of Beaufort, Town of Port Royal DISPATCH
3	400	FIRE DISPATCH: Beaufort, Bluffton, Burton, Fripp Island, Ladys Island/St.Helena and sometimes Yemassee. Simulcast Page 154.355MHz
4	432	Town of Hilton Head Island and Dafuskie Fire and EMS DISPATCH Simulcast page on 154.145
5	464	Beaufort County EMS DISPATCH (everywhere except Ch 4) simulcast 155.175 MHz

6	496	Sheriffs secondary
7	528	City of Beaufort Police secondary
8	560	Town of Port Royal Police secondary
9	592	Town of Bluffton Police secondary
10	624	Town of Yemassee Police secondary
11		
12		
13		
14	752	Town of Port Royal Police
15		
16	816	Fripp Island Fire Admin
17	848	Fripp Island Fire Fireground
18	880	Fripp Island Fire Talk Around
19	912	Ladys Island/St. Helena (LISH) Fire Admin
20	944	LISH Fire Ground
21	976	LISH Talk Around
22	1008	City of Beaufort Fire Admin
23	1040	City of Beaufort Fire Ground
24	1072	City of Beaufort Talk Around
25		
26		
27		
28	1200	Burton Fire Admin
29	1232	Burton Fire Fire Ground
30	1264	Burton Fire Talk Around
31	1296	Sheldon Fire Admin
32	1328	Sheldon Fire Ground
33	1360	Sheldon Talk Aound
34		
35		
36		
37	1488	Bluffton Fire Admin
38	1520	Bluffton Fire Fire Ground
39	1552	Bluffton Talk Around
40	1584	Town of Hilton Head Island (HHI)Fire, North End ,Admin
41	1616	HHI Fire, North End, Fire Ground
42	1648	HHI Fire, North End, Talk Around
43	1680	HHI Fire, South End, Admin
44	1712	HHI Fire, South End, Fire Ground
45	1744	HHI Fire, South End, Talk Around
46	1776	Dafuskie Island Fire Admin
47	1808	Dafuskie Island Fire Fire Ground
48	1840	Dafuskie Island fire Talk Aound
49		Belong to the former Haig Point Fire
50		
51		
52		
53		
54		
55		
56		
57		
58	2160	HHI Ambulance Admin
59		
60		
61		
62		
63	2320	Sheriff Supervisor
64		
65		
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67		
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78		
79		
80		
81		
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85		
86		
87		
88		
89		
90	3184	County Detention Center Internal 460.300MHz
91	3216	Parris Island
92		
93	3280	Marine Corp Air Station Fire Dept (Dispatch on 140.625)
94		
95		
96		
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106		
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109		
110		
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113		
114	3952	Sheriffs Shift
115	3984	Sheriffs Shift
116		
117	4048	Sheriffs Shift
118	4080	Sheriffs Shift
119	4112	Sheriffs Shift
120	4144	City of Beaufort Police Shift
121		
122		
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129		
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131		
132		
133		
134		
135	4624	Animal Control
136	4656	EMS to Beaufort Memorial Hospital
137	4688	EMS to Hilton Head Hospital
138	4720	EMS to Beaufort Naval Hospital
139	4752	Hilton Head Airport Crash Fire Rescue (possible dispatch)
140	4784	Sheriffs Talk Around
141	4816	City of Beaufort Police Talkaround

"Note: Talkgroups for the talk around channels (radio to radio) are guesses. Everything to date has been confirmed.

"It will be awhile before I have a significant number of other public safety talkgroups confirmed, if for no other reason than the county is only 110,000 population and a number of the missing talkgroups require large scale events to be activated, such as mutual aid and Emergency Management."

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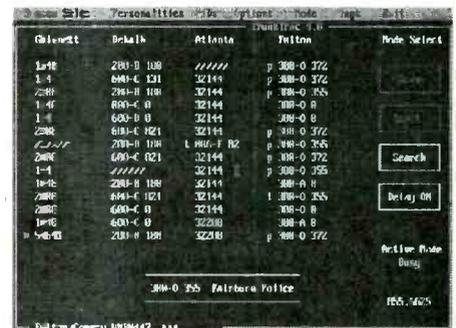
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The Wonderful World of Utilities

A very common question that I have been asked over the last 10 years is, "What is utility monitoring?" My answer is simple. "It is probably one of the most fascinating hobbies on earth."

Utility monitoring is the real world in its everyday, peaceful or harried existence. It can be as mundane as an aviation weather broadcast or as exciting as an open sea search and rescue.

Utility comms are basically business transmissions. In the HF spectrum from 1.6 to 30 MHz, throw out the Citizen Band channels, amateur radio frequencies, and shortwave broadcast bands, and everything left is considered a utility frequency.

With a turn of the dial you might hear Aunt Mabel on the Love Boat talking to Aunt Jane in Kansas on the marine bands. The eight maritime bands are always hopping with ship-to-shore, ship-to-ship, and shore-to-ship traffic 24 hours a day in a variety of transmission modes.

Tune around some more and you will might hear airliners flying the world's air routes. They report weather and their positions to radio operators on the ground. In the aeronautical bands you will also hear aviation weather broadcast from stations all around the world in the form of *volmet* transmissions. You can even intercept private airline company traffic in the HF aero bands.

Air traffic control chatter can be heard along established routes in Europe, the Middle East, Africa, the Indian Ocean, the Pacific rim, Asia, the Atlantic Ocean, and South America. Keep the receiver in the upper sideband (USB) mode and you will hear quite a bit of aero traffic in English.

Also located within the aero bands are the flight test frequencies. These frequencies are the domain of aerospace industry testing and experimental aircraft, such as the *Voyager* flight several years ago.

■ More Exciting Fare

There is plenty of mystery and intrigue in the utility bands. Most listeners stumble on communications from the mysterious world of spy number stations early in their listening

careers. These transmissions are broadcast in a variety of languages and formats. This mystery hasn't been solved conclusively in over 30 years and the transmissions still haunt many listeners who wonder about their exact purpose.

Tune around the HF utility spectrum some more and you will hear the constant buzz of military tactical communications from almost all branches of the U.S. military and from other military organizations worldwide. You will hear all sorts of colorful call signs associated with these stations such as Aardvark, Eight Ball, Charlie 8 Lima calling Whiskey 2 Kilo and the like. Imagine hearing Fireball calling Old Salt or Devil 26 working Outhouse. The range of calls are both creative and fun to listen to.

Tune just about anywhere in the HF spectrum and you will find the United States government is well represented in the utility bands. Agencies like FEMA (Federal Emergency Management Agency), NRC (Nuclear Regulatory Commission), FHA (Federal Highway Administration), DOT (Department of Transportation), DOE (Department of Energy), Department of State (including embassies), several Alaskan state agencies, the FCC (Federal Communications Commission), Department of Commerce, TVA (Tennessee Valley Authority), FBI (Federal Bureau of Investigation), and Customs/DEA (Drug Enforcement Agency) can all be heard from time to time using voice and data communications.

International agencies are also prominent in the utility bands. The International Red Cross (and Red Crescent), Spanish and Zaire National Police, World Relief and other various Christian Missions, United Nations, and Caribbean hurricane emergency networks (to name just a few) will be heard.



Larry Van Horn

■ Business Not Exactly as Usual

As I said, the utility bands handle businesslike communications. There is no shortage of actual business communications in these HF bands. Petroleum companies and their support personnel can be heard in the lower frequency ranges. This stuff can get real interesting when hurricanes threaten in the Gulf of Mexico. Limited coastal stations are always heard working their private fleet of marine vessels on selected HF marine simplex frequencies 24 hours a day.

Bell Telephone has extensive networks in case of emergencies and they can be heard testing those networks from time to time. There are all sorts of business traffic experimental stations, and common carriers (telephone comms) that can be heard as well.

Need to know the exact time? There is a whole group of stations in the utility bands devoted to providing you with the time of day. Most of these stations use atomic standards and the time and frequency accuracy of their broadcasts are the best in the world. Stations from the United States, Australia, Canada, Czechoslovakia, Ecuador, and Venezuela and many more, can be heard transmitting the time 24 hours a day.

■ Space Relations

If space is your bag, the utility bands offer some exotic flair for you, too. You can listen to NASA's space shuttle tracking networks, shuttle air to ground comms (via amateur radio, ESA-European Space Agency), launches, military missile test range communications, and even an occasional spacecraft in orbit.

But, signals from space aren't limited to spacecraft. You can hear Jupiter, meteors, even our sun puts out noise in the HF spectrum. Good luck getting your reception reports verified from these sources!

■ Whistles, Beeps, and Buzzes

You will also hear a wide variety of nonvoice signals on the utility bands. All sorts of groans, whistles, beeps, blurbs, and buzzes. Signals in the nonvoice modes come in many shapes and sizes. Sweepers, water drippers, foghorns, key clicks, scrambled communications, and thunderstorms are just some of the many exotic and often mysterious signals listeners run across while tuning the utility bands. (I don't recommend monitoring the thunderstorms!)

You will encounter other noises on HF as well. These might include your neighbor's florescent lights, light dimmer panels, fish tanks, TV sets, power tools, air conditioners (most motor driven appliances), auto ignitions, thermostats, and outside power lines.

There is a huge number of non-voice signals, such as digital modes, that you *can* monitor, though, if your shack is appropriately equipped. Radioteletype (or RTTY for short) capability will allow you to receive news services straight from the source. While there aren't as many digital targets as there used to be, you won't be disappointed at what you can hear if you have digital capability in the shack.

The newer multimode data terminals such as Universal's M-7000/8000 can demodulate most of these systems: baudot or standard RTTY, ASCII (found sparingly), SITOR-A/B (maritime bands), VFT (Frequency Division Multiplex) used by military stations, ARQ (Moore Time Division Multiplex) 2 and 4 channel modes, ARQ-E/E3/S, and many, many more.

Some of the ARQ modes have been developed for use by certain countries and their governments, including CAN-ARQ (Canada), DUP-ARQ (Hungary), GDR-DUP (Old East Germany), Swedish-ARQ, and SI-ARQ/FEC. There are even musical digital modes used by French and British diplomatic services called Coquelet and MSFK (or Piccolo as it's more commonly known).

The Russians have a special RTTY mode called Russian third shift cyrillic, to accommodate the cyrillic alphabet on RTTY. Greece, Korea, Ethiopia, Thailand, and Japan also use a third shift mode to enable them to transmit their alphabets via RTTY. There is even a four-shift Arabic code that is now in use on some Arabic radio systems. Don't ask about the ancient Chinese alphabet!

Another mode that is gaining in popularity is facsimile, or fax for short. This mode is used to transmit pictures (yep, just like that office fax) weather maps, and weather satellite pictures. Computers have really helped this mode gain favor with utility hobbyists.

The newest modes that are gaining popularity on HF are packet and PACTOR. Right now pirate stations and MARS stations are the primary users of this mode.

If Morse code or CW is your bag, the number of CW stations in the utility bands is almost endless. While the maritime services are trying to rid themselves of this mode, CW still flourishes in abundance in other segments of the utility bands. Morse code signals bridge a variety services including the Russian Navy single letter CW HF markers. These signals have been around since the late 60s or early 70s though we still don't know exactly what they are used for.

■ The offbeat and bizarre

There are the bizarre and unknown stations in the HF spectrum. Fishing fleets can be found just about anywhere with their X-rated language. These guys add new meaning to the saying, "Cussing like a sailor." Pirate radio broadcasters, cordless telephones, terrorist networks, drug smugglers, numbers Morse code traffic, and the aforementioned number stations and single letter HF beacons are just some of the stations you will hear in this category.

And yes, there are those transmissions for which we don't know what they are, who is transmitting them, why they are being transmitted, or what they are sending. Maybe, someday, you will solve one of these mysteries, but you have to give it a twirl of the dial first to find them.

Were else can you hear islands from Anguilla to the Yap Islands? The variety and diversity of utility communications and stations involved are seemingly endless. Seventy-eight percent of the shortwave spectrum is devoted to communications of a utility nature. So why don't you fire up that shortwave radio and let your curiosity and imagination take hold. If you do, an arm chair adventure is just beginning.

■ Ten Years in the Utility World

Yep, it's all there to be heard on the utility bands. And for the last ten years I have been honored that you, our *MT* readers, have allowed me to document what has been heard in the HF utility bands. But this is my last *Utility World* column.

Since Grove Enterprises started publishing *Satellite Times* in September/October 1994, the single, most frequently asked question from its readers and staff alike has been, "When is *ST* going monthly?"

One of my long term goals as the managing editor of *Satellite Times* has been to turn

this wonderful resource — the only one of its kind — into a monthly publication. Recently a decision was made here in Brasstown to do just that. The down side of this exciting development is that I will not have the time to continue my longstanding writing career with *Monitoring Times*.

I wrote my first column in *MT* 170 months ago in November 1983. That monthly contribution to *MT* was called *Signals from Space*, and it was the first column ever to cover space communications on a regular basis in any of the major hobby publications of the time.

In March of 1988, then *MT* editor Larry Miller asked me to switch my emphasis from space to terrestrial communications and I started writing this column. With this February issue I have completed 120 issues — or ten years — of writing *Utility World*.

In addition to *UW*, I have also written several other columns which have carried my byline, and I have also penned quite a few features for *MT*. I will miss all of this. But I will especially miss the readers of *MT*.

I have made many lifelong friends in my 14 years with *Monitoring Times*. Hundreds of readers contributed to the columns, for which I'm eternally grateful. Many of you now also subscribe to *Satellite Times* and I look forward to serving you in that publication.

It would be impossible to name or thank each of you personally, but I do want each of you to know how grateful I am for your support and friendship over these many years. The reason I was able to learn and grow in the radio hobby was because of your kindness in sharing your knowledge and support.

I feel my radio career has now come full circle as I return to what started me with Grove Enterprises 14 years ago: space communications. I look forward to being able to do more writing in the pages of *Satellite Times* and I hope that each of you are a part of that effort.

If you aren't a subscriber to *ST*, you should be: Space is the communications promise of the future and you don't want to be left out of the new frontiers and discoveries from LEO to GEO and beyond. You don't want to miss a single exciting issue of the new monthly *Satellite Times*, your magazine of record for *Signals from Space*.

Whether you listen to the utility bands or the far out communications of INMARSAT, the radio hobby of utility listening is probably one of the most fascinating hobbies on earth.

73 to all de Larry, N5FPW SK.

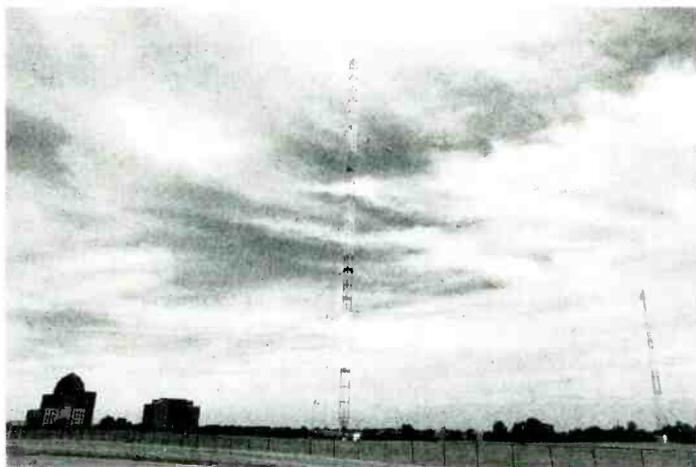
What Happened to the 10-watters?

Pirate (i.e., unlicensed) broadcasters have received a lot of press lately. Several of the pirates and their sympathizers have argued that they would happily operate legally if the FCC hadn't eliminated the legal 10-watt FM station. Just what were the 10-watters, and how were (are) they different from the regular, legal non-commercial FM stations we have today?

In the first years of AM broadcasting, the government would license stations for any amount of power their owners wanted. Money and technology set an upper limit — the need to cover enough people to make the station profitable set a lower limit. But in densely populated cities, this lower limit could be as little as 5 watts. The problem was that, while a 5-watt AM station might only provide service to a radius of 2-3 miles, it could cause interference much farther away. So a minimum power limit of 100 watts (later increased to 250) was set. Many smaller stations couldn't make the minimum, and went off the air forever.

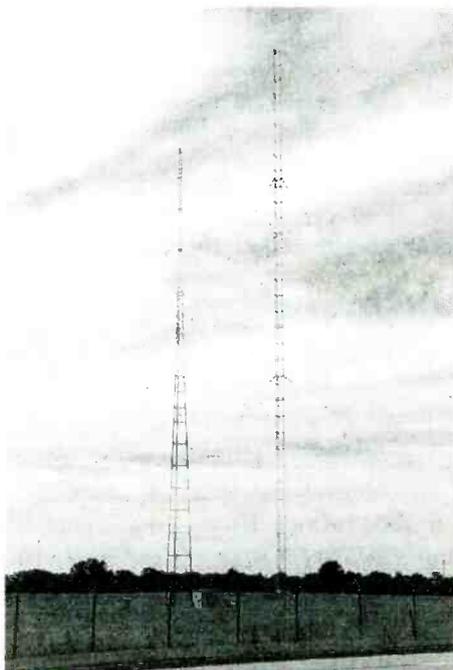
After WW2, FM broadcasting began. Educational interests insisted that 4 MHz of the FM band be reserved for educational use. But the 100-watt minimum power had been written into the FM rules as well, and many smaller institutions couldn't afford to get into broadcasting. The FCC warned educators they would not be able to keep their channels reserved much longer if they didn't start building some stations! At the same time, they had given Syracuse University special temporary authority to build a station that would violate the 100 watt minimum. WAER (which incidentally is still on the air, but with 50,000 watts) was authorized to operate with only 2.5 watts. WAER's broadcasts were considered very successful, spurring the FCC to create the new D class of FM broadcast station.

All Class D FM stations were non-commercial and licensed to educational institutions. There was no minimum power limit,



Pat Griffith of Denver sent this photo he took of WBBM-780's towers northwest of Chicago. This is most certainly not a 10-watter!

though the vast majority of Class D stations used the legal maximum of 10 watts transmitter power. Tower height was not directly regulated, though few stations used antennas higher than 100 feet. Many simply put their antenna on the roof of the school.



Pat is also responsible for this shot of WGN-720, another Chicago powerhouse.

Transmitter operators required only a 3rd Class operator license, which basically meant you demonstrated to the FCC your ability to read meters. The schedule regulations, which require stations to broadcast 36 hours per week to maintain their license, were waived for these low-power operations. By the mid-1970s, there were over 400 Class D stations, representing over half of all non-commercial stations. But something was about to change.

In the 1970s, many cities had no public radio. Dayton, Oklahoma City, and San Antonio — and many smaller cities — had no NPR stations. In some of these

cities, it was felt that the establishment of full-powered public radio was being prevented by the need to protect the numerous Class D stations from interference. To that end, on January 1, 1980, the FCC re-imposed the 100 watt minimum power for new non-commercial FM stations.

That prevented the construction of any more Class D stations. But something had to be done with the over 400 such stations already in operation. They were given several choices:

Upgrade to Class A:

Many Class D stations were able to increase power to or above the 100 watt minimum. The FCC assisted by allowing non-commercial stations to upgrade if they would not cause interference at their actual licensed power (normally, a Class A station can only be licensed if it could use 6,000 watts without causing interference, even if that station is actually only using 100 watts). Approximately 25% of the 10-watters took this option, with most of them going just barely above the minimum.

Move above 92MHz:

Stations that could not increase power on their old frequencies could apply to move to a new frequency in the commercial 92-108 MHz band. The Class D station would not be protected from interference from commercial stations. (Another rulemaking at the same

time greatly increased the number of commercial FM stations, making such interference much more likely) 25% of 10-watters chose this option.

Stay put:

If the 10-watter couldn't increase to Class A, and couldn't find an available frequency above 92MHz, it could find the least desirable non-commercial frequency and go there. It would not be protected from interference, and could lose its frequency to a higher-power applicant. The FCC didn't expect many stations to choose this option, but nearly 30% did.

Go off the air:

Another 20% of Class D stations couldn't find anywhere to go. They turned in their licenses and went "dark." The number of stations in this category is gradually increasing as new commercial stations "bump" low-power non-commercials from their channels.

Actually, there was a fifth option: move to 87.9 MHz. But to prevent interference to channel 6 TV stations, there are severe restrictions on the use of this frequency. Stations must be outside the Grade B contour of any channel 6 assignment, whether there's a license for a TV station on that channel or not. Such areas are remote and lightly populated. There weren't many 10-watt stations there, and those that did exist had little trouble finding some other frequency to move to. I believe WNDN-FM in North Carolina was the only station to ever hold a permit for 87.9 MHz, and they never used it. Today, it's WOGR-FM on 93.3.

Expanded-band news

The first regular expanded-band station went on the air in mid-November. WJDM-1660 and KXBT-1640 were licensed as the result of a special act of Congress, but WCMQ-1700 was licensed through the regular expanded-band process. WCMQ is a Spanish-language station in Miami Springs, Florida, and IDs in Spanish as "CMQ," the call letters of a popular Cuban station in the 1950s. You will also hear English-language IDs on the hour, and mentions of affiliated FM stations on 106.3 and 107.9. I would expect to more expanded-band stations by the time you read this.

Something strange is happening with the call signs of the new expanded-band stations. The first three received the same calls as the regular-band stations they replace. But now, the FCC is assigning completely new calls to the new expanded-band permits. And these

aren't being assigned in alphabetical order (as the FCC usually does for new stations that haven't requested calls yet), but appear to have been requested by the stations. I don't know what's going on, but hope to have more information next month.

Bits and Pieces

Thanks to Pat Griffith for the Chicago tower pictures this month! These towers are easily visible from Interstate 290 in Schaumburg, near Woodfield Mall. The photos don't show an apartment complex located between the two stations. I would imagine the local Radio Shack does a land-office business in anti-RFI choke cores for renters' telephones!

Pat spoke with the chief engineers of these two stations for more information on their towers. At WBBM, the tall tower was built in 1942. It's 680 feet, with each face 10 feet across. The smaller tower is a 250-foot backup. WBBM CE Mark Williams told Pat that it doubles as lightning protection — during storms, they ground the 680-footer and hook the transmitter to the shorter tower. The taller one then helps prevent lightning

TABLE 1: Call sign changes		
The following AM stations have changed callsigns in the last month:		
Old call:	City:	New call:
WJHO-1400	Opelika, AL	WANI
KEZQ-1250	Little Rock, AR	KLIH
KTZN-710	Los Angeles, CA	KDIS
KANS-1510	Larned, KS	KNNS
WRUM-790	Rumford, ME	WLLB
WIFN-1590	Marine City, MI	WHYT
KATZ-1600	St. Louis, MO	KMJM
WMDC-1220	Hazlehurst, MS	WOEG
KDUN-1030	Reedsport, OR	KLLU
WLKW-790	Providence, RI	WSKO
WDAW-1350	Darlington, SC	WPFM
WVPA-1390	Arlington, VA	WZHF
WXRE-1490	Hampton, VA	WBVM
KKMO-1360	Tacoma, WA	KZTS

damage to the transmitting equipment.

WGN's facility is about 2 miles from WBBM's. Their tower dates back to 1938; it's 750 feet tall and 12 feet across. WGN's 266-foot auxiliary tower is somewhat easier to see in this picture.

Do you have any pictures of your locals, or that strange-looking station you drove past on vacation? Write Box 98, Brasstown NC 28902-0098, or by email to: 72777.3143@compuserve.com. Good DX!

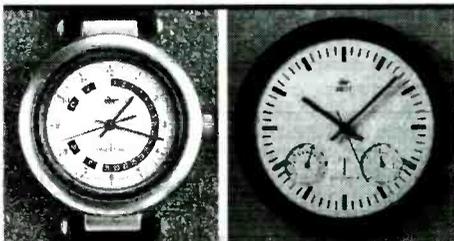
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FCC Accepts SW Application from Allan Weiner

More than two years ago, Allan Weiner filed an application with the FCC for a new legal shortwave station in Monticello, Maine. The FCC did nothing until last November, when it finally accepted the application for filing, probably because Weiner had signed up George Jacobs & Associates to represent him. Some factions at the FCC opposed this, remembering Weiner's long record of pirate radio, flouting FCC rules and regulations; but the powers that be decided he had done his time in limbo. This is, of course, only the first of several steps in putting a new station on the air. The application

originally planned to aim at Europe, 65 degrees, but this has been reversed to 245 degrees toward "Mexico," heh heh. Location is in the extreme northeast corner of the USA whence skip-zone will be minimized, at these coordinates: 46-20-30 N, 67-49-40 W, per official FCC info.

They never got around to it last year, but this year, a huge file of many, but not all international broadcasters involved in the High Frequency Coordination Committee, W97 registrations in frequency order, has been made available to the public at: <http://www.hfcc.org>

ALBANIA R. Tirana on 6088.36v at 0124, much clearer after 6085 station went off at 0200 (Dave Valko, PA, BC-DX)

ALGERIA R. Algeria International English at 1600-1700 retimed to 1200-1300 on 11715, 15160 (Patrick Travers, England via Edwin Southwell, *World of Radio*) Also Spanish after 1300 on same, but heavy Arabic interference on 15161.81 (Wolfgang Büschel, BC-DX)

ANTARCTICA R. La Colifata, the program from a neuro-psychiatric hospital in Argentina previously on WRMI, is scheduled for a special via LRA36, 15476, April 18 at 2000; special QSL card for reports with two IRCs to Casilla 17, 1640 Martinez, B.A., Argentina (Norberto Pugliese via Gabriel Iván Barrera, DSWCI DX Window)

ARMENIA V. of Armenia winter sked shows English on 9965. 4810 Mon-Sat at 2145-2215 (Guido Schotmans, Belgium, BC-DX) Leaving a gap at former time 2115 after German, but when we checked English was still at 2115-2145, altho announced as "2145-2215." Perhaps a change not yet implemented (gh) Other English: Sat/Sun 0400-0430 4810; Sun 1000-1030 15270, 4810 (BBCM)

AUSTRALIA RA keeps making frequency changes for the worse. The former loud and clear 9415 in our mornings from 1200 was moved to 9590, where it clashes with BBC/WYFR after 1300. On 49m, we have 6020 clashing with Bonaire and something in Chinese, while former 5870 and 5890 were in the clear (gh) Australian government directed RA to stop using extended-band frequencies; 9500 and 9590 are interim channels pending further talks with other Australian government agencies (Nigel Holmes, RA via BBCM)

RA's RealAudio service crashed when more than 100 people tried to access it during a sports broadcast (RA *Feedback* via BBCM)

Australian Defense Forces Radio was on 13625 at 0430-0630 for PNG area, Thu 1100-1200 on 4763 and others for Persian Gulf. Contemplating more hours and more power (Hugh MacKenzie [sic], ADFR via Hans Johnson, *Cumbre DX*) Used to be on 13525, typo? (gh)

BELARUS [non] Following closure of opposition newspaper in crackdown on press freedom, RFE/RL added SW frequencies for Belarus broadcast (VOA *Communications World*)

BELGIUM RVI announced a new QSL policy: one per semester rather than one per month. Doesn't bother me, since the last one I got was in 1958 for World's Fair Radio (gh)

CANADA RCI proposes increased funding from Ottawa in order to add German, Japanese and Portuguese services (*Globe & Mail* via Ivan Grishin)

CENTRAL AMERICA On his WWCR program, Jeff Baker said he plans to set up three SW transmitters somewhere in CAM, since the Feds are going to prohibit all far-right broadcasting from the USA! Had raised half the \$200K necessary, power as "4 million watts," presumably exaggerated ERP. We're very interested in which country—most of them would not welcome such a station. Perhaps only a "paper station" for fund-raising (James Latham, RFP) *Far Right Radio Review*) Checked his wacky, slow-loading website and found nothing about it yet: <http://www.remnantradio.org> (gh)

CHINA CRI has been running a "Macao Knowledge Contest," deadline for receipt of answers the end of Feb. Six winners get a free trip to Beijing and Macao (via Gigi Lytle, Bob Thomas)

One can be somewhat amused by commu-



Radio Tirana

nists jamming communists — Cuba's bubble jammer against R. Marti on 7405 stays on after 1400 marring CRI in English to us (gh)

Zhejiang PBS, Hangzhou, on 2475 at 2130-1505. Includes English lessons daily at 1430-1500. Silent period is Tue 0505-0855 (BBCM) Guizhou PBS, Guiyang, on 7275 and 3260 at 2210-0600, 0850-1605 in Std Chinese (BBCM) Qinghai PBS, Xining, 2220-2430 and 0925-1505 on 6260, 3950. Tibetan program 2255-2455, 0355-0545, 1055-1540 on 6500 (BBCM)

Among the new high-power frequencies of CRI from Urumchi: 7200 at 1700-1727, 1800-1827; 7230 at 1830-1927; 7255 at 1700-2057; 9635 at 2000-2057; 9670 at 1730-2157; 9900 at 1800-2257 in European languages including English at 1700, 2000, 2100 (Nagoya DX Circle via EDXP)

See my new "Radio China" website: <http://w2.dj.net.tw/~hansenglish/radio/> (Hans van den Boogert, Taiwan, *hard-core-dx*)

COLOMBIA R. Patria Libre, clandestine on 6250v at 1803-1826 for anniversary, claiming to have network of four regional stations. The next day on 6251v-6255, a R. Patria Libre imposter at 1800-1821 and 2200-2221 with insidious anti-guerrilla propaganda, quite successfully jamming the original RPL (Henrik Klemetz, *Dateline Bogotá* via *Play-DX*)

COSTA RICA RFPi's antenna for 6980-USB is a bobtail curtain, bi-directional N/S, less subject to wind-loading since it is closer to the ground and mostly wire (James Latham, RFPi) *Report from the Desert* by Richard McCarthy for Gulf War veterans has resumed, Wed 1845, Thu 0245, 0945 (gh)

CROATIA [non] HRT relay via Germany to SAM 0000-0200 moved to 9520 (via Bob Padula, *Electronic DX Press*) As we said, bad clash with WYFR and Habana on former 9505 (gh)

CUBA R. Morón, 1530, Ciego de Ávila, music heard around 0000 on 1640 and in almost hi-fi FM mode; ID at 0100 was for CMIX on 1530 (Jay Novello, NC)

[non] Having lost its plant in El Salvador for political reasons in 1997, La Voz del CID programs now appear on WRMI, 9955, such as *30 Minutos con El CID* M-F 2330-2400, Sat 1430-1500 (WRMI as of Dec)

R. Marti hopes to complete its move to Miami by early spring; will move from temp offices at 5325 NW 77th Ave to new building at 4201 NW 77th Ave (Cynthia Corzo, Miami *Herald* via Mike Cooper) New head is Roberto Rodriguez-Tejera, who quit his job at WQBA for diluting its commitment to the Cuban exile cause. Pay is \$85K a year (Bruce Taylor Seeman, *Herald* via Cooper) RM godfather Jorge Mas Canosa, head of the Cuban American National Foundation, died on Nov 23 (NPR via Tim Hendel) Ringleader of Miami's extreme right groups, promoter of anti-Cuban actions. He suffered from Paget's disease, was considered one of the ten richest Hispanic citizens in the US (R. Rebelde via BBCM)

CURAÇAO R. Koursou FM has started RealAudio stream at <http://www.koursou.com/> (Wian Stienstra, DSWCI DX Window) Antillean music is a fantastic blend of cultural influences (Andy Sennitt, *ibid.*)

CZECH REPUBLIC Parliamentary resolutions supporting SW for foreign policy purposes gave R. Prague hope that it could continue in 1998, at least in English (R. Prague mailbag) Letters of support needed to <cr@radio.cz> (Edwin Southwell, World DX Club Contact)

R. Prague at 1300 in German on 6055 and 7345 produce mixing product on 8635; 6055 in Czech at 1330 also puts spurs at 79 kHz intervals on 5818, 5897, 5976, 6134, 6213, 6292, 6371 (Wolfgang Büschel, Germany, BC-DX)

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

DOMINICAN REPUBLIC R. San Juan, 2880 = 2 x 1440 at 1059 ID, ads, weak but clear (Mark Mohrmann, VT, *Cumbre DX*)

ECUADOR HCJB's two separate English programs at 0700-0800+ on 9640 ex-9645 and 9365 still put mixing products now on 9090 and 9915 (Brian Alexander, PA) see also UKOGBANI



MW harmonics heard here: R. Sonorama, Riobamba on 2480 = 2 x 1240; R. Central, Riobamba on 2340 = 2 x 1170 at 1000, and an unID on 2560 (Don Moore, Ecuador, HCJB *DX Partyline*)

R. Quito is strong on 9838 = 2 x 4919 at 1250-1300, but hard to hear on the fundamental (Rafael Rodriguez, Colombia)

EL SALVADOR La Voz del CID is no longer allowed to broadcast from here (Jeff White, WRMI) Presumably refers to old 6305, 9941v frequencies; see also CUBA [non]

ERITREA V. of the Broad Masses of Eritrea, the official government station, program I in Tigre, Tigrigna, Kunama on 7085, 5000: 0300 (Sat, Sun 0400)-0500 (Sat 0700), Mon-Sat 0930-1030, Sun 1100-1300, Sat 1200-1300, daily 1500-1830. Program II in Arabic, Afar on 7390v, 4000: daily 0300-0400, 0930-1030, 1600-1800 (BBCM)

[non] A third opposition station via Sudan is on 9230, and others retimed: 1415-1445 V. of Free Eritrea, 1500-1530 V. of Democratic Eritrea, 1600-1630 V. of Truth (BBCM) Try contacting all three via the Foreign Information Department of the Eritrean Liberation Front-Revolutionary Council, P O Box 200434, Bonn, Germany. Request info with a prepared card; do not send a technical reception report which would confuse them and hurt chances for everyone (Nick Grace, Indonesia, *Cumbre DX*) The 9230 stations are often audible here, mostly in Arabic, which is not the primary language in Eritrea; how come? (gh) V. of Truth was heard on 9240, strong at 1500-1530 (Victor Goonetilleke, Sri Lanka, R. Nederland *Media Network*)

ETHIOPIA [non] Rainbow Radio, via DTK Germany in Amharic: Thu 1700-1800 11605, Sat 0100-0200 5905, 1800-1900 9490 (*PanView* via *BC-DX*)

V. of United and Free Ethiopia, or V. of One Free Ethiopia, Wed & Sun 1730-1830 on 12105 via Russia. Has webpage including 15 min of program in RA, and online feedback form, <http://www.ethiopia.org> and E-mail <unite@ethiopia.org> and new address ENC, P O Box 547, Swarthmore, PA 19081-0537 (Nick Grace, Indonesia, *Cumbre DX*)

V. of Oromo Liberation, now 1600-1700 exc Tue on Kiev 9980, says the current Ethiopian regime, under a veil of mock democracy, systematically oppresses and exploits the great Oromo nation of 25 megapeople; P. O. Box 510610, D-13366 Berlin, Germany (*BC-DX*) It's Mon/Wed/Sat only (BBCM)

FINLAND QSL cards for R. Finland can be obtained only through this address: Radio Finland, Raimo Makela, PL 113, 28101 Pori, Finland (Makela)

FRANCE R. Neige, the low-power NBFM transmitters at ski resorts are again being heard in parallel on 25710, 25900, 26070, until fade around 1600 (Alan Roberts, Québec, *World of Radio*)

Spur from RFI via French Guiana on 7740 at 0105-0130+ is a mix of two different French programs on 9790 and 5920; the math is: 9790 minus 5920 = 3870 x 2 = 7740 (Brian Alexander, PA, *World of Radio*)

GEORGIA V. of Hope Indian Beacon replaced 9310 at 1300-1530 with 12120 at 1400-1630; also VOH European Beacon on 6290 at 1630-2200 (Bob German, George Jacobs & Associates, via *BC-DX EDXP*)

GREECE VOG has a new Spanish newscast at 1815 to take advantage of USA relays on 15485, 17705, but also heard direct on 7450, 9420. For English at 1800, 15485 was missing until 1813 (gh)

GUAM *Pacific DX Report*, the best program on KTWR, is now sked: Fri 1045 9865, Sat 0940 15330, Mon 1615 15105, Tue 0900 15200 (via *EDXP*)

GUATEMALA At least in Dec. La Voz de Atitlán had a window on 2390 clear of both WWCR and XEJN, 1200-1300. Mentions of Santiago Atitlán were heard at 1213 and 1214 (gh, OK)

Is AWR still on the air? It's missing from the worldwide AWR sked (Mauno Ritola, Finland) Yes, it is on, but should not be with extremely distorted modulation and off-frequency, 5980.84 with full ID at 1232, also exact frequency detectable at 0055 (gh)

IRAN VIRI in English until March: 1100-1230 on 15230 15084 13605; 1530-1630 on 1305 11790 7215; 1930-2030 on 9022 7260 7160; 2130-2230 on 6175 6165; 0030-0130 on 9685 9022 6055 (BBCM) Moved from 6050 despite Spain on 6055 (Brian Alexander, PA)

The Mashhad studio of VIRI uses 7180 in Dari, Uzbek and Tajik at 0100-0300, 1330-1730 (BBCM)

[non] V. of the Communist Party of Iran, daily in Persian 1700-1800 on 4375v, 3920v, same frequencies shared with V. of the Iranian Revolution. Starts by playing the *Internationale*, with addresses in London, Stockholm (BBCM)

IRAQ [non] V. of the Islamic Revolution in Iraq, 7295 from Iran, expanded to *0330-0530 //7115, 9610, maybe 6195 (Tony Jones, Paraguay, via Marie Lamb, *Cumbre DX*)

IRELAND [non] WCRI's NAM service via 5905 Germany, UT Thu 0100-0159 has been broadcast live this winter, taking phone calls (Finbarr O'Driscoll, Ireland, *Review of International Broadcasting*)

KENYA KBC, 4935, is a personal challenge as to how early I can hear it. In Nov it was easy copy already at 1850 (Chuck Rippel, VA, DSWCI *DX Window*)

KOREA NORTH R. Pyongyang rescheduled English, including to NAM: 1800-1900 & 2100-2200 on 11700, 13760, 2300-2400 on 11335, 11700, 13760, 15130 (via Gigi Lytle, TX) Nothing here on 11700 or 13760, blocked by WHRI, at 18 and 21 (gh)

R. Pyongyang has been down a lot lately. They do a varying but small percentage of scheduled broadcasts, and give up on the rest. RP transmitters continue to be frequently down due to power shortage; many that are up are silent because the relay from the studio is down. A long silence is often followed by an attempt to make do with backup feeders on 3560, 4405, hence containing lots of noise, CW QRM and fading. RP is being sacrificed to keep the all-important jammers on against KBS, RKI, Voice of People, Echo of Hope, RFA, AWR, all in Korean, to name a few.

Harmonics from NK transmitters up to the sixth order are booming in during local daytime 0400-0600 on 5700, 6962, 10443, 11400, 12500, 12800, 14250, 17100, 18300, 23360, as well as jammers on 12690, 13020, 13200 (Sonny Ashimori, Japan, *hard-core-dx*)

R. Pyongyang sent an Oct issue of *Pyongyang Times* overflowing with praise of Kim Jong-Il, topped by claims that flowers and trees bloomed mysteriously in the fall as he was elected secretary-general of the Worker's Party of Korea! (via Gigi Lytle, *Review of International Broadcasting*)

LAOS Hearing radio from here is difficult, but now there is an alternative, the first Lao radio in cyberspace: <http://www.laowaves.com/> (Andy Sennitt, DSWCI *Caught in the Web*)

LIBERIA What has become of the old VOA relay site? Antennas still stand, but the grounds are home to 27,000 people displaced by the civil war. Tiny huts are open to cold winds from the nearby Atlantic and flooding at high tide. People sleep on the bare ground and commonly die of pneumonia. A former resident called "VOA a death trap, a hell on earth." (David C. Butty, *Detroit News* via Mike Cooper, *R.I.B.*)

R. Veritas, initially on 3450, was reported later on 3425 (Paul Ormandy, RNZI *Mailbox*) The Catholic church is fighting attempts by the Liberian government to shut down R. Veritas for operating illegally from a diplomatic enclave (Star Radio website via Hans Johnson, *Cumbre DX*)

ELWA is returning to the air on FM as the political situation is relatively stable again. There is a damaged 10 kW SW transmitter which needs to be worked on, and an antenna to be erected. No target date for return to SW (SIM on Moody's *Prime Time America* via Colin Miller, *rec.radio.shortwave*) Needs a new SW transmitter; some towers still up and cable in the ground. SIM now stands for Society for International Ministries, no longer Sudan Interior Mission (Ron Frazee, SIM, HCJB *DX Partyline*)

LITHUANIA [non] R. Vilnius via Germany tested 5880 for a while along with 5905 for English at 0030-0100, but 5880 had BBC Spanish adjacent on 5875 (Bob Thomas, CT) The heavy but intermittent fax against 5905 made it handy to have both, but I suppose they were thinking about moving (gh)

MALTA [non] VOM relay sked [via Russia] in English: daily 2000-2100 7440 to Eu; Sun 0200-0300 15550 & 17570 to Philippines, Au/NZ (Diao Xiaoli, PRC, *Cumbre DX*) VOM heard with new English broadcast Wed at 1200-1230 on 9660, presumably another Russian relay (Noel Green, England, *BC-DX*) V. of Mediterranean includes a *DX Corner* Sat in the 2000 (Bob Padula, *Electronic DX Press*)

MAURITIUS My latest meeting with MBC staff was very discouraging, as they have no intention of going on SW. They don't believe there is an audience for SW. If you would like to help me convince them of the importance of SW please contact me at: <vaghjee@intnet.mu> (Mahendra Vaghjee, *Cumbre DX*)

MÉXICO Longtime harmonic on 2640 = 2 x 1320 from XERJ, "La R-J," Mazatlán, Sinaloa, still appears around 1255, R. Huayacocotla winter sign-on is at *1303 on 2390 (gh, OK)

MOLODVA V. of Russia via Grigoriopol' on 7125 around 2300-0200, supposed to be in English to NAM, was blocked for weeks by a huge buzzing sound. Isn't anybody monitoring their own transmission? (gh) Likely a video signal, due to faulty satellite receiving equipment coupling into the audio (Kai Ludwig, Germany)



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MYANMAR R. Myanmar, 7185, surprisingly good with enjoyable local song at 0037; new transmitter or antenna? (Bob Hill, MA, DSWCI *DX Window*)

NIGERIA [non]. V. of Free Nigeria, Sat only at 1900-2000 moved from 11715 to 11645 due to interference from Iran. VOFN calls for a boycott of Coca Cola for doing lots of business with the military regime in Nigeria (Free Nigeria Movement)

NORWAY December revision of NRK and R. Denmark sked shows new 18950 to SAM at 1000-1055 only (via Jan Nieuwenhuis, BDXC) It's experimental instead of 21 MHz; audible here by 1045 (Joe Hanlon, PA) This and WSHB 18930 the only stations on the new 18 MHz band (gh)

OMAN BBC Eastern Relay verified with full data QSL letter after a year or more, photo of site, from Chris Dolman, A45XL, Senior Transmitter Engineer (George Maroti, NY, *Cumbre DX*)

PALESTINE [non] V. of the Palestinian Islamic Revolution operates from Iran, in Arabic daily 0400-0500 on 9670, 6020; 1930-2030 on 7230; may be one hour earlier in summer (BBCM)

PERÚ R. Frecuencia San Ignacio heard on 11354.4 = 2 x 5677.2 at 0230-0240 and next night from *0030, claiming to be on 5700 (Rafael Rodríguez R., Colombia, *World of Radio*)

Three weeks after "imminent" switch to 4780 requested by authorities, R. Satélite was still on 6725.56 at 0205-0300* (Brian Alexander, PA)

R. La Voz de Chiriaco, in Chiriaco, Bagua district, Amazonas dept., new on 5264.8 at 1110 with huayno music, full ID, 1135 into relay of R. Programas del Perú from Lima (Rafael Rodríguez, Colombia, *World of Radio*)

R. Gotas del Oro, Chiclayo, varies 4568-4574, heard around 1000, 2200 with lots of folk music, IDs only as "Frecuencia 14-30" (Don Moore, Ecuador, HCJB *DX Partyline*)

R. Frecuencia Nueva, 5304.98, Santa Cruz, new station with very frequent IDs and timechecks over and between songs, big signal at 2355 (Jay Novello, NC) It's really R. La Inmaculada, reactivated ex-5556.2, announced sked 2000-0230 (Henrik Klemetz, Colombia, DSWCI *DX Window*)

PHILIPPINES R. Veritas Asia "Pilipino" language is at 1500-1525 (Wed/Fri/Sun -1555) on 9685 (RVA via Bob Padula, *EDXP*) Another version says 9680 (Sonny Ashimori, *hard-core-dx*) Has included some elements in English (gh)

POLAND Here in deep NAM we await the annual peak of possible Polish propagation in Dec-Jan when the dim northern European noon absorption of PRW's too-low frequencies is minimized. English at 1300 can be audible on 9525, and sometimes top co-channel Spain via Costa Rica on 11815 (gh, OK)

PORTUGAL RDP Int'l, 17745 with sports around 1530, accompanied by strong matching spurs on 17908, 17583. Blocks Romania also on 17745 in English at 1300-1400 (gh) Portugal's 17745 is Sat/Sun only at 1300-2100 (BBCM) RDP East Timor service Sat/Sun 0800-1000 on 17595 produces two spurs on 17433.6 and 17756.7 (Wolfgang Büschel, Germany, *BC-DX*) Also sports, Sun around 1530 on 17745, with spurs 17908 and stronger on 17583 (gh, OK)

[non] Due to poor coverage to SE Australia, RDP is about to start tests via Jülich, Germany. For the Americas, RDP may also be relayed by VOA, sites not known. The 300 kW RDP transmitter is still inoperational, waiting on spare parts (Carlos de Assunção Gonçalves, *SW News* via *EDXP*)

ROMANIA Of the four frequencies for RRI English at 1300, 17745 is by far the best here tho for WEU, not NAM, but blocked by Portugal on weekends. *Letterbox* is Fri around 1340 (gh) RRI's new 0600-0700 English to NAM on 6155 clashed with Austria, so RRI forced off 6155 (Wolfgang Büschel, *BC-DX*) RRI replaced 6155 with 6095 for English to NAM at 0600, and still on 5965 with heavy Norway interference (Peter Hallam, N. Ireland, *World of Radio*) Took Saftica site out of mothballs for broadcasts only to neighboring countries, such as Russian 1300-1357 on 6185, 9570, 11775 (*PanView* via *BC-DX*) Maybe old site once used for R. España Independiente (Büschel, *BC-DX*)

RUSSIA We have started a VOR Listeners webring, to bring them closer together: <http://www.geocities.com/Athens/Delphi/6422> (Kathi Lawson)

SLOVAKIA AWR *Wavescan* announced it would no longer be aired via Rimavská Sobota (Edwin Southwell, England, *World of Radio*) I'll bet they move to DTK Jülich, Germany, where they have more transmitters than they know what to do with, and AWR has already started using (gh)

SOMALIA Unidentified gunmen attacked the north Mogadishu radio station of Ali Mahdi Muhammad, putting it off the air. Transmitters and generator were destroyed (AFP via BBCM) This refers to R. Mogadishu, V. of the Somali Republic, which had been on 6755 (BBCM)

R. Hargeisa, V. of the Republic of Somaliland (Somali: *Halkani wa Radio Hargeisa. Codka Jamhuriyada Somaliland*), P O Box 14, Hargeisa; street address: Ex-Indian Club, Tima-Cadde, near the Main Street, Hargeisa, in Somali on 7061-7071v, 0330-0530 and 1500-1800 (BBCM)

SUDAN [non] National Democratic Alliance, in Europe, confirms that V. of Sudan is transmitted from Eritrea, but thinks it is not audible in Europe or USA (Nick Grace, Indonesia, *Cumbre DX*) Heard on 7999.55 at *0357-0405+ //9025.03 (Brian Alexander, PA, *ibid.*)

SWITZERLAND Roland Anderau of SRI at the Schwarzenburg SW site told me when I visited in Oct that early in 1998 that site, Lenk and other SRI domestic sites will be closed down. SRI will retain an international SW service, leasing time from other broadcasters such as French Guiana (George Zeller, *The ACE Newsletter*)

TAHITI RFO's lingering transmitter was still detectable in Dec on 15167.35 around 2351. The signal is useful only for the memories it evokes of former exotic and good reception (gh)

TAIWAN VOFC's new address from Jan 1 is 55 Peian Road, Taipei, which is the same as the Central Broadcasting System. Does that mean the new Taipei Radio International comes under the Defense Ministry, which operated the CBS, while VOFC was part of the Broadcasting Corporation of China, hence a private enterprise? I love the VOFC for its brave speech often critical of the government who pays them to do so; fascinating political commentaries since the KMT lost the election. Will TRI be able to do the same? I sincerely hope so (Sonny Ashimori, Japan, *hard-core-dx*)

Premier Hsiao Wan-Chang says his government supports the intention of R. Free Asia to set up a relay station in Taiwan (*Chung Yang Jih Pao* via BBCM) RFA has not asked Taiwan to do this (*VOA Communications World*)

TANZANIA R. Tanzania-Zanzibar, 11734.1, at 1950-2000* closing with Qur'an and anthem, not every day (Brian Alexander, PA, *World of Radio*)

THAILAND We are still working on the five new services. Austerity is a must, with budget cuts, so Spanish, Russian and Arabic will have to wait. We shall start Tagalog and Cantonese shortly (Amporn Samsorn, R. Thailand, *World of Radio*) Changed both frequencies to NAM: 0030 on 13695, 0300 on 15460 (Warren561, *World of Radio*)

Dusit Palace Station [Or Sor], 6149, monitored: Mon, off air; Tue-Sat 0330-0500, 0900-1200, Sun 0230-0500 (Paul Yablo, Thailand, *Cumbre DX*)

TURKEY We are pleased that Americans like Turkish music. Turkish service to NAM is: 0800-2200 on 9460, 2200-0800 on 9445, 2300-0500 on 5980 (Rafet Eset, VOT via Gigi Lytle)

UKOGBANI BBC has launched the world's most comprehensive continuous news web site, and there are no commercials: <http://news.bbc.co.uk> (Colin Wilding, BBC, *rec.radio.shortwave*)

London Radio Service launches a 4-language news website, on behalf of the British Foreign & Commonwealth Office [i.e. government, unlike BBC]. Audio news reports can be downloaded and used by anyone: <http://www.lrs.co.uk> (Tim Ayris, LRS)

From Jan 1, HCJB, Ecuador is buying time on Merlin transmitters, once owned by BBC: 1700-1800 Uzbek and Tajik 7175; 1800-1900 Russian, Ukrainian on 6150; 2100-2200 Arabic 6090 (John Beck, HCJB *DX Partyline*)

UKRAINE RUI's 1200-1300 English is heard on 9870 (gh) Listed // 17725, 7285, for EU/As/Au (BBCM) R. Ukraine home service heard on 5985 and on 3 x 5985 = 17955 around 1400 (Jürgen Lohuis, Germany, DSWCI *DX Window*)

UNITED ARAB EMIRATES Tho missing from sked issued by UAE Radio, Dubai, itself, the best English broadcast for us continues to be 1330-1352 on 13675, also on much poorer 13630, 15395 and occasionally propagating on 21605 (gh)

URUGUAY Emisora Ciudad de Montevideo, 9650v, is scheduled 1300-2130, sometimes much later for sports, and during February's summer carnival (Horacio Nigro, Uruguay) Heard one evening only with sports until 0208:30* (David Clark, Ont., *Cumbre DX*)

USA The disused VOA SW transmission towers at Bethany, OH, were demolished on Dec 2, 1997. The VOA site was declared surplus by the government in 1995 (Sa'udi news agency UPI via Mike Cooper) In a strange policy decision, unlike many other major broadcasters, VOA is keeping off the increasingly useful 13m band, for W97 using only one frequency 21485 at 1730 for an hour or less per day (gh)

WHRA in Maine, ex-WVHA, expected to test in January, with official first day of programming Feb 15, Lester Sumrall's birthday (Joe Brashier, *Cumbre DX*)

WGTV tested second transmitter for two days in late Nov on 9505 with 340° rhombic, but this may not be ultimate frequency; applied for 3200 and 6955. New transmitter uses digital modulation (gh)

More MW harmonics: WCLW, Eden, NC, 2260 = 2 x 1130 at 1131 ID; WKEN, Dover, DE, 3199.97 = 2 x 1600, tentative at 1020 ID (Mark Mohrmann, VT, *Cumbre DX*)

World Radio Network has some more FM affiliates, which may or may not be carrying WRN when *World of Radio* is on; can anyone confirm near these low-power outlets? WMCO, 90.7, New Concord OH; and WFNP, 88.7, Rosedale NY, Sat noon and Sun 1:30 am EST; KMUD, 91.1, Garberville/Redway CA, Sat 9 am, 10:30 pm PST (gh) WRN hopes to install a RealAudio 5 server this year; until then some need to use ftp rather than http to download *World of Radio* from the <http://www.wrn.org> Sound Store, where only the past four programs are kept (Karl Miosga, WRN)

[non] Brother Stair via Germany with additional broadcast 1300-1400 on 15185 (*PanView* via *BC-DX*)

VANUATU R. Vanuatu, 4960.1, at 1008 flute interval signal, French, 1016 orchestral anthem and chimes, 1019 ID (Roger Chambers, NY)

VIETNAM Re the Dec item on new facilities: VOV has 4, not 5 new transmitters in the Mekong Delta, but they are all mediumwave—one 2 megawatt Harris and three 500 kW Harris. Two more MW transmitters are under construction in the north, supplied through Marconi by Nautel. VOV put them all out for tender a couple of years ago (B. Dawson, P.E., WA)

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



Gayle Van Horn

0000 UTC on 6980 USB

COSTA RICA: Radio for Peace Int'l. Spanish program F.I.R.E. on // 7385 to English at 0100. Noted in English on 15050 // 21465 USB at 2300-2354. (Lee Silvi, Mentor, OH)

0020 UTC on 4485

PERU: Radio Frecuencia. Evening chat to station ID and regional commercial. Tentative ID on Peru's **Radio Oriente** on 6188 at 1150, poor quality noted. (Frank Hillton, Charleston, SC)

0030 UTC on 4779.9

GUATEMALA: Radio Buenas Nuevas. Spanish. Clear "Radio Buenas Nuevas Guatemala" ID audible with fair signal quality. Poor propagation noted with HCJB and Swiss Radio Int'l barely audible. (Joe Karthaus, Canada/*Cumbre DX*)

0045 UTC on 4960

ECUADOR: Radio Federacion. Talks about Ecuador to national anthem and 0101*. Open carrier past 0101. (Tom Messer, River Falls, WI/*Hard Core DX*)

0200 UTC on 11710

ARGENTINA: RAE. English to North America alternating a few minutes of news with a few minutes of nice Argentine folk tunes. (Silvi, OH)

0221 UTC on 2390

GUATEMALA: La Voz de Atitlan. Latin vocals at unusually good level, only weak carrier noted on 2360. (David Clark, Thornhill, Ontario, Canada/*The Four Winds*)

0308 UTC on 4935

KENYA: KBC. World news headlines to domestic news at 0310. Fanfare to brass band music, mixing with higher frequency Brazilian. (Clark, CAN)

0338 UTC on 15415

BRAZIL: Radio Clube. Musical program to time check and ID "una e trienta oito minutos em la Clube...Peter Ctera em la Clube." (Nicolas Eramo, Buenos Aires, Argentina/*The Four Winds*)

0354 UTC on 5030

COSTA RICA: AWR Radio. Spanish. Classical music to ID at 0400, "envie sus cartas y reportes de recepcion ...Alajuela, Costa Rica..." SINPO=23322. (Eramo, ARG)

0354 UTC on 4945

BOLIVIA: Radio Illimani. Male/female duo to sign-off ID as, "amigos de Bolivia y del mundo Radio Illimani...nos despedimos...que Dios les bediga y tengan un descanso reparador." National anthem to 0400*. (Eramo, ARG)

0515 UTC on 5003

EQUATORIAL GUINEA: Radio Nacional. Hi-life music to rather poor signal quality with silent periods. Copied some IDs, not clear on their broadcast language. Signal had faded by 0540. (Piet Pijpers, Netherlands/*Cumbre DX*)

0700 UTC on 4918

ECUADOR: Radio Quito. ID and time at the hour to frequency schedule. Ecuador's **HCJB** noted on 5865//9365 with *Studio 9* program to IDs. (Mark Veldhuis, Borne, Netherlands/*Hard Core DX*)

0711 UTC on 11920

SINGAPORE: Radio Japan-Kranji relay. News in English covering financial stats, weather and top news from Asian headlines, // 7230 **Skelton, UK, / 17810 Yamata, Japan, / 17815 Ascension Islands.** (Veldhuis, NLD)

0820 UTC on 11915

BRAZIL: Radio Gaucha. Portuguese. Announcer's chat and advertisements to ID. Listed sign-on is 0900. Brazil's **Radio Clube do Para** noted on 4885, 2115-2130 with IDs and items about Belem. (Tom Banks, Dallas, TX)

0851 UTC on 11925

JAPAN: Radio Japan. Japanese interview to musical interlude. ID to time check and news. Co-channel interference from **Radio Brasil Central** which included an ID at 0854. (Veldhuis, NLD) Japan's **Radio Tampa** heard on 3925 at 1252. (Brian Boulden, Fairfield, CA)

1030 UTC on 6195

ANTIGUA: BBC World Service. *Discovery* segment on making headless frogs eventually to create independent human organs for transplants. (Bob Fraser, Cohasset, MA)

1140 UTC on 9580

AUSTRALIA: Radio Australia. *Australia Today* featuring the role of modern Australian women. (Fraser, MA)

1249 UTC on 3220

CHINA: Central People's BS. Very weak programming in Chinese with talk and regional music. (Boulden, CA)

1312 UTC on 5825

USA: WEWN. *End of the Times* discussion, to readings on Daniel the prophet. Very clear reception. (Boulden, CA)

1315 UTC on 13805

NORWAY: Radio Norway Int'l. Feature on carnivores of the Scandinavian

forests. (Fraser, MA)

1502 UTC on 4777

INDONESIA: RRI Jakarta. Indonesian. National news to station ID. SINPO=32442. (Veldhuis, NLD; Liangas, GRC) Indo's noted as; **RRI-Ujung Pandang** 4753.3 at 1510-1517; **RRI-Pontianak** 3976 at 1519-1525; **RRI-Tanjung Karang** 3395.1 at 1526-1536. (Veldhuis, NLD)

1544 UTC on 4959.6

VIETNAM: Voice of Vietnam. Regional music to station ID. Replay of station's signature tune. Presumed newscast in Asian dialect. (Veldhuis, NLD)

1605 UTC on 11570

PAKISTAN: Radio Pakistan. English news read by lady announcer to 1610. Item on national waterways system to 1614 and regional music. Overall good readable signal thanks to long path propagation. (Mark J. Fine, Remington, VA)

1830 UTC on 4950

ANGOLA: Radio Nacional de Angola. Continuous pop English songs to ad for Castor Beer. Portuguese chat with 1900 ID and *Journal News Bulletin*. Fair reception. (Mahendra Vaghjee, Rose Hill, Mauritius)

1830 UTC on 6230

GEORGIA: Georgian Radio. Heard programming in English and German, with co-channel interference from Radio Tashkent. Russian noted 2030-2100. (Nikolay Pashkevich, Russia/*Cumbre DX*)

1851 UTC 9260 USB

ICELAND: Rikisutvarpid. Noted this frequency instead of scheduled 9275 with vocal ballad and usual Icelandic talk; // 11402 instead of scheduled 7735. (Bob Hill, Littleton, MA/*The Four Winds*)

2015 UTC on 7465

ISRAEL: Kol Israel. Item on a committee to investigate Rabin's assassination proposed, // 9365, 9435. (Fraser, MA)

2027 UTC on 9675

BRAZIL: Radio Cancao Nova. Portuguese. Religious talk and prayers. *Ava Maria* tune to short musical interlude and station ID. (Veldhuis, NLD)

2042 UTC on 4782.3

MALI: ORTM. Vernacular text to native music. No signal noted on // 4835. SINPO=23432. (Veldhuis, NLD)

2051 UTC on 11785

IRAQ: Radio Iraq Int'l. French text on topography to instrumental interludes. Strong signal, however undermodulated. **Deutsche Welle's** interval signal on frequency. (Veldhuis, NLD)

2105 UTC on 9605

MADAGASCAR: Radio Netherlands relay. *State of the Arts* program chats on the future of electronic music. (Fraser, MA)

2145 UTC on 3396

ZIMBABWE: ZBC. Noted on 3396 instead of 4828, with pop tune *All Out of Love*. Good signal quality for // 3306. (Clark, CAN)

2200 UTC on 7520

MOLDOVA: Radio Moldova Int'l. English service including IDs and news with poor modulation. (Martin Schoech, Merseburg, Germany/*The Four Winds*)

2250 UTC on 4732.31

BOLIVIA: Radio La Palabra. Spanish. Clear signal with RTTY interference to 2307. Regional Bolivian music to 2355 tune-out. Signal improved from previous monitoring. (Robert C. Wilkne, FL/*Hard Core DX*)

2300 UTC on 13760

NORTH KOREA: Radio Pyongyang. News item on the praising of army units. // 11335, 11700. Fair to poor quality. Spanish service at 0000. (Fraser, MA)

2330 UTC on 4750

CHINA: Xizang PBS. Chinese text with low modulation. China's **Voice of the Strait** heard on 5050 at 2335, with very clear anthems and text. (Zacharias Liangas, Thessaloniki, Greece/*The Four Winds*)

2350 UTC on 11939.28

PARAGUAY: Radio Encarnacion. Fair and clear level with talk from announcer; however, poorer level for recorded music at 2352. Very nice readable signal at 0014, absence of any signal on 11940. (Clark, CAN)

2355 UTC on 6811.3

PERU: Ondas del Rio Mayo. Spanish. Male announcer to advertisements. Musical program to comunicados (messages) segment for local residents. ID, "Ondas del Rio Mayo...para todo Cajamarca." SINPO=23222. (Eramo, ARG)

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.

DXing the Bottom of the World

The month of February continues to be an excellent month for winter listeners to monitor the tropics, medium wave and utility stations...but have you considered DXing Antarctica?

Radio Nacional Arcangel San Gabriel (also known as LRA36), is an Argentine government station operated by personnel of the Argentine army. Broadcasting from Base Esperanza, the station has been heard in Spanish at their 1800 sign-on, to shortly after 2330 UTC, with a multilingual sign-off on 15476 kHz.

During our winter months, LRA36 is broadcasting during their summer, which allows for an opportune DX window to log and, yes, even verify!

Return postage is required for a reply and I recommend Argentine mint postage stamps from Bill Plum's DX Stamp Service (12 Glenn Rd., Flemington, NJ 08822-3322). Write

Bill with an SASE for his latest price list.

Send your report in Spanish, English or French to:

Radio Nacional Arcangel San Gabriel-LRA36, Base Esperanza, Tierra del Fuego, Antartida e Islas del Atlantico Sur, 9411 Argentina. If you receive no reply, try sending two IRC's c/o G.I.B., Casilla 2868, 1000 Buenos Aires, Argentina. Don't wait until next winter to log this excellent catch!

You'll also have one opportunity this year to hear Radio La Colifata, which will broadcast through the transmitters of LRA36 for the Base

Esperanza staff and all DXers and shortwave listeners. The program can be heard on WRMI on 9955 on **April 18th** from 0230-0300. All reports will be confirmed with a special QSL card if sent with two IRCs to; Radio Colifata, Casilla 17, 1640-Martinez (B.A.), Argentina.



COLOMBIA

Radiodifusora Nacional de Colombia, 4955 kHz. No data *Inravisión* QSL postcard, signed by Athala Morris-Directora. Veri signer stated the station prefers reports in the SINPO code. Received in 204 days for a Spanish report and mint stamps (not used on reply). Station address: Avenida El Dorado, CAN, Edificio de Inravisión, Santefe de Bogota, D.C., Colombia. (Randy Stewart, Springfield, MO)

COSTA RICA

Radio Reloj, 4832 kHz. Full data QSL card signed by Francisco Barabona. Received in 30 days for an English report, one U.S. dollar and souvenir baseball cards. Station address: Sistema Radiofonico H.B., Apartado 341, 1000 San Jose, Costa Rica. (Tom Messer, River Falls, WI)

FM/TV

WJFR-FM 88.7. Full data QSL letter signed by Michael H. Lewis-Operations Manager. Received for an English FM report and an SASE. Station address: c/o Family Stations Inc., P.O. Box 40345, Jacksonville, FL 32203-0345. (Hank Holbrook, Dunkirk, MD)

WJNN-FM 106.7. Full data prepared QSL card with illegible signature. Received for an English FM report and an SASE. I have been after this station's QSL for a long time and finally got them to sign my prepared card! Station address: 403 S., Rt 47-Rd 5, Cape May Court House, NJ 08210. (Holbrook, MD)

CBVG-FM 88.5. Full data QSL letter signed by Carla Brown-Production Assistant. Received for an English FM report. Original report sent to CBVG Gaspe, follow up report sent c/o CBVE main NET station. Station address: Canadian Broadcasting Corp., 900 Place Dyouville, Quebec City, Quebec G1R 3PZ Canada. (Holbrook, MD)

WNGS-TV Springfield, NY-Ch. 67. Full data prepared QSL card and personal letter from Caroline K. Powley-Owner. Received in 3 weeks for a TV reception report and mint stamps. Station address: 9279 Dutch Hill Rd., West Valley, NY 14171. (Robert S. Ross-VA3SW, London, Ontario, Canada/*amfimtvdX*)

IRELAND

Radio Telefis Eireann, 12160 kHz. Full data postcard QSL unsigned. Received in 193 days for a taped report and one U.S. dollar. Station address: Broadcasting Developments, Radio Telefis Eireann, Dublin, 4, Ireland. (Walt Szczepaniak, Philadelphia, PA)

MADAGASCAR

Radio Malagasy, 5010 kHz. Full data verification letter initial by Many Rafenomanatsoale Directeur de R.N.M. Letter was received via airmail and was a copy of a fax form letter, confirming my report details. After years of endless attempts, I sent a fax (00261-2-31719) of my reception report. Station address: Boite Postal 442-Anosy Antananarivo 101 Madagascar. (Beppe Gornati, Concorezzo, Italy/*Hard Core DX*)

MEXICO

Radio Mil-XEOII, 6010 kHz. Full data verification letter plus two station stickers signed by Zoila Quintanar Flores. Received in 20 days for a Spanish report and one U.S. dollar. Station email: inform@nrm.com.mx Station address: NRM, Insurgentes Sur 1870, Col. Florida, 01030 Mexico D.F., Mexico. (Messer, WI)

MOROCCO

Radio Free Europe/Radio Liberty via Briech, Morocco, 7155 kHz. Full data verification on station letterhead signed by David Walcutt-Broadcast Operations Liaison. Received in 12 days for an English report of Kazakh service, mint stamp, souvenir postcard and SAE (not returned) Station QSL address: RFE/RL, Inc., 1201 Connecticut Ave., Washington, DC 20036. (Gayle Van Horn, Brasstown, NC)

NEPAL

Radio Nepal, 5005 kHz. Full data QSL card signed by R.R.S. Karki. Received for an English report. Station address: P.O. Box 634, Kathmandu, Nepal. (Zacharias Liangas, Thessaloniki, Greece)

PIRATES

Radio Metallica Worldwide, 6955 kHz USB. Blue no-data QSL card with tornado graphic and a personal note signed by Dr. Tornado. Received in five months for a pirate report. QSL mail drop: P.O. Box 109, Blue Ridge Summit, PA 17214. (Jari Lehtinen, Finland/*Hard Core DX*)

Radio San Marino Int'l, 11410 kHz USB. Folder QSL card signed by S. Gasparoni. Received for a pirate report of test transmission broadcasting from the territory of San Marino, with 0.3 kW and inverted-V antenna. QSL mail drop: RSMI-c/o Play DX, via Davanzati 8, 20158 Milano, Italy. (or) RSMI, P.O. Box 411131, 55068 Mainzi, Germany. (Giampiero Bernardin, Italy; Christopher Ratzer, Salzburg, Austria *Hard Core DX*)

SHIP TRAFFIC

Cho Yang World-D9TZ, 156.87/156.4 MHz (Container). Full data prepared QSL card verified plus photo of vessel. Received for an English utility report and U.S. currency. Ship address: Cho Yang Shipping Co., Ltd., Cheong-Ahm Bldg., 35-3 Sosomun-dong-Chung-gu, P.O. Box 1163, Seoul 100, South Korea. (Holbrook, MD)

Medan-9VHL, 156.8/156.4 MHz (Car Carrier). Full data prepared QSL verified plus postal card of vessel. Flag changed call from SJUF to Singapore flag 9VHL. Received for an English utility report and U.S. currency. Ship address: Walleniusrederierna, S-104 62, Stockholm, Sweden. (Holbrook, MD)

TURKS & CAICOS ISLANDS

Radio Vision Int'l, 530 kHz AM. Full data verification letter signed by Peter Polanco-Chief Engineer, plus station bumper sticker. Received in 11 days via U.S. address for an English AM report and one U.S. dollar. QSL address: P.O. Box 2908, Paterson, NJ 07509-2908. (Pat Griffith, Federal Heights, CO)

HOW TO USE THE SHORTWAVE GUIDE.

1: Convert your time to UTC.

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

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

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

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

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

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

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

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

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

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

SWL PROGRAMS

COMPILED BY JIM FRIMMEL

Sundays

0000 WRMI (Florida): "Wavescan" (1/3/5)
0020 Radio Exterior de Espana: "Distance Unknown"
0109 HCJB (am): "DX Partyline"
0120 Radio Exterior de Espana: "Distance Unknown"
0200 Radio For Peace Intl: "World of Radio"
0234 Radio Havana Cuba: "DXers Unlimited"
0258 Vatican Radio: "On-the-Air"
0300 WWCR #3 (Tennessee) (5070): "Spectrum"
0305 Australia, Radio: "Feedback"
0409 HCJB (am): "DX Partyline"
0415 Voice of Turkey: "DX Corner (biweekly)"
0430 WRMI (Florida): "Wavescan"
0500 WWCR #1 (Tennessee): "Spectrum"
0520 Radio Exterior de Espana: "Distance Unknown"
0530 WHRI (Angel 2 Indiana) (5760): "DXing with Cumbre"
0530 Australia, Radio: "Media Report"
0547 Radio Bulgaria: "Radio Bulgaria Calling"
0608 Vatican Radio: "On-the-Air"
0634 Radio Havana Cuba: "DXers Unlimited"
0730 KWHR (Angel 4 Hawaii) (17555): "DXing with Cumbre"
0730 WWCR #3 (Tennessee) (5070): "World of Radio"
0835 Radio Vlaanderen Intl: "Radio World"
0836 Radio Korea: "Multiwave Feedback"
0900 Radio For Peace Intl: "World of Radio"
0905 BBC (am/au): "Write On"
0905 BBC (af): "Write On"
0905 BBC (as): "Write On"
0930 WHRI (Angel 2 Indiana) (5760): "DXing with Cumbre"
1100 AWR Latin America: "Wavescan"
1137 Radio Korea: "Multiwave Feedback"
1205 BBC (am/au): "Write On"
1205 BBC (as): "Write On"
1215 WWCR #1 (Tennessee): "Ask WWCR"
1236 Radio Korea: "Multiwave Feedback"
1237 Radio Korea: "Multiwave Feedback"
1247 Radio Bulgaria: "Radio Bulgaria Calling"
1300 KWHR (Angel 4 Hawaii) (11565): "DXing with Cumbre"
1305 Radio Vlaanderen Intl: "Radio World"
1330 WHRI (Angel 1 Indiana) (9495): "DXing with Cumbre"
1330 WRMI (Florida): "Wavescan"
1352 Vatican Radio: "On-the-Air"
1430 WHRI (Angel 1 Indiana) (15105): "DXing with Cumbre"

1501 BBC (af): "Waveguide" (4)
1501 BBC (as): "Waveguide" (4)
1630 KWHR (Angel 3 Hawaii) (9930): "DXing with Cumbre"
1636 Radio Korea: "Multiwave Feedback"
1705 BBC (as): "Write On"
1735 Radio Vlaanderen Intl: "Radio World"
1830 KWHR (Angel 3 Hawaii) (9930): "DXing with Cumbre"
1830 WHRI (Angel 2 Indiana) (13760): "DXing with Cumbre"
1835 Radio Vlaanderen Intl: "Radio World"
1936 Radio Korea: "Multiwave Feedback"
2105 BBC (am/au): "Write On"
2105 BBC (as): "Write On"
2130 KWHR (Angel 4 Hawaii) (17555): "DXing with Cumbre"
2130 WRMI (Florida): "Wavescan"
2135 BBC (af): "Write On"
2136 Radio Korea: "Multiwave Feedback"
2200 AWR-Europe (Slovakia): "Wavescan"
2300 AWR Latin America: "DXing with Cumbre"
2300 KSDA (Guam): "Wavescan"
2300 Radio For Peace Intl: "World of Radio"
2330 Australia, Radio: "Media Report"

Mondays

0230 Radio Korea: "Multiwave Feedback"
0305 BBC (am/au): "Write On"
0305 BBC (af): "Write On"
0330 KWHR (Angel 4 Hawaii) (17555): "DXing with Cumbre"
0400 WWCR #1 (Tennessee): "World of Radio"
0430 Radio New Zealand Intl: "Mailbox (biweekly)"
0700 Radio For Peace Intl: "World of Radio"
0730 BBC (af): "Waveguide" (4)
1040 All India Radio: "DX-ers Corner" (2/4)
1615 KTWR (Guam): "Pacific DX Report"
1840 All India Radio: "DX-ers Corner" (2/4)
2015 Radio Tallinn: "Radio Estonia DX Program"
2130 All India Radio: "DX-ers Corner" (2/4)
2200 WWCR #1 (Tennessee): "Ask WWCR"

Tuesdays

0500 WGTG (Georgia): "World of Radio"
0900 KTWR (Guam): "Pacific DX Report"
1210 AWR Latin America: "Wavescan"
1330 WWCR #1 (Tennessee): "World of Radio"
1346 Radio Sweden: "MediaScan" (1/3)
1355 FEBC (Philippines): "DX Dial"

1446 Radio Sweden: "MediaScan" (1/3)
1615 BBC (am/au): "Waveguide" (4)
1846 Radio Sweden: "MediaScan" (1/3)
1900 Radio For Peace Intl: "World of Radio"
2100 Polish Radio: "Polish Radio DX Club"
2109 Radio Havana Cuba: "DXers Unlimited"
2309 Radio Havana Cuba: "DXers Unlimited"
2340 All India Radio: "DX-ers Corner" (2/4)

Wednesdays

0135 Radio Havana Cuba: "DXers Unlimited"
0146 Radio Sweden: "MediaScan" (1/3)
0246 Radio Sweden: "MediaScan" (1/3)
0300 Radio For Peace Intl: "World of Radio"
0335 Radio Havana Cuba: "DXers Unlimited"
0345 BBC (as): "Waveguide" (4)
0346 Radio Sweden: "MediaScan" (1/3)
0535 Radio Havana Cuba: "DXers Unlimited"
0730 HCJB (eu): "Ham Radio Today"
0930 HCJB (pac): "Ham Radio Today"
1000 Radio For Peace Intl: "World of Radio"
1230 BBC (am/au): "Waveguide" (4)
1315 FEBC (Philippines): "DX Dial"
1820 Argentina, RAE: "DX-ers Special"
1820 Polish Radio: "Polish Radio DX Club"
1930 HCJB (eu): "Ham Radio Today"
2206 Radio Budapest Intl: "Radio Budapest DX Show"
2345 BBC (as): "Waveguide" (4)

Thursdays

0130 HCJB (am): "Ham Radio Today"
0239 Argentina, RAE: "DX-ers Special"
0336 Radio Budapest Intl: "Radio Budapest DX Show"
0430 HCJB (am): "Ham Radio Today"
0754 Radio Netherlands Intl: "Media Network"
0830 Radio New Zealand Intl: "Mailbox (biweekly)"
0953 Radio Netherlands Intl: "Media Network"
1153 Radio Netherlands Intl: "Media Network"
1320 Polish Radio: "Polish Radio DX Club"
1352 Radio Netherlands Intl: "Media Network"
1515 BBC (as): "Waveguide" (4)
1753 Radio Netherlands Intl: "Media Network"
1954 Radio Netherlands Intl: "Media Network"
2130 WWCR #1 (Tennessee): "World of Radio"

Fridays

0053 Radio Netherlands Intl: "Media Network"
0053 Radio Netherlands Intl: "Media Network"

0253 Radio Netherlands Intl: "Media Network"
0453 Radio Netherlands Intl: "Media Network"
0730 Australia, Radio: "Media Report"
1045 KTWR (Guam): "Pacific DX Report"
1930 Radio New Zealand Intl: "Mailbox (biweekly)"
2000 Radio For Peace Intl: "World of Radio"
2047 Radio Bulgaria: "Radio Bulgaria Calling"
2100 WWCR #1 (Tennessee): "Ask WWCR"
2105 Australia, Radio: "Feedback"

Saturdays

0010 Australia, Radio: "Feedback"
0044 Radio Bulgaria: "Radio Bulgaria Calling"
0200 WRMI (Florida): "Wavescan"
0230 KWHR (Angel 3 Hawaii) (17510): "DXing with Cumbre"
0400 Radio For Peace Intl: "World of Radio"
0600 WHRI (Angel 1 Indiana) (7315): "DXing with Cumbre"
0600 WHRI (Angel 2 Indiana) (5760): "DXing with Cumbre"
0605 Australia, Radio: "Feedback"
0700 WWCR #1 (Tennessee): "World of Radio"
0700 WWCR #3 (Tennessee) (5070): "World of Radio"
0709 HCJB (eu): "DX Partyline"
0800 KWHR (Angel 4 Hawaii) (11565): "DXing with Cumbre"
0909 HCJB (pac): "DX Partyline"
0940 FEBC (Philippines): "DX Dial"
0940 KTWR (Guam): "Pacific DX Report"
1015 WWCR #3 (Tennessee) (5070): "Ask WWCR"
1030 Voice of America (as pac): "Communications World"
1100 Radio For Peace Intl: "World of Radio"
1130 KWHR (Angel 3 Hawaii) (9930): "DXing with Cumbre"
1230 Voice of America (as pac): "Communications World"
1230 WWCR #3 (Tennessee) (5070): "World of Radio"
1247 Radio Bulgaria: "Radio Bulgaria Calling"
1342 Radio Tashkent: "Radio Tashkent DX Program"
1345 Voice of Turkey: "DX Corner (biweekly)"
1455 FEBC (Philippines): "DX Dial"
1530 WHRI (Angel 2 Indiana) (6040): "DXing with Cumbre"

(Continued on page 41)

FREQUENCIES

0000-0100	Anguilla, Caribbean Beacon	6090am				0000-0100	Spain, R Exterior Espana	6055am			
0000-0100	Australia, Radio	9660pa	12080pa	13605pa	13755pa	0000-0030	Thailand, Radio	9655af	9680af	11905af	
		15510pa	17750as	17795pa		0000-0030	UK, BBC Asian Service	3915as	6195as	7110as	9410as
0000-0100 vl	Australia, VL8K Katherine	5025do						9580as	11945as	11955as	15280as
0000-0100 vl	Australia, VL8T Tent Crk	4910do				0000-0100	UK, BBC World Service	15310as	15360as		
0000-0100	Bulgaria, Radio	7375na	9485na					5970sa	5975am	6175na	9590am
0000-0015	Cambodia, Natl Voice of	11940as				0000-0100	USA, KAIJ Dallas TX	9915sa	11750sa		
0000-0100	Canada, CBC N Quebec Svc	9625do				0000-0100	USA, KTBN Salt Lk City UT	5810am			
0000-0100	Canada, CFRX Toronto	6070do				0000-0100	USA, KWHR Naalehu HI	7510am			
0000-0100	Canada, CFVP Calgary	6030do				0000-0100	USA, KWHR Naalehu HI	7560as	17510as	17555pa	
0000-0100	Canada, CHNX Halifax	6130do				0000-0100	USA, Monitor Radio Intl	7535am	9430am	15665as	
0000-0100	Canada, CKZN St John's	6160do				0000-0100	USA, Voice of America	7215as	9890as	11760as	15185as
0000-0100	Canada, CKZU Vancouver	6160do				0000-0100	USA, Voice of America	15290as	17735as	17820as	
0000-0029	Canada, R Canada Intl	5960na	6040na	9535na	9755na	0000-0030 twhta	USA, Voice of America	5995am	6130ca	7405am	9455am
		11865am						9775am	11695am	13740am	
0000-0027	Czech Rep, Radio Prague	5930na	7345na			0000-0100	USA, WEWN Birmingham AL	5825eu			
0000-0100	Ecuador, HCJB	9745am	21455am			0000-0100	USA, WGTG McCaysville GA	5085am			
0000-0030	Egypt, Radio Cairo	9900na				0000-0100	USA, WHRI Noblesville IN	5745am	7315am		
0000-0100	Germany, Overcomer Ministr	5840na				0000-0100	USA, WINB Red Lion PA	11950am			
0000-0015 vl	Ghana, Ghana Broadc Corp	3366do	4915do			0000-0100	USA, WJCR Upton KY	7490na			
0000-0045	India, All India Radio	7410as	9705as	9950as	11620as	0000-0100	USA, WRMI/R Miami Intl	9955am			
0000-0100	Japan, R Japan/NHK World	6155eu	6180eu	13630as	13650as	0000-0100	USA, WRNO New Orleans LA	7355am			
0000-0100	Lebanon, Voice of Hope	9960va				0000-0100	USA, WWCR Nashville TN	3215am	5070am	7435am	13845am
0000-0100	Liberia, LCN/R Liberia Int	5100do				0000-0100	USA, WYFR Okeechobee FL	6085na	9505ca		
0000-0100	Malaysia, Radio	7295do				0029-0059	Canada, R Canada Intl	5960na	9755na		
0000-0100	Malaysia, RTM Kuching	7160do				0030-0100	Iran, VOIRI	6050eu	9022eu	9685eu	
0000-0030	Netherlands, Radio	6020na	6165na			0030-0100	Lithuania, Radio Vilnius	5880na	5905na		
0000-0100	New Zealand, R NZ Intl	15115pa				0030-0100	Netherlands, Radio	5905as	6020na	6165na	7305as
0000-0100	North Korea, R Pyongyang	11845na	13650na	15230na				9860as	11655as		
0000-0100 vl	Papua New Guinea, NBC	9675do				0030-0100	Sri Lanka, Sri Lanka BC	9730as	15425as		
0000-0100	Russia, Voice of Russia WS	5940na	7105na	7125na	7180na	0030-0100	Thailand, Radio	9655as	13695na	15395as	
0000-0100	Singapore, SBC Radio One	6160do				0030-0100	UK, BBC Asian Service	5965as	6080as	6195as	9410as
0000-0100 vl	Solomon Islands, SIBC	5020do						11955as	15310as	15360as	
						0050-0100	Italy, RAI Intl	6010na	9675na	11800na	

SELECTED PROGRAMS

Sundays

- 0000 Russia, Voice of: News. Every hour on the hour.
- 0000 UK, BBC London (as): Newsdesk. World news and dispatches from overseas and UK correspondents.
- 0011 Russia, Voice of: News and Views. Russian views on news developments.
- 0030 Russia, Voice of: News in Brief. Ninety seconds news summary every hour on the half-hour.
- 0030 UK, BBC London (as): Short Story. Fifteen-minute dramas written by listeners from around the world.
- 0032 Russia, Voice of: This is Russia. A program which helps you to get to know Russia, the Russians, and it's ethnic minorities better.
- 0045 UK, BBC London (as): Britain Today. News about Britain.

Mondays

- 0000 Russia, Voice of: News. See S 0000.
- 0000 UK, BBC London (as): Newsdesk. See S 0000.
- 0011 Russia, Voice of: Sunday Panorama. See S 1211.
- 0030 Russia, Voice of: News in Brief. See S 0030.
- 0030 UK, BBC London (as): Variable Feature. See S 0245.
- 0032 Russia, Voice of: Folk Box. One of the top ten entertainment programs (Passport to World Band Radio).
- 0045 UK, BBC London (as): Britain Today. See S 0045.

Tuesdays

- 0000 Russia, Voice of: News. See S 0000.
- 0000 UK, BBC London (as): Newsdesk. See S 0000.
- 0011 Russia, Voice of: News and Views. See S 0011.
- 0030 Russia, Voice of: News in Brief. See S 0030.
- 0030 UK, BBC London (as): Learning Zone. See M 0915.
- 0032 Russia, Voice of: Yours for the Asking. A 30-minute musical request program.
- 0045 UK, BBC London (as): Britain Today. See S 0045.

Wednesdays

- 0000 Russia, Voice of: News. See S 0000.
- 0000 UK, BBC London (as): Newsdesk. See S 0000.
- 0011 Russia, Voice of: News and Views. See S 0011.
- 0030 Russia, Voice of: News in Brief. See S 0030.
- 0030 UK, BBC London (as): Variable Feature. See S 0245.
- 0032 Russia, Voice of: Your Top Tune. See S 0332.
- 0045 UK, BBC London (as): Britain Today. See S 0045.
- 0047 Russia, Voice of: You Write to Moscow. See S 0347.

Thursdays

- 0000 Russia, Voice of: News. See S 0000.
- 0000 UK, BBC London (as): Chimes of Big Ben (1). Hear the famous bells at this time on the first Monday of each month.
- 0000 UK, BBC London (as): Newsdesk. See S 0000.
- 0011 Russia, Voice of: News and Views. See S 0011.
- 0030 Russia, Voice of: News in Brief. See S 0030.
- 0030 UK, BBC London (as): From Our Own Correspondent. See S 0430.
- 0032 Russia, Voice of: Music at Your Request. See M 1232.
- 0045 UK, BBC London (as): Britain Today. See S 0045.
- 0047 Russia, Voice of: You Write to Moscow. See S 0347.
- 0054 Radio Netherlands: Documentary. Farming (5th).
- 0054 Radio Netherlands: Documentary. Portugal (12th). See A 0154.
- 0054 Radio Netherlands: Documentary. The Dutch Seaborne Empire (The Company of Far Lands) (19th). See H 1454.
- 0054 Radio Netherlands: Documentary. The Dutch Seaborne Empire (The Tavern of Two Seas) (26th). See F 2354.

Fridays

- 0000 Russia, Voice of: News. See S 0000.
- 0000 UK, BBC London (as): Newsdesk. See S 0000.
- 0011 Russia, Voice of: News and Views. See S 0011.
- 0030 Russia, Voice of: News in Brief. See S 0030.
- 0030 UK, BBC London (as): Learning Zone. See M 0915.
- 0032 Russia, Voice of: The Jazz Show. See M 0532.
- 0045 UK, BBC London (as): Britain Today. See S 0045.

Saturdays

- 0000 Russia, Voice of: News. See S 0000.
- 0000 UK, BBC London (as): Newsdesk. See S 0000.
- 0011 Russia, Voice of: News and Views. See S 0011.
- 0030 Russia, Voice of: News in Brief. See S 0030.
- 0030 UK, BBC London (as): From the Weeklies. Review of the British weekly press.
- 0032 Russia, Voice of: Folk Box. See M 0032.
- 0045 UK, BBC London (as): Britain Today. See S 0045.

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THANK YOU...

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FREQUENCIES

0500-0600	Anguilla, Caribbean Beacon	6090am				0500-0600	Swaziland, Trans World R	4775af	6100af		
0500-0600	Australia, Radio	9660pa	12080pa	13605as	15240pa	0500-0530	Switzerland, Swiss R Intl	5840eu	6165eu		
		15510as	17795pa			0500-0515	Uganda, Radio	4976do			
0500-0600 a	Australia, Radio	17750as				0500-0600	UK, BBC African Service	3255af	6005af	6190af	7160af
0500-0600 vl	Australia, VL8K Katherine	5025do						9600af	15420af	17885af	
0500-0600 vl	Australia, VL8T Tent Crk	4910do				0500-0530	UK, BBC Asian Service	9740as	11955as	15280as	15310as
0500-0600	Australia, Defense Forces R	13525as	15707as					15360as	17760as	17790as	21660as
0500-0600	Bulgaria, Radio	7375na	9485na			0500-0530	UK, BBC World Service	3955eu	5975am	6175am	6180eu
0500-0600 vl	Cameroon, Radio Cameroon	4850do						6195eu	9410eu	11760me	12095eu
0500-0600	Canada, CBC N Quebec Svc	9625do						15575as	17640af		
0500-0600	Canada, CFRX Toronto	6070do				0500-0600	USA, KAIJ Dallas TX	5810am			
0500-0600	Canada, CFVP Calgary	6030do				0500-0600	USA, KTBN Salt Lk City UT	7510am			
0500-0600	Canada, CHNX Halifax	6130do				0500-0600	USA, KVOH Los Angeles CA	9975am			
0500-0600	Canada, CKZU Vancouver	6160do				0500-0600	USA, KWHR Naalehu HI	7560as	9930as	17555pa	
0500-0600	China, China Radio Intl	9560na				0500-0600	USA, Voice of America	5970af	6035af	6080af	7170eu
0500-0600	Costa Rica, Adv World R	5030ca	6150ca	9725ca				7295af	9700af	9775af	11825me
0500-0600 as	Costa Rica, Adv World R	7375am						11965eu	12080af	15205eu	
0500-0600	Costa Rica, RF Peace Intl	6980am	7385am			0500-0600	USA, WGTG McCaysville GA	5085am			
0500-0600	Cuba, Radio Havana	6180na	9820na	9830na		0500-0600	USA, WHRI Noblesville IN	5760am	7315am		
0500-0600 vl	Cyprus, BRT International	6150do				0500-0600	USA, WINB Red Lion PA	11950am			
0500-0600	Ecuador, HCJB	9745am	21455am			0500-0600	USA, WJCR Upton KY	7490na			
0500-0550	Germany, Deutsche Welle	5960na	6100na	6120na	6185na	0500-0600	USA, WRMI/R Miami Intl	9955am			
0500-0600	Guyana, GBC/Voice of	3290do				0500-0600	USA, WRNO New Orleans LA	7395am			
0500-0515	Israel, Kol Israel	7465na	9435na	17545na		0500-0600	USA, WWCR Nashville TN	2390am	3210am	5070am	5935am
0500-0600 as/vl	Italy, IRRS	7120va				0500-0600	USA, WYFR Okeechobee FL	5985na	9985af	11550eu	
0500-0600	Japan, R Japan/NHK World	6110na	6150eu	9835am	11840as	0500-0520	Vatican State, Vatican R	7360af	9660af	11625af	
		11895am	11920as	15230am		0500-0600	Zambia, Christian Voice	3330af	6065af		
0500-0600 vl	Kenya, Kenya Broadc Corp	4885do	4935do	6150do		0500-0530 vl	Zambia, R Zambia/ZNBC 1	4910do			
0500-0600 vl	Kiribati, Radio	9810do				0500-0600 vl	Zambia, R Zambia/ZNBC 2	6165do			
0500-0600	Lebanon, Voice of Hope	9960va				0500-0530 vl	Zimbabwe, Zimbabwe BC	3396do			
0500-0505	Lesotho, Radio Lesotho	4800do				0505-0600	Swaziland, Trans World R	9500af			
0500-0600	Liberia, LCGN/R Liberia Int	5100do				0525-0600	Ghana, Ghana Broadc Corp	3366do	4915do		
0500-0510 mtwhf	Malawi, MBC	3380do				0530-0600	Austria, R Austria Intl	6015na	6155eu	13730eu	15410me
0500-0530 mtwhf	Mexico, Radio Mexico Intl	9705na						17870me			
0500-0525	Netherlands, Radio	6165na	9590na			0530-0600	Thailand, Radio	9655eu	11905eu	15115eu	
0500-0600	New Zealand, R NZ Intl	11905pa				0530-0548	UAE, Radio Dubai	15435as	17830as	21700as	
0500-0505	Nigeria, FRCN/Radio	3326do	4770do	4990do		0530-0600	UK, BBC Asian Service	9740as	11955pa	15310as	15360as
0500-0600	Nigeria, Voice of	7255af						17760as	21660as		
0500-0600	North Korea, R Pyongyang	3560as	11740as	13790as		0530-0600	UK, BBC World Service	3990eu	5975am	6050eu	6175am
0500-0600 vl	Papua New Guinea, NBC	975do						7150eu	7270eu	11760me	15575as
0500-0600	Russia, Voice of Russia WS	5905na	5920na	5930na	6005na			17640af	6180eu	6195eu	9410eu
		9580na	6150na	7175na	7330na	0530-0600 as	UK, BBC World Service	3955eu	12095eu		
		9675af						7220do			
0500-0530	S Africa, Channel Africa	9675af				0530-0600 vl	Zambia, R Zambia/ZNBC 1	5975do			
0500-0600	Singapore, SBC Radio One	6160do				0545-0600 vl	UK, BBC African Service	7275af	9710af		
0500-0600 vl	Solomon Islands, SIBC	5020do									
0500-0600	Spain, R Exterior Espana	6055am									

SELECTED PROGRAMS

Sundays

- 0500 Nigeria, Voice of: Reflections. A thought-provoking talk on the real meaning of man and his existence.
- 0500 Russia, Voice of: News. See S 0000.
- 0500 UK, BBC London (as): Newsday. See S 0200.
- 0505 Nigeria, Voice of: VON Link-Up. Call-in request and dedication music program.
- 0511 Russia, Voice of: Program Preview. A review of programs to be featured in the coming week.
- 0530 Nigeria, Voice of: News. Thirty minutes of news, press review, sports, and interviews on the most current issues in Nigeria and elsewhere.
- 0530 Russia, Voice of: News in Brief. See S 0030.
- 0530 UK, BBC London (as): Westway Compilation Edition. Catch up on the week's episodes of the World Service's drama serial.
- 0532 Russia, Voice of: Moscow Yesterday and Today. Sit back and enjoy a great program about Russian history, with magnificent sound effects.

Mondays

- 0500 Nigeria, Voice of: Wave Train. A live music magazine which lightens up and informs listeners.
- 0500 Russia, Voice of: News. See S 0000.
- 0500 UK, BBC London (as): Newsday. See S 0200.
- 0511 Russia, Voice of: Program Preview. See S 0E11.
- 0530 Nigeria, Voice of: VONSCOPE. See S 0530.
- 0530 Russia, Voice of: News in Brief. See S 0030.
- 0530 UK, BBC London (as): Variable Feature. See S 0245.

- 0532 Russia, Voice of: The Jazz Show. The world of Russian jazz.

Tuesdays

- 0500 Nigeria, Voice of: Wave Train. See M 0500.
- 0500 Russia, Voice of: News. See S 0000.
- 0500 UK, BBC London (as): Newsday. See S 0200.
- 0511 Russia, Voice of: Commonwealth Update. See M 2311.
- 0530 Nigeria, Voice of: VONSCOPE. See S 0530.
- 0530 Russia, Voice of: News in Brief. See S 0030.
- 0530 UK, BBC London (as): Omnibus. See S 1715.
- 0532 Russia, Voice of: Yours for the Asking. See T 0032.

Wednesdays

- 0500 Nigeria, Voice of: Wave Train. See M 0500.
- 0500 Russia, Voice of: News. See S 0000.
- 0500 UK, BBC London (as): Newsday. See S 0200.
- 0511 Russia, Voice of: Commonwealth Update. See M 2311.
- 0530 Nigeria, Voice of: VONSCOPE. See S 0530.
- 0530 Russia, Voice of: News in Brief. See S 0030.
- 0530 UK, BBC London (as): Sports International. Live commentaries and interviews, features and discussions.
- 0532 Russia, Voice of: Music at Your Request. See M 1232.

Thursdays

- 0500 Nigeria, Voice of: Wave Train. See M 0500.
- 0500 Russia, Voice of: News. See S 0000.
- 0500 UK, BBC London (as): Newsday. See S 0200.

- 0511 Russia, Voice of: Commonwealth Update. See M 2311.
- 0530 Nigeria, Voice of: VONSCOPE. See S 0530.
- 0530 Russia, Voice of: News in Brief. See S 0030.
- 0530 UK, BBC London (as): Variable Feature. See S 0245.
- 0532 Russia, Voice of: Folk Box. See M 0032.

Fridays

- 0500 Nigeria, Voice of: Wave Train. See M 0500.
- 0500 Russia, Voice of: News. See S 0000.
- 0500 UK, BBC London (as): Newsday. See S 0200.
- 0511 Russia, Voice of: Commonwealth Update. See M 2311.
- 0530 Nigeria, Voice of: VONSCOPE. See S 0530.
- 0530 Russia, Voice of: News in Brief. See S 0030.
- 0530 UK, BBC London (as): Focus on Faith. Alison Hilliard talks to church leaders about their hopes for the future.
- 0532 Russia, Voice of: Moscow Yesterday and Today. See S 0532.

Saturdays

- 0500 Nigeria, Voice of: African Safari. A musical journey around the countries of Africa with country profiles and current happenings.
- 0500 Russia, Voice of: News. See S 0000.
- 0500 UK, BBC London (as): Newsday. See S 0200.
- 0511 Russia, Voice of: Commonwealth Update. See M 2311.
- 0530 Nigeria, Voice of: News. See S 0530.
- 0530 Russia, Voice of: News in Brief. See S 0030.
- 0530 UK, BBC London (as): Variable Feature. See S 0245.
- 0532 Russia, Voice of: Timelines. See M 0332.

FREQUENCIES

0600-0700	Anguilla, Caribbean Beacon	6090am				0600-0700	Swaziland, Trans World R	4775af	6100af	9500af	
0600-0700	Australia, Radio	9660pa	11880pa	12080pa	13605as	0600-0700	UK, BBC African Service	6005af	6155af	6190af	7160af
		15240pa	15415as	15510as	17750as			9600af	11940af	15420af	17885af
0600-0700 vl	Australia, VL8K Katherine	5025do				0600-0700	UK, BBC Asian Service	7145pa	9740as	11955pa	15310as
0600-0700 vl	Australia, VL8T Tent Crk	4910do						15360as	17760as	17790as	21660as
0600-0633	Australia, Defense Forces R	13525as	15707as			0600-0630	UK, BBC World Service	3955eu	5975am	6175am	6180eu
0600-0700 vl	Canada, CBC N Quebec Svc	9625do						6195eu	7325eu	9410eu	11760me
0600-0700	Canada, CFRX Toronto	6070do						12095eu	15565eu	15575as	17640af
0600-0700	Canada, CFPV Calgary	6030do				0600-0700	USA, KAIJ Dallas TX	5810am			
0600-0700	Canada, CHNX Halifax	6130do				0600-0700	USA, KTVN Salt Lk City UT	7510am			
0600-0700	Canada, CKZU Vancouver	6160do				0600-0700	USA, KVOH Los Angeles CA	9975am			
0600-0659 mtwhf	Canada, R Canada Intl	6050va	6150va	9740af	9760va	0600-0700	USA, KWHR Naalehu HI	7560as	9930as	17555pa	
		11905af				0600-0700	USA, Monitor Radio	7535eu			
0600-0700	Costa Rica, RF Peace Intl	6980am	7385am			0600-0700	USA, Voice of America	5970af	5995me	6035af	6080af
0600-0700	Cuba, Radio Havana	6180na	9820na	9830na				7170eu	7285af	11805eu	11825me
0600-0700	Ecuador, HCJB	9745am	21455am					11950af	12080af	15205eu	15600af
0600-0650	Germany, Deutsche Welle	6045af	7225af	9565af	11765af	0600-0700	USA, WGTG McCaysville GA	5085am			
		17820as	21705me			0600-0700	USA, WHRI Noblesville IN	5760am	7315am		
0600-0700	Germany, Overcomer Ministr	9500au				0600-0700	USA, WINB Red Lion PA	11950am			
0600-0615	Ghana, Ghana Broadc Corp	3366do	4915do			0600-0700	USA, WJCR Upton KY	7490na			
0600-0700	Guyana, GBC/Voice of	3290do				0600-0700	USA, WRMI/R Miami Intl	9955am			
0600-0700 vl	Italy, IRRS	3985va				0600-0700	USA, WRNO New Orleans LA	7395am			
0600-0700	Japan, R Japan/NHK World	6190na	7230eu	9505pa	9835na	0600-0700	USA, WWCR Nashville TN	2390am	3210am	5070am	5935am
		11740as	11840as	11920pa	15550as	0600-0700	USA, WYFR Okeechobee FL	5985am	7355eu	9985eu	
		15570as	17810as			0600-0700 vl	Vanuatu, Radio	3945do	4960do		
0600-0700 vl	Kenya, Kenya Broadc Corp	4885do	4935do	6150do		0600-0700	Vatican State, Vatican R	4005eu	5883eu	7250eu	
0600-0700 vl	Kiribati, Radio	9810do				0600-0700	Yemen, Radio Aden	9780do			
0600-0700	Lebanon, Voice of Hope	9960va				0600-0700	Zambia, Christian Voice	3330af	6065af		
0600-0700	Liberia, Radio Veritas	3425do				0600-0700 vl	Zambia, R Zambia/ZNBC 1	7220do			
0600-0700	Liberia, LCN/R Liberia Int	5100do				0600-0700 vl	Zimbabwe, Zimbabwe BC	5975do			
0600-0700	Malaysia, Voice of	6175as	9750as	15295au		0605-0700	Swaziland, Trans World R	9650af			
0600-0700	New Zealand, R NZ Intl	11905pa				0630-0700	Austria, R Austria Intl	6015na			
0600-0630	Nigeria, FRCN/Radio	3326do	4770do	4990do		0630-0700	Switzerland, Swiss R Intl	5840eu	6165eu		
0600-0700	Nigeria, Voice of	7255af				0630-0700	UK, BBC World Service	5975am	6175am	6180eu	7325eu
0600-0700 vl	Papua New Guinea, NBC	9675do						9410eu	11760me	12095eu	15565eu
0600-0641	Romania, R Romania Intl	5965na	6155na	7225na	9690na			15575as	17640af		
0600-0700	Russia, Voice of Russia WS	5905na	5920na	5930na	6005na	0630-0700 as	UK, BBC World Service	3955eu	6195eu		
		6065na	6150na	7175na	7270na	0630-0645 s	UK, BBC World Service	6010eu	9740eu		
		7330na	7345na	9580na	9825na	0630-0700	USA, Voice of America	5995me	7170eu	11805eu	11825me
		9895na	12025as	12055na	15460na			15205eu			
		15470au	17570au	17795as	21790au	0630-0700 as	USA, Voice of America	5970af	6035af	6080af	7285af
0600-0630	S Africa, Channel Africa	11900af						11950af	12080af	15600af	
0600-0630	S Africa, Trans World R	11730af				0630-0700	Vatican State, Vatican R	9660af	11625af	13765af	
0600-0610	Sierra Leone, SLBS	3316do				0641-0656	Romania, R Romania Intl	5965na	6155na	7105eu	7225na
0600-0700	Singapore, SBC Radio One	6160do						9510eu	9625eu	9690na	11775eu
0600-0630	Slovakia, AWR Europe	11640af				0645-0700	UK, BBC World Service	5875eu	7260eu		
0600-0700 vl	Solomon Islands, SIBC	5020do				0700-0800	Anguilla, Caribbean Beacon	6090am			

SELECTED PROGRAMS

Sundays

- 0600 Russia, Voice of: News. See S 0000.
- 0600 UK, BBC London (as): World News. See S 0100.
- 0611 Russia, Voice of: Science and Engineering in the Commonwealth. The latest developments in science and technology.
- 0615 UK, BBC London (as): Letter from America. See S 0230.
- 0630 Russia, Voice of: News in Brief. See S 0030.
- 0630 UK, BBC London (as): Meridian Arts. A weekly program about the world of the arts.
- 0632 Russia, Voice of: This is Russia. See S 0032.

Mondays

- 0600 Russia, Voice of: News. See S 0000.
- 0600 UK, BBC London (as): World News. See S 0100.
- 0611 Russia, Voice of: Moscow Mailbag. See S 0111.
- 0615 UK, BBC London (as): Seven Days. Roundup of the week's news, plus sports highlights, finance and the weather.
- 0630 Russia, Voice of: News in Brief. See S 0030.
- 0630 UK, BBC London (as): Jazzmatazz. The request program that lives up to its title.
- 0632 Russia, Voice of: This is Russia. See S 0032.

Tuesdays

- 0600 Russia, Voice of: News. See S 0000.
- 0600 UK, BBC London (as): World News. See S 0100.
- 0611 Russia, Voice of: Focus on Asia and the Pacific. See T 0111.
- 0615 UK, BBC London (as): The World Today. See M 1715.
- 0630 Russia, Voice of: News in Brief. See S 0030.
- 0630 UK, BBC London (as): Composer of the Month. See M 1930.
- 0632 Russia, Voice of: Moscow Yesterday and Today. See S 0532.

Wednesdays

- 0600 Russia, Voice of: News. See S 0000.
- 0600 UK, BBC London (as): World News. See S 0100.
- 0611 Russia, Voice of: Focus on Asia and the Pacific. See T 0111.
- 0615 UK, BBC London (as): The World Today. See M 1715.
- 0630 Russia, Voice of: News in Brief. See S 0030.
- 0630 UK, BBC London (as): Meridian On Screen. See T 0915.
- 0632 Russia, Voice of: This is Russia. See S 0032.

Thursdays

- 0600 Russia, Voice of: News. See S 0000.
- 0600 UK, BBC London (as): World News. See S 0100.
- 0611 Russia, Voice of: Focus on Asia and the Pacific. See T 0111.
- 0615 UK, BBC London (as): The World Today. See M 1715.
- 0630 Russia, Voice of: News in Brief. See S 0030.
- 0630 UK, BBC London (as): Meridian Arts. See S 0630.
- 0632 Russia, Voice of: Moscow Yesterday and Today. See S 0532.

Fridays

- 0600 Russia, Voice of: News. See S 0000.
- 0600 UK, BBC London (as): World News. See S 0100.
- 0611 Russia, Voice of: Focus on Asia and the Pacific. See T 0111.
- 0615 UK, BBC London (as): The World Today. See M 1715.
- 0630 Russia, Voice of: News in Brief. See S 0030.
- 0630 UK, BBC London (as): Music Review. News and views from the world of music.
- 0632 Russia, Voice of: This is Russia. See S 0032.

Saturdays

- 0600 Russia, Voice of: News. See S 0000.
- 0600 UK, BBC London (as): World News. See S 0100.
- 0611 Russia, Voice of: Focus on Asia and the Pacific. See T 0111.

- 0615 UK, BBC London (as): The World Today. See M 1715.
- 0630 Russia, Voice of: News in Brief. See S 0030.
- 0630 UK, BBC London (as): Meridian Arts. See S 0630.
- 0632 Russia, Voice of: Moscow Yesterday and Today. See S 0532.

HAUSER'S HIGHLIGHTS

CYPRUS: CyBC in Greek
to Cypriots in the UK via BBC Limassol
Fri/Sat/Sun
2215-2245 UTC 9760, 7105, 6180 kHz
(BBCM)

JORDAN: R. Jordan

0400-0900 15435
0400-1500 11810
1100-1730 11690
1600-0200 6105
1800-2200 9830
2200-0100 15435

All Arabic except 11690 English
(Mikhail Timofeyev, NERRS Monitoring
via DSWCI DX Window)

FREQUENCIES

0700-0800	Australia, Radio	9660pa 15240pa	11880pa 15415as	12080pa 15510as	13605pa 17750as
0700-0800 vl	Australia, VL8K Katherine	5025do			
0700-0800 vl	Australia, VL8T Tent Crk	4910do			
0700-0800	Canada, CFRX Toronto	6070do			
0700-0800	Canada, CFVP Calgary	6030do			
0700-0800	Canada, CHNX Halifax	6130do			
0700-0800	Canada, CKZU Vancouver	6160do			
0700-0800	Costa Rica, RF Peace Intl	5980am	7385am		
0700-0800	Ecuador, HCJB	5865eu	9365eu	9640pa	21455au
0700-0800 as	Eqt Guinea, R East Africa	15186af			
0700-0800 mtwhf	Eqt Guinea, Radio Africa	15186af			
0700-0800	Germany, Overcomer Ministr	9500au			
0700-0715	Ghana, Ghana Broadc Corp	3366do	4915do		
0700-0800	Guyana, GBC/Voice of	3290do			
0700-0800 vl	Italy, IRRS	3985va			
0700-0800	Japan, R Japan/NHK World	7230eu 11920as 17815af	11740as 15230af	11840as 15570as	11850as 17810as
0700-0800 vl	Kenya, Kenya Broadc Corp	4885do	4935do	6150do	
0700-0800 vl	Kiribati, Radio	9810do			
0700-0800	Lebanon, Voice of Hope	9960va			
0700-0715	Liberia, LCN/R Liberia Intl	5100do			
0700-0800 asmtwh	Malaysia, Radio	7295do			
0700-0800	Malaysia, Voice of	6175as	9750as	15295au	
0700-0758 as	New Zealand, R NZ Intl	11905pa			
0700-0800 mtwhf	New Zealand, R NZ Intl	11905pa			
0700-0730 s	Norway, Radio Norway Intl	9590va	11625va		
0700-0800 vl	Papua New Guinea, NBC	9675do			
0700-0756	Romania, R Romania Intl	11940af	15105af	17775af	
0700-0800	Russia, Voice of Russia WS	5905na 6065na 9580na 15470as 21790as	5920na 6150na 12025as 17570as	5930na 7175na 12055as 17795as	6005na 7330na 15460as 17860as
0700-0710	Sierra Leone, SLBS	3316do			
0700-0800	Singapore, SBC Radio One	6160do			
0700-0730	Slovakia, AWR Europe	9435eu			
0700-0800 vl	Solomon Islands, SIBC	5020do			
0700-0735	Swaziland, Trans World R	6100af	9500af	9650af	
0700-0800	Taiwan, Taipei Radio Intl	5950na			
0700-0715	UK, BBC African Service	6005af 17830af	6190af	9600af	11940af
0700-0800 as	UK, BBC African Service	17885af			
0700-0800	UK, BBC Asian Service	7145pa 15360as	9740as 17760as	11955pa 21660as	15310as 21660as
0700-0730	UK, BBC World Service	5975am 7325eu 15485eu	6175am 11760me	6180eu 12095eu	6195eu 212095eu
0700-0800	USA, KAIJ Dallas TX	5810am			
0700-0800	USA, KTNB Salt Lk City UT	7510am			
0700-0800	USA, KVOH Los Angeles CA	9975am			
0700-0800	USA, KWHR Naalehu HI	7560as	9930as	11565pa	
0700-0800	USA, WEWN Birmingham AL	5825eu			
0700-0800	USA, WHRI Noblesville IN	5760am	7315am		
0700-0800	USA, WJCR Upton KY	7490na			
0700-0800	USA, WRMI/R Miami Intl	9955am			
0700-0800	USA, WRNO New Orleans LA	7395am			
0700-0800	USA, WWCR Nashville TN	2390am	3210am	5070am	5935am
0700-0800	USA, WYFR Okeechobee FL	7355eu	9455af	9985af	
0700-0800 vl	Vanuatu, Radio	3945do	4960do		
0700-0800	Zambia, Christian Voice	6065af			
0700-0800 vl	Zambia, R Zambia/ZNBC 1	7220do			
0700-0800 vl	Zimbabwe, Zimbabwe BC	5975do			
0705-0710 mtwhf	Croatia, Croatian Radio	6175eu	7185eu	11730au	
0715-0730 s	Greece, Voice of	7430eu 11645eu	7450eu	9425au	9775au
0715-0730	UK, BBC African Service	6005af 15400af	6190af 17830af	9600af	11940af
0715-0730	UK, BBC World Service	9635eu 15325eu	11680eu	11845eu	13745eu
0730-0745 s	Greece, Voice of	7430eu 11645eu	7450eu	9425au	9775au
0730-0800	Netherlands, Radio	9830pa	11895pa		
0730-0800 as	Palau, KHBN/Voice of Hope	9730as			
0730-0800	Switzerland, Swiss R Intl	9885af	11860af	13635af	
0730-0800	UK, BBC African Service	6190af 17830af	9600af	11940af	15400af
0730-0800	UK, BBC World Service	5975am 11760me 17640eu	6175am 12095eu	7325eu 15485eu	9410eu 15565eu
0730-0800 as	UK, BBC World Service	15575as			
0730-0745	UK, BBC World Service	5875eu	7260eu		
0730-0745 mtwhfa	Vatican State, Vatican R	4005eu 9645eu	5883eu 11740eu	6185eu 15595va	7250eu
0735-0800 as	Swaziland, Trans World R	6100af	9500af	9650af	
0740-0800	Guam, TWR/KTWR	15200as			

0745-0800	Albania, TWR Tirana	9685eu			
0745-0800 s	Ghana, Ghana Broadc Corp	3366do	4915do		
0745-0800 as	Monaco, Trans World Radio	9755eu			
0755-0800 mtwhf	Monaco, Trans World Radio	9755eu			
0758-0800 as	New Zealand, R NZ Intl	9700pa			

0800 UTC

0800-0900	Albania, TWR Tirana	9685eu			
0800-0900	Anguilla, Caribbean Beacon	6090am			
0800-0830	Australia, Radio	5995pa	9580pa	9710pa	11880pa
		12080pa	15415as	15510as	17750as
0800-0830 vl	Australia, VL8K Katherine	5025do			
0800-0830 vl	Australia, VL8T Tent Crk	4910do			
0800-0900 mtwhfa	Bhutan, Bhutan BC Service	5030do			
0800-0900 vl	Canada, CBC N Quebec Svc	9625do			
0800-0900	Canada, CFRX Toronto	6070do			
0800-0900	Canada, CFVP Calgary	6030do			
0800-0900	Canada, CHNX Halifax	6130do			
0800-0900	Canada, CKZU Vancouver	6160do			
0800-0900	Costa Rica, RF Peace Intl	6980am	7385am		
0800-0857	Czech Rep, Radio Prague	9505eu	11600as		
0800-0900	Ecuador, HCJB	5865eu	9365eu	9645pa	21455au
0800-0900 as	Eqt Guinea, R East Africa	15186af			
0800-0900 mtwhf	Eqt Guinea, Radio Africa	15186af			
0800-0830 m	Estonia, Estonian Radio	5925eu			
0800-0805 s	Ghana, Ghana Broadc Corp	3366do			
0800-0900	Guam, TWR/KTWR	15200as			
0800-0900	Guyana, GBC/Voice of	3290do			
0800-0900	Indonesia, Voice of	11785as			
0800-0830 vl	Italy, IRRS	3985va			
0800-0900 vl	Kiribati, Radio	9810do			
0800-0900	Lebanon, Voice of Hope	9960va			
0800-0900	Liberia, LCN/R Liberia Intl	5100do			
0800-0900	Malaysia, Radio	7295do			
0800-0825	Malaysia, Voice of	6175as	9750as	15295au	
0800-0900	Monaco, Trans World Radio	9755eu			
0800-0830	Netherlands, Radio	9830pa	11895pa		
0800-0815 mtwhf	New Zealand, R NZ Intl	11905pa			
0800-0900 as	New Zealand, R NZ Intl	9700pa			
0800-0830 s	Norway, Radio Norway Intl	11625au			
0800-0900 as	Palau, KHBN/Voice of Hope	9730as			
0800-0900 vl	Papua New Guinea, NBC	9675do			
0800-0900	Russia, Voice of Russia WS	9875as 17795as	12025as 17860as	12055as	15460as
0800-0900 f	Seychelles, FEBA Radio	15540as			
0800-0810	Sierra Leone, SLBS	3316do			
0800-0900	Singapore, SBC Radio One	6160do			
0800-0900 vl	Solomon Islands, SIBC	5020do			
0800-0900	South Korea, R Korea Intl	9570au	13670eu		
0800-0805 as	Swaziland, Trans World R	6100af	9500af	9650af	
0800-0900 as	UK, BBC African Service	17885af			
0800-0810	UK, BBC Asian Service	7145pa 15360as	11750as 17760as	11955pa 21660as	15310as 21660as
0800-0900	UK, BBC World Service	5975am 7325eu 15485eu	6175am 11760me	6180eu 12095eu	6195eu 212095eu
0800-0900 as	UK, BBC World Service	15575as			
0800-0900	USA, KAIJ Dallas TX	5810am			
0800-0900	USA, KNLS Anchor Point AK	6150as			
0800-0900	USA, KTNB Salt Lk City UT	7510am			
0800-0900	USA, KWHR Naalehu HI	7560as	11565pa		
0800-0900	USA, Monitor Radio Intl	7535eu	9845au	15665eu	
0800-0900	USA, WEWN Birmingham AL	5825eu			
0800-0900	USA, WHRI Noblesville IN	7315am			
0800-0900	USA, WJCR Upton KY	7490na			
0800-0900	USA, WRMI/R Miami Intl	9955am			
0800-0900	USA, WWCR Nashville TN	2390am	3210am	5070am	5935am
0800-0900	Zambia, Christian Voice	6065af			
0800-0900 vl	Zambia, R Zambia/ZNBC 1	7220do			
0800-0900 vl	Zimbabwe, Zimbabwe BC	5975do			
0805-0810 as	Croatia, Croatian Radio	6175eu	7185eu	11730au	
0810-0900	UK, BBC Asian Service	9740as 15360as	11750as 17760as	11955pa 21660as	15310as
		3326do 4770do			4990do
0815-0900 mtwhf	Nigeria, FRCN/Radio	9700pa			
0816-0900 mtwhf	New Zealand, R NZ Intl	9700pa			
0830-0900	Australia, Radio	5995pa	6080as	9580pa	9710pa
		12080pa	15415as	15510pa	17750as
0830-0900 vl	Australia, VL8A Alice Spg	2310do			
0830-0900 vl	Australia, VL8K Katherine	2485do			
0830-0900 vl	Australia, VL8T Tent Crk	2325do			
0830-0900	Austria, R Austria Intl	6155eu	13730eu	17870me	
0830-0855	Belgium, R Vlaanderen Intl	6130eu	13795au		
0830-0900 fas/vl	Italy, IRRS	7120va			
0830-0900	Netherlands, Radio	5965pa	9830pa	13700pa	
0830-0900	Slovakia, R Slovakia Intl	11990as	17485au	21705au	
0830-0900	Switzerland, Swiss R Intl	9885au	12075au	13685au	
0830-0900	UK, BBC African Service	6190af	11940af	15400af	17830af
0855-0900	Guam, TWR/KTWR	15330pa			

FREQUENCIES

0900-0920 as	Albania, TWR Tirana	9685eu							
0900-1000	Anguilla, Caribbean Beacon	6090am							
0900-1000	Australia, VL8A Alice Spg	6080as	9580pa	11880as					
0900-1000 vl	Australia, VL8A Alice Spg	2310do							
0900-1000 vl	Australia, VL8K Katherine	2485do							
0900-1000 vl	Australia, VL8T Tent Crk	2325do							
0900-1000	Canada, CFRX Toronto	6070do							
0900-1000	Canada, CFVP Calgary	6030do							
0900-1000	Canada, CHNX Halifax	6130do							
0900-1000	Canada, CKZU Vancouver	6160do							
0900-1000	China, China Radio Intl	9785pa	11755pa						
0900-1000	Costa Rica, RF Peace Intl	6980am	7385am						
0900-1000	Ecuador, HCJB	5865eu	9645pa	21455au					
0900-1000 as	Eqt Guinea, R East Africa	15186af							
0900-1000 mtwhf	Eqt Guinea, Radio Africa	15186af							
0900-0930	Finland, YLE/R Finland	9760as	15225as						
0900-0950	Germany, Deutsche Welle	6160au	7380as	9565af	11715as				
		15145af	15410af	17800af	17810as				
		21600af							
0900-0915 mtwtf	Ghana, Ghana Broadc Corp	3366do	4915do						
0900-1000	Guam, TWR/KTWR	15330as							
0900-1000	Guyana, GBC/Voice of	3290do							
0900-1000 fas/vl	Italy, IRRS	7120va							
0900-0930 vl	Kiribati, Radio	9810do							
0900-1000	Lebanon, Voice of Hope	9960va							
0900-0915	Liberia, LCN/R Liberia Int	5100do							
0900-1000	Malaysia, Radio	7295do							
0900-0935 a	Monaco, Trans World Radio	9755eu							
0900-0950 s	Monaco, Trans World Radio	9755eu							
0900-0920 mtwhf	Monaco, Trans World Radio	9755eu							
0900-0925	Netherlands, Radio	5965pa	9830pa	13700pa					
0900-1000	New Zealand, R NZ Intl	9700pa							
0900-1000 as	Palau, KHBN/Voice of Hope	9730as							
0900-1000 vl	Papua New Guinea, NBC	4890do							
0900-1000	Russia, Voice of Russia WS	9825au	9835au	9875as	17795as				
		17860as							
0900-1000	Singapore, SBC Radio One	6160do							
0900-1000 vl	Solomon Islands, SIBC	5020do							
0900-1000	UK, BBC African Service	6190af	11940af	15400af	17830af				
		17885af							
0900-0915	UK, BBC Asian Service	6065as	6195as	9580as	9740as				
		11750as	11765as	11955as	15280as				
		15310as	15360as	17760as	17790as				
		21660as							
0900-1000	UK, BBC World Service	9410eu	11760me	12095eu	15190sa				
		15485eu	15565eu	15575as	17640eu				
		17705af							
0900-1000	USA, KAIJ Dallas TX	5810am							
0900-1000	USA, KTBN Salt Lk City UT	7510am							
0900-1000	USA, KWHR Naalehu HI	11565pa							
0900-1000	USA, Monitor Radio Intl	7395sa	7535eu	9355as	13840au				
0900-1000	USA, WEWN Birmingham AL	5825eu							
0900-1000	USA, WHRI Noblesville IN	5760am	7315am						
0900-1000	USA, WJCR Upton KY	7490na							
0900-1000	USA, WMLK Bethel PA	9465am							
0900-1000	USA, WRMI/R Miami Intl	9955am							
0900-1000	USA, WWCR Nashville TN	2390am	3210am	5070am	5935am				
0900-1000	Zambia, Christian Voice	6065af							
0900-1000 vl	Zambia, R Zambia/ZNBC 1	7220do							
0900-1000 vl	Zimbabwe, Zimbabwe BC	5975do							
0905-0910 mtwhf	Croatia, Croatian Radio	6175eu	7185eu	11730au					
0915-1000	Ghana, Ghana Broadc Corp	6130do	7295do						
0915-0945	UK, BBC Asian Service	6065as	6195as	7235as	9580as				
		9740as	11750as	11765as	11955as				
		15280as	15360as	21660as					
0915-0945 as	UK, BBC Asian Service	6065as	6195as	7235as	9580as				
		9740as	11765as	11955as	15280as				
		15360as	21660as						
0915-0930	UK, BBC World Service	11680eu	13745eu	15325eu	15340eu				
		17695eu							
0930-1000	Austria, R Austria Intl	15455as	17870au						
0930-1000	Canada, CKZN St John's	6160do							
0930-1000	Lithuania, Radio Vilnius	9710eu							
0930-1000	Netherlands, Radio	7260as	9810as						
0930-1000	Philippines, FEBC/R Intl	11635as							
0930-1000 as	Slovakia, AWR Europe	9450eu							
0935-0950 s	Albania, TWR Tirana	9685eu							
0945-1000	UK, BBC Asian Service	6195as	9740as	11750as	11765as				
		15360as	21660as						
0945-1000 a	UK, BBC Asian Service	6065as	7235as	9580as	11955as				
		15280as							
0945-1000 smtwhf	UK, BBC Slow Speed News	6065as	7235as	9580as	11955as				
		15280as							
1000-1100	Anguilla, Caribbean Beacon	6090am							
1000-1030 s	Armenia, Voice of	4810eu	15270eu						
1000-1100	Australia, Radio	6080as	9580pa	11880as					
1000-1100 vl	Australia, VL8A Alice Spg	2310do							
1000-1100 vl	Australia, VL8K Katherine	2485do							
1000-1100 vl	Australia, VL8T Tent Crk	2325do							
1000-1100 vl	Canada, CBC N Quebec Svc	9625do							
1000-1100	Canada, CFRX Toronto	6070do							
1000-1100	Canada, CFVP Calgary	6030do							
1000-1100	Canada, CHNX Halifax	6130do							
1000-1100	Canada, CKZN St John's	6160do							
1000-1100	Canada, CKZU Vancouver	6160do							
1000-1100	China, China Radio Intl	9785pa	11755pa						
1000-1100	Costa Rica, RF Peace Intl	6980am	7385am						
1000-1030	Czech Rep, Radio Prague	17485af							
1000-1100	Ecuador, HCJB	9645pa	21455au						
1000-1100 as	Eqt Guinea, R East Africa	15186af							
1000-1100 mtwhf	Eqt Guinea, Radio Africa	15186af							
1000-1100	Guam, AWR/KSDA	11790as	15170as						
1000-1100	Guam, TWR/KTWR	9865as							
1000-1100	India, All India Radio	11585au	11735au	13700au	15050au				
		17387au	17840au						
1000-1100 fas/vl	Italy, IRRS	7120va							
1000-1020 tfa	Kazakhstan, Radio Almaty	9620eu	11720eu						
1000-1100	Lebanon, Voice of Hope	9960va							
1000-1100	Malaysia, Radio	7295do							
1000-1100 vl	Malaysia, RTM Kuching	7160do							
1000-1100 vl	Malaysia, RTM KotaKinabalu	5980do							
1000-1100	Netherlands, Radio	7260as	9810as						
1000-1100	New Zealand, R NZ Intl	9700pa							
1000-1100	Nigeria, Voice of	7255af							
1000-1100 as	Palau, KHBN/Voice of Hope	9730as							
1000-1100 vl	Papua New Guinea, NBC	4890do							
1000-1100	Philippines, FEBC/R Intl	11635as							
1000-1100	Russia, Voice of Russia WS	9825au	9835au	9875au	11820as				
		11880as	15470as	15560as	17755as				
		17795as	17860as						
1000-1100	Singapore, SBC Radio One	6160do							
1000-1100 vl	Solomon Islands, SIBC	5020do							
1000-1100	UK, BBC African Service	6190af	11940af	17885af					
1000-1100 as	UK, BBC Asian Service	15400af	17830af						
1000-1100	UK, BBC Asian Service	6195as	9740as	11750as	11765as				
		15310as	15360as	17790as	21660as				
1000-1100	UK, BBC World Service	9410eu	11760me	12095eu	15485eu				
		15565eu	15575as	17640eu	17705af				
1000-1100 as	UK, BBC World Service	15190sa							
1000-1100	USA, KAIJ Dallas TX	5810am							
1000-1100	USA, KTBN Salt Lk City UT	7510am							
1000-1100	USA, KWHR Naalehu HI	11565pa							
1000-1100	USA, Monitor Radio Intl	6095am	7395sa	9355as	15725as				
1000-1100	USA, Voice of America	5985pa	6165am	7405am	9590am				
		11720pa	15425pa						
1000-1100	USA, WEWN Birmingham AL	5825na	7465eu						
1000-1100	USA, WGTG McCaysville GA	9400am							
1000-1100	USA, WHRI Noblesville IN	6040am	9495am						
1000-1100	USA, WJCR Upton KY	7490na							
1000-1100 as	USA, WRMI/R Miami Intl	9955am							
1000-1100	USA, WRNO New Orleans LA	15420am							
1000-1100	USA, WWCR Nashville TN	2390am	3210am	5070am	5935am				
1000-1100	USA, WYFR Okeechobee FL	5950na							
1000-1025	Vietnam, Voice of	5940as	7270as	7400as	9840as				
		12020as							

FREQUENCIES

1400-1500	Anguilla, Caribbean Beacon	11775am				1400-1430	Thailand, Radio	9530as	9655as	11905as		
1400-1500	Australia, Radio	5870pa	5995pa	6080as	9415pa	1400-1430	Turkey, Voice of	9630as	15290as			
		9500as	11660as			1400-1410 thfs	Turkmenistan, Turkmen R	5015eu				
1400-1500 vl	Australia, VLBA Alice Spg	2310do				1400-1500	UK, BBC African Service	6190af	11860af	11940af	15420af	
1400-1500 vl	Australia, VL8K Katherine	2485do						17830af	17885af	21470af	21490af	
1400-1500 vl	Australia, VL8T Tent Crk	2325do						21660af				
1400-1500 vl	Canada, CBC N Quebec Svc	9625do				1400-1500	UK, BBC Asian Service	5990as	6195as	9740as	11750as	
1400-1500	Canada, CFRX Toronto	6070do				1400-1500	UK, BBC World Service	9410eu	9515na	9590na	12095eu	
1400-1500	Canada, CFVP Calgary	6030do						15220na	15485eu	15565eu	15575as	
1400-1500	Canada, CHNX Halifax	6130do						17640eu	17705eu	17840am		
1400-1500	Canada, CKZN St John's	6160do				1400-1500	USA, KAIJ Dallas TX	13815am				
1400-1500	Canada, CKZU Vancouver	6160do				1400-1500	USA, KTBN Salt Lk City UT	7510am				
1400-1430 smtwhf	Canada, R Canada Intl	9640na	11855na			1400-1500	USA, KWHR Naalehu HI	7560pa				
1400-1500	China, China Radio Intl	7260na	7405na	9405na	9535as	1400-1500	USA, Monitor Radio Intl	9355as				
		11825as				1400-1500	USA, Voice of America	6160as	7125as	7215as	9645as	
1400-1500	Costa Rica, RF Peace Intl	7385am	21465am					9760as	11705as	15205as	15395as	
1400-1430	Czech Rep, Radio Prague	13580na	21700af					15425as				
1400-1500	Ecuador, HCJB	12005am	15115am	21455am		1400-1500	USA, WEWN Birmingham AL	9455na	11875na	15745eu		
1400-1500 as	Eqf Guinea, R East Africa	15186af				1400-1500	USA, WGTG McCaysville GA	9400am				
1400-1457	France, Radio France Intl	7110as	11910as	12030as	15405as	1400-1500	USA, WHRI Noblesville IN	6040am	15105am			
		17560me				1400-1500	USA, WJCR Upton KY	7490na				
1400-1500	Georgia, Voice of Hope	12120as				1400-1500	USA, WRMI/R Miami Intl	9955am				
1400-1500	India, All India Radio	9545as	11620as	13710as		1400-1500	USA, WRNO New Orleans LA	15420am				
1400-1500 fas/vl	Italy, IRRS	7120va				1400-1500	USA, WWCR Nashville TN	9475am	12160am	13845am	15685am	
1400-1500	Japan, R Japan/NHK World	7200as				1400-1500	USA, WYFR Okeechobee FL	5950na	11830na	17760ca		
1400-1500	Jordan, Radio	11690eu				1400-1405	Vatican State, Vatican R	13765au	15540au			
1400-1500	Malaysia, Radio	7295do				1400-1500	Zambia, Christian Voice	6065af				
1400-1500	Malaysia, RTM Kuching	7160do				1400-1500 vl	Zambia, R Zambia/ZNBC 1	4910do				
1400-1500 vl	Malaysia, RTM KotaKinabalu	5980do				1415-1420	Nepal, Radio	3230do	5005do			
1400-1500	Netherlands, Radio	9895as	13700as	15585as		1420-1500 as	Palau, KHBN/Voice of Hope	9985as				
1400-1500 occsnal	New Zealand, R NZ Intl	6105pa				1430-1500	Canada, R Canada Intl	9555va	11915eu	11935va	15325va	
1400-1430 s	Norway, Radio Norway Intl	13800as				1430-1500 smtwhf	Canada, R Canada Intl	9640na	11855na			
1400-1500 vl	Papua New Guinea, NBC	4890do				1430-1500 vl	China, China Radio Intl	6995as	8660as	9880as	11445as	
1400-1500	Philippines, FEBC/R Intl	11995as				1430-1500	Guam, AWR/KSDA	7400as				
1400-1500	Russia, Voice of Russia WS	7130me	9470me	9840me		1430-1500 mtwhf	Portugal, R Portugal Intl	21515as				
1400-1455 as	S Africa, Channel Africa	9440af	17675af	17870af		1430-1500	Sweden, Radio	11650au	11880as	15240au		
1400-1500	Singapore, SBC Radio One	6155do				1430-1500 vl	Zambia, R Zambia/ZNBC 2	6165do				
1400-1500	Sri Lanka, Sri Lanka BC	9730as	15425as			1440-1500	Myanmar, Voice of	5990do				
1400-1500	Switzerland, Swiss R Intl	9885as	12075as	13635as		1450-1500	Vatican State, Vatican R	9875au	11640au			

SELECTED PROGRAMS

Sundays

- 1400 Russia, Voice of: News. See S 0000.
- 1400 UK, BBC London (as): News Summary. One minute news update.
- 1401 UK, BBC London (as): Variable Feature. See S 0245.
- 1411 Russia, Voice of: Science and Engineering in the Commonwealth. See S 0611.
- 1430 Russia, Voice of: News in Brief. See S 0030.
- 1432 Russia, Voice of: Your Top Tune. See S 0332.
- 1445 UK, BBC London (as): Health Matters. See S 0115.
- 1447 Russia, Voice of: You Write to Moscow. See S 0347.

Mondays

- 1400 Russia, Voice of: News. See S 0000.
- 1400 UK, BBC London (as): East Asia Today (EAs). See S 2300.
- 1400 UK, BBC London (as): World News. See S 0100.
- 1405 UK, BBC London (as): Outlook. An up-to-the-minute mix of conversation, controversy and color from around the world.
- 1411 Russia, Voice of: Moscow Mailbag. See S 0111.
- 1430 Russia, Voice of: News in Brief. See S 0030.
- 1430 UK, BBC London (as): Variable Feature. See S 0245.
- 1432 Russia, Voice of: Audio Book Club. See S 0132.

Tuesdays

- 1400 Russia, Voice of: News. See S 0000.
- 1400 UK, BBC London (as): East Asia Today (EAs). See S 2300.
- 1400 UK, BBC London (as): World News. See S 0100.
- 1405 UK, BBC London (as): Outlook. See M 1405.
- 1411 Russia, Voice of: Newmarket. See M 1311.
- 1430 Russia, Voice of: News in Brief. See S 0030.
- 1430 UK, BBC London (as): Discovery. See T 0230.
- 1432 Russia, Voice of: Kaleidoscope. See S 1532.

Wednesdays

- 1400 Russia, Voice of: News. See S 0000.
- 1400 UK, BBC London (as): East Asia Today (EAs). See S 2300.
- 1400 UK, BBC London (as): World News. See S 0100.
- 1405 UK, BBC London (as): Outlook. See M 1405.
- 1411 Russia, Voice of: Moscow Mailbag. See S 0111.
- 1430 Russia, Voice of: News in Brief. See S 0030.

- 1430 UK, BBC London (as): Sports International. See W 0530.
- 1432 Russia, Voice of: Russian by Radio. See M 0132.

Thursdays

- 1400 Russia, Voice of: News. See S 0000.
- 1400 Russia, Voice of: News. See S 0000.
- 1400 UK, BBC London (as): East Asia Today (EAs). See S 2300.
- 1400 UK, BBC London (as): World News. See S 0100.
- 1405 UK, BBC London (as): Outlook. See M 1405.
- 1411 Russia, Voice of: Moscow Mailbag. See S 0111.
- 1430 Russia, Voice of: News in Brief. See S 0030.
- 1430 Russia, Voice of: News in Brief. See S 0030.
- 1430 UK, BBC London (as): Assignment. A weekly examination of a topical issue.
- 1432 Russia, Voice of: Kaleidoscope. See S 1532.
- 1432 Russia, Voice of: This is Russia. See S 0032.

Fridays

- 1400 Russia, Voice of: News. See S 0000.
- 1400 UK, BBC London (as): East Asia Today (EAs). See S 2300.
- 1400 UK, BBC London (as): World News. See S 0100.
- 1405 UK, BBC London (as): Outlook. See M 1405.
- 1411 Russia, Voice of: Moscow Mailbag. See S 0111.

- 1430 Russia, Voice of: News in Brief. See S 0030.
- 1430 UK, BBC London (as): Science in Action. The latest in science and technology.
- 1432 Russia, Voice of: Russian by Radio. See M 0132.
- 1454 Radio Netherlands: Documentary. Farming (6th).
- 1454 Radio Netherlands: Documentary. Portugal (13th). See A 0154.
- 1454 Radio Netherlands: Documentary. The Dutch Seaborne Empire (The Company of Far Lands) (20th). The beginning of this epic series describes the Dutch effort to break the Portuguese monopoly in trading spices.
- 1454 Radio Netherlands: Documentary. The Dutch Seaborne Empire (The Tavern of Two Seas) (27th). See F 2354.

Saturdays

- 1400 Russia, Voice of: News. See S 0000.
- 1400 UK, BBC London (as): World News. See S 0100.
- 1405 UK, BBC London (as): Sportsworld. The weekly sports magazine.
- 1411 Russia, Voice of: Program Preview. See S 0511.
- 1430 Russia, Voice of: News in Brief. See S 0030.
- 1432 Russia, Voice of: A Christian Message from Moscow. See S 0432.

Hello, Writers...

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

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

FREQUENCIES

1700-1800	Anguilla, Caribbean Beacon	11775am			
1700-1800	Australia, Radio	5870pa 9500as	5995pa 11880pa	6080pa	9415va
1700-1800 vl	Australia, VL8A Alice Spg	2310do			
1700-1800 vl	Australia, VL8K Katherine	2485do			
1700-1800 vl	Australia, VL8T Tent Crk	2325do			
1700-1800 vl	Canada, CBC N Quebec Svc	9625do			
1700-1800	Canada, CFRX Toronto	6070do			
1700-1800	Canada, CFVP Calgary	6030do			
1700-1800	Canada, CHNX Halifax	6130do			
1700-1800	Canada, CKZN St John's	6160do			
1700-1800	Canada, CKZU Vancouver	6160do			
1700-1800	China, China Radio Intl	7150af	7200af	7405af	9570af
1700-1800	Costa Rica, RF Peace Intl	15050am	21465am		
1700-1727	Czech Rep, Radio Prague	5930eu	9430af		
1700-1800	Egypt, Radio Cairo	15255af			
1700-1800	Eqt Guinea, Radio Africa	15186af			
1700-1730	France, Radio France Intl	9845af 15530af	11615af	11700af	12015af
1700-1800	Germany, Overcomer Ministr	6175eu	11985eu		
1700-1800 vl	Italy, IRRS	3985va			
1700-1800	Japan, R Japan/NHK World	6035as 7225as	6190va 9535na	7110eu 11730as	7200as 11880af
1700-1730	Jordan, Radio	11690eu			
1700-1800 mtwhf	New Zealand, R NZ Intl	9810pa			
1700-1730 s	Norway, Radio Norway Intl	7560va			
1700-1800 vl	Papua New Guinea, NBC	4890do			
1700-1756	Romania, R Romania Intl	7195eu	9690eu	11790eu	11940eu
1700-1800	Russia, Voice of Russia WS	4920af 6175af 7180eu 7275af 9560af 9890eu	5940eu 7115af 7185af 7305af 9585af 12065me	5965eu 7125eu 7210af 7330af 9765af	6130eu 7175af 7260af 7355af 9880eu
1700-1730	S Africa, Channel Africa	15240af			
1700-1730	Slovakia, AWR Europe	7325as	9450af		
1700-1800	Swaziland, Trans World R	9500af			
1700-1800	UK, BBC African Service	6005af 15400af	6190af 15420af	9630af 17830af	11940af
1700-1745	UK, BBC Asian Service	3915as 9740as	5975as 11750as	7135as	9510as
1700-1800	UK, BBC World Service	3955eu 7210eu 15485eu	6095me 9410eu 17840na	6130eu 9530eu	6195eu 12095eu
1700-1800	USA, KAIJ Dallas TX	13815am			
1700-1800	USA, KTBN Salt Lk City UT	15590am			
1700-1800	USA, KWHR Naalehu HI	7560pa	9930as		
1700-1800 tha	USA, Monitor Radio Intl	18930af			
1700-1800	USA, Voice of America	6040af 9645as 15120eu 15445af	6110as 9760as 15205as 17895af	7125as 11920af 15395as	7215as 12040af 15410af
1700-1800 mtwhf	USA, Voice of America	5990as 9795as 15255as	6045as 11955as	9525as 12005as	9670as 12050as
1700-1800	USA, WEWN Birmingham AL	11875na	13615na	15745eu	
1700-1800	USA, WGTG McCaysville GA	9400am			
1700-1800	USA, WHRI Noblesville IN	13760am	15105am		
1700-1800	USA, WINB Red Lion PA	13790af			
1700-1800	USA, WJCR Upton KY	7490na			
1700-1800	USA, WMLK Bethel PA	9465am			
1700-1800	USA, WRMI/R Miami Intl	9955am			
1700-1800	USA, WRNO New Orleans LA	15420am			
1700-1800	USA, WWCR Nashville TN	9475am	12160am	13845am	15685am
1700-1800	USA, WYFR Okeechobee FL	11550as 3330af	15695eu 4965af	17555eu	
1700-1800	Zambia, Christian Voice	3330af			
1700-1800 vl	Zambia, R Zambia/ZNBC 1	4910do			
1700-1800 vl	Zambia, R Zambia/ZNBC 2	6165do			
1700-1800 vl	Zimbabwe, Zimbabwe BC	4828do			
1715-1730	Vatican State, Vatican R	4005eu 11810va	5883eu	7250eu	9645eu
1730-1755	Austria, R Austria Intl	6155eu	9655me	13710as	13730af
1730-1755	Belgium, R Vlaanderen Int	5910eu	9925eu	11680me	
1730-1800	Guam, AWR/KSDA	9370as			
1730-1800	Netherlands, Radio	6020af	9605af	11655af	
1730-1800	Philippines, R Pilipinas	11730me	11890me	15190me	
1730-1800	Slovakia, R Slovakia Intl	5915eu	6055eu	7345eu	
1730-1745 mtwh	Swaziland, Trans World R	3200af			
1730-1745	UK, BBC African Service	3390af	6070af	9510af	
1730-1800	Vatican State, Vatican R	11625af	13765af		
1745-1800	Bangladesh, Bangla Betar	7190as	9570eu	15520do	
1745-1800	India, All India Radio	7410eu 11620eu	9650af 11935af	9910eu 13780af	9950eu 15075af
1745-1800	Swaziland, Trans World R	3200af			
1745-1800	UK, BBC Asian Service	5975as	9510as	9740as	11750as

1800-1900	Anguilla, Caribbean Beacon	11775am			
1800-1900 mtwhf	Argentina, RAE	15345eu			
1800-1900	Australia, Radio	5995pa 9500as		6080as 11880pa	7240pa 9415pa
1800-1900 vl	Australia, VL8A Alice Spg	2310do			
1800-1900 vl	Australia, VL8K Katherine	2485do			
1800-1900 vl	Australia, VL8T Tent Crk	2325do			
1800-1900	Bangladesh, Bangla Betar	7190eu		9570as	15520do
1800-1900	Brazil, Radio Bras	15265eu			
1800-1900	Canada, CFRX Toronto	6070do			
1800-1900	Canada, CFVP Calgary	6030do			
1800-1900	Canada, CHNX Halifax	6130do			
1800-1900	Canada, CKZN St John's	6160do			
1800-1900	Canada, CKZU Vancouver	6160do			
1800-1900	Costa Rica, RF Peace Intl	15050am	21465am		
1800-1900	Czech Rep, Radio Prague	5930eu	9430as		
1800-1827	Egypt, Radio Cairo	15255af			
1800-1830	Eqt Guinea, Radio Africa	15186af			
1800-1900	Greece, Voice of	7450eu	9420eu	15485na	17705sa
1800-1815	India, All India Radio	7410eu 11935af	9650af 13770af	9950eu 15075af	11620eu
1800-1900 vl	Italy, IRRS	3985va			
1800-1900	Kenya, Kenya Broadc Corp	4885do	4935do	6150do	
1800-1900	Kuwait, Radio	11990na			
1800-1900 s	Morocco, RTVM Marocaine	17815af			
1800-1830	Netherlands, Radio	6020af	9605af	11655af	
1800-1852 mtwhf	New Zealand, R NZ Intl	9810pa			
1800-1900	North Korea, R Pyongyang	6575eu	9345eu	11700am	13760am
1800-1900 vl	Papua New Guinea, NBC	4890do			
1800-1900	Philippines, R Pilipinas	11730me	11890me	15190me	
1800-1900	Poland, Polish R Warsaw	6000eu	6095eu	7285eu	
1800-1900	Russia, Voice of Russia WS	6130eu 7210va 7440af	7115af 7260af	7175af 7275af	7180eu 7305af
1800-1830	S Africa, Channel Africa	15240af			
1800-1900	Sudan, Radio Omdurman	9200af			
1800-1900	Swaziland, Trans World R	3200af			
1800-1830	Swaziland, Trans World R	9500af			
1800-1900	UK, BBC African Service	3255af 15400af	6005af 15420af	6190af 17830af	9630af
1800-1830	UK, BBC Asian Service	5975as	9510as	9740as	
1800-1815	UK, BBC Asian Service	6065as	7200as	9605as	
1800-1900	UK, BBC World Service	3955eu 9410eu	6095me 12095eu	6180eu 17840na	6195eu
1800-1900	USA, KAIJ Dallas TX	13815am			
1800-1900	USA, KJES Mesquite NM	15385au			
1800-1900	USA, KTBN Salt Lk City UT	15590am			
1800-1900	USA, KWHR Naalehu HI	7560pa	13625as		
1800-1900	USA, Monitor Radio Intl	9355va	9385af		
1800-1900	USA, Voice of America	6035af 11975af	6035af 13710af	9760eu 15410af	11920af 15580af
1800-1900	USA, WEWN Birmingham AL	11875na			
1800-1900	USA, WGTG McCaysville GA	9400am			
1800-1900	USA, WHRI Noblesville IN	9495am	13760eu		
1800-1900	USA, WINB Red Lion PA	13790af			
1800-1900	USA, WJCR Upton KY	7490na			
1800-1900	USA, WMLK Bethel PA	9465am			
1800-1900	USA, WRMI/R Miami Intl	9955am			
1800-1900	USA, WRNO New Orleans LA	15420am			
1800-1900	USA, WWCR Nashville TN	9475am	12160am	13845am	15685am
1800-1900	USA, WYFR Okeechobee FL	11550as 3330af	15695eu 4965af	17555eu	
1800-1900 vl	Zambia, R Zambia/ZNBC 1	4910do			
1800-1900 vl	Zambia, R Zambia/ZNBC 2	6165do			
1800-1830	Zimbabwe, Zimbabwe BC	4828do			
1805-1830	Malawi, MBC	5993do			
1830-1855	Belgium, R Vlaanderen Int	9925af	13745af		
1830-1900 vl	Cyprus, BRT International	6150do			
1830-1900	Georgia, Radio	6230eu			
1830-1900	Netherlands, Radio	6020af	9605af	9895af	11655af
1830-1900 w	Saipan, FEBC/KFBS	15315af			
1830-1835	Somalia, Radio Mogadishu	9465as			
1830-1900 mtwfh	Sweden, Radio	6732do			
1830-1900 s	Sweden, Radio	6065eu			
1830-1900	UK, BBC Asian Service	9645eu			
1830-1900	UK, BBC World Service	9740pa			
1830-1845 m w	UK, BBC World Service	6050eu	7325eu	9685eu	
1830-1900 as	USA, Voice of America	7150af	9845af	15445af	
1840-1850	Greece, Voice of	11645af	15150af		
1845-1900 irreg s	Mali, RDTV Malienne	4783do			
1853-1900 smtwhf	New Zealand, R NZ Intl	11735pa			

GROVE

February 1998

*Our Complete
Buyer's
Guide*

BLAST OFF MONTHLY WITH SATELLITE TIMES!

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!

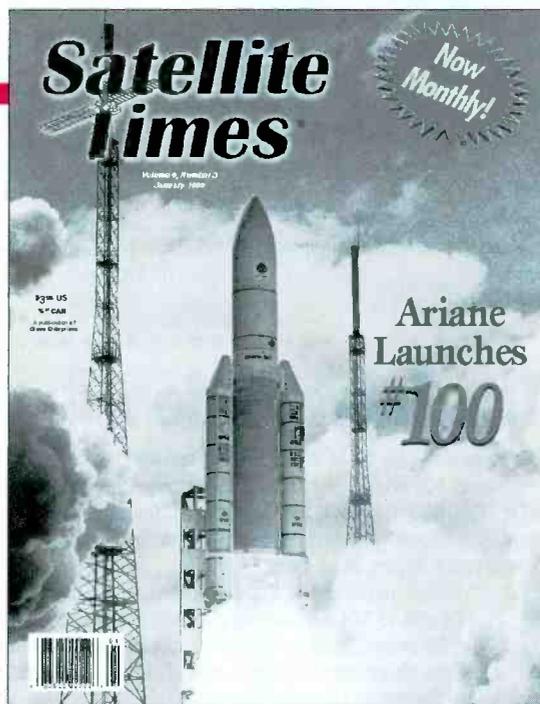
More Grove product information can be requested by phone, fax, ground mail, or e-mail. Please visit us on-line at www.grove.net.

WE ARE PLEASED TO ANNOUNCE the expansion of our newest magazine, *Satellite Times*. At the request of readers and advertisers, *ST* will now be published monthly, greatly increasing its content and timeliness.

In its three years of publication, *ST* has earned its reputation as the leading, full-spectrum, satellite monitoring magazine. With its emphasis on **satellite communications, radio and visual astronomy, PCS, weather satellites, NASA and Space Shuttle missions, worldwide satellite broadcasting, and more**, *ST* is an ideal tool for the modern listener.

Even more good news--although the publication has doubled its issues, an annual U.S. subscription is only **\$23.95!** Call now, toll-free, to reserve your subscription: **(800) 438-8155**.

(Other rates: 6 months US, \$12.95; 2 years US, \$45.95; 3 years US, \$67.95; 1 year Canada surface, \$36.50; 1 year foreign international, \$55.45. Call for other options, or see details in our magazines)



Judy Bob

Anyone who says the hobby radio market is dead

wasn't listening to the telephones, fax machine, Internet terminals, and walk-in customers at Grove Enterprises over the holidays! We enjoyed a superb business season, unequalled in recent history.

While the complexion of the hobby is changing, it is by no means moribund. New shortwave listeners and scanner enthusiasts are contacting us daily, expressing their appreciation for our customer support; long-timers thank us for our representation at the scanner hearings a year ago in Washington.

At that time it was grueling, but in the long run, it was worth it. Working together, the radio community has secured the legitimacy of the hobby, and has prevented the passage of outrageous legislation which would have virtually banished radio monitoring.

And now we see once again the emergence of new products on the market, a welcome sight, some of which are breathtaking in their potential. As more unfold, you will see them reviewed in *Monitoring Times*, and offered for sale in the *Grove Buyer's Guide* and on our Web site (www.grove.net).

We look forward to a year renewed in radio vitality and, as the sunspot cycle continues to improve shortwave reception, we prepare for a new era of communications. We are glad you will be with us for that pleasure.

Bob & Judy Grove

Trade In, Trade Up!

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

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

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

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

A Word about Wide-Band Receivers

Beginning with this issue of the Grove Buyer's Guide, we are creating a new category of radio monitoring equipment which we call "WIDE-BAND RECEIVERS." This nomenclature is in response to a host of new radio products which cover the frequency bands normally associated with BOTH shortwave radios and scanners.

So, you ask, are these wide-band radios suitable replacements for the best shortwave receivers and scanners on the market? The answer is: "maybe, depending on your needs."

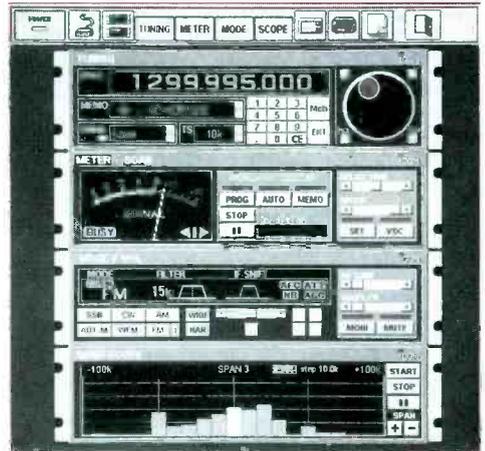
No receiver with exceptionally broad frequency range can hope to match the performance of a radio designed for a specific frequency band. If you want the best shortwave receiver, look at the top dedicated shortwave receivers of Drake, AOR and JRC.

On the other hand, wide-band receivers tend to make fine scanners, rivaling the performance of dedicated VHF/UHF scanners. We recommend that you consider purchasing a wide-band receiver if you truly need the exceptional range and flexibility they provide.

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



Computer screen simulation.

ORDER RCV 21 only **\$499⁹⁵**
(Includes Percon FCC Database)



The Incredible Alinco DJ-X10

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

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

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

ICOM R8500

Huge \$300 Discount on one of the World's Best 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. And for a limited time, it's yours for only \$1,699.95!

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 "h". **Accessories: ACC 6, ACC 7, ACC 8, ACC 72, ACC 74, ANT 2, BRK 4, BRK 5, MAN 1 beginning on page "m".**

ORDER SCN 01 only ~~\$1999⁹⁵~~ **\$1699⁹⁵**

ICOM R-10! Special Discount Price!



Now get \$100 off the regular price of this incredible scanning receiver, featuring 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 "h". **Accessories: ACC 3, ACC 4, ADPK 4, ANT 8, ANT 14, CAS 1-N, DCC 5, AND SFT 2 beginning on page "m".**

ORDER SCN 06 only ~~\$499⁹⁵~~ **\$399⁹⁵**

WIDE-BAND RECEIVERS

WINRADIO WR-1000i

The receiver of your dreams on your computer screen!

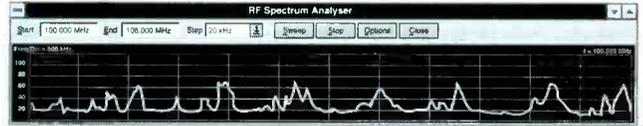


This computer-controlled, simulated receiver and spectrum display (right) appear on your computer screen!

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.

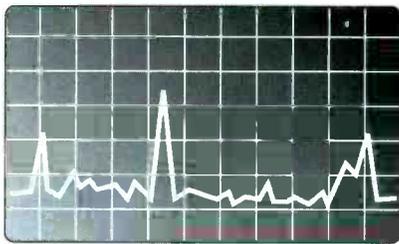
Turn your PC into a potent, wide-coverage monitoring station! User-friendly software allows all the usual receiver controls, plus much more. Rugged shielding resists interference from the host computer. Enjoy continuous 500 kHz through 1300 MHz (less cellular) frequency coverage;



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 "h" in this Buyer's Guide. **Accessories: TUN 4A, ANT 1, ANT 2, ANT 3, ANT 7, ANT 9, ANT 15, SPK 13, CBL 50 and CBL 100 beginning on page "m".**

ORDER RCV 16 only **\$499⁹⁵**

In addition to the receivers shown on these two pages, please see specifications for the wide-band AR-3000 on page h.



Superb SDU5000 Spectrum Display

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

ORDER SDU 5000 only **\$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**

AR-5000

Super-wide-coverage receiver

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

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

ORDER RCV 12 only **\$1895⁹⁵**

AR-5000 PLUS 3 also available. All the features of the AR-5000 plus double and single sideband synchronous detection, 2000 memory channels, AM & FM automatic frequency control, 10 VFOs, 40 search banks, and more. Order RCV 12-P, only **\$2095.95.**



The Renowned 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 bold alphanumeric characters.

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

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

ORDER SCN 27 only **\$599⁹⁵**

New TrunkTracker BC895XLT

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

Featuring 29-54, 108-174, 216-512, and 806-956 MHz frequency coverage (less cellular), 300 memory 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: see BRK 2, ACC 15, SFT2 and DCC 3 beginning on page "m".**

ORDER SCN 09 only **\$369⁹⁵**



NOTE: Custom leather cases available from Bee Electronics for the ReIm 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 "h". **Accessories: ANT 8, ANT 14, ANT 22, BAT 5, CAS-3 and DCC-7 beginning on page "m".**

ORDER SCN 10 only **\$249⁹⁵**

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

Uniden BC9000XLT

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

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



ORDER SCN 30 only **\$399⁹⁵**

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.

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

SCANNERS / ANTENNAS

Relm MS 200 Mobile-Base Scanner

New!



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

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

requirements! Features include priority, PC programming capability, alphanumeric display, weather scan/alert, and more! AC wall adaptor, cigarette lighter cord, attachable antenna, mobile bracket, and full instructions provided at no extra charge!

ORDER SCN 15 only **\$279⁹⁵**

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



ORDER SCN 08 only **\$249⁹⁵**

New: RCA Scanner



One of the most respected names in consumer electronics now offers their first programmable scanner. Covering 30-54, 118-174, 380-512, and 806-960 MHz (less cellular), the RCA RP-6150 is a triple-conversion scanner with 200 memory channels and 25-channel-per-second scan/search speed.

Channels may be individually locked out and scan-delayed, and up to 10 search-discovered frequencies may be temporarily stored in monitor memory.

ORDER SCN 12 only **\$199⁹⁵**



New!

Radio Shack PRO-90 Trunk Tracking Scanner

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

ORDER SCN 11 only **\$269⁹⁵**

REACH OUT TO THE WORLD WITH GROVE SCANNER ANTENNAS

Grove OMNI II



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

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

ORDER ANT 05 only **\$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. Accomodate any standard mast-pipe (1" to 2-1/8" diameter). **Accessory: CBL50 or CBL100.**

ORDER ANT 09 only **\$87⁹⁵**

Famous Grove Scanner Beam

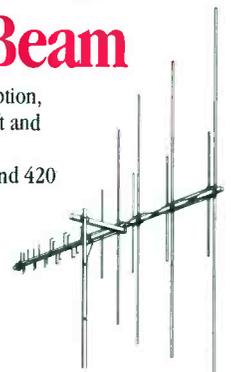
Our world-renowned Scanner Beam enhances 30-50 MHz low band reception, 108-137 MHz aircraft, 137-174 MHz high band, 225-400 MHz military aircraft and satellites, 406-512 MHz UHF, and 806-960 MHz microwave mobile.

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.**

ORDER ANT 01 only **\$59⁹⁵**



THE SCANTENNA

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

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

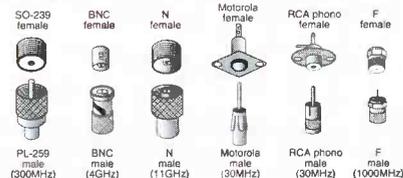


ORDER ANT 07 only **\$399⁹⁵**

Premium Low-Loss RG6-U Cable/Adaptors

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

CBL 25	25' RG-59U	\$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 (qnty.2)
- ADP 27 Banana Plug (qnty.4)
- ADP 28 F female to PAL fem. Satellite700
- ADP 29 3.5mm female to 2.5mm male mini plug (qnty.2)
- ADP 30 Dual BNC female to BNC male T-adaptor (qnty.2)
- ADP 31 BNC female to Motorola male
- ADP 32 RCA female to male PL-259
- ADPK 10 F female to Motorola male
- ADPK 13 F male to F male 3ft cable (qnty.3)
- ADPK 14 F/Motorola cable, 3ft.(qnty.2)
- ADPK 15 PL259 male to PL259 male 3ft.
- ADPK 16 BNC male/ BNC male 3ft cable

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

Grove PRE-5A VHF/UHF Signal Booster

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



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

ORDER PRE 5A only **\$89⁹⁵**

NEW Universal Whip!

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



Order ANT 8 (7"-47-1/2")	\$16⁹⁵
ANT 19 (4"-21")	\$14⁹⁵
ANT 8B	\$21⁹⁵
ANT-8N	\$23⁹⁵

STEALTH Mobile Monitoring Antenna

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

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



ORDER ANT 30 only **\$29⁹⁵**

High Gain Flex Antenna

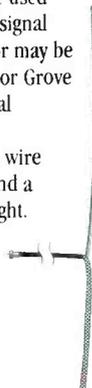
This "rubber duckie" really makes a difference on handheld scanners. The 12" Austin Condor is guaranteed to improve weak signal scanner reception—on all frequency ranges—over the original scanner antenna.

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

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



ORDER ANT 06 only **\$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**

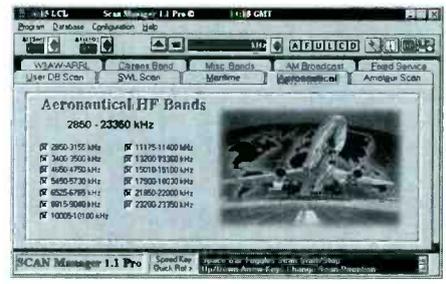
With right-angle connector for desktop use (right)



SOFTWARE FOR SCANNERS/SHORTWAVE RECEIVERS

Scan Manager Pro v.1.1

Powerful software for hams and SWLs from KC4ZGL. If you have a modern IBM compatible computer equipped with Windows 3.1 or higher, you can edit databases and control all Kenwood, Icom, Drake R8A/B (R8 not supported) and Yaesu (except FT-767) transceivers and receivers! Display your data in powerful spreadsheet style, controlled and edited by keyboard or mouse. Scan Manager 1.1 Pro includes SWL Manager 2.0. When ordering, specify radio, computer and call sign. **Order SFT 13, only \$68.95**



Scancat-Gold for DOS

Use your 640k (or better) computer to control your AOR, Drake, Kenwood, ICOM, Yaesu, JRC, Lowe, WJ, and Radio Shack PRO-2005/6/35/42 with this fast, all-new software program! Operates from the RS-232 port. Works with any IBM compatible system. **Order SFT02, only \$94.95**

Scancat-Gold for Windows®



Computer control your BC895XLT and ICOM R-10! Offers all the Scancat-Gold features plus graphic receiver tuning by mouse, slide rule or on-screen knob, no-conversion direct scanning of DBASE, FOXPRO, ACCESS, BTRIEVE files, interactive database, map and scanning functions, and much more. **Order SFT 02W, only \$99.95**

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

Scancat-Gold for Windows® SE Upgrade

The SE upgrade to Scancat-Gold for Windows features unlimited graphic capabilities for spectrum analysis. Will examine your database, plot each frequency and "paint" the entire analysis on your screen, displaying it from the lowest to the highest frequency. Shows any point by frequency and tunes your radio with the click of the mouse. Four different analysis modes. "SE" supports Master Slave with us to six CI-VB addressable radios. **Order SFT 02-SE, only \$59.95**

Optoelectronics CUB

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



ORDER CRT 9 only **\$144.95**

Incredible, 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**

Optoelectronics Frequency Scout

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

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

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



ORDER CRT 8 only **\$399.95**



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

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. "c"), RCV 12 (p. "c"), RCV 16 (p. "c"), SCN 06 (p. "b"), SCN 01 (p. "b"), and SCN 26 (p. "1").

Grove's Wide Band-Receiver Specification Guide

Prices subject to change without notice

Scanner	Alimo DA-X10	AR-300A	AR-300	AR-800	ICOM PCR-1000	ICOM F10	ICOM RS50	WINRADIO
Grove Order #	SCN 02	SCN 26	RCV 12	SCN 27	RCV 21	SCN 6	SCN 1	RCV 16
Grove Price	Call	\$1,062.95	\$1,895.95	\$599.95	\$499.95	\$399.95	\$1,699.95	\$499.95
Frequency Range	100 kHz-2000 MHz (less cellular)	100kHz-2008 MHz (less cellular)	500kHz-1900 MHz (less cellular)	500kHz-1900 MHz (less cellular)	500 kHz-1300 MHz (less cellular)	500 kHz-1300 MHz (less cellular)	100 kHz-999.99999 MHz (less cellular)	500 kHz-1300 MHz (less cellular)
Keypad Entry?	Yes	Yes, plus tuning dial	Yes	Yes	Yes	Alphanumeric	Yes	Yes
Tuning Steps	10.700 Hz(12.5/25.0/50/100/125/250/500/1000/2000) Hz	Programmable, 50 Hz-999 Hz	Programmable, 10 Hz-1 MHz	1 Hz minimum, user programmable	10 Hz-1 MHz, custom	10 Hz-1 MHz, custom	10 Hz-1 MHz, custom	50 kHz-1 kHz
Display	Backlit LCD	Backlit LCD	Backlit LCD	Backlit LCD	Backlit LCD	Backlit LCD	Backlit LCD, alphanumeric display	On screen (PC)
Dimmer	Yes	On/Off	Yes	Yes	On/Off	On/Off	Yes	N/A
Receiving Modes	AM/FM/WFM/LSB/USB/CW	AM/FM/WFM/LSB/USB/CW	AM/FM/WFM/LSB/USB/CW	AM/FM/WFM/LSB/USB/CW	AM/FM/WFM/LSB/USB/CW	AM/FM/WFM/LSB/USB/CW	AM/FM/WFM/LSB/USB/CW/RTTY	AM/FM/WFM/SSB
Memory	1200 channels	400 channels	1000 channels	1000 channels	1000 channels	1000 channels	1000 channels	Virtually unlimited
Scan	25 channels/sec.	50 channels/sec.	45 channels/sec. w/ priority	30 channels/sec.	40 chan./sec.	40 ch./sec.	50 ch./sec.	50 ch./sec. FM modes
Banks	30	4	20/40	20	18	18	20	16
Channel Lockout	1000	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Priority	1 channel	4 channels	Any channel	Any channel	Yes	Yes	Yes	Yes
Search	Yes	50 channels/sec.	50 channels/sec.	30 channels/sec.	17 channels	40 channels/sec.	40 channels/sec.	Yes
Delay	Selectable	All channels	Programmable	Programmable	Programmable time, channel	Programmable time, channel	Yes	Programmable
Clock	Clock timer	Yes	Yes	No	No, sleep timer	No, sleep timer	Yes	Yes
Audio Output (Typical)	100 mW	1.2 W	1 W	180 mW	120 mW	2 W	200 mW	200 mW
Recorder/Activator	No	Yes	Yes	No	No	Yes	No	No
Signal Strength Ind.	LCD bargraph	Yes	Analog S-meter	Yes	LCD bargraph	Analog S-meter	On PC screen	8 dim mini-jack
Computer Interface	No	RS232C	RS232C	RS232C	C-I-V	RS232C and C-I-V	Expansion slot	Expansion slot
Conversion Scheme	Triple up-conversion	Triple conv.	Triple up-conversion	Triple up-conversion	Triple up-conversion	Triple up-conversion	Triple up-conversion	Triple up-conversion
Sensitivity (NFH)	1 uV AM, 0.25 uV SSB, 0.35 uV WFM	0.25 uV	0.6 uV	0.3 uV	0.6 uV	0.6 uV	0.5 uV	0.35 uV
Selectable Altn.	Yes	Yes	Yes, chan. selectable	20 dB	Programmable, 20 dB	Programmable, 20 dB	-10/-20 dB	Yes
IF Selectivity (6-60 dB)	(-6 dB) 4 kHz SSB/CW, 15 kHz AM/FM, 150 kHz WFM	3.6/15/40/10/220 kHz	4.8-16 VDC, AC adaptor included	4.8-16 VDC, AC adaptor included	4.8-16 VDC, AC adaptor included	4.8-16 VDC, AC adaptor included	5.5/17/50 kHz FM, AM/SSB 6 kHz, WFM 17 kHz, WFM 280 kHz	AM/SSB 6 kHz, WFM 17 kHz, WFM 280 kHz
Antenna Connector	BNC	BNC	BNC	BNC	BNC	BNC	SO-239	BNC
Dimensions (W*H*D")	2-1/4x6-1/8	5.5x7.1x3	8.5x3.5x10	6.2x5.1x5	5.1x2.5x1.25	11.25x4.5x8.25	PC expansion slot	PC expansion slot
Weight	11 oz.	2.5 lbs.	7 lb. 10.5 oz.	13 oz.	11 oz.	18 lbs.	N/A	N/A
Power Requirements	4 AA cells or 6-15 VDC external	9-16 VDC	12 VDC @ 700 mA, 120 VAC @ 60 Hz	4AA cells (IN/Cts supplied)	12 VDC @ 700 mA, AC adaptor included	12 VDC/120 VAC	PC bus powered	PC bus powered
Accessories incl.	Telescopic whip	Telescopic whip	Telescopic whip, manual	Telescopic whip, manual	Telescopic whip, manual	Telescopic whip, manual	Telescopic whip, manual	Telescopic whip, manual

Grove's Scanner Specification Guide

Prices subject to change without notice

Scanner	Radio Shack Pro 2846	Rein HS-20	SCN 1	SCN 24	SCN 10	SCN 19	SCN 9	SCN 29	SCN 30	SCN 21
Grove Order #	SCN 17	SCN 1	SCN 1	SCN 24	SCN 10	SCN 19	SCN 9	SCN 29	SCN 30	SCN 21
Grove Price	\$239.95	\$249.95	\$239.95	\$239.95	\$249.95	\$289.95	\$389.95	\$499.95	\$399.95	\$179.95
Frequency Range	29-54, 108-174, 406-512, 806-958 MHz (less cellular)	29-54, 118-174, 406-512, 806-958 MHz (less cellular)	29-54, 108-174, 406-512, 806-958 MHz (less cellular)	29-54, 108-174, 406-512, 806-958 MHz (less cellular)	29-54, 108-174, 406-512, 806-958 MHz (less cellular)	29-54, 108-174, 406-512, 806-958 MHz (less cellular)				
Keypad Entry?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Alphanumeric	No
Tuning Steps	50 kHz	50 kHz	50 kHz	50 kHz	50 kHz	50 kHz	50 kHz	50 kHz	50 kHz	50 kHz
Display	Backlit LCD	Backlit LCD	Backlit LCD	Backlit LCD	Backlit LCD	Backlit LCD	Backlit LCD	Backlit LCD	Backlit LCD	Backlit LCD
Dimmer	No	No	On/Off	On/Off	On/Off	No	No	On/Off	High/low/off	No
Receiving Modes	AM, FFM	AM/FM	AM, FM (auto)	AM/FM	AM/FM	AM, FFM	AM, FFM	WFM, FFM, AM (selectable)	WFM, FFM, AM	AM (bit), FFM
Memory	100 channels	200 channels	200 channels	200 channels	300 channels	200 channels	300 channels	400 channels	500 channels	Pre-programmed by service plus user-selected frequencies
Scan	34 channels/sec.	100 ch./sec.	100 channels/sec.	100 channels/sec.	100 channels/sec.	100/20 channels/sec.	100-300 channels/sec.	100 channels/sec.	100 channels/sec.	100 channels/sec.
Banks	10	10	10	10	10	10	10	20	20	12 service bands
Channel Lockout	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Priority	Yes	10 channels	10 channels	10 channels	10 channels	No				
Search	300 channels/sec.	Yes, with lockout	300 channels/sec.	Yes	Yes	w/ auto-store	Yes	300 ch./sec.	300 ch./sec.	Yes
Delay	2 sec. any chan.	2 sec. any chan.	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.	2 sec. all channels
Clock	No	No	No	No	No	No	No	No	No	No
Audio Output (Typical)	2 W	400 mW nom.	180 mW	180 mW	180 mW	2.7 W	2.7 W	320 mW	2.2 W	3 W
Recorder/Activator	No	No	No	No	No	No	Yes	Spor. & exp./pass	Yes	No
Signal Strength Ind.	No	LCD bargraph	No	No	No	No	3.5 mm (1/8") earphone jack	No	Yes	No
Computer Interface	No	No	No	No	No	No	LCD bargraph	No	No	No
Conversion Scheme	Dual conv.	Double conv.	Double conv.	Triple conv.	Triple conv.	Triple conv.	Triple up-conversion	Triple up conv.	Triple up conv.	Double conversion
Sensitivity (NFH)	0.7 uV	0.5 uV	0.5 uV	0.3 uV	0.3 uV	0.75 uV	Unspecified	6.5 uV	0.5 uV	0.5 uV
Selectable Altn.	No	No	No	No	No	No	No	No	Yes, chan. selectable	No
IF Selectivity (6-60 dB)	2200 kHz, 6-50 dB	50 dB adjacent channel	N/A	N/A	N/A	N/A	Unspecified	N/A	N/A	N/A
Antenna Connector	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC
Dimensions (W*H*D")	7x2.7x1.5	2.5x1.5x1.5	6.2x1.7x1.7	2.5x1.5x1.5	2.5x1.5x1.5	2.5x1.5x1.5	10.75x3.375x1.5	7.4x2.7x1.5	10.5x3.8x1.5	5.5x1.8x2.7
Weight	2 lbs. 3 oz.	15 oz.	12.5 oz.	12.5 oz.	12.5 oz.	3 lbs. 14 oz.	3 lbs. 8 oz.	13 oz.	4 lbs.	1 lb. 11 oz.
Power Requirements	12 VDC	4 AA cells or 12 VDC (adapter optional)	Rechargeable battery, 12VDC	Rechargeable battery, 12VDC	Rechargeable battery, 12VDC	120VAC/12 VDC	12 VDC AC adaptor included	6.5 VDC	12 VDC (AC adapt. incl.)	12 VDC
Accessories incl.	DC cord/mobile charging station, carrying strap	Flex antenna/AC charger, 3-pin antenna, carrying strap	Flex antenna/AC charger, 3-pin antenna, carrying strap	Flex antenna/AC charger, 3-pin antenna, carrying strap	Flex antenna/AC charger, 3-pin antenna, carrying strap	Flex antenna/AC charger, 3-pin antenna, carrying strap	Telescopic whip, AC adaptor, manual	Rectargraphic belt pack/AC wall adaptor, carrying strap	Telescopic whip, AC adaptor, manual	Mobile bracket, DC cord, cigarette lighter, AC adaptor, telescopic whip, mobile whip

New, Improved Drake R8-B



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

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

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

ORDER RCV 19 only **\$779⁹⁵**

AR7030 PLUS



IPLUS
PERFORMANCE

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

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

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 "l". **Accessories:** ANT 2, ANT 3, SPK 13 beginning on page "m".



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 SWL's.

Frequency range includes 150 kHz-30MHz, 76-108, and 116-136 MHz. Requires 3D/2AA cells. See specifications on page "l". **Accessories:** ANT 3, ANT 32, BAT 1, BAT 2, SPK 13, WPO4, and TUN 4A beginning on page "m".

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 "l". **Accessories:** ANT 21, BAT 1, SPK 11, SPK 13, and TUN 4A beginning on page "m".



ORDER RCV 24 **\$359⁹⁵**

NEWLY UPDATED SONY ICF-SW7600GS

Now includes an LPI Shortwave Active Antenna and AC adaptor!



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

Continuous 150 kHz-29.995 MHz frequency coverage plus 87.6-108 MHz FM headphone stereo, pushbutton tuning, tone control, external antenna jack, clock timer with sleep function, tilt bracket, direct-entry keypad and 22 scannable memory channels keynote the high-tech features of this potent portable! See specifications on page "I". Requires 4 AA cell batteries. **Accessories:** ANT 3, ANT 2, ANT 32, BAT 1, SPK 11, and TUN 4A, beginning on page "m."

ORDER RCV 11 only **\$249⁹⁵**

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, BAT 2, SPK 13, and TUN 4A beginning on page "m."

ORDER RCV 5 only **\$59⁹⁵**

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 "I". **Accessories:** ANT 3, ANT 21, ANT 32, BAT 1 (4 required), SPK 11, and TUN 4A, 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 "I".

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

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

FAMOUS GROVE SKYWIRE



High performance and low cost. Comes fully assembled with Budwig center connector ready for your PL-259 (UHF male) equipped coaxial cable (50 or 75 ohm, see page f); 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**

SHORTWAVE ANTENNAS

GROVE TUN-4A MINITUNER PLUS

Here's a high performance, amplified, frequency-tunable



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

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

ORDER TUN 4A only **\$99⁹⁵**

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

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



ORDER ANT 31 only **\$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**

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

Receiver	AR 7050 "Plus"	Drake R88	Drake SW2	Drake SW8	Grundig YL By 400	JRC HRD-345	Sangean AT-808	Sangean AT-818CS	Sangean AT-909	Sony ICF-SW77	Sony ICF-SW100	Sony ICF-SW2010	Sony ICF-SW7600ES
Grove Order #	RCV 17	RCV 3	RCV 18	RCV 19	RCV 22	RCV 20	RCV 13	RCV 9	RCV 8	RCV 10	RCV 24	RCV 2	RCV 11
Grove Price	\$1269.95	\$1159.95	\$489.95	\$779.95	\$199.95	\$799.95	\$129.95	\$279.95	\$259.95	\$469.95	\$359.95	\$349.95	\$249.95
Frequency Range	0-32 MHz	100kHz-30MHz (35-55/108-174MHz with optional converter)	100 Hz-30 MHz	100 kHz-30 MHz, 87-108, 118-137MHz	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, 116-136MHz	150kHz-30MHz, 76-108, 116-136MHz	150kHz-29.995MHz, 87.6-108MHz
Keypad Entry?	Remote control (incl.)	Yes, plus tuning dial	Yes	Yes, plus tuning dial	Yes	Yes	Yes	Yes	Yes	Yes, plus tuning dial	Yes, plus tuning dial	Yes, plus tuning dial	Yes
Tuning Steps	2.665 Hz SSB, 20.62 Hz AM/FM	10/100Hz	50 Hz-5 kHz	100 Hz FM, 50 Hz AM	1.5 kHz	5/100 Hz/110 kHz	50/100 MHz FM, 10/9.5/1 kHz AM	1 kHz	40 Hz USB, LSB	50Hz/1MHz	10Hz/15kHz, 9/10kHz MW, 50kHz FM	100Hz/1MHz	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	Yes	On/Off	On/Off	No	No	Yes	On/Off	On/Off	On/Off	On/Off	No
Receiving Modes	AM/Synchronous AM/USB/LBC/CW, data, WFM	AM, WFM, USB, LSB, CW, RTTY	AM, AM Synchron, USB, LSB	AM, AM Synchron, WFM, LSB, USB	AM, LSB, FM, CW, USB	AM, AM Synchron, USB, LSB	AM, FM	AM, LSB, WFM, USB	AM, FM broadcast, USB, LSB	AM, AM Synchron, USB, LSB, CW, WFM	AM, AM Synchron, USB, LSB, CW, WFM	AM, USB, LSB, WFM, Synchron, det.	AM, WFM, USB, LSB, Synchron, det.
Memory	400 channels	1000 channels	100 channels	70 channels	40 channels	100 channels	45 channels	45 presets	307 channels	162 channels	50 channels	32 channels	22 channels
Scan	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Banks	10	10	No	7	No	No	No	No	29	20	10	No	No
Search	No	No	No	No	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Delay	Yes	Yes	No	5 sec. per step	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	No
Clock	Clock timer	Dual time zone	No	Dual mode	12/24 hr./sleep	12/24 hour clock/timer	24 hour UT/Critical, alarm/timer	Dual time with record alarm	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	No	2 W @ 4 ohms	700 mW	1 Watt	440 mW @ 10 @ T/D	800 mW	Yes	400 mW	250 mW	380 mW	Yes
Record Audio Output	Yes	Yes	No	Yes	Yes	Yes	No	No	No	138 mV	245 mV	.775 mV @ 1000 ohms	Yes
Recorder Activator	Yes	No	No	No	No	No	No	Internal prog. cassette	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/655 kHz)	Double up-conversion	Double up-conversion (55 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
Sensitivity (Typical)	0.5 uV	0.5 uV	0.5 uV	0.5 uV	0.5 uV	0.3 uV	Yes	RF gain control	Yes	Yes	Yes	Yes	Yes
Selectable Alien.	5 level	Yes	No	Yes	Yes	20 dB	Yes	RF gain control	Yes	Yes	Yes	Yes	Yes
IF Selectivity (-6/-60dB)	2.2/4.5-39.5 kHz	6/12 kHz AM, 2.35 kHz SSB	6/12 kHz AM, 2.35 kHz SSB	(-6/-50 dB) AM Narrow 4/6 kHz SSB 2,3/4.5 kHz	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	Wide 9/18 kHz Narrow 4/18 kHz
Passband Tuning	+/-2 kHz, all modes	500-5000 Hz, 40 dB	No	No	No	No	No	No	No	No	No	No	No
Adjustable Notch Filter	No	Dual, switched SO-239	SO-239 and screw terminal	SO-239, Push terminals, integral whip	SO-239	SO-239 and 600 ohm	18" min whip	18" min whip	18" min whip	18" min whip	18" min whip	18" min whip	18" min whip
Antenna Connector	SO-239 and 600 ohm	Dual, switched SO-239	SO-239 and screw terminal	SO-239, Push terminals, integral whip	SO-239	SO-239 and 600 ohm	18" min whip	18" min whip	18" min whip	18" min whip	18" min whip	18" min whip	18" min whip
Dimensions (W*H*D")	9.5x3.9x4	13.5x5.25x13	11.4x3.7x5	11.3x5.25x13	7.75x4.62x1.75	10x4.97D	7.5x5x1.57D	11.25x7.37x2.75	8.5x5x1.5	10.87x6.87x1.87	4.37x2.87x3.93	11.37x6.25x2.16	7.27x4.72x1.25
Weight	4 lbs, 13 oz	13 lbs	5.8 lbs	10 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.)	100/120/200/240VAC, 11-16VDC @ 2A	12 VDC/120 VAC	6-9VDC/6 cells	6VDC @ 300 mA or 6 AA cells	12 VDC/120 VAC	120VAC/int cells 4D cells	120VAC/int cells 4D cells	4AA batteries or optional external antenna connection.	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	AC adaptor, wire antenna, manual	Tele. whip/AC adaptor, manual	Real ant./case/earphones/SW Guide/6AA batteries	AC adaptor, manual	Soft pouch/stereo earphones/external antenna adaptor	AC adaptor/external antenna connection	AC adaptor, carrying pouch earphones, external antenna connection.	Stereo earphones/AC adaptor, tele. ant./SW Guide	Stereo earphones/AC adaptor, tele. ant./pouch/SW Guide	Earphone/AC adaptor, tele. ant./antiradiat. ant. adaptor, SW Gd	Carrying case/LPI active antenna/AC adaptor

ACCESSORIES / OTHER GROVE PRODUCTS

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

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

ACCESSORIES

ACC-1	REGENERATION MODULE FOR ANT-32	\$47.95
ACC-2	NIGHTLOGGER II TAPE RECORDER ACTIVATOR	\$69.95
ACC-3	OPC-478 COMPUTER INTERFACE CABLE, ICOM R10	\$44.95
ACC-4	OPC-474 CLONING CABLE, ICOM R10	\$17.95
ACC-6	CR-293 HIGH STABILITY CRYSTAL, ICOM R8500	\$295.95
ACC-7	FL-52A CW NARROW FILTER, ICOM R8500	\$189.95
ACC-8	UT-102 VOICE SYNTHESIZER, ICOM R8500	\$57.95
ACC-9	DRAKE SW-2 REMOTE CONTROL	\$48.95
ACC-11	MAGELLAN GPS 3000/4000 DATA MODULE/ANTENNA KIT	\$149.95
ACC-12	SWIVEL MOUNTING BRACKET, MAGELLAN GPS 2000/3000/4000	\$19.95
ACC-13	INSTRUCTIONAL VIDEO, MAGELLAN GPS-2000	\$14.95
ACC-14	INSTRUCTIONAL VIDEO, MAGELLAN GPS-3000	\$14.95
ACC-15	COMPUTER INTERFACE CABLE FOR BC-895	\$29.95
ACC-21	JPS ANC-4 NOISE CANCELLER 100 kHz-80 MHz	\$194.95
ACC-43	VHF CONVERTER, DRAKE R8A/B (33-55, 108-174 MHZ)	\$219.95
ACC-50	FAX INTERFACE, O'GARA PHN-5	\$95.00
ACC-51	DATA INTERFACE, O'GARA PHN-5	\$295.00
ACC-53	RECHARGEABLE NIMH BATTERY, O'GARA PHN-6	\$335.00
ACC-54	AC-DC CONVERTER, O'GARA PHN-6	\$175.00
ACC-55	12 VDC MINI CHARGER, O'GARA PHN-6	\$160.00
ACC-56	SOFT CARRYING CASE, O'GARA PHN-6	\$95.00
ACC-57	HARD CARRYING CASE, O'GARA PHN-6	\$325.00
ACC-58	REMOTE ANTENNA, O'GARA PHN-5A	\$1395.00
ACC-59	ADDITIONAL ACCESS CARDS, O'GARA COMPACT-M, PHN-5	\$85.00
ACC-60	ANTENNA WALL MOUNTING BRACKET, O'GARA PHN-6	\$400.00
ACC-61	ANTENNA CABLE (10 METERS), O'GARA PHN-6	\$320.00
ACC-62	ANTENNA CABLE, (20 METERS), O'GARA PHN-6	\$480.00
ACC-63	INTERNAL RECHARGEABLE BAT PACK O'GARA PHN-6	\$128.00
ACC-64	UNIVERSAL AC/DC CONVERTER, O'GARA PHN-6	\$335.00
ACC-72	TV-R7100 TV/FM ADAPTER, ICOM R7100/8500	\$339.95
ACC-74	CT-17 LEVEL CONVERTER, ICOM R7000/7100/8500	\$134.95
ACC-79	AUDIO CASSETTE ADAPTER, SCANNERS/SW RECEIVERS	\$9.95
ACC-94	ADHESIVE REPLACEMENT KIT, ANT-13	\$4.95
ACC-96	CTCSS SQUELCH DECODER, BC-890	\$59.95
ACC-101	BUDWIG CH-239 SW DIPOLE CONNECTOR	\$9.95
ACC-130	CTCSS TONE BOARD, UNIDEN BC-9000&PRO-2045	\$46.95
ACC-156	SAC-8000 INTERFACE CABLE, AR-8000/OPTO SCOUT	\$34.95
ACC-157	OPTO'S LYNX COMPUTER INTERFACE, AR-8000	\$129.95
ACC-168	WEATHER-PROOF FLEX TAPE, 22 FT ROLL	\$1.95

ADAPTORS & ADAPTOR KITS

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

ANTENNAS VHF/UHF

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

ANTENNAS SHORTWAVE

ANT-12	ALPHA DELTA ANT KIT, SO-239 CONNECTOR, INSULATORS	\$29.95
ANT-16	23' REEL FOR SW PORTABLES	\$14.95
ANT-25	25' RANDOM WIRE W/RCA & PL-259 ADAPTORS	\$7.95
ANT-32	KIWA POCKET LOOP 530 kHz - 30 MHz	\$119.95

BATTERIES

BAT-1	ENERGIZER INDUSTRIAL "AA"	\$7.99
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 mA/H CHARGEABLE, UNIDEN BC-230/235, PRO-90	\$29.95
BAT-9	METROWEST LONG LIFE PACK, UNIDEN BC-200/205	\$79.95
BAT-13	RECHARGEABLE "AA" NICAD BATTERIES	\$2.75
BAT-14	RECHARGEABLE PACK, UNIDEN BC-200/205	\$39.95
BAT-15	RECHARGEABLE PACK, UNIDEN BC-2500/3000	\$31.95
BAT-16	POWER POCKET RECHARGEABLE LEAD/ACID 12 V, 2 AH	\$59.95

BOOKS (See listings and displays on following pages)

BRACKETS

BRK-1	HAND-HELD RADIO MOBILE MOUNT, SINGLE	\$9.95
BRK-2	MOBILE MOUNTING BRACKET FOR BC-890/9000XLT, PRO2045	\$15.95
BRK-3	UNIVERSAL BELT CLIP CAN BE USED WITH BRK-6	\$4.95
BRK-4	MB12 MOBILE MOUNTING BRACKET, ICOM R8500	\$35.95
BRK-5	MB-23 CARRYING HANDLE, ICOM R7100/8500	\$12.95
BRK-6	MOBILE HANGER FOR BELT CLIPS UP TO 1"W	\$4.95
BRK-7	HAND-HELD RADIO MOBILE MOUNT, DOUBLE	\$12.95
BRK-9	WINDOW ANTENNA MOUNT KIT BNC CONNECTOR	\$28.95
BRK-10	DELUXE MOBILE HAND HELD SCANNER MOUNT/ORGANIZER	\$14.95
BRK-12	DRAKE SW-1.2 CARRYING/TILT HANDLE	\$6.95
BRK-13	DRAKE SW-1.2 MOBILE MOUNTING BRACKET	\$14.95
BRK-14	AOR-5000 DOUBLE RACK MOUNT	\$149.95
BRK-15	AOR-3000 RACK MOUNT	\$89.95
BRK-15	AOR-3000 DOUBLE RACK MOUNT	\$95.95

CARRYING CASES

CAS-1-N	ICOM R10 HEAVY-DUTY DURAS NYLON CASE	\$29.95
CAS-2	LEATHER CASE FOR AR-8000	\$29.95
CAS-3	LEATHER CASE FOR UNIDEN BC-230/235, PRO-90	\$29.95
CAS-6	LEATHER CASE FOR UNIDEN BC-3000XLT	\$29.95
CAS-7	MAGELLAN GPS-2000 CARRYING CASE	\$9.95
CAS-8	OPTOELECTRONICS SCOUT	\$15.10
CAS-10	DRAKE SW-8 CARRYING CASE	\$49.95
CAS-11-L	RELM HS-200 LEATHER CASE	\$29.95

CABLE

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

CHARTS

CHT-1	RADIO SPECTRUM COLOR WALL CHART, 1996	\$9.95
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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 (DOOR SIZE: 3-5/8"x5"Hx3-3/4")	\$39.95
COL-11	POST OFFICE BANK LARGE (DOOR SIZE: 5-3/8"x6-1/4"Hx3-3/4")	\$79.95
COL-12	POST OFFICE BOX DOORS, SMALL (3-5/8"x5"Hx3-3/4")	\$19.95
COL-13	POST OFFICE BOX DOORS, LARGE (5-3/8"x6-1/4"Hx3-3/4")	\$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-8	OPTOELECTRONICS SCOUT-40 (10 MHz - 2.8 GHz)	\$399.95
CTR-9	OPTOELECTRONICS CUB (1 MHz - 2.8 GHz)	\$144.95

CONVERTERS

DCC-2	3-SOCKET CIGARETTE LIGHTER ADAPTOR	\$12.95
DCC-3	MOBILE DC ADAPTOR (1.5,3,4.5,6,7.5,9,12 v, 800 mA)	\$12.95
DCC-4	OPC-131 DC POWER CABLE FOR ICOM PCR1000	\$12.95
DCC-5	CP-12 DC ADAPTOR W/ NOISE FILTER FOR ICOM R10/PCR 1000	\$29.95
DCC-7	MOBILE DC ADAPTOR FOR UNIDEN BC-3000/230/235	\$15.95

FILTERS

FTR-6	30-2000 MHZ BANDPASS FOR SCANNERS	\$29.95
FTR-7	540-1700 KHZ BAND REJECT FOR SHORTWAVE RECEIVERS	\$29.95
FTR-8	118-137 MHZ BAND REJECT FOR SCANNERS	\$29.95
FTR-9	30 MHZ LOW PASS FOR SHORTWAVE RECEIVERS	\$29.95

GPS SATELLITE EQUIPMENT

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

HEADPHONES

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

LIGHTNING PROTECTORS

LAR-1B	GAS DISCHARGE LIGHTNING/SURGE PROTECTOR (BNC)	\$24.95
LAR-1F	GAS DISCHARGE LIGHTNING/SURGE PROTECTOR (F)	\$19.95
LAR-1M	GAS DISCHARGE LIGHTNING/SURGE PROTECTOR (MOTO)	\$29.95
LAR-1P	GAS DISCHARGE LIGHTNING/SURGE PROTECTOR (PL-259)	\$24.95
LAR-2	SINGLE OUTLET-SURGE PROTECTOR (120 VAC)	\$3.95
LAR-03	SIX OUTLET SURGE PROTECTOR (120 VAC)	\$4.95

MANUALS

MAN-1	SERVICE MANUAL, ICOM R-8500	\$57.95
MAN-2	SERVICE MANUAL, DRAKE R8A	\$39.95
MAN-6	SERVICE MANUAL, AR-5000	\$29.95

MICROPHONES

MIC3	CLIP-ON MICROPHONE, 1/8" PLUG, 10' CORD	\$4.95
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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-3	DAIWA POWER SUPPLY, ADJUSTABLE 9-15 V, 5 AMPS DC	\$59.95
PWR-4	+12 VDC ADAPTOR, 800 MA, 2.1 mm PLUG	\$14.95
PWR-9	+6VDC ADAPTOR 700 mA, SONY SW-7600G	\$19.95
PWR-12	AC ADAPTOR, 500mA +/- 3/4 5/6/7.5/9/12V, 5 PLUGS	\$4.95
PWR-13	SAME AS WR12 BUT UL APPROVED	\$9.95
PWR-15	METRO WEST PRO-CHARGE FOR BAT-9	\$49.95
PWR-19	+12VDC APAPTOR, 200mA, 2.1 mm PLUG	\$7.95
PWR-21	+12VDC ADAPTOR, 500 mA, 2.1 mm PLUG	\$9.95

RECORDERS

REC-2	VOICE IT POCKET RECORDER VT300 (5-MINUTE)	\$69.95
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ROTATORS/ANTENNA

ROT-1	HEAVY DUTY WINEGUARD MODEL RT 1000	\$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-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

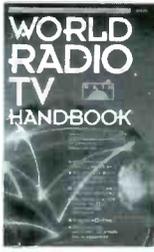
WP-9	HOW TO INTERPRET SPECIFICATIONS	\$5.95
WP-10	DRAKE SW8	\$5.95
WP-11	OUTDOOR ANTENNAS	\$5.95

BOOKS (ALL LATEST EDITIONS)

(See some of our best selling books at right)

BOK-1	FEDERAL FREQUENCY ASSIGNMENT MASTERFILE	\$24.95
BOK-2	SCANNER MOD. HANDBOOK VOLUME I, BILL CHEEK	\$17.95
BOK-2V	SCANNER MOD. HANDBOOK, VOLUME II, BILL CHEEK	\$17.95
BOK-3	1998 WORLD RADIO TV HANDBOOK	\$24.95
BOK-4	CONFIDENTIAL FREQUENCY LIST, GEOFF HALLIGEY	\$24.95
BOK-6	3D OFFICIAL AERONAUT. FREQ DIR, ROBERT A. COBURN	\$21.95
BOK-8	TOP SECRET REGISTRY OF U.S. GOVT. RADIO FREQUENCIES	\$21.95
BOK-18	1998 PASSPORT TO WORLD BAND RADIO, LARRY MAGNE	\$19.95
BOK-19	SATELLITE TV SOURCEBOOK, KEN REITZ	\$3.95
BOK-21-29	POLICE CALL PLUS (SPECIFY STATE), GENE HUGHES, 1998	\$12.95
BOK-30	ANTIQUE RADIOS, MARTY & SUE BUNIS	\$18.95
BOK-31	RADIO'S FIRST 75 YEARS, B. ERIC RHOADS	\$39.95
BOK-32	ARRL RADIO FREQUENCY INTERFERENCE HANDBOOK	\$14.95
BOK-33	RADIO ON THE ROAD, WILLIAM HUTCHINGS	\$14.95
BOK-34	KLINGENFUSS 97 SW FREQ. DIR., JOERG KLINGENFUSS	\$36.95
BOK-35	COLLECTOR'S GUIDE TRANSISTOR RADIOS, M. & S. BUNIS	\$15.95
BOK-36	THE GPS MANUAL, PRINC & APPS .S. DYE & F. BAYLIN	\$39.95
BOK-37	CRUISER'S RADIO GUIDE. ROGER KRAUTKREMER, KOYY	\$19.95
BOK-38	CRYSTAL SET PROJECTS, PHILLIP N. ANDERSON	\$14.95
BOK-47	PIRATE RADIO, ANDREW YODER	\$29.95
BOK-48	RAILROAD RADIO FREQUENCIES, STURM & LANDGRAF	\$16.95
BOK-50	RADIO MONITORING, J. (SKIP) AREY	\$19.95
BOK-51	INTERNATIONAL CALLSIGN HANDBOOK, GAYLE VAN HORN	\$9.95
BOK-53-97	M-STREET JOURNAL, ROBERT UNMAGHT, ED.	\$48.95
BOK-54	GUIDE TO UTILITIES, JOERG KLINGENFUSS	\$39.95
BOK-56	WEATHER SATELLITE HANDBOOK, RALPH TAGGART	\$19.95
BOK58-98	1998 ARRL HANDBOOK	\$32.00
BOK-59	SHORTWAVE RECEIVERS PAST & PRESENT, FRED OSTERMAN	\$24.95
BOK-62	THE ULTIMATE SPY BOOK, KEITH MELTON	\$29.95
BOK-63	MONITOR AMERICA, RICHARD BARNETT	\$29.95
BOK-64	FM ATLAS, BRUCE ELVING	\$14.95
BOK-65	RADIOS BY HALLICRAFTERS, CHUCK DACHIS	\$29.95
BOK-69	SW RADIO LISTENER'S GUIDE, ANITA LOUISE MC CORMICK	\$11.95
BOK71	PHILCO RADIO'S 1928 - 1942, MICHAEL PROSISE	\$29.95
BOK-72	COMMUNICATIONS RCVR'S VACUUM TUBE ERA, E. RHOADS	\$19.95
BOK-74	RECEIVING ANTENNA HANDBOOK, JOE CARR	\$19.95
BOK-75	TRAFFIC RADAR HANDBOOK, DON SAWICKI	\$14.95
BOK-77	SCANNERS & SECRET FREQUENCIES, HENRY L. EISENSON	\$19.95
BOK-78	MASTER FREQUENCY FILE, J. TUNNELL & R. KELTY	\$29.95
BOK-79-97	1997 WRTH SATELLITE & TV HANDBOOK	\$24.95
BOK-81	FREQ & INTELLIGENCE DIRECTORY, JAY HARRIS	\$19.95
BOK-83	ULTIMATE SCANNER (MODIFICATIONS), BILL CHEEK	\$29.95
BOK-85	SATELLITE EXPERIMENTER'S HDBK, MARTIN DAVIDOFF	\$19.95
BOK-86	WORLDWIDE AERONAUTICAL COMMUNICATIONS, R. EVANS	\$19.95
BOK-87-18	ARRL ANTENNA HANDBOOK	\$29.95
BOK-88	CRYSTAL SETS (VOLUME V), PHILLIP N. ANDERSON	\$9.95
BOK-89	SHORTWAVE ANTENNAS, ANDREW YODER	\$16.95
BOK-95	INSTALL AIM & REPAIR YOUR SAT. SYST., F. BAYLIN	\$9.95
BOK-96	MINIATURE SATELLITE DISHES, FRANK BAYLIN	\$19.95
BOK-97	SPECTRUM GUIDE, BENNETT Z. KOBB	\$29.95
BOK-102	ZENITH TRANSOCEANIC ROYALTY, H. CONES & J. BRYANT	\$24.95
BOK-102B	ZENITH RADIO, THE EARLY YEARS, H. CONES & J. BRYANT	\$29.95
BOK-103	ARRL REPEATER DIRECTORY	\$8.00
BOK-108	VISUAL DICTIONARY OF SPECIAL MIITARY FORCES	\$16.95

BOOKS



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.**

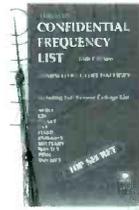


SHORTWAVE RECEIVERS, Past and Present, by Fred Osterman, 2nd Edition. Collectors and flea market addicts will covet this new, glossy, photo essay of more than 500 receivers from 70 manufacturers since 1945. Receivers are identified by type, date of manufacture, size and weight, features and specifications, circuit description and tube identifications, value, and even a commentary overview. Includes text on buying, repairing, and restoring used radios. By far the best reference of its type available. **Order BOK59, only \$19.95.**



ZENITH RADIO: The Early Years 1919-1935, by Harold Cones and John Bryant. Few flea market radios stir the interest as the Zenith brand, a

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FREQUENCIES

2100-2200	Anguilla, Caribbean Beacon	11775am			
2100-2130	Australia, Radio	5995pa 9660pa	7240pa 11880pa	9415pa 12080pa	9500as 17795pa
2100-2130 vl	Australia, VL8A Alice Spg	2310do			
2100-2130 vl	Australia, VL8K Katherine	2485do			
2100-2200 vl	Australia, VL8K Katherine	5025do			
2100-2130 vl	Australia, VL8T Tent Crk	2325do			
2100-2200 vl	Australia, VL8T Tent Crk	4910do			
2100-2115 vl	Cameroon, Radio Cameroon	4850do			
2100-2200 vl	Cameroon, Radio Garoua	5010do			
2100-2200 vl	Canada, CBC N Quebec Svc	9625do			
2100-2200	Canada, CFRX Toronto	6070do			
2100-2200	Canada, CFVP Calgary	6030do			
2100-2200	Canada, CHNX Halifax	6130do			
2100-2200	Canada, CKZN St John's	6160do			
2100-2200	Canada, CKZU Vancouver	6160do			
2100-2200	Canada, R Canada Intl	5925va 11945va 13650va	5995va 13690va	7235va 15150va	9805va
2100-2130	China, China Radio Intl	3985eu	7180af	9535af	
2100-2200	China, China Radio Intl	6950eu	9635eu	9920eu	
2100-2200	Costa Rica, RF Peace Intl	15050am	21465am		
2100-2130	Cuba, Radio Havana	13600eu	13715eu		
2100-2200 vl	Cyprus, BRT International	6150do			
2100-2127	Czech Rep., Radio Prague	5930na	7345af		
2100-2200	Ecuador, HCJB	12015eu	21455am		
2100-2200	Egypt, Radio Cairo	15375af			
2100-2200	Eq Guinea, Radio Africa	15186af			
2100-2130	Finland, YLE/R Finland	6135eu			
2100-2200	Georgia, Voice of Hope	6290eu			
2100-2150	Germany, Deutsche Welle	9615af 11785as	9670as 11865af	9690af 15275af	9765as
2100-2130	Germany, Adventist World R	9835af			
2100-2200	India, All India Radio	7150va 9950eu	7410eu 11620eu	9650eu 11715au	9910au
2100-2157	Iraq, Radio Iraq Intl	11785me			
2100-2200 vl	Italy, IRRS	3955va			
2100-2200	Japan, R Japan/NHK World	6035as	13630na		
2100-2130	Japan, R Japan/NHK World	6090as			
2100-2107 vl	Kenya, Kenya Broadc Corp	4885do	4935do	6150do	
2100-2200	Lebanon, Voice of Hope	9960va			
2100-2200	Liberia, Radio Veritas	3425do			
2100-2115	Liberia, LCN/R Liberia Int	5100do			
2100-2130	Mexico, Radio Mexico Intl	9705na			
2100-2107	Namibia, NBC	3270do	3290do		
2100-2200	New Zealand, R NZ Intl	15115pa			
2100-2200	Nigeria, FRCN/Radio	3326do	4770do	4990do	
2100-2200	North Korea, R Pyongyang	6575eu	9345eu	11700am	13760am
2100-2200 vl	Papua New Guinea, NBC	4890do			
2100-2129	Poland, Polish R Warsaw	6035eu	6095eu	7285eu	
2100-2130 mtwhf	Portugal, R Portugal Intl	7110eu	9780eu	9815eu	7195eu
2100-2156	Romania, R Romania Intl	5955eu	5990eu	6175eu	
2100-2200	Russia, Voice of Russia WS	9570eu 5940eu 7320eu	5965eu 7170eu	7180eu	
2100-2130	Slovakia, AWR Europe	7265af			
2100-2200 vl	Solomon Islands, SIBC	5020do			
2100-2200	South Korea, R Korea Intl	15575eu			
2100-2130	Switzerland, Swiss R Intl	6165eu	7410eu		
2100-2200	Syria, Radio Damascus	12085na	13610au		
2100-2110	Uganda, Radio	4976do			
2100-2200	UK, BBC African Service	6005af	6190af	11835af	
2100-2200	UK, BBC Asian Service	3915as 6195as	5965as 9740pa	5975pa 6120as	
2100-2200	UK, BBC World Service	3955eu 7325eu	5975am 9410eu	6180eu 11750sa	6195eu
2100-2200	USA, KAIJ Dallas TX	13815am			
2100-2200	USA, KTBN Salt Lk City UT	15590am			
2100-2200	USA, KWHR Naalehu HI	7560pa	17555pa		
2100-2200	USA, Monitor Radio Intl	9355eu			
2100-2200	USA, Voice of America	6035af 9760eu 11870pa 15410af 15580af	6070me 11975af 13710af 17725af 17735as	7415af 15185as 15205as	9595af
2100-2200	USA, WEWN Birmingham AL	11875na	13615na	17695eu	
2100-2200	USA, WGTG McCaysville GA	9400am			
2100-2200	USA, WHRI Noblesville IN	9495am	13760am		
2100-2200	USA, WINB Red Lion PA	13790eu			
2100-2200	USA, WJCR Upton KY	7490na			
2100-2200	USA, WRMI/R Miami Intl	9955am			
2100-2200	USA, WRNO New Orleans LA	15420am			
2100-2200	USA, WWCR Nashville TN	7435am	12160am	13845am	15685am
2100-2200	USA, WYFR Okeechobee FL	7355eu	11580af	15565eu	
2100-2110	Vatican State, Vatican R	4005eu	5883eu	7250eu	
2100-2200	Zambia, Christian Voice	3330af	4965af		
2100-2200 vl	Zambia, R Zambia/ZNBC 1	4910do			
2100-2200 vl	Zambia, R Zambia/ZNBC 2	6165do			
2100-2200 vl	Zimbabwe, Zimbabwe BC	4828do			
2115-2200	Egypt, Radio Cairo	9900eu			
2115-2130 mtwhf	UK, BBC Caribbean Report	5975ca	15390ca	17715ca	
2115-2130 as	UK, BBC World Service	5975am			
2130-2200	Australia, Radio	7240pa 12080pa	9500as 12080pa	9660pa 17795pa	11695as
2130-2200	Ghana, Ghana Broadc Corp	3366do			
2130-2200	Guam, AWR/KSDA	15310as			
2130-2200	Iran, VOIRI	6165pa	6175pa		
2130-2135 mtwhf	Latvia, Radio	5935eu			
2130-2200	Malawi, MBC	3380do			

2130-2200 as	Sweden, Radio	6065eu	9655eu		
2130-2200	Turkey, Voice of	7200eu			
2130-2145 1f	UK, BBC Calling Falklands	11680sa			
2130-2200	UK, BBC World Service	5875eu	6050eu	9850eu	
2130-2200	Uzbekistan, R Tashkent	7105as	9540as		
2145-2200 mtwhfa	Armenia, Voice of	4810eu	9965eu		
2145-2200 a	Greece, Voice of	9420au	11645au		

2200 UTC					
2200-2230	Albania, R Tirana Intl	6025eu	7135eu		
2200-2300	Anguilla, Caribbean Beacon	6090am			
2200-2215 mtwhfa	Armenia, Voice of	4810eu	9965eu	13755pa	15510as
2200-2300	Australia, Radio	9660pa 17795pa			
2200-2300 vl	Australia, VL8K Katherine	5025do			
2200-2300 vl	Australia, VL8T Tent Crk	4910do			
2200-2300	Bulgaria, Radio	7530eu	9700eu		
2200-2300	Canada, CBC N Quebec Svc	9625do			
2200-2300	Canada, CFRX Toronto	6070do			
2200-2300	Canada, CFVP Calgary	6030do			
2200-2300	Canada, CHNX Halifax	6130do			
2200-2300	Canada, CKZN St John's	6160do			
2200-2300	Canada, CKZU Vancouver	6160do			
2200-2229	Canada, R Canada Intl	5995va 11705as	7235va 11945va	9735va 13690va	9805va 15150va
2200-2300	China, China Radio Intl	7170eu			
2200-2230	China, China Radio Intl	3985eu			
2200-2300	Costa Rica, RF Peace Intl	7385am	15050am	21465am	
2200-2300 vl	Cyprus, BRT International	6150do			
2200-2245	Egypt, Radio Cairo	9900eu			
2200-2300	Eq Guinea, Radio Africa	15186af			
2200-2215	Ghana, Ghana Broadc Corp	4915do			
2200-2230	Hungary, Radio Budapest	3975eu	9840eu		
2200-2230	India, All India Radio	7150va 9950eu	7410eu 11620eu	9650eu 11715au	9910au
2200-2230	Iran, VOIRI	6165pa			
2200-2225	Italy, RAI Intl	6150pa			
2200-2300	Lebanon, Voice of Hope	9960va			
2200-2215	Liberia, LCN/R Liberia Int	5100do			
2200-2300	Malaysia, Radio	7295do			
2200-2225	Moldova, R Moldova Intl	7520eu			
2200-2300	New Zealand, R NZ Intl	15115pa			
2200-2215	Nigeria, FRCN/Radio	3326do	4770do	4990do	
2200-2230 s	Norway, Radio Norway Intl	7570sa			
2200-2300 vl	Papua New Guinea, NBC	9675do			
2200-2300	Russia, Voice of Russia WS	5940eu 7320eu	5965eu 7360eu	7105eu 7440eu	7125eu 9890eu
2200-2230	Serbia, Radio Yugoslavia	7180eu 7205eu			
2200-2215	Sierra Leone, SLBS	6100eu			
2200-2230	Slovakia, AWR Europe	3316do			
2200-2230 vl	Solomon Islands, SIBC	6055eu			
2200-2230	South Korea, R Korea Intl	5020do			
2200-2300	Spain, R Exterior Espana	3970eu	6480eu		
2200-2205	Syria, Radio Damascus	6125eu	11775af		
2200-2300	Taiwan, Taipei Radio Intl	12085na	13610au		
2200-2230	Turkey, Voice of	5810eu	9985eu		
2200-2300	UK, BBC African Service	7200eu			
2200-2300	UK, BBC Asian Service	11835af 5905as	5965as	6195as	7110as
2200-2300	UK, BBC World Service	11955as 3955eu	5975am	6110am	6175na
2200-2300	USA, KAIJ Dallas TX	9560am	9590na	9660as	9825am
2200-2300	USA, KWHR Naalehu HI	9915sa 11750sa	12080pa	15390am	
2200-2300	USA, Monitor Radio Intl	5905eu	5940eu	6010eu	6020eu
2200-2300	USA, Voice of America	6080eu 13815am 15590am	7205eu 7420eu		
2200-2300	USA, KTBN Salt Lk City UT	15590am			
2200-2300	USA, KWHR Naalehu HI	7560pa	17555pa		
2200-2300 ws	USA, Monitor Radio Intl	13770sa			
2200-2300	USA, Voice of America	7215as 15305as	9770as 17735as	9890as 17820as	11760as
2200-2230 mtwhf	USA, Voice of America	15185as 15290as	15305as 17735as	17820as 17975af	12080af
2200-2300	USA, WEWN Birmingham AL	13710af			
2200-2300	USA, WGTG McCaysville GA	5825eu	13615na		
2200-2300	USA, WHRI Noblesville IN	9400am			
2200-2300	USA, WINB Red Lion PA	9495am			
2200-2300	USA, WINB Red Lion PA	11950ca			
2200-2300	USA, WJCR Upton KY	7490na			
2200-2300	USA, WRMI/R Miami Intl	9955am			
2200-2300	USA, WRNO New Orleans LA	15420am			
2200-2300	USA, WWCR Nashville TN	5070am	7435am	9475am	13845am
2200-2300	USA, WYFR Okeechobee FL	11580af	15565eu		
2200-2300 vl	Zambia, R Zambia/ZNBC 1	4910do			
2205-2210	Croatia, Croatian Radio	9590af			
2230-2255	Austria, R Austria Intl	5945eu	6155eu	13730af	
2230-2300	China, China Radio Intl	7170eu			
2230-2300	Cuba, Radio Havana	6000na			
2230-2227	Czech Rep., Radio Prague	5930na	7345na		
2230-2300	Iraq, Radio Iraq Intl	11785me			
2230-2300	Sweden, Radio	6065eu	7325eu		
2240-2250	Greece, Voice of	9420au	11645au		
2245-2300	Ghana, Ghana Broadc Corp	3366do	4915do		
2245-2300	India, All India Radio	7410as	9705as	9950as	11620as
2245-2300	Vatican State, Vatican R	6160au	7305au	9600au	11830au

PROPAGATION CONDITIONS, UNITED STATES

NVIS PROPAGATION IN NORTH AMERICA (PART 1)

By Jacques d'Avignon
monitor@rac.ca

OPTIMUM WORKING FREQUENCIES (MHz)

For the Period 15 February to 14 March 1998 Flux=108 SSN=58

Predictions prepared using ASAPS for Windows®

Why use low power transmitters on the broadcast band in North America? Anytime we think of the power on broadcast bands, we generally think of the powerhouse running 50kW or the "regular" station that operates with power much less than that. But if you are trying to cover the hinterland of Canada where, in some areas, the population density is very low, what system would you use?

In Canada we have two broadcasting networks that are very similar to the U.S. National Public Radio. These networks were mandated by law in the mid 1930's and are still operating today. One English and one French network are operated to reach as many Canadians as possible. This mandate is exercised by the Canadian Broadcasting Corporation/Radio Canada.

In the mid-30's, as now, the majority of the Canadian population was located along a very narrow band of real estate along the Canada-USA border. But there were pockets of population along the railways in northern Quebec and Ontario, and in some regions of British Columbia where normal broadcast signals could not reach into the deep valleys. What all these sites had in common was that they were located along railways, and along these railways you found telegraph lines.

Before the advent of microwave and satellites, all the radio network programs were carried across the country on landline and yes, you may have guessed it, the telegraph lines were used to carry the network signal across the country. Why telegraph lines instead of telephone lines? Part of the answer is that the all the telegraph lines across Canada belonged to only two companies, so it was easy for the radio broadcasting networks to negotiate rates and conditions, and one company was owned by the Government of Canada!

The northern, isolated, small pockets of population were all clustered around railway stations in a thin strip along the railroad right of way. How can you tailor a signal that can cover such an unusual pattern of listeners when you don't have the funds to build many transmitters with elaborate antenna systems?

Someone put on his thinking cap and designed a small transmitter of less than 50 watts that could deliver a broadcast

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	24	21	17	14	12	12	12	12	12	10	9	10	10	11	17	21	23	24	25	26	26	26	25	25
WESTERN EUROPE	9	8	8	8	8	8	8	8	8	8	9	*	*	*	11	15	18	18	18	17	15	13	11	10
EASTERN EUROPE (P)	*	8	8	8	9	10	9	*	*	*	*	*	*	*	10	14	17	14	12	*	*	*	*	*
MEDITERRANEAN	12	12	12	13	12	11	10	*	*	*	*	*	*	*	13	16	19	19	19	19	15	14	13	12
MIDDLE EAST (P)	11	11	11	14	12	*	*	*	*	*	*	*	*	*	10	13	16	14	*	*	*	*	*	*
CENTRAL AFRICA	20	19	16	13	12	11	10	*	*	*	*	*	*	*	16	19	21	21	22	22	22	22	22	22
SOUTH AFRICA	14	13	12	11	10	11	11	*	*	*	*	*	*	*	18	22	23	23	22	19	17	15	15	15
SOUTH EAST ASIA (P)	20	22	21	18	15	*	*	*	*	*	*	9	10	10	10	11	15	16	15	14	*	*	*	*
FAR EAST	21	20	19	17	14	12	10	10	9	9	9	9	9	9	9	10	11	11	11	*	11	17	21	20
AUSTRALIA	23	24	24	21	17	14	13	12	12	12	11	11	11	10	9	11	15	13	*	*	17	21	22	23
TO/FROM US MIDWEST																								
SOUTH AMERICA	20	17	13	12	11	11	11	11	10	9	8	10	10	14	19	21	22	22	23	24	24	23	23	22
WESTERN EUROPE	11	10	9	9	9	9	9	9	10	10	10	*	*	14	18	20	20	20	20	19	17	16	14	12
EASTERN EUROPE	8	8	8	7	8	9	9	*	*	*	*	*	*	11	15	17	17	15	13	*	*	*	*	*
MEDITERRANEAN	13	13	13	12	11	10	10	*	*	*	*	*	*	14	18	20	20	21	20	17	15	14	13	13
MIDDLE EAST (P)	11	11	11	12	11	*	*	*	*	*	*	*	*	11	14	17	17	14	*	*	*	*	*	11
CENTRAL AFRICA	20	17	14	13	11	11	11	*	*	*	*	*	*	16	20	21	22	22	23	23	22	22	22	22
SOUTH AFRICA	14	13	12	11	10	11	12	*	*	*	*	*	*	18	21	22	23	24	22	19	17	15	15	15
SOUTH EAST ASIA (P)	19	19	17	14	*	*	*	*	*	*	*	9	9	9	11	15	16	15	14	13	*	*	*	11
FAR EAST	21	19	17	15	12	11	10	9	9	9	9	9	9	9	10	11	11	12	11	*	12	17	21	21
AUSTRALIA	23	23	21	16	*	*	*	12	12	11	11	11	11	10	11	15	14	13	*	*	17	21	22	23
TO/FROM US EAST COAST																								
SOUTH AMERICA	14	12	11	10	10	10	10	9	8	7	9	14	18	20	20	21	21	22	21	21	20	20	18	
WESTERN EUROPE	9	9	9	9	9	8	8	8	9	9	9	11	15	18	18	19	19	19	19	18	16	14	12	11
EASTERN EUROPE	8	8	8	8	8	9	8	9	*	*	*	10	13	17	18	18	18	16	14	12	10	9	9	8
MEDITERRANEAN	13	12	12	11	10	10	10	*	*	*	*	12	16	19	20	20	20	21	20	16	14	13	13	13
MIDDLE EAST (P)	12	11	11	11	10	10	*	*	*	*	*	16	19	20	20	18	16	14	12	12	12	11	12	
CENTRAL AFRICA	16	14	13	13	13	12	12	12	*	*	*	16	21	23	24	24	25	25	25	23	23	23	21	18
SOUTH AFRICA	14	13	12	11	10	11	12	12	*	*	*	15	21	23	24	24	25	25	22	19	17	15	15	15
SOUTH EAST ASIA (P)	16	15	*	*	*	*	*	*	*	*	*	10	12	15	17	16	15	14	13	13	13	12	10	11
FAR EAST	19	17	14	*	*	*	*	9	9	10	9	9	10	11	11	11	*	*	*	*	12	16	21	21
AUSTRALIA	22	18	*	*	*	*	*	11	12	11	11	11	11	14	15	15	14	*	*	*	17	20	21	22

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

quality signal on any frequency available in the broadcast band. The next ingredient in the recipe was to decide where to locate those transmitters. They needed reliable power, access to network audio, and some supports to hang the antenna. The answer was elegantly simple: locate the transmitters in the railway stations!

Many railway stations housed repeater equipment to amplify the telegraph and radio network signals travelling on the lines across the country; therefore they had easy access to the audio from the networks and the power source was reliable. And how about antenna supports? Every 100 feet

along the railways was a pole to carry the many telegraph wires, so why not use the same pole?

The antenna didn't have to be very elaborate, just a piece of wire that would properly load the transmitter and produce a radiation pattern that has its main lobe in the vertical plane. So they strung their antennas on the telegraph poles. Nowadays, of course, this is no longer the custom as the telegraph lines, and in many cases the poles, have disappeared.

Next month we will finish the rest of the equation as to how the isolated Canadian population had a radio service.

Reviewing the Basics

Many of you folks who follow the public service world are probably aware that there is currently a nationwide push to a new set of standards for Emergency Medical Technicians. Now Old Uncle Skip has run "The Streets" as an EMT-A since 1984. (If you want to hear war stories you'll have to track me down at the Kulpville SWL Winterfest) Still, as law required, I had to sit through a transition class to the new EMT-B standard.

When I reviewed the class schedule I initially got a chuckle out of the fact that we would have a lecture on radio communications. Here I am, an Amateur Extra Class licensee, an FCC General Radiotelephone license holder, a former Army officer, and a battle hardened "squaddy" who has survived the rigors of cross county dispatching and serving as ground contact at the landing zone for dozens of emergency chopper rescues. Furthermore I have my notable status as a world recognized "radio sage." I figured that this would be the session where I could grab a few "Z"s since I had run hard with my squad the night before. Maybe I could sell a copy of my book to the instructor so he could learn a thing or two.

Then I received the latest column deadlines from Brasstown: Hmmm, I needed a column, quick! The problem was further complicated by the fact that the EMT-B practical test sessions were going to take up most of the day I normally use to churn out this column. So, instead of being a cocky know-it-all with my feet up on the seat in front of me, the instructor saw a student taking copious notes about the basics of radio communication.

Interestingly enough it was interesting stuff. I had the chance to relearn a few things that I had forgotten. And of course I get to pass this information on to you, Compadre.

Good radio practice is just plain polite under normal circumstances. If you ever find yourself involved in emergency radio communications, it is essential. These practices don't just apply if you're bouncing around in an ambulance. They have meaning to anyone who picks up a microphone as a hobbyist, volunteer, or professional.

1) Always make sure your transceiver is working and tuned to the proper frequency.



Good communications skills are important in any two-way interchange, but in an emergency they are essential.

I know this sounds a bit silly but it happens to the (allegedly) best of us. I was recently involved in an Amateur Radio Emergency Service (ARES) drill in my home county. Our communication was going to be performed through our local ARES repeater. Well, I heard a couple of hams having a chit-chat on the system so I asked them politely to clear off so we could get our operation underway. They sincerely complied. However, my rig was tuned to another repeater and of course the system they QSY'd to was the actual ARES repeater and with egg all over my face I had to once again beg their pardon and send them back from whence they came.

2) Take steps to reduce background noise and interference.

Just as everything, including interference, comes down your antenna wire, everything in the background goes out over your mike. How many times have you listened to your scanner and heard someone trying to talk over a running siren? Even in the ham radio world, ragchewing on the local repeater is hard enough without a lot of noise coming from the wind blasting in an open window.

Also, communications is sometimes necessary in the presence of loud machinery. (Like those choppers I mentioned earlier). An old trick that they used to teach in the shipboard training manuals was to cup your hands around the mike to reduce outside noise. Another possibility is to put a vehicle, building,

or even a few people between you and the noise source.

Keep in mind that most modern microphones are designed to operate with your mouth between two and three inches away from the grill. Trying to out-talk a noise source by getting up close to the mike like Janis Joplin used to do will only result in distortion and further unintelligibility. Remember that the whole point of communication is to be understood.

While we're on the subject of microphones, always wait a second or two after pushing down the mike button before speaking. Along that route between your rig, the repeater system and the other person's radio are no doubt a few relays to click on and off. Waiting a brief second or so will assure that the first few words of your communication won't be cut off.

3) Always establish a clear path of communication.

In all forms of radio communication, it is not uncommon to have a whole lot of people wanting or even needing to use the same frequency at the same time. Things can get confusing really fast unless you take the time to follow a few simple guidelines. First, listen to the frequency and make sure that it is not in use. In the amateur radio world we go a step further and then go on the air and ask if the frequency is occupied.

In any form of two-way radio communica-

tion where more than a few folks are in operation, it is essential that you make it clear who you are and who you are talking to. The formal practice for this is probably as old as radio itself and is maintained across all radio services that I know of. First you state the name or callsign of the station you are calling followed by your name or callsign. In the amateur radio world it would be "WB2KKS this is N2EI." While clamping off an umbilical cord in the back of an ambulance it may be "County Dispatch, Squad 2697." In the Family Radio Service (FRS) it may simply be "Dad this is Number One Son." See the pattern? This not only makes the communication between you and the station you are calling clear, it also lets everybody else on the frequency know what is going on.

In most formal communication situations you are in the position of calling a central dispatch or net control. Once you have called the control station you will then be told to proceed or to stand by. It's always important to follow the control station's directions explicitly.

Further, in most such operations you would ask permission of the control station before contacting any other station on the frequency or network directly. Hams in an ARES or RACES net would say something like "Net Control this is N2EI request informal with WB2KKS." An EMS operation would sound more like "County Dispatch, Squad 2697 calling Unit 2691." A good net control will anticipate frequency use and direct stations requiring direct communication off the main frequency. So this might sound like, "Squad 2697 call Unit 9 on Tac 2," indicating that the two stations should shift to the secondary tactical frequency.

Once a net operation is formalized, it's not uncommon for stations to shift to "tactical" callsigns that may have particular meaning in the situation, further increasing an understanding of the operation. If our ARES group is supporting a Walk-A-Thon we may shift from our ham callsigns to such things as "Checkpoint 1," "Checkpoint 2," "Finish Line" etc. When the net is formalized the net control station will identify for the entire group usually using the repeater callsign or group name. In my group's case this would be, "This is net control station W2KUU for the Burlington County ARES Net operating in support of the 'XYZ' Walk-A-Thon."

All stations still have to ID with their FCC callsigns every 10 minutes, as the rules require.

4) Manage the language.

In formal radio operations, clear communications become all the more important. So it

is just good common sense that you try to speak slowly and clearly. You may not have background noise on your end but the person trying to copy you may have helicopter blades swinging over their heads. Also, in any emergency operation, keep transmission as brief as possible. If you have to go on for a bit — such as giving a medical status report while enroute to a trauma center with the end result of a bad motor vehicle accident — pause every 30 seconds or so. This does two things. It lets the person's pen on the other end catch up to what you are saying. It also allows for other stations on frequency to break in with priority traffic.

In spite of all the APCO codes you've memorized, *use plain language*. If you want to talk like a cop, sign up for the police academy. Also, don't use "Joe Friday" phrases such as "be advised" or any form of slang or nonstandardized abbreviations. They have no meaning except to give the dispatcher a giggle about your unprofessional radio technique.

Be very careful when trying to transmit numbers. Running down the highway in an ambulance that missed its last wheel alignment can make the number sixteen sound like sixty. Always take the time to say the number in two forms. Example: "The patient's pulse is 'sixty,' 'six zero.'" In high noise environments you may need to "count up" — "The patient has five...one, two, three, four, five, broken ribs."

The words "yes" and "no" can sound like a dozen other things in the heat of an emergency. Use "affirmative" and "negative" instead, as they work better over the radio. By the way, nobody uses "Roger" anymore except when they are calling their friend by that

name. The more modern expression is "understood" or "acknowledged," depending on the context.

By the way, when you have finished what you are saying on the air, please remember to say "over." On a busy net you could have fifty people holding their breath waiting for you to formally end your transmission. Once you have said "over" wait for acknowledgement from the other station so you are sure your message was received. At the completion of a transmission that requires no further communications between stations, it is proper to conclude with the word "out" signifying the end of your part of the operation. "Over and out" is only heard in old war movies.

Since I am both a radio monitoring hobbyist and a person involved in public service and emergency medical communications, I always remain acutely aware that folks just like me are often listening to what I'm saying over their scanning receivers. It reminds me that it is my duty to perform my radio communications as professionally as possible because the folks who pay the taxes and make the contributions are often keeping an ear on things.

By the time you read this I'll be running the streets with my shiny new EMT-B patch sewn on my jacket. If you want to try your hand at some of these skills I've just talked about, remember your local fire departments, emergency medical services and amateur radio groups are always looking for volunteers. You can also contribute generously to your local services. Think of it as paying the rent on those frequencies you monitor. If you see me in your rear view mirror running "hot," please pull to the side of the road.

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GOT A SCANNER? GET POLICE CALL PLUS

Q. Why can I hear only one side of the conversation on some cellular phone calls? How does a cell phone user get privacy protection? (R.L., Chicago, IL)

A. You shouldn't be listening to *either* side of telephone conversation unless you are a law enforcement officer with a court ordered wiretap authorized under Title III (USC 18, Sec. 2511, et. seq.).

But on to your question. According to Dan Veeneman, our intrepid PCS columnist, you hear both sides of the conversation due to the "echo" effect resulting from the circuitry's hybrid design which discriminates between mouthpiece signals and earpiece signals. Some

circuits are very effective in rejecting voice signals from the mobile user, others aren't; thus, the echo effect. (See p. 70 for more.)

And yes, voice privacy is available from the private sector. In most cases this involves installing an analog scrambler (usually simple voice inversion) on the cell phone, and a compatible unit at the location of the cellular service provider. If you didn't have one at the service provider's location, then you would have to have a separate descrambler at every telephone number you called.

Anyone listening to either your 824-849 MHz mobile transmission or the 869-894 MHz cell site signal would hear only the scrambled signal, while the wireline would be carrying unscrambled analog voice to and from the landline party.

Q. What frequencies were used by the French Foreign Legion back in the '30s and '40s? Is the legion still active and using radio? (Bob Brock, Phoenix, AZ)

A. Now there's an esoteric question if I've ever heard one! Bob, do you lie awake at night thinking these questions up, or have you been watching late night television?

Seriously, it is doubtful that the Legion used any radio before World War II. Now, they probably share the diplomatic service radio systems, most notably ARQ digital modes on HF, and military satellites in the 7-8 GHz bands, all digitally encrypted.

Bob's Tip of the Month

Computer users are aware of the virtues of the uninterruptible power supply (UPS) which prevents crashes when the power line hiccups, but few of us think about its value in the radio shack as well. During winter ice storms and summer windstorms, when power mains go down, most of us are stuck without communications except for battery-operated or mobile gear. But wouldn't it be nice to know that the main equipment can still be operational without an auxiliary gasoline generator?

The computer UPS can be used to power the radio equipment during blackouts, or a separate UPS can be installed for the radio equipment alone. Since most UPSs have built-in transient protection and line noise filtering as well, those are added bonuses.

Be sure to specify appropriate power ratings for your application. A 100 watt

Try This Emergency Power Supply for the Radio Room

SSB transceiver is rated in peak envelope power (PEP), so you only need to specify about half that power rating, and that's only during transmit. Solid state receivers and scanners take minimum power, averaging only about 20-40 watts each. If you are going to transmit, use a UPS rated at least 300 watts—the more, the better, and the longer the batteries will last.

An enterprising experimenter may wish to add a 12-volt connector to his UPS, attached directly to the internal battery, for even better efficiency while operating his DC-powered equipment. An optional 30A fuse in series with the positive (+) terminal is recommended. This DC connection also provides the ability to recharge the UPS batteries from a 12 volt source such as a vehicle or solar array.

■ Curing Those Noisy Touch Lamps

As though we didn't have enough electrical noise in our environments, about ten years ago, the off-shore manufacturers unleashed a

new plague, the touch lamp! Sloppily designed with no radiation suppression, these noisy consumer lamps generate powerful hash down in the shortwave spectrum; I've decommissioned more than one in an effort to clean up my receiving environment.

But it seems there is a way that both the touch lamp user and the radio hobbyist can co-exist: by the placement of one simple component in line with the lamp's sensor wire.

With the lamp unplugged, carefully remove the cover from the base, exposing the internal electronic module. Note that there are several wires coming from it: the lamp cord, the leads to the light bulb, and one sensor wire (often yellow) to the lamp's metal framework.

Cut the sensor wire about an inch from the module, trim about 1/2 inch of insulation from each cut end, and solder a 2.5 mH (or thereabouts) RF choke between the two cut ends. Tape the exposed leads. This should do the trick.

Q. Back in the '70s and '80s, GM put their AM/FM antennas in the front windshield; they no longer do. How come? (Mark Binns, Terra Haute, IN)

A. The innovative practice had its good points and its bad points. While the in-windshield antennas did prevent carwash incidents and other breakage, the antennas were highly directional, susceptible to engine noise interference, and very expensive to replace when a windshield cracked.

A local dealer told us that another problem was uneven expansion of the glass and thin wire, causing breakage and erratic performance or reduced signal sensitivity.

Ford is currently offering a similar product in the rear windows of their upscale models; it is connected to the in-glass heating element. They feel that the extra cost is worth it, since the motor-drive, external, telescoping units made by Harada are even more expensive.

Q. Are there any scanners coming up that will be compatible with the proposed APCO 25 digital communications system planned for law enforcement agencies? (Mark Stachurski, Baltimore, MD)

A. While it would be easy to do, there are still some questions which need to be resolved. First, if one of the purposes of digitizing the transmissions is privacy, then no, scanners would be prohibited from such decoding under the provisions of the 1986 Electronic Communications Privacy ACT (ECPA '6). If the encoding is for spectrum efficiency, then yes, since the program utilizes an open, public algorithm, such a scanner would be legal.

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

Hopefully an answer to this dilemma will be forthcoming.

Q. I need to connect two scanners to one antenna. Shall I just splice two coax leads together, use a "T" adaptor, or do I need a splitter? (Jim Ashe, Weymouth, MA)

A. When you splice two scanner antenna leads together (or use a T adaptor which does the same thing), you invite oscillator radiation from one to interfere with reception on the other. Splitters, the same little boxes sold to operate two TV sets from one antenna, work well for scanners. They include a transformer which attenuates the unwanted oscillator radiation from one scanner (or TV) from interfering with the other.

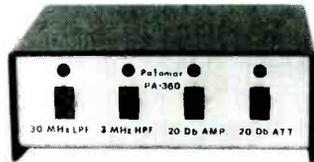
Be sure to get one marked "U/V," "VHF/UHF," or "54-890 MHz." You can also order scanner-compatible splitters and cables from Grove Enterprises.

Q. I have tried to hear stations in the AM medium wave band, notably 530 and 540 kHz. Any reason for this? (Robert E. Brock, Phoenix, AZ)

A. The lowest and highest frequencies of the medium wave broadcast band in the U.S. are 540 and 1700 kHz. If you aren't hearing anything there, it's because there is no licensee close enough for your system to ad-

equately receive it. 530 kHz and 1610 kHz are allocated to the Traveler's Information Service (TIS), those scratchy signals that provide highway construction information across the country.

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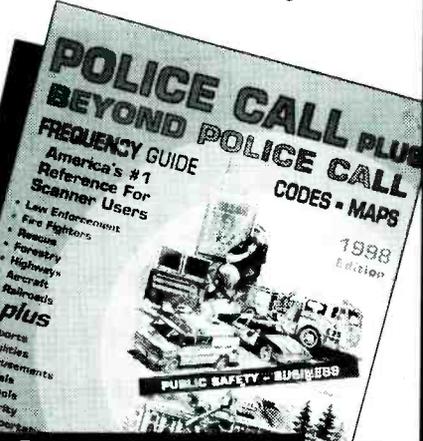
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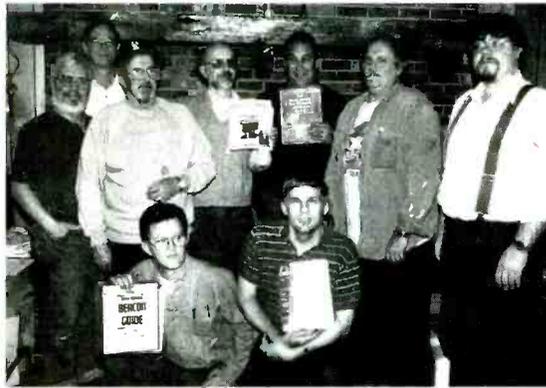
Away from Home

Again this fall, I was privileged to join the Mohawk Valley Shortwave Listener's Club for their annual DX Camp at Brantingham Lake in the Adirondacks of New York. Other longwave listeners included Bob Montgomery of the *Lowdown* (PA), Howard Mortimer (NY), *MT's* Jacques d'Avignon (ONT), and Dick Pierce (VT).

This year's goal was to log beacons from at least 20 states and provinces. To chart our progress, we posted a map and colored in the sections we had "worked." Most of us DXed the "B" shift; however, Dick Pierce put in considerable time on the "C" shift and caught some excellent DX for his efforts.

Despite lousy conditions the first night of listening (heavy static), things improved considerably on the second evening. Not only did we meet our goal, but we logged 24 states, seven provinces and nine "bonus" territories as follows:

Puerto Rico (DDP/391 kHz)
Dominican Rep. (PPA/450 kHz)
Columbia (MER/1685 kHz)
Jamaica (KIN/360 kHz)
Antigua (ZDX/369 kHz)
Cuba (UCM/370 kHz)
Bahamas ZIN/376 kHz)
Turks & Caicos (PV/387 kHz)
Venezuela (HOT/353 kHz)



Monitoring Times Readers at the '97 DX Camp. Kneeling: Dick Pierce, Chet Dougherty. Standing: Jacques d'Avignon, Bob Montgomery, Howard Mortimer, Roger Chambers, John Figliozi, Daryl Rocker, and Lee Reynolds.

When longwave conditions became poor, many of us ventured onto higher frequencies and logged numerous utility, pirate and shortwave broadcast stations. We also heard several low-power TIS and experimenter stations in the 1620–1700 kHz range.

You just can't beat a DXpedition for the camaraderie, exchange of ideas, and good food that goes with them! From Natural Radio to VHF scanning, there was something for everyone at this year's camp. I look forward to another fun event in 1998.

■ Euro Guide Revisited

Readers may recall my September '96 review of Robert Connolly's publication, *Non-Directional Beacons of Europe*. The book has now been updated, and if it's anything like the first copy, it will make a fine addition to any listener's bookshelf. Robert sent me an e-mail regarding the new guide, and I'm going to let him speak for himself:

"...This edition has extended coverage and now includes most of North Africa and the Persian Gulf with over 2800 aero and marine NDBs listed. The format is as per previous editions, with Aero, Marine and reverse frequency listing sections. This new edition also includes a new unids (unidentified) section. Basically, the coverage area is from 60 degrees West to 60 degrees East and from the Arctic to 10 degrees North. The publication extends to 56 A4 comb bound pages. All information is believed to be accurate as of September 1997."

The basic cover price for the guide is £5.50 in the UK, and 12 U.S. Dollars elsewhere. For further information, or to place an order, write to: R. A. Connolly (GI7IVX) 21, Eleastan Park, Kilkeel, Co. Down, Northern Ireland, UK BT34 4DA.

■ Loggings

Our loggings this month are from Terry Krey (TX) and Jack Sippel (KS). Listener loggings are always welcome at *Below 500 kHz*. They can be sent via e-mail at the address in the masthead, or by regular mail to: P.O. Box 98, Brasstown, NC 28902.

■ Low Power in Canada

A while back, we mentioned that the lower and medfer band was available to Canadian operators under rules very similar those in the U.S. We now have excerpts from the actual text of the rules and it is presented here for your convenience.

Remember, these are parts of a much larger document called "RSS-210," which pertains to license-free operation. You should review the entire document before placing a transmitter on the air. A copy of RSS-210 can be requested from Industry Canada, or it can be viewed on the web at: <http://strategis.ic.gc.ca/SSG/sf01320e.html>. Here are the excerpts:

6.2.2 (a) 160-190 kHz

Systems using this band shall limit the total input power to the final radio frequency stage to one watt, and the total length of transmission line, antenna and ground lead (if used) to 15 metres. Example: A coaxial or twin-wire transmission line of L metres long has wire length of 2L. If a loop antenna of N turns is used with this transmission line, compute the length of wire used by the N turns, then add to 2L. The total shall not exceed 30 metres. Emissions outside of this band (CISPR or averaging measurement) shall be attenuated by at least 20 dB below the mean transmitter output power.

6.2.2 (b) 510-1,705 kHz

Systems using this band shall limit the total input power to the final radio frequency stage to 100 milliwatts, and the total length of transmission line, antenna and ground lead (if used) to 3 metres. For an example, see 6.2.2(a). Emissions outside of this band (CISPR measurement) shall be attenuated by at least 20 dB below the mean transmitter output power.

That wraps it up for another month. Best LW DX!

TABLE 1: Selected Beacon Loggings

FREQ (kHz)	ID	LOCATION	BY
21.4	NSS	Annapolis, MD	T.K.
24	NAA	Cuttler ME	T.K.
24.8	NLK	Jim Creek, WA	T.K.
50	--	(Time station-Siberia likely)	T.K.
56	NPG	Dixon Ca (likely)	T.K.
60	WWV	Ft. Collins CO	T.K.
74	CFH	Halifax NS	T.K.
76	CKN	Vancouver BC	T.K.
100	--	Loran, (various)	T.K.
122	CFH	Halifax NS	T.K.
136	NPG	Dixon CA	T.K.
146	NPM	Lualualei HI	T.K.
198	DIW	Dixon, NC	J.S.
206	GLS	Scholes Field, TX	J.S.
212	DBX	Morrison, KS	J.S.
216	CLB	Carolina Beach, NC	J.S.
224	GVA	Geneva, KY	J.S.
236	GNI	Grand Isle, LA	J.S.
269	BEX	Bloomfield, IA	J.S.
281	DMO	Sedalia, MO	J.S.
284	GPH	Mosby, MO	J.S.
302	EAG	Eagle Grove, IA	J.S.
314	GGU	Praque, OK	J.S.
323	HJJ	Hebron, NE	J.S.

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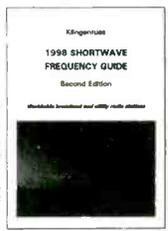
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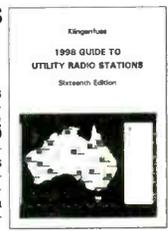
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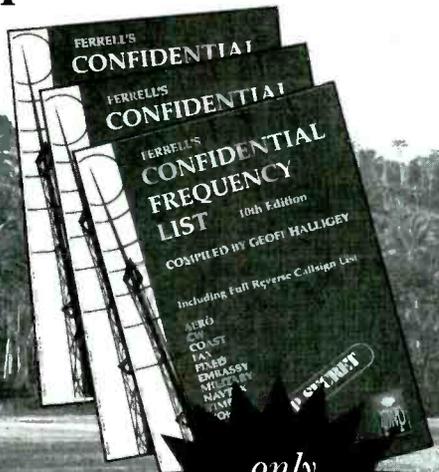
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La Voz del CID Moves to WRMI

La Voz de Cuba Independiente Democrática has been the last purely clandestine anti-Castro station since the demise of the CIA's Radio Caiman. It has apparently thrown in the towel. Jeff White of shortwave station WRMI in Miami reports that the station went off the air earlier this year due to "political problems" in El Salvador, which was the location of their widely heard transmitter on 9941 and 6306 kHz.

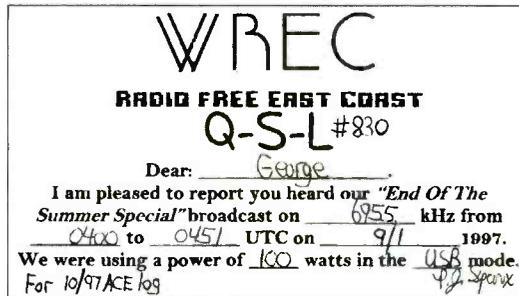
Jeff announces that the station's revamped programming, called *30 Minutos con el CID*, is now carried over WRMI Monday through Friday on 9955 kHz for a half hour at 2330 UTC. Jeff notes that other CID programming, including *Contaco*, *Presencia*, and *Caribe Llama Cuba*, are now heard during WRMI's broadcast schedule. This historic development closes a page in the formerly very active clandestine radio scene in North and Central America.

■ Jorge Mas Canosa

In another major development in the anti-Castro clandestine broadcasting community, longtime leader of the Cuban American National Foundation, Jorge Mas Canosa, died of cancer on November 23. Mas, probably the most powerful Cuban exile in the United States, headed the president's advisory committee for the Office of Cuba Broadcasting for several years. Among his clandestine radio links was the CANF's anti-Castro broadcast *La Voz de La Fundacion*, heard at 1100 UTC daily via WRMI on 9955 kHz. Mas overtly planned to replace Fidel Castro as President of Cuba. He is often credited with being the one person most associated with USA policy toward Cuba, including passage of the Helms-Burton Act.

■ WGTG on 6955?

Pirate DXpert Michael Folk of Kentucky sends in word that according to *MT* columnist Glenn Hauser on *World of Radio*, McCaysville, Georgia, religious shortwave broadcaster WGTG has applied to the FCC to test and broadcast on 6955 kHz. Although outside international broadcasting bands



The most active pirate of 1997.

agreed to by international treaty, the FCC has been approving requests like this one for out of band operations. As you note in another blizzard of pirate logs submitted by *MT* readers this month, 6955 remains by far the dominant frequency used by North American shortwave pirate broadcasters. If WGTG carries through with this move, look for some instability until the pirates settle on a new frequency. Until then, 43 meters is still the best place to scan for the pirate transmissions.

■ New SMR Maildrop

David Miller of New Zealand pirate **South-ern Music Radio** announces that the station has acquired a new maildrop. Many of us hear them via their **IRRS** or **WRMI** relays, but they sometimes also are noted on the pirate bands. If you hear them, the new contact address is PO Box 1212, Dunedin, New Zealand.

■ What We Are Hearing

Due to column shifts and a reduction in the overall size of *Monitoring Times* beginning with the March issue, this will be the last listing of pirate loggings for a while. More on alternative places to post next month ...

North American pirate stations listed here use the following addresses: PO Box 1, Belfast, NY 14711; PO Box 109, Blue Ridge Summit, PA 17214; PO Box 28413, Providence, RI 02908; PO Box 146, Stoneham, MA 02180; PO Box 11522, Huntsville, AL 35814; and PO Box 293, Merlin, Ontario N0P 1W0. For return postage, enclose three 32¢ stamps in the envelope to USA addresses; \$2 US or two International Reply Coupons go to foreign maildrops.

6YVOS- 6955 at 1545. Also known as the Voice of Smoke, this Jamaican pirate is dominated by reggae music. Addr: Belfast. (Jeff Arndt, Manitowac, WI; Lee Silvi, Mentor, OH)

Altered States Radio- 6955 at 1900. William Hurt's station combines rock music with off the wall commentary about world events. Addr: Merlin. (David Krause, Eastlake, OH; Ross Comeau, Andover, MA; Dick Pearce, Brattleboro, VT)

Anteater Radio- 6955 at 0045. The station operator recently claimed over the air that his rock music has been transmitted from every state in the USA. Addr: Belfast. (Gary Neal, Sugar Land, TX; Greg Majewski, Oakdale, CT; Jerry Coatsworth, Merlin, Ontario)

CITH- 6955 at 1945. Dean's early November log was delayed in the mail, but Cat in the Hat Radio pops up throughout the year with its Dr. Seuss shows. Addr: Providence. (Dean Burgess, Manchester, MA)

Friday Radio- 6955 at 2200. It pays to tune around the pirate bands on late local Friday afternoons, since this is the only time that this station broadcasts its rock music. Addr: Providence. (Joel Altre-Kerber, Buffalo, NY; Rich and Talea Jurens, Katy, TX; William Hassig, Mt. Prospect, IL; Coatsworth)

Hotel California Shortwave- 6955 at 1830. For some reason, rock songs by the Eagles inspired several new pirate ID's in 1997. Like the others, this one plays Eagles tunes. Addr: Providence. (Harold Frogge, Midland, MI; Coatsworth, Silvi)

Indira Calling- 6955 at 0400. We now have two pirates with programming commemorating the licensed broadcaster **All India Radio**. This one is slightly less tongue in cheek. Addr: Providence. (Neal)

KOLD- 6955 at 0100. Their call letters accurately describe their musical style, which lately has been very old swing music recordings. Addr: Stoneham. (Jurens; Silvi)

Lounge Lizard Radio- 6955 at 0515. The station travels around for remote broadcasts of Dean Martin and Frank Sinatra style "Lounge Music," always from a cocktail lounge in a city where a noted DXer lives. Addr: Providence. (Werner Brandt, Hofer, Germany; Coatsworth)

Mystery Radio- 6955 at 0100. Their distinctive format of complex rock and new age instrumental music is easy to spot once you've heard it before. Addr: Stoneham. (Michael Prindle, New Suffolk, NY; Coatsworth; Frogge; Jurens; Neal; Silvi)

One Voice Radio- 6955 at 1715. Announcer "Joe" calmly reads the latest findings from medical journals, urging pirate DXers to clean up their lifestyles for better health. Addr: Belfast. (Altre-Kerber)

Partial India Radio- 6955 at 1430. Many pirates structure their humor around DXing themes. This one, which simultaneously pillories SWBC broadcaster **All India Radio** and the DXing scene, is one of the best. Addr: Stoneham. (Niel)

Wolfish, Toronto, Ontario; Coatsworth; Comeau; Frodge; Majewski; Prindle)

Pirate Radio Boston- 6955 at 2230. Which city does the rock, comedy, and mailbag programming come from on this station? You get two guesses. Addr: Stoneham. (Art Krugaluk, Wilmington, MA; Coatsworth)

Radio Azteca- 6955 at 1945. Although Bram Stoker has produced dozens of shows, he never seems to run out of very funny material making fun of DXing and DXers. The Bullwinkle cartoon music he uses as bridges makes the station easy to identify. Addr: Belfast. (Joe Wood, North Augusta, SC; Ronnie Stroup, Wooster, OH; Bill McClintock, Minneapolis, MN; Altre-Kerber; Coatsworth; Comeau; Frodge; Krause; Majewski; Neal; Pearce; Silvi; Wolfish)

Radio Clandestine- 7375 at 1900. R. F. Burns holds the record for longest running North American pirate, and his fast paced shows still set a standard of programming quality in unlicensed broadcasting. Note the odd frequency; the station has always been famous for popping up unexpectedly within regular shortwave broadcasting bands. Nice catch, Rich! Addr: None currently. (Rich Dalton, Newark, DE; Frodge)

Radio Eclipse- 6955 at 1515. Steve Mann always features a complex production of rock music and parodies. When his news includes items on Marv Alpert and Saddam Hussein, you know that strange fare dominates the "news." Addr: Providence. (Altre-Kerber; Burgess; Comeau; Frodge; Jurens; Krause; Krugluk; McClintock; Pearce; Prindle; Silvi; Wood)

Radio Eurogeek- 6955 at 2215. The pirate that annually precedes the Radio St. Helena broadcast on 11 MHz also pops up occasionally with repeats on the pirate bands, for those who missed the hilarious original transmission. Addr: Providence. (Silvi)

Radio Four- 6955 at 1700. Radios One, Two, Three, and Nine have some new numbered station competition. The latest version mixed rock music and parody ads. Addr: None yet. (Stroup)

Radio Free Euphoria- 6955 at 1915. The friendly Captain Ganja plays rock and reggae music with drug advocacy content. Addr: Belfast. (Altre-Kerber; Frodge; Pearce)

Radio Free Speech- 6955 at 2230. Bill O. Rights, who has aired several "last broadcasts," says that he really will retire someday. Meanwhile, his

political comedies and pirate advocacy are still entertaining. Addr: Belfast. (Frodge; Krause; Majewski; McClintock; Pearce)

Radio Goon- 6957 at 2300. Few have heard this new pirate, where The Deuceman mixes rock music and sound clips. They've QSLed Bill via this route. Addr: Reports to alt.radio.pirate internet newsgroup. (McClintock)

Radio Metallica Worldwide- 6957 at 0245. Their big 10 kW signal is still very widely heard, usually with rock music from Dr. Tornado and Señor El Niño. As the world's only superpowered shipboard pirate, they remain unique. Addr: Blue Ridge Summit. (Garth Doetzel, Kamloops, British Columbia; Kevin Nauta, Grand Rapids, MI; Burgess; Frodge; Hassig; Jurens; Krause; McClintock; Pearce; Silvi; Stroup)

Radio Nonsense- 6955 at 0000. Carrying on a long tradition of pirate stations broadcasting humor, Joe Mama's new station probably transmits the most elaborate productions of any current station in this genre. Addr: Belfast. (Shawn Axelrod, Winnipeg, Manitoba; Altre-Kerber; Coatsworth; Frodge; Jurens; Majewski; McClintock; Prindle; Silvi; Wolfish)

Radio USA- 6955 at 1615. It's amazing that Mr. Blue Sky has now been around for 16 years on the pirate bands. Lately they have added Europirate relays to their traditional programming of punk rock and comedy. Addr: Belfast. (Altre-Kerber; Arndt; Coatsworth; Krause; Silvi)

Reefer Madness Radio- 6950 at 0215. Yet another pro-marijuana pirate has arrived on the scene. Their first shows were heavily laced with commentaries. Addr: Belfast. (Frodge)

Take It Easy Radio- 6955 at 0615. The station name originated from an Eagles rock song, but they feature other rock music. Over the holidays they played Christmas music, producing Fred's first pirate log. Congratulations! Addr: Belfast. (Fred Kelly, Houston, TX; Jim Franke, Bartlett, IL; Brandt; Hassig; Jurens; Krause; Pearce; Wolfish)

Take It to the Limit Radio- 6955 at 2300. This new one is another station that borrowed its name from lyrics of a rock music song. Don Pardo has mixed banjo music in with his rock tunes. Addr: Providence. (Martin Field, Hillsdale, MI; Joe Filipkowski, Providence, RI; Altre-Kerber; Arndt; Brandt; Coatsworth; Frodge; Hassig; McClintock; Nauta; Prindle; Silvi; Wolfish)

Up Against the Wall Radio- 6955 at 2230. With a Klaxon "oogah" horn as an interval signal, this nostalgia station recreates the political and musical mood of the 1960's. Addr: Providence. (Arndt; Frodge; Hassig; McClintock; Silvi)

Voice of Christmas- 6955 at 0315. Using an "O Tannenbaum" interval signal on a music box, the chipmunk-voiced announcer on this one appears toward the end of every year. He says his holiday music is the only station that broadcasts from the North Pole. Addr: Providence. (Altre-Kerber; Frodge; Neal; Prindle; Silvi; Wolfish)

Voice of Radio Freedom- 6955 at 2000. Apparently a new station, they have tested with rock music and a male DJ. Addr: None yet. (Majewski; Silvi; Wolfish)

Voice of Shortwave Radio- 6955 at 1800. Here's another rock music pirate. Have you noticed that fewer stations use "Voice of" in their names nowadays? Harold bagged their QSL. Addr: Blue Ridge Summit. (Coatsworth; Frodge; Hassig)

Voice of the Long Run- 6955 at 1400. This new station appears to be closely associated with Radio Eclipse, but they've been airing their own

programming. Addr: Providence. (Frodge; Prindle; Silvi)

WARR- 6955 at 0145. Captain Nobeard's marijuana advocacy station still pumps out rock music, but he also is still very erratic at responding to his mail. Addr: Belfast? (McClintock; Neal; Silvi)

WBIG- 6955 at 1900. Big Mike produces friendly programs of rock music. I heard this one on the Philips DC-777 in my car. Addr: Belfast. (George Zeller, Cleveland, OH; Hassig; Pearce; Silvi)

WDRR- 6955 at 1700. Their rock music often is dominated by rockabilly tunes. Addr: Belfast. (Comeau)

WLIQ- 6955 at 1815. Their activity level has increased lately. Rock music comes in clearly, but there is heavy reverb in the announcer's voice that makes copy a challenge. Addr: Blue Ridge Summit. (Majewski; Wolfish; Zeller)

WLIS- 6955 at 0630. If you hear shortwave broadcast interval signals on the pirate bands, you undoubtedly have logged Jack Boggan's veteran pirate. Addr: Blue Ridge Summit. (Neal)

WMFQ- 6955 at 1500. Rock music is their staple. But, their off-color ID slogan both promotes and parodies the pirate station QSL process. Addr: Providence. (Coatsworth; Frodge; Jurens; Silvi; Wolfish)

WMOM- 6955 at 2300. Their drama shows use the slogan, "All Mom, All the Time." Addr: Reports to alt.radio.pirate internet newsgroup. (Arndt; Axelrod; Frodge; Jurens; Zeller)

WMPR- 6955 at 0315. Their distinctive format of electronic instrumental music comes with only two words of talk: a "WMPR" ID by a man, and the "6955" frequency by a woman. Although widely heard, they do not communicate with their listeners. Addr: Still none. (Altre-Kerber; Comeau; Frodge; Krause; Majewski; Nauta; Pearce; Silvi; Stroup; Wolfish)

WPN- 6955 at 1930. Captain Squirtlong's format of rock and comedy is straight in the middle of mainstream pirate radio tradition. This niche has largely been abandoned by commercial radio in North America. Addr: Huntsville. (Coatsworth; Silvi)

WQSL- 6955 at 1500. As you might expect from the call letters, their slogan is, "The Verification Station." Normally they feature rock, but seasonal music also creeps in. Addr: Belfast. (Altre-Kerber; Coatsworth; Frodge; Silvi)

WREC- 6955 at 2015. Since P. J. Sparx was the most active North American pirate of 1997, both with relays of other pirates and his own elaborate shows, we picture his latest QSL here. He seems to specialize in novelty songs recorded to the tune of rock music hits. Addr: Belfast. (Altre-Kerber; Comeau; Krause; Pearce; Wood)

WRYT- 6955 at 1115. Hard rock music dominates their programming. Note the early morning time of this log; many pirates currently use daylight hours because of winter propagation conditions. Addr: Belfast. (Altre-Kerber; Arndt; Comeau; Frodge; McClintock; Silvi; Stroup)

WSRR- 6955 at 1900. Their "Solid Rock Radio" accurately describes the basic nature of their programming, but comedy and listener mailbags are mixed in. Harold's QSL featured their call letters. Addr: Belfast. (Altre-Kerber; Coatsworth; Frodge; Pearce; Prindle)

WTVU- 6955 at 2015. Using a slogan of, "The Howard Stern Experience," this new station rebroadcasts Howard's syndicated radio show via the magic of audio tape. Addr: Providence. (Altre-Kerber; Frodge; Majewski; Prindle; Silvi; Wolfish)

THE VOICE OF AMERICA CERTIFICATE OF RECEPTION	
RELAY VIA RADIO METALLICA	
NAME	GEORGE ZELLER
DATE UTC	25 JULY 1997
TIME UTC	0035-0059
FREQUENCY	6955 KHZ
POWER	10,000 WATTS!
PROGRAM:	SEVEN TUNES FOR POSSIBLE REPLACEMENT OF THE U.S. NATIONAL ANTHEM AND/OR THE INTERVAL SIGNAL FOR THE VOICE OF AMERICA.

No error here: Leonard Longwire's QSL is backwards.

Books to Build Your Antenna By

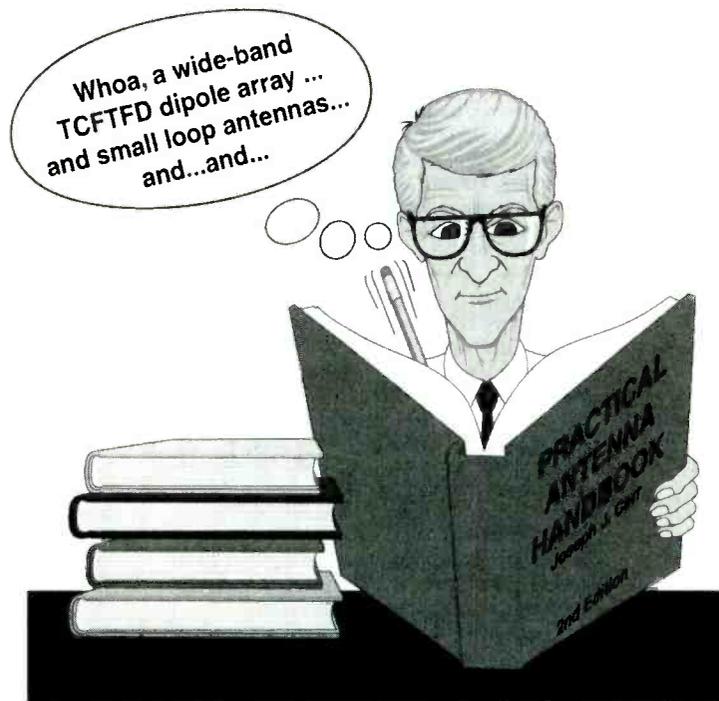
I have just finished reviewing a very interesting book by Joseph J. Carr entitled *Practical Antenna Handbook, 2nd edition*. The author is very well known in amateur circles and writes regular columns in *Popular Electronics*, *Popular Communications*, and *73* magazine.

There are many excellent antenna manuals available to radio enthusiasts today; Mr. Carr's book is outstanding in the manner in which things are explained and illustrated. If you can comprehend the English language this book will provide a superb fundamental education on the subject of antennas. In addition there are dozens of projects contained between the covers of this book for everyone from the shortwave listener (SWL) to the microwave experimenter.

The first five chapters deal with radio waves, transmission lines, Smith charts, and the fundamentals of antennas. If you are new to radio, by all means read these first five chapters carefully. Carr thoroughly explains the basics in a way that is easy to understand. With this information in hand you will have a practical understanding of how radio waves function and how you can design or choose an antenna for a particular purpose.

Chapters six through eighteen discuss various types of antennas and the processes of designing and building them. The chapters are: HF Dipole Antennas, Vertically Polarized HF antennas, Multi-Band Antennas, Longwire Directional Antennas, Hidden and Limited Space Antennas, Directional Phased Vertical Antennas, Directional Beam Antennas, Antennas for the SWL, Large Wire Loop Antennas, Small Transmitting and Receiving Loops, Other Wire Antennas, VHF/UHF Antennas, and Microwave and Waveguide Antennas.

In the chapter on phased vertical antennas the author illustrates the various methods of phasing — fully and clearly. He provides information on how to build a phasing transformer (something most other manuals only hint at). The popular beam antennas are de-



scribed along with several projects.

Of particular interest to me was the description of the TCFTFD dipole (a very wide band antenna), and the chapter on small loop antennas (I have constructed two small receiving loops based on information in this book with great results). The new VHF/UHF ham will enjoy the chapter on transmitting and receiving antennas for these bands. About a dozen projects are illustrated in this chapter.

The final chapters discuss antenna matching, mobile, emergency and marine antennas, antennas for low frequency operation, measurements and adjustment techniques (this portion is worth the price of the book), antenna construction techniques, grounds, and what is a good ground.

The question of buy or build an antenna is one often asked by new hams. Too frequently the novice will feel overwhelmed by all of the misinformation available on antennas and shy away from constructing his own. With the information available in this manual even the most timid beginner will be able to build and erect an antenna every bit as good as the commercially available equivalent; in fact, the home built model may very well work far better than the high dollar store bought antenna. In addition you will have the satisfac-

tion of knowing you built it yourself!

Practical Antenna Handbook, 2nd edition is available from TAB Books, Blue Ridge Summit, PA 17294-0850 at a price of \$24.95 plus shipping and handling. I suggest you drop them a line for latest prices and S&H. TAB is a division of McGraw Hill Books. Often this book is on special for joining their book club.

(If transmitting is not a consideration, a similar book by Joe Carr is his *Receiving Antenna Handbook*, published by High Text and available from Grove Enterprises for \$19.95.)

■ Conditions

Openings on ten meters have been improving dramatically with East/West Coast contacts occurring almost daily, and DX is available from many areas on most days. Six meters has been decent but not super as of this writing. The lower bands have been good to excellent. It appears we are on the upswing of the solar cycle and due for lots of fun for the next few years.

■ New Zealand Beacon on the Air

ZL6B, located near Masterton, New Zealand, transmits with 100 watts reducing to 100 milliwatts on 14100, 18110, 21150, 24930 and 28200 kHz. These are the same frequencies used by 5Z4B in Kenya. Give a listen for this beacon when checking band conditions.

There are many other beacons in various locations around the earth. Listings of these beacons is available in the ARRL Book *Operating Manual* available from the ARRL, 225 Main St. Newington, CT 06111 or call 1-888-277-5289 for the ARRL dealer near you. Price is \$25.00 plus \$5.00 S&H direct from ARRL.

■ Phase 3D

The launch date of AMSAT Phase 3 D amateur communications satellite has been delayed. It is hoped the launch will still occur sometime early this year.

How To Be a Hometown Hero

In my view, if there's one thing that's more fun than messing around with radios, it's messing around with radios and helping people. As much as I enjoy rag chewing with my pals on 2 meter ham or single sideband CB, I get much more pleasure and satisfaction out of using my radios to help someone out of a jam or to provide emergency communications.

Over the years, I have reported numerous traffic accidents and roadway hazards, given directions to travelers (including one to a trucker who was in the wrong state!), provided information to local law enforcement authorities, and reassured families that their loved ones were safe. I've dealt with such oddities as a bear (the honey-eating kind, not the one with the radar gun) wandering through a suburb, a portajohn that was on fire at a bridge construction site and in danger of melting down, and a mattress (unoccupied) in the high-speed lane of an interstate. Twice, I've provided communications for situations in which it was clear that someone's survival might be on the line.

You, too, can get in on this kind of action. If you'd like to provide a vital service to your community and maybe even save someone's life, you can — by monitoring citizens band channel 9 (27.065 MHz AM). You don't need a license or special permission from someone, and the monetary investment is relatively modest. In fact, the main thing you need is a fire in your belly for helping other people.

But first, some basics. Citizens band is the Godzilla of all radio services. Every year, CB manufacturers in the United States sell several million CB transceivers. The total installed base of CBs is estimated at some 40-50 million radios. In addition, CB continues to be a favorite communications tool for long-haul truckers. The bottom line: there are a lot of CBs in use out there, and every once in a while, someone turns to ch. 9 and yells for help.

Ch. 9 is the only channel that has been set aside by the FCC for a particular purpose. According to FCC rules, "95.407(b) Channel 9 may be used only for emergency communications or for traveler assistance." Emergency communications, according to the FCC, concern "the immediate safety of life or the im-



The Cherokee CBS-1000 makes an excellent base station for Ch. 9 emergency monitoring.

mediate protection of property." But travelers' assistance has an even wider scope: "communications necessary to assist a traveler to reach a destination or receive necessary services." That could include a disabled vehicle, somebody out of gas, or a person who needs directions or a place to stay for the night.

So what do you need to provide a valuable service by monitoring CB ch. 9 from your home? Surprisingly little:

- a CB transceiver and an antenna;
- a pen and paper for writing down information about incidents;
- a list of local law enforcement phone numbers for reporting incidents that require their attention; and
- a willingness to serve.

The rest is easy. Just turn your transceiver to ch. 9, squelch out the noise, and go about your business. When a call comes through, turn the squelch down and respond to the caller.

Here's the information you need to successfully handle an incident:

- the location — the street or highway, the direction, and the nearest cross street or highway identification marker. Remember, a report without a location is essentially useless.
- the nature of the incident — is it a personal injury

accident, a disabled vehicle, or what? Here is the list that I use for prioritizing calls:

1. personal injury accidents
 2. Immediate threats, such as vehicles stalled in the driving lane, chemical spills, large debris, accidents in the driving lane with no injury
 3. Disabled vehicles out of traffic but occupied. Key indicators include flashers or hood up for cars; reflective triangles on shoulder or roadway for semi-trucks
- what is needed — do the authorities need to be notified? If so, what jurisdiction?

If you are in your car and you hear an unanswered call for assistance on ch. 9, you need to gather the same information and then relay it to a base station if there is one available, or use alternative means of communication (ham radio, cell phone, pay phone, whatever is available to you) to report the information to the authorities.

In many areas of the country, members of the Radio Emergency Association of Citizens Teams (REACT) spend countless hours monitoring Ch. 9 and providing assistance to people in distress. If there is a REACT team in your area, and you like the way they operate, consider joining them. For additional information contact REACT International, PO Box 998, Wichita, KS 67201 or phone 316-263-2100.

A final thought: In some areas of the country, there has been no CB ch. 9 monitoring for years. As a result, it sometimes happens that local CBers think of ch. 9 as their personal place to hang out and talk. If you suddenly show up and start monitoring for emergencies, they may find this upsetting. The best three tools for dealing with this are a thick skin, an unflaggingly cheerful disposition, and a great deal of patience.

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*New Trunk
Tracker Scanners*

The Flap Over Digital Decoding

We get letters... I received the following electronic mail message recently:

I wrote a couple weeks back about information on how a digital data interpreter works, and since that time I have been all over the Internet trying to find some basic information. I know that there are manufacturers of those devices and that they limit their sales to "qualified personnel." There also seems to be some kind of invisible veil of secrecy surrounding this subject -- it's almost like a taboo to discuss this kind of technology. Where can a fellow get any type of straight dope on this stuff?

The digital data interpreter (DDI) the writer is asking about refers to a class of devices that decode the data stream transmitted in cellular telephone systems. This data stream includes the numbers dialed by the user, channel assignments, security identifiers, and other information relating to the flow and control of the phone call. (For an introduction to cellular signaling, see the December 1996 *PCS Front Line* column.)

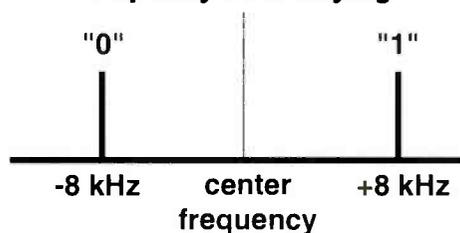
"Professional" DDI units used by law enforcement agencies are usually self-contained briefcase-style setups and cost thousands of dollars. Since the task of decoding the data stream is relatively simple and straightforward (after all, every analog cellular telephone ever manufactured does it), identical results have been obtained from low-cost models produced over the years by a handful of small companies and hobbyists. These DDI units are typically a small box of electronics being fed signals from an 800 MHz receiver and delivering a decoded stream of messages to a computer.

Manufacturers of the "professional" units aren't interested in talking to individuals unless they represent government organizations with large budgets, and the small companies and hobbyists are somewhat reluctant to discuss the particulars of what they're doing.

■ Political Aspects

Their nervousness revolves around the interpretation of a part of the Crime Control and Safe Streets Act of 1968 (amended by the

FIGURE 1: Binary Frequency Shift Keying



Electronic Communications Privacy Act of 1986). Codified in Title 18 of the United States Code, the more familiar section 2511 makes it illegal to listen to cellular (and since 1994, cordless) telephones, as well as certain other radio frequency emissions. As has been covered numerous times in the past, this section of the law has been heavily influenced by the cellular telephone industry, who want to be able to tell their customers that no one can listen in. Having an expectation of privacy while using a radio broadcast device defies logic and physics, but that's the law.

A less well-known section, 2512, is addressed to another group. Any person who "manufactures, assembles, possesses, or sells any device that is primarily useful for the purpose of the surreptitious interception of ... communications" is subject to five years in prison and a hefty fine. In the original law a description of what constituted "primarily useful" was specified under the heading "Title III," and now such restricted items are referred to as "Title III" devices.

Exceptions granted in section 2512 are limited to "an officer, agent, or employee of, or a person under contract with," a communications provider, or federal, state or local government.

Until recently it had been understood that manufacturers of Title III equipment were acting as "a person under contract" to law enforcement or other government agencies, and were protected from prosecution. This is no longer the case, at least for some individuals, as demonstrated recently.

Gilbert Walz and Jude Daggett, the owners of Tech Support Systems and Countersurveillance in California, were indicted for violation of section 2512 in March of 1996 for allegedly manufacturing and selling cellular, fax, and pager interception equip-

ment. Their trial took a strange turn when, on the advice of a government agency official, the judge classified some of the evidence for national security reasons.

Prior to their arrest, Tech Support Systems had exported Title III equipment to such countries as Mexico, Italy, Brazil, South Korea, and the Philippines, and counted a number of embassies in Washington, D.C., as customers. According to a former employee these foreign sales were detailed in monthly reports to the Central Intelligence Agency. The Commerce Department had granted export licenses to Tech Support Systems for sales to private companies overseas, including more than \$100,000 worth of cellular interception gear to an Italian firm.

For quite some time Walz had also attempted to get clarification from federal prosecutors on the legality of their equipment and operation, but could not a clear answer.

Curiously, a number of large corporations including Westinghouse and Harris regularly advertise Title III devices but don't seem to come under the same scrutiny as did Tech Support Systems. In addition, media maven and computer security researcher Tsutomu Shimomura, who was involved in the pursuit and capture of Kevin Mitnick, describes an interface and software program that turns his OKI 900 cellular telephone into a tool which is clearly "primarily useful for the surreptitious interception" of cellular telephone calls, but no action has been taken against him or those who manufacture, sell, etc., such devices.

Such unequal and arbitrary enforcement of Title 18 further undermines respect for the law and encourages the spread of fear, uncertainty, and doubt, which in the end appears to be the goal.

As the electronic mail author notes, a "veil of secrecy" seems to surround these devices because of the uncertainty about what is legal and what is not. If manufacture or even possession of such devices subjects a person to prosecution under 2512, it's no wonder such circumspect behavior is the result. This legal limbo should be familiar to anyone considering owning or using a scanner capable of receiving cellular frequencies. Since the law is so poorly written and prosecution so selective, everyone is at risk.

■ Technical Aspects

The standards for the Advanced Mobile Phone System (AMPS), the analog system in North America, are spelled out in Electronics Industries Association document EIA/TIA-553. In order to produce compatible telephones and base stations, manufacturers must follow this standard.

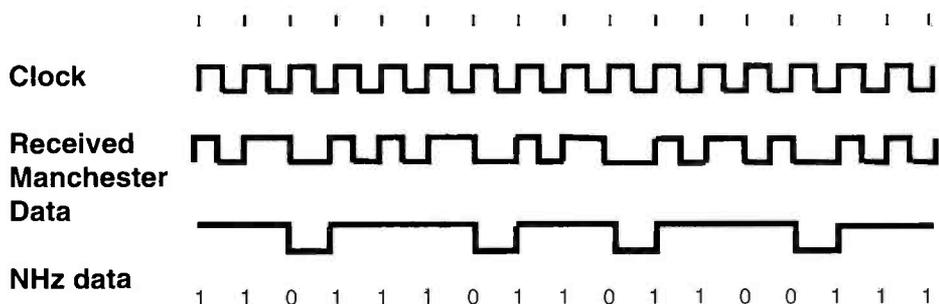
The 832 cellular control channels allocated in the United States are divided into two types, voice and control. Voice channels carry data only briefly, during a process known as hand-off or when the base station sends a control message to the phone during the course of a conversation. The audio is muted and a burst of data is sent from the base station, interrupting the conversation for less than one second.

Control channels carry data all of the time. The forward control channel, transmitted from a base station to the mobile phone, is continuous and carries a number of different kinds of messages, the format of which are spelled out in exacting detail in the EIA specification. The reverse control channel is shared by a number of mobiles, each of whom transmit brief messages to the nearest base station. In addition, since a mobile transmits at a maximum of three watts (0.6 watts for handhelds) and base stations transmit at tens or hundreds of watts, it is much easier to receive the forward channel than reverse channel.

Cellular telephone service providers are sensitive about discussions of reverse channel monitoring, not for reasons of privacy but because messages on this channel often contain mobile identification number (MIN) and electronic serial number (ESN) numbers. As detailed in the January 1997 *PCS Front Line* column, these ESN/MIN pairs are used to perpetrate fraud by cellular "bandits."

If you were to accidentally overhear a forward control channel (abbreviated FOCC) you'd hear a steady stream of bledle-bleddle-bleddle from the speaker. This is the data stream that the mobiles are listening to while not engaged in a conversation.

FIGURE 2: Manchester Decoding



■ Frequency Shift Keying

Bits are transmitted using a form of modulation known as binary frequency shift keying (FSK), which means that the digital ones and zeroes are sent as two different frequencies. In the AMPS system, a bit with a value of one is represented as a signal 8 kHz above the center frequency of the channel, and a bit with a value of zero is represented as a signal 8 kHz below the center frequency. These bits are sent at a rate of 10 thousand (10 kilobits) per second.

Hobby decoding usually begins with a scanner or communications receiver tuned to the proper frequency in FM mode. For signals with relatively high data rates, better results are achieved using the discriminator output rather than the speaker or line out due to the effects of filtering in the audio circuitry.

The discriminator output is fed to a FSK decoder, which are in common use for decoding a variety of radio formats including ACARS and digital amateur radio. Bob Evans covers a number of these formats and services in his *Monitoring Times* "Digital Digest" column. Several firms produce such FSK decoders (the Optoelectronics Optolinx has one built-in), or you could make your own at very low cost using a simple 741 op amp circuit known as a zero crossing detector or "data slicer." FSK signals may also be decoded using a sound card and the appropriate software in a personal computer.

The ones and zeroes from the FSK decoder must be further decoded as noted in the EIA specification. For various technical reasons, most of which involve making the receiver's job easier, cellular transmitters encode the data bits in a special way.

■ Manchester Coding

Each transmitted bit is sent using what is known as Manchester encoding. Each data bit is represented by a signal transition in the middle of each bit period (at 10,000 bits per second, a bit period is a tenth of a millisecond long). A data bit of one is sent as a signal transition from 0 to 1 and a data bit of zero is sent as a signal transition from 1 to 0. A

feature of this biphasic encoding is that it is self-clocking; that is, the receiver can synchronize to the transmitter from the data stream alone. Manchester encoding is also used in magnetic stripe cards, which is why you can swipe your card at a variety of speeds and the machine can successfully read it.

Decoding Manchester data involves extracting the clock signal (10 kHz) and deriving the information bits. One hardware approach is to feed the incoming Manchester data into a phase-locked loop (such as a 4046 integrated circuit) and use the output to detect the transitions, which occur either once or twice for each bit period. An alternate approach is to feed the incoming data into the decoding circuitry of a cellular telephone. If the FSK decoding is done in software using a sound card, information bits can be derived using digital signal processing techniques.

■ Information Streams

With the information bits in hand it is then a matter of formatting them into message groups. The forward control channel is made up of three "information streams," called stream A, stream B, and a busy/idle stream that indicates the availability of the reverse channel. Cellular telephones with an even MIN listen to stream A and phones with an odd MIN listen to stream B. All phones listen to the busy/idle stream. Messages in stream A and stream B consist of one or more 40-bit words repeated five times. The details are too involved to spell out here but are available in the EIA standard and in a more readable format in my forthcoming book from Index Publishing.

That's all for this month, but more information is available on the *PCS Front Line* website at <http://www.grove.net/~dan>, and I am reachable by electronic mail at dan@decode.com. Until next month, happy monitoring!

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China Central Television

I was watching a soap opera the other day and it had a familiar theme: ne'er-do-well boy living off sister's hard work tries to impress lovely young lady who has told him she's from a wealthy family. Each deceiving the other brings shame and scandal to their respective families and, like all soap operas, it goes on and on. Later that evening I watched a drama about a farmer who was swindled out of his life savings by a crook and is forced to go to the city and live off the charity of his hard working daughter. He tries his hand at being a street vender, but his naivete about the business world and failure to pay off corrupt officials has him on the run.

It's the usual line-up for prime time viewing in China that has upwards of 450 million viewers glued to their sets each night. I'm watching China Central Television's (CCTV) Channel 4 from Beijing which also doubles as their Overseas Service. In North America it's seen on the Ku-band side of Galaxy 4. Throughout the evening a parade of dramas and melodramas are laced with musical interludes featuring western style symphonic music or almost unbelievable circus and acrobatic acts.

News programs highlighting events from around the world betray the distinctive edge of old fashioned communist propaganda. During coverage of last year's Veteran's Day, footage was shown of President Clinton laying a wreath at the Tomb of the Unknown Soldier while a voiceover announcer reeled off statistics about the number of American service personnel who are alcoholics, drug addicts and homosexuals.

If you lived in Beijing you would be able to receive all four CCTV channels: Channel 1 all news; Channel 2 economic and social education programming; Channel 3 entertainment; and Channel 4, a mix of news and entertainment. Dozens of countries throughout Asia, North America and the former Soviet Union rebroadcast Channel 4. CCTV began broadcasting on September 2, 1958, and, much to the envy of each of our national networks, is the only national network in the country. It is run and totally funded by the central govern-



China Central Television (CCTV) presents the official view of China for overseas consumption.

ment of the People's Republic of China. Much of the programming on Channel 4 features English sub-titles or has an English over-dub on a separate subcarrier.

If you thought that listening to Communist propaganda was boring, try watching it Chinese style! It's not long before you're hit with a bizarre craving to watch *Three's Company* or *Gilligan's Island*. From what I've seen there's precious little humor to be found on CCTV, and that's too bad, because, Chinese people are just like the rest of us: we all love a good joke.

■ Seeing Between the Lines

So, why watch at all? Because this is a very important country. Its boundaries contain nearly a quarter of the planet's people; the people in their factories produce a growing percentage of products Americans buy; their media is so tightly controlled that CCTV is America's only window to this late 20th century enigma; and, our ignorance of China's history, current way of life, culture and future aspirations needs to be brought up to date.

Viewing Communist propaganda requires an attentive eye. You have to be able to see between the lines. Ignore the blatant anti-West messages and look for clues to present day China and how her people fare. The Chinese government uses these programs to teach the people to change directions politically, socially, or economically. Virtually all their programming is aimed at getting an approved message across.

Look through the message and try to examine Chinese life today. For instance, see how they dress, look for emerging class differences, try to determine how they want people to react to ownership of private property, higher education, immigration to the West. If we look closely, these soap operas and dramas show us more than any American network news team traipsing across the country and posing at the Great Wall could possibly show. Here we get a glimpse of cultural attitudes and biases most difficult to disguise.

Two interesting programs to watch are the musical shows which often feature distinctive Chinese folk instruments such as the one stringed, fretless instrument which is bowed cello-style to make a haunting sound the cross between a violin and a bird. And the short daily lessons in Kung Fu, the ancient ancestor to the more popular Korean and Japanese styles of martial arts. At the end of each demonstration a complete Kung Fu form is demonstrated by a master often in the robes of a monk. You won't see that on ESPN.

During last year's U.S. visit by Chinese leader Jang Zamin, coverage on Channel 4 was nearly constant. Every state reception and plant visit was dutifully presented. Seen, too, in the background of those shots were the omni-present protesters waving placards urging Zamin to "Free Tibet" and calling for "China Out Of Tibet." While the words were wasted on the hundreds of millions of non-English reading Chinese back home, it was extraordinary to see them at all, and certainly a salve for exiled dissidents.

Production values for CCTV programming are a little uneven. In some places they're technologically old-fashioned, but some of the computer generated graphics are well done. The favorite color, understandably, is "revolutionary red."

One recent live event I watched featured hours of parading groups of people from different cultural regions of China; there were traditional Dragon Dancers and the obliga-



tory military ballet dancers leaping and whirling with their rifles clenched in earnest hands. There were quick cuts to the audience of government and military officials on the official viewing stand. Their faces were passive but less stone faced than their old Soviet counterparts from days gone by.

■ Other Asian Residents on G4

The Ku-band side of Galaxy 4 has become the Asian home of the Clarke Belt. Whether by design or accident, it's home to CCTV, Chinese Television Network (CTN), China Dong-Feng, The Filipino Channel, Cantonese TVB, and The Asian Network (Korean). Of these only CCTV and CTN are in the clear.

Chinese Television Network (CTN) features 24 hour news programming from Hong Kong. The coverage leading up to last year's handover to the People's Republic of China (PRC) and that which followed it are remarkably different. While all of the programming is in Mandarin without any English sub-titles or subcarriers, it's clear that programming has changed. Prior to the handover there were many programs featuring pro-West activists who are notably absent from the coverage now.

China Dong-Feng (AATV) has a limited programming schedule of entertainment and news in Mandarin. Operation is Monday through Friday from 6 PM ET to 3 AM and Saturday and Sunday from 12 Noon to 3 AM ET.

The Asian Network uses an encryption system which looks like VideoCrypt. The audio is in the clear. The Cantonese TVB channel uses a decoder which is apparently

unavailable while The Filipino Channel uses Oak decoders. Their subscriptions are steep, but since they are the only source for Filipino programming there's not much alternative for viewers. Annual subscriptions can be as low as \$200 or, paying quarterly, over \$400.

Two other Asian programmers of note which are not on G4 are NATV Taiwan which features variety programming 24 hours a day on the Ku-band side of GE-1. Encrypted with what looks like the Oak system, the channel features KAZN-AM 1300, a 24 hour Mandarin radio station from Pasadena, California, on a clear audio subcarrier (6.20 MHz). NHK Tokyo has a full schedule of a variety of programs direct from Japan's national network NHK. This channel is on Galaxy 6 C-band channel 6. Programming is mostly in Japanese with occasional news in English on 6.20 MHz.

Worthy of note is the lack of audio subcarrier programming on most of these channels. With the exception of KAZN-AM, Asian programmers are missing a great opportunity for additional use of their transponders. Unlike Deutsche Welle, which offers many additional audio services, CCTV, CTV, AATV as well as NHK have no additional audio. The Filipino Channel, however, has two such services: DZMM which is mostly chat in Tagalog and WRR 101.9 FM (Radio Romance) which features a blend of lite American romantic pop music and announcers with American accents speaking mostly English. While the video is Oak encrypted, the audio is in the clear.

■ Receiving Asian Programming

Any standard C/Ku-band satellite TV system can receive the Asian programming just described. However, because of the large and growing population of Asian people in this country, there has emerged a brisk business in the selling of stand-alone Ku-band satellite TV systems. These systems typically feature 3 foot non-motorized dishes with a simple receiver and low noise LNB. The systems are small and (more importantly) portable, thereby enabling owners to use the system in places where full sized satellite TV systems might be prohibited. It also makes it possible to move the sys-

tem easily. Another big attraction is price. These systems typically sell for under \$500 complete.

Several companies offer these stand-alone Ku-band systems, such as Skyvision which offers a large catalog of all kinds of satellite TV goodies (see their ad in this magazine). Another company, which has an on-line only "store," is Ku-band Small-Ear Satellite Online (<http://www.smallear.com>). They have a lengthy list of dishes, receivers, and decoders which are used in conjunction with subscriptions to many of these services. They also have a list of foreign language programs with links to appropriate web sites. I have had no personal experience dealing with this company. Orders cannot be made via mail but they do have a Tech Support phone line (716-639-7778) and a Fax order line (716-639-7779).

Another option is to look for used equipment in your area. Many satellite TV dealers are also DBS dealers and may have many C/Ku-band systems they've taken in trade for the new, more popular DBS units. They may be eager to unload these systems at a decent price. Don't be afraid to bargain.

One dealer I know, when asked, said he'd turned down many complete C-band systems which customers asked him to take away when he installed their new DBS system. There's a lot of good, used equipment out there just waiting for people who appreciate the hobby aspect of satellite TV. One reader recently wrote that he had picked up a complete system, VCII decoder and all, for \$200. Nice work!

Ken Reitz can now be found every month in Satellite Times. Call 800-438-8155 for a sample copy.



English programming on CCTV includes news and features like Chinese cooking and Kung Fu.

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Federal Monitoring Takes to the High Seas

Recent months have taken us from dry land to the high seas in monitoring the counternarcotics activities of the Joint Task Forces. The Caribbean JTF has been active on both the Drug Enforcement Administration (DEA)/Customs channels and also on the Coast Guard channels.

Early in December 1997 at approximately 0500 UTC, several U.S. Coast Guard (USCG) and Customs vessels were monitored on 5696 kHz chasing a vessel in the Caribbean. A station call sign "Panther" (DEA Operations Center in the Bahamas) was coordinating the operation. Several "balls" were reported being dropped in the water as well as persons who jumped overboard. Other units included Stingray 40, 12 Charlie, 33 Charlie, and 63 Alpha. A Coast Guard helicopter was also monitored doing visual coordination at the scene.

The above units were also monitored on 5277.0 kHz (DEA Alpha). Shark 27 was monitored also on this frequency. Charlie 1-2 was identified as a HH-60J Coast Guard aircraft (side number 6012). Shark 27 is the *USCG Cutter Vigorous* (WMEC-627). Thanks to Rick Baker from the WUN group for this information.

Other high frequency activity included a high speed, ocean going chase out in the Pacific. On November 22, 1997, the *Coast Guard Cutter Dallas* (WHEC-716) was diverted to conduct search and recover possible contraband packages jettisoned by a "go fast" boat at a location approximately 150 miles west of Cartagena, Colombia. The go fast was first spotted by a Drug Joint Task Force P-3 Orion aircraft on patrol in the area. Forty-seven bales of cocaine were found within a two nautical mile radius.

Dallas conducted destruction of the 47 bales by immersion in salt water and discharging the solution over the side at sea. Two kilos of cocaine were kept for court proceedings and were transferred to the *USCG Cutter Courageous* (WMEC-622) and then to a representative of the Government of Colombia.

What makes this interesting was that

nearly all of the chase and interdiction radio traffic was conducted on 8971 kHz using upper sideband (USB). This frequency is one of the main frequencies used by the Joint Task

Force in the Caribbean. Keep this frequency in your memory banks. This information comes to us by way of Ed Ashcraft and the Fedcom internet newsgroup.

More and more drug interdiction activities are taking place on the high frequency bands. All of the communications use the upper sideband mode. Due to an increased number of drug interdiction reports recently, Table 1 is a listing of the frequencies used by various agencies in the war on drugs.

The frequency of 9145 kHz has been monitored in the Florida area with anti-smuggling drug traffic. Thanks to Ed Ashcraft for the information presented above.

A monitor who wishes to remain anonymous sent in the following drug interdiction frequencies from the Southwest (along the Mexican border).

Frequency	Use
165.2375	Customs Channel 1
165.7375	Bravo 1 X-Ray (Mexican Border Primary)*
164.6000	Customs Channel 5
120.3250	Customs air training
387.8000	Customs air operations UHF
132.9500	Customs air operations VHF
169.5500	Customs Channel 8
163.2250	Customs Channel 6

Note: The 120, 132 and 387 MHz freqs are AM mode

Other interesting frequencies from our anonymous contributor included: 169.000 and 168.525 MHz for the local Veteran's Hospital and 167.2875 and 414.425 MHz for the local FBI office. If you live along the Mexican border in the southwest part of the United States you might want to keep these frequencies in your scanner along with the previously published Customs frequencies.

Monitoring the Feds on Itinerants

Regular contributor Chris Parris in Houston, Texas, has been monitoring 168.350 MHz activity in the Houston area. The activity, which has been going on for the last few months, has all been in the DES mode of encryption. As we have previously mentioned, when the radios are in the encrypted mode, no subaudible tone is transmitted. Without the tone, it is difficult to determine who the users are on the channel.

In late November the operation turned off the encryption and began transmitting in the clear. The subaudible tone was 167.9 Hz. This tone is used nationwide by the FBI.

The activity has involved a base station

TABLE 1

U.S. Joint Task Force Drug Interdiction HF Frequencies (DoD/DEA/Customs/Coast Guard)

Frequency	Identifier	Frequency	Identifier
2808.5	X-ray Alpha	14443.0	Yankee Foxtrot
4500.0	Zulu Alpha	14686.0	Papa
4991.0	X-ray Bravo	14690.0	Golf
5058.5	X-Ray Charlie	15443.0	Sierra 1-3
5277.0	Alpha	15867.0	Zulu Echo
5527.0	No name	15953.5	X-ray Foxtrot
5571.0	Yankee Bravo	15964.0	Victor Delta
5841.0	Bravo	16141.0	Hornet 4
5732.0	No name	16300.0	No name
6870.0	No name	16348.0	No name
7300.0	Charlie	17171.0	Sierra Hotel
7527.0	Zulu Bravo	17301.0	Sierra 0-8
7582.0	No name	17312.0	Delta 0-7
7657.0	Foxtrot	17443.0	Tango Echo
7778.0	X-ray Delta	17601.0	X-ray Golf
8912.0	Yankee Charlie	17952.0	No name
9238.5	X-ray Echo	18171.0	Sierra India
9497.0	Delta	18283.0	No name
9802.0	Zulu Charlie	18594.0	Victor Charlie
10242.0	Tango Alpha	18666.0	Hotel
11073.5	Sierra Echo	19015.0	Sierra 0-7
11076.0	Echo	19131.0	Sierra Juliet
11246.0	No name	20890.0	No name
11288.0	Yankee Delta	23214.0	No name
11408.0	Victor Golf	23343.0	Tango Hotel
11494.0	Victor Foxtrot	23402.5	Romeo
12138.5	No name	23675.0	India
12215.0	Sierra Two Nine	24120.0	Sierra 0-3
12222.0	Zulu Delta	25350.0	No name
13312.0	Yankee Echo	25410.0	Sierra 0-2
13907.0	No name	26600.0	Sierra 0-1
14350.0	Lima		

5696.0	U.S. Coast Guard (USCG) air-to-ground
6776.0	Department of Defense (DoD) Joint Task Force (Scorpion Base)
6815.6	USCG tactical frequency 3E11
8983.0	USCG air-to-ground secondary
8971.0	U.S. Navy Atlantic/Caribbean safety of flight frequency
11049.0	DoD Joint Task Force (Scorpion Base)

Drug Enforcement Administration Tactical Aircraft Frequencies

132.950	Victor 1
139.700	Victor 2
234.600	Blue 5
238.400	Blue 7
254.200	Blue 4
260.800	Blue 2
282.400	Southwest Florida Operations
282.425	Blue 1
303.825	Blue 2
336.600	Blue 3
350.450	Air-to-ground
353.900	Blue 3
355.900	Unknown designator
361.800	Blue 9
381.800	Blue 6
387.800	Blue 8

Contributed by Ed Ashcraft

plus a few mobiles in the downtown area running license plate checks and confirming addresses. The communications are very informal and no unit numbers were being used. More to follow as it becomes available.

The above frequency, 168.350 MHz, is one of the nationwide government itinerant frequencies which can be used by any federal agency. Here is a listing of the various low power and itinerant frequencies which can be used by government agencies and departments.

163.100	168.350	418.050
418.075	408.400	418.575

These frequencies are programmed into my scanners and they should be in yours also. You never know who you will find using one of these frequencies.

■ Agency Sharing

Speaking of sharing frequencies, we are seeing more combining of local/state military units with federal government agencies in the drug war. In the Washington, D.C., area, the Metro Police Department is working with the District of Columbia (DC) Army National Guard. This operation began in 1989, but lately has been more active. The DC guard is providing helicopter support to the Metro Police.

The helicopter uses the callsign Raid when conducting a DC joint operation and the operations center uses the callsign Tiger 30. Communications have been monitored on the Raid repeater. This repeater has an output of 161.000 MHz and an input of 158.000 MHz. No, these are not typos. (*Editors Note:* Someone from the railroad and mobile telephone industry needs to file a formal complaint on this operation. It is totally illegal and should be causing harmful interference to legitimate users on 157.980/158.010 mobile phone repeater inputs and 160.995/161.010 MHz railroad simplex channels-LarryVH)

The helicopters are from the Reconnaissance and Interdiction Detachment (RAID) of Company B, 1st Battalion, 132nd Aviation, DC Army National Guard, which is headquartered at Davison Army Airfield. There are 33 such Army National Guard detachments nationwide.

The helicopters are OH-58A Cayuse and are equipped with a thermal imaging system that can see temperature variations as small as one half a degree Fahrenheit. The system, known as FLIR for Forward Looking Infrared Radar, is mounted under the helicopter and operated on a joystick. The aircraft have a 360 channel programmable Wolfsburg ra-

dio system which allows it to have communications with almost any jurisdiction. Raid helicopters are only permitted by federal law to support anti-drug operations and it must be in response to a specific request from local law enforcement.

Monitors in the D.C. area say this is an "interesting" channel to keep in the primary channel banks.

The state of Oregon also uses its national guard helicopters in anti-drug operations. The national guard units are equipped with military PRC-127 handie talkies. These are the military equivalent of the Bendix-King programmable walkie talkies. For situations such as disaster relief, they operate on the local government channels. For tactical situations or for the drug patrols, they use the following frequencies:

Channel	Frequency	Channel	Frequency
01	139.2125	08	141.1500
02	139.1375	09	141.2000
03	139.3875	10	142.8750
04	139.1825	11	142.9250
05	141.0500	12	148.5250
06	141.1000	13	150.6250
07	139.2375		

Helicopter communications are conducted on 40.9 MHz, which is the Fox Mike channel, and 241.600 MHz, which is the Uniform channel. The frequency of 135.000 MHz is the Victor working channel. The frequencies of 139.1875 and 139.2625 MHz are also used but do not have known channel identifiers. Thanks to Brian Varnie of Milcom for this submission.

■ Another Auction Snafu

I received a letter recently from Abe who wishes not to be otherwise identified. He was at a Government Services Administration auction at a midwestern city recently. He purchased, for a very reasonable amount, a Motorola SYNTOR-X DES equipped radio which was being surplusd out for sale. This radio costs a few thousand dollars when our government buys them, but they sell for literally pennies on the dollar.

What makes this radio so interesting is that

it was on the Internal Revenue Service criminal investigation division (CID). A description of the IRS CID and their radio system was recently published in this column, but the complete scheme of the radio system was not available then. Shown below is the nationwide radio plan.

Channels 19 and 20 are interesting. The radios are set up for receive only with no transmit. Could these be surveillance microphone frequencies? Channels 22 and 23 are DEA frequencies for joint operations. The PLI tones for channels 1-17 are 3Z. The PLI tones for channels 22 and 23 are 5Z.

This just goes to show you never know what you will pick up at an auction. Recently the Department of the Interior held an equipment auction in North Carolina. I am waiting to hear, from people who attended, what items of communications equipment were sold.

■ Odds and Ends

- Robert Rankin in Kansas has been monitoring a repeater output on 166.275 MHz where the dispatcher identifies as "Creek nation." This would be the Creek Indian Nation in eastern Oklahoma. While the channel is assigned to the Park Service and Customs, it looks like the Bureau of Indian Affairs has now taken up residence on it.
- We have been discussing the lack of FBI activity on their normal radio channels recently and the increased usage of NEXTEL equipment by them. A monitor in the midwest was at a bank robbery recently. He reports that the FBI agents were all using the NEXTEL handheld unit that looks and works like a combined cellular/two way. One agent was using it as a cell phone. He reported that none of the FBI channels carried any traffic, but that the NEXTEL units saw plenty of action.
- It is not storm season yet, but it is time to get the tornado chaser frequencies loaded into your scanners, especially if you live in "Tornado Alley." The tornado teams use a repeater with 165.435 MHz out and 163.100 MHz in. If they are out of repeater range, they use the 163 MHz frequency simplex.

IRS CID NATIONWIDE RADIO PLAN			Channel	Transmit	Receive	Channel	Transmit	Receive
	01	418.225	418.225	13/B1	418.200	415.000		
	02	418.175	418.175	14/B2	418.200	415.100		
	03	418.200	418.200	15/B3	418.200	415.800		
	04	418.225	414.700	16/B4	415.725	418.650		
	05	418.225	415.000	17/B5	415.000	418.250		
	06	418.225	415.100	18/B6	Blank	Blank		
	07	418.225	415.800	19/B7	409.875	None		
	08	418.175	414.700	20/B8	416.800	None		
	09	418.175	415.000	21	Blank	Blank		
	10	418.175	415.100	22	418.900	416.325		
	11	418.175	415.800	23	418.750	418.750		
	12	418.200	414.700					

"Give Us 30 Minutes, We'll Give You..."

Back in the mid-sixties when 1010-WINS (then one of New York City's three main AM rock and roll music stations) became the nation's first all-news radio station, the event not only heralded the beginning of the decline of AM radio as a music medium. It also was the first time a listener heard what is now an oft-repeated and grandiose newsradio vow, "Give us thirty minutes and we'll give you the world!"

International broadcasting has much greater justification for making this pledge. Although one may not truly get the whole world in thirty minutes, it's almost a certainty you'll get a good slice of it.

No international station has a budget that affords it the ability to provide around-the-clock services in multiple languages. Only a few provide even one such service in their native language. (The BBC, RFI and DW are three.) Consequently, most stations opt for a daily hour or two timed to be available to listeners during prime morning or evening listening hours.

For stations sponsored by the world's smaller countries, even those limited hours are often beyond their ability. Several, though, have become quite proficient at communicating via a thirty minute daily format. And it just so happens that such a format probably fits nicely with the often hectic lifestyles of many listeners.

So, this month's column takes a somewhat different tack than has been our custom. Instead of focusing on one type of programming, what follows is a series of descriptions and evaluations of some of shortwave's "thirty minute wonders." As usual, please refer to *MT's Shortwave Guide* for information on frequencies, as well as additional times if you reside outside North America. Although times are in UTC, the days mentioned refer to the particular day in North America.

■ Radio Sweden

For as long as I can remember (at least to 1965), Radio Sweden has utilized the half-hour format for all its foreign language services. The English Service is anchored weekdays by the all-purpose magazine program, *Sixty Degrees North*, which begins with the



news and continues with some timely and topical feature reports. The focus is almost entirely on Swedish matters or on those of the Nordic region. Included are reports on the relationship between the Nordic region and that of the Baltic countries (Estonia, Latvia and Lithuania) and the role that Sweden and the Nordic countries play within Europe and on the world scene. Subjects are wide-ranging from politics to the arts to everyday matters. Friday's *Sixty Degrees North* is a "week-in-review" report.

Most weekday broadcasts also include a feature program during the last fifteen minutes. Weekends provide the listener with regular, full half-hour features. The most notable of these is the listener contact program *In Touch with Stockholm*, heard on the first Sunday of the month. One of the best of this genre, *In Touch*, not only reads letters from listeners, but goes several steps further to put listeners on the air and directly "in touch" with those in Sweden best able to respond to their queries. The only drawback is that it airs only once a month.

Taken together, the Radio Sweden schedule provides the listener with an excellently-produced and comprehensive "view" of Sweden and the Nordic region. Here is the format for their thirty minute transmissions (to North America at 1230/1430/0230/0330):

- :00 - *News* (primarily about Sweden and the Nordic region) [Mon.-Fri.]
- *Spectrum* (Swedish arts and culture) [1st and 3rd Sat.]
- *Sweden Today* (an omnibus program on Swedish topics) [2nd Sat.]
- Documentary or Special Feature [4th Sat.]
- *In Touch with Stockholm* (listener contact with a flair) [1st Sun.]
- *Sounds Nordic* (Swedish youth culture and rock music) [2nd and 4th Sun.]
- *Weekend* (regional magazine coproduced by Nordic broadcasters) [3rd Sun.]
- :05 - *Sixty Degrees North* (daily magazine) [Mon.-Fri.]
- :15 - *Sportscan* (sports in Sweden) [Mon.]
- *Mediascan* (developments in the mass media) [1st

and 3rd Tue.]

- *Money Matters* (Nordic economic report) [Wed.]
- *Greenscan* (environmental matters) [2nd Thu.]
- *HeartBeat* (health and medicine report) [3rd Thu.]
- *Horizon* (science and technology in Sweden) [last Thu.]

■ Radio Austria International

As with Radio Sweden, the English Service schedule is built around a daily general magazine program, in this case, *Report from Austria*. It, too, is a well-produced program that keys on events and issues, political and cultural, of concern to Austrians and Eastern Europeans. In fact, this radio journal's coverage of eastern Europe might be the best available from international broadcasters.

Report from Austria balances its stories well, moving easily from hard news and geopolitical issues and events to cultural matters to everyday life in Austria and the lighter side of things. Weekends provide an opportunity to hear listener comments, some fine Austrian music and a review of the week. Here's the weekly format (to North America at 1330/0130/0530/0630):

- :00 - *News* (primarily of Austria and eastern Europe) [daily]
- :05 - *Report from Austria* (Austrian cultural, political, news magazine) [Mon. to Fri.]
- *Report from Austria* (listener letters) [Sat.]
- *Report from Austria* (the week in review) [Sun.]
- :15 - *Music from Austria* (Austrian music and performances) [Sat.]
- *Profile of Austria* (Austrian people and places) [Sun.]

■ Swiss Radio International

SRI also builds its schedule around a daily news and features magazine. Coming from a nation which is often a focal point of international events, *Newsnet* casts a little wider beam than its two counterparts above, concentrating on both what's happening in the world as well as on life in Switzerland. The first half of the program features analyses of international events by Swiss-based specialists and correspondents abroad. The second half concentrates on Switzerland with reports of every type designed to give the listener a fuller understanding of Switzerland and the Swiss.

Saturdays are reserved for special regular features that review listener mail, play some incomparable Swiss music and provide a

monthly competition with prizes for listeners who can identify a place in Switzerland based on a sound portrait of the mystery location. The format (to North America at 0100 and 0400):

- :00 - International and Swiss News
- :05 - *Newsnet* (magazine of international and Swiss events and topics) [daily]
- :10 - *The Name Game* (sound portraits of Swiss places; prizes for listeners identifying the mystery location from clues provided) [1st Sat.]
- *Capital Letters* (answering listener letters and questions) [2nd and 4th Sat.]
- *Sounds Good* (music from Switzerland and the people who make it) [3rd and 5th Sat.]

SRI has been one of the best sounding stations on shortwave for a long time. It made what many thought was a premature and precipitous move toward satellite delivery at the expense of shortwave some years ago. However, SRI has restored a second half-hour back to its schedule at 0430 (to North America and at 1130, 1330, 1430 and 1630 elsewhere) offering *Rendezvous with Switzerland*, a unique and pleasant program featuring Swiss musical selections interspersed with brief topical reports. (Some might reason that a half-hour plus a half-hour equals an hour, but, in this case, one should not be so clever.) The Saturday features above are repeated during this half hour on Sundays.

■ Radio Vlaanderen Internationaal

Like Switzerland, Belgium is also a focal point for European and international events. Belgium is also a curious place—seemingly more divided among its French (Walloon), Dutch (Flemish) and German citizens than united, but somehow surviving as a nation. This is underscored by the fact that RVI freely describes itself as representative of the Flemish speaking community in Belgium.

RVI's signal is a little weaker and its production techniques are perhaps a little less sophisticated than its forgoing "competitors." Nonetheless, its programming and presenters are pleasant and informative. Furthermore, RVI often provides a perspective on Europe and on central Africa, where it was the colonial power, that is unavailable elsewhere.

RVI also provides a bonus each day that is almost hidden by its subtle presentation. The last five minutes of each half hour features some of the best and most varied music on the international airwaves. Here is RVI's format (to North America at 1300):

- :00 - News [daily]
- :05 - *Belgian Press Review* [Mon.-Sat.]
- *Radio World* (listening tips for shortwave enthusiasts) [Sun.]
- :08 - *Belgium Today* (brief magazine featuring a topical report) [Mon.-Fri.]
- *Music from Flanders* (Belgian performances) [Sat.]
- :15 - *The Arts* (Belgian cultural events) [Mon. and Thu.]
- *Focus on Europe* (European Community

- issues) [Tue.]
- *Living in Belgium* (aspects of life there) [Wed.]
- *Economics* (weekly Belgian business report) [Fri.]
- *P.O. Box 26* (listener mail) [Sun.]
- :20 - *Tourism* (places to visit in Belgium) [Mon.]
- *Sports* (weekly report focusing on Belgium) [Tue.]
- *Green Society* (environmental report) [Wed.]
- *Around Town* (leisure and entertainment in Belgium) [Thu.]
- *International Report* (world current events) [Fri.]

■ YLE-Radio Finland

Finland is an interesting place. It has reindeer, Lapland and the Sami people. There is a significant Swedish-speaking minority, a reminder of the time when Finland was a part of the Kingdom of Sweden. It survived — and did so in unique fashion — as a small independent nation on the doorstep of the gargantuan Soviet Union, giving it a distinct perspective on the Cold War period. And it is emerging as a successful, business-conscious country in the post-Soviet era with strengthening ties to the Baltic countries and Europe in general.

For all these reasons and more, YLE Radio Finland's sole morning broadcast (1330 UTC) to North America makes for fascinating listening. And its smooth, although soon predictable, production style makes it easy on the ears. It even has international broadcasting's only non-religious program in classical Latin! The format:

- :00 - *Compass North* (news and commentary on Finland and the Nordic region, plus business and weather reports) [daily]
- :05 - *This Week* (topics making headlines over the past week) [Sun.]
- *Capital Cafe* (meet the Finns and what they're talking about) [most Sat.]
- *Nordic Report* (a regional magazine jointly produced by Radio Finland, Radio Sweden and Radio Norway) [2nd Sat.]
- :10 - *Nordic Update* (current affairs program on Nordic politics, foreign and security policy and economic development) [Mon.]
- *Compass North* continues with features on life in Finland, Finnish history, the environment and the media [Tue.-Fri.]
- :15 - *Starting Finnish* (language instruction) [Sun.]
- :20 - *Echo* (listener mail and a weekly competition) [Sat.]
- :25 - *Nuntii Latini* (weekly news review in classical Latin) [Sun.]
- *Finnish Press Review* [Mon.-Sat.]

■ Radio Prague

It transmits from the city in eastern Europe with the most American expatriates. Back during the days of the Iron Curtain it was easily the most listenable station in the Soviet bloc, somehow transcending the drone of agricultural and industrial reports and endless political tracts with its daily folk music selection and evident pride in the city's long history. For a young listener new to the shortwave medium, it provided a means of witnessing history as tanks rolled into Czecho-

slovakia to crush the Prague Spring and force a free radio station to submit to raw power.

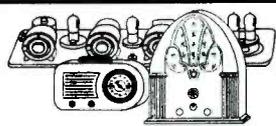
Today Radio Prague is again under siege, only this time it is threatened by the seemingly more menacing power of a shrinking budget and a dearth of governmental foresight. At one time, Radio Prague was a symbol of independence and freedom. Surely, memories will not prove to be as short in this developing democracy as they are here?

But despite its problems, Radio Prague soldiers on. It provides a range of interesting programs from one of Europe's most historic and preserved places. Here's the format (to North America at 1400/2100/2230/0000/0100/0300):

- :00 - *News* (usually of the Czech Republic and its immediate neighbors) [daily]
- :05 - *The Week in Politics* (Czech Parliamentary report) [Sun.]
- *Current Affairs* (reports on commentary on Czech current events) [Mon.-Fri.]
- *Musical Feature* (Czech classical, folk or jazz performances in weekly rotation) [Sat.]
- :15 - *From the Weeklies* (clippings from Czech periodicals) [Sun.]
- *Magazine '97* (life in the Czech Republic) [Mon.]
- *Talking Point* (debate on a topical issue) [Tue.]
- *The Arts* (Czech cultural current events) [Wed.]
- *Economic Report* (business and investment in the Czech Republic) [Thu.]
- *Between You and Us* (listener letters and comment) [Fri.]
- :20 - *Media Czech* (what the foreign press says about the Czech Republic) [Sun. and Tue.]
- *From the Archives* (a popular or noteworthy past program) [Wed.]
- *I'd Like You to Meet...* (conversations with prominent and everyday Czechs) [Thu.]

Other stations utilizing this thirty minute approach include Radio Portugal, Radio Yugoslavia, Radio Budapest (although there are two distinct half-hour blocks), Channel Africa, Radio Thailand and the Voice of Vietnam. Radio Norway International's excellent magazine program of news and features, *Norway This Week*, is heard for a half-hour as well, but only on Sundays. Tune around and compare. You can get a lot for your thirty minutes!

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Computer Programming the PRO-64/PRO-2041 (Cheap!)

Brand spanking new for Radio Shack's 1998 catalog year are the PRO-2041 and PRO-64 VHF/UHF scanners, made by GRE-Japan. The PRO-64 and PRO-2041 are premium quality scanners, electronic clones of each other, sharing the same electronic design, though one is a handheld and the other is a base. Each has triple conversion; four RF bandpass filters; a double-balanced 1st mixer; and an AGC-controlled front end for state-of-the-art reception and immunity to pseudo-signals and interference.

And, these fine scanners are Radio Shack's first ever to be programmable by a computer! Four hundred frequencies can be autoloading into these scanners in under a minute!

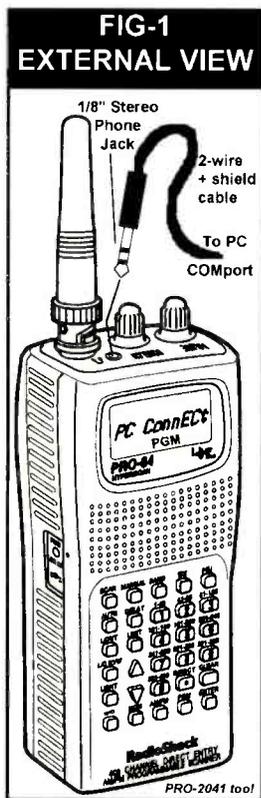
Radio Shack's Secret

Odd, but these two scanners aren't billed as computer-programmable in the catalog. The only clue for the clueless are cryptic comments in the *Owner's Manuals*, one of which says to "contact your Radio Shack dealer for more information about programming these two scanners from a computer."

Early requests for this "more information" received replies to the effect: Special Order "Data Link" P/N 11996428 \$129.99. However, now Radio Shack sends a brochure about third party sources of software for these scanners. Some people, however, managed to acquire the "Developer's Information" before Tandy stopped giving it out.

One astute programmer, Ken Plotkin, said Tandy wouldn't provide him with the developer's support, so he poked and prodded the scanner with his computer and ferreted out the control codes on his own.

Well, all I know about programming is that it comes on radio and TV, but I can tell you how to connect a computer to these scanners. And I will tell you where to find the software to ease the pain in your bony fingers. Let's



look first at the hardware side of programming the PRO-64 and PRO-2041.

The Hardware

The interface to these scanners is in the earphone jack! How cool! Who'd ever think....? And even then it isn't obvious how the earphone jack can be used for headphones and programming. Figure 2 shows the earphone jack as a stereo (3-pin) variety. When a normal monaural headphone is inserted, the tip of the plug passes the signal from the audio amplifier to the earphones as you'd expect. The ring contact in the jack is shorted to ground by the longer shell of the monaural (2-pin) plug. Since the ring contact of the jack goes to the scanner's

CPU, a normal earphone deactivates the data port. When the plug is removed from the earphone jack, an internal switch closes to keep the ring contact grounded (and inactive.)

The only way the CPU data port can be activated is with a stereo plug inserted into the earphone jack. So, get a stereo plug (RS #278-284 or 274-869) and a practical length of two-wire + shield cable (RS #278-514 is fine.) One end of this cable goes to the stereo phone plug as shown in Figure 3. The other end of the cable goes to a computer connector, typically a female DB-9 (#276-

1538) or a female DB-25 (#276-1548), to fit the serial port on your computer. Add a 1-kΩ resistor (RS #271-1321) between Pins 2 and 3 of the DB-9 or DB-25 plug. Make the cable as shown in Figure 3. (You can buy a ready-made cable from Computer Aided Technologies - see below.)

Initial Setup

Turn the scanner off. Plug the female DB-9 (or DB-25) end of the cable into the PC's serial port (COM1 or COM2). Then insert the stereo interface plug into the scanner's earphone jack. Press and hold both the <ENTER> and <3> keys on the PRO-64 or PRO-2041 scanner, and turn it on. Release the two keys and "PC" should appear in the display.

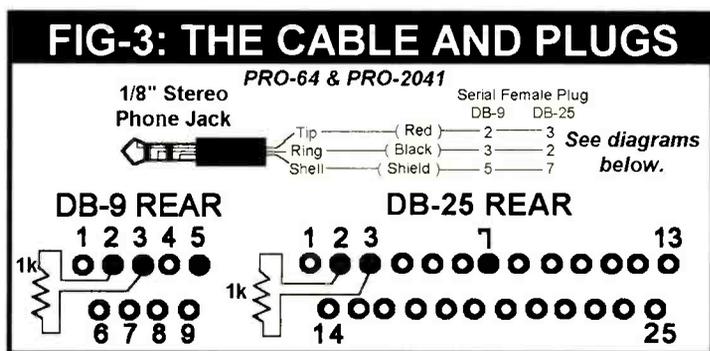
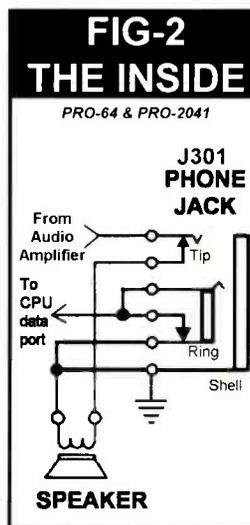
After the programming mode has been established, the scanner is ready to accept serial commands and data. Exactly how this is done depends on your depth of computer savvy and choice of software.

The Software

Fortunately, there is something for just about everyone, from raw novice to grizzled expert. Ken Plotkin released a "careware" (free), no-brainer loader program called (what else?) LOAD, available from the below Web site in a zip file called LOAD64.ZIP:

<http://hruska.home.mindspring.com/pro-prog.html>

This site also has some great



information on the underpinnings of programming the PRO-2041 and PRO-64, if you are into the technical details. In any event, LOAD64.ZIP contains the necessary software and instructions to get your scanner programmed in a flash. You need only the small program, the interface cable, and a simple frequency list in ASCII text format. More on that in a minute...

■ Alternatives

Another freeware way (not for the neophyte) to autoloading frequencies into the scanner is with a plain terminal program like Telix, ProComm, or even HyperTerminal that comes with Windows 95. If you opt for this method (and it is fun), the terminal program should be set to 2400 bps (8N2) 8 data bits, no parity, and 2 stop bits. The plain ASCII text file, albeit a bit more complicated than required by Plotkin's LOAD.EXE, is sent to the scanner exactly like an ASCII file transfer over a modem. I'll tell you more about that, too, in a moment.

If you prefer a hands-off and ready-to-go method of programming your PRO-2041 or PRO-64, then Computer Aided Technologies (a regular MT advertiser) is a good choice for premium software. They also provide the interface cable. See the Index of Advertisers in this issue or visit their web site at:

<http://www.scancat.com/pro64.html>

Ben Saladino offers the shareware Radio Manager for Windows with support for the PRO-2041/64.

<http://www.interplaza.com/bensware/#RM>

John Montalbano offers the shareware PROGRAMIT with support for the PRO-2041 and PRO-64.

<http://www.qsl.net/ka2pyj/pro64.htm>

■ Plotkin's LOAD.EXE

The remainder of this article deals expressly with Plotkin's LOAD.EXE — probably the best way to get your feet wet; it's free and it's the easiest. Instructions for LOAD are self-contained, so for now you really need only know how to create and structure the frequency files to be loaded into the scanner. LOAD.EXE requires a simple text file frequency list like shown in Table 1.

The comments text is strictly for your benefit; the LOAD program ignores it. In fact, LOAD requires only a frequency list laid out like Table 1 with one or more spaces between the Channel, Frequency, and Comments columns. And you don't absolutely have to have either the Channel or Comments columns. LOAD.EXE will pick the channel

TABLE 1: Frequency List for LOAD.EXE

CHAN	FREQ	COMMENTS
1	154.8	DC Police
2	153.7	DC Police
3	153.09	DC Police
4	153.15	DC Police
41	151.625	Port Royal Speedway
42	151.655	Trailway Speedway, Hanover, PA
43	151.775	Lincoln Speedway, New Oxford, PA
44	4E9.9375	Grandview Speedway
45	4E4.425	Pocono International Raceway

numbers for you if all you have is a columnar list of frequencies! We don't know if Delay and LockOut are possible to program from the computer. Perhaps in good time...

Execute LOAD <FreqFileName> <ENTER> from a DOS command line (Windows 95 DOS box okay) and if everything is right, the LCD display will indicate, "PC CONNECT" as the frequency list is loaded into the scanner. When it's done, the LCD display will change to indicate, "FINISH". Turn the scanner off; remove the interface cable; and turn it back on to operate. The autoloading process for 400-ch takes about 45-seconds with LOAD!

■ For the Experts

If you prefer a manual seat-of-the-pants approach, you can use a terminal program configured to 2400-bps, 8N2, and upload a comma-delimited ASCII text file to the scanner. There is an extra complexity of the required file, however. The type of file really required by the scanner is shown in Table 2.

Say what?! Well, Table 2 appears complicated, but it represents exactly what the scanner needs in order to be programmed with the list in Table 1. The neat thing is that Plotkin's LOAD.EXE creates Table 2 for you, automatically, on the fly, so you don't have to be bothered with it. You need only create something similar to Table 1. But if you want to load the scanner using a terminal program, or any of several other methods, then you'll need to learn about the required file structure seen

TABLE 2: File Format

\$99E*F9
\$902.0001,0154.8000,1*1F
\$902.0002,0155.7000,1*20
\$902.0003,0156.0900,1*24
\$902.0004,0159.1500,1*25
\$902.0041,0151.6250,1*25
\$902.0042,0151.6550,1*29
\$902.0043,0151.7750,1*2D
\$902.0044,0469.9375,1*3F
\$902.0045,0464.4250,1*2E
\$904*EB

in Table 2. The best info resource I've seen this far can be found at: <http://hruska.home.mindspring.com/pro-prog.html>

That file structure begins with a \$999*F9 that tells the scanner to go into the Data Program mode. \$902 tells the scanner that a line of data is on the way. The channel data must be four digits, meaning that leading zeroes are required (0001 = channel 1; 0400 = channel 400).

Likewise, the frequency data must consist of four digits; a decimal; and four more digits, (leading zeroes also required). See Table 2 for examples. A line of data must end with a 1*nn where "nn" is a hexadecimal number representing the checksum of the data on that line. A line of data must end with a carriage return and linefeed (not shown, but usually standard). The file has to end with a \$904*EB to end the transfer and trigger the display to show, "FINISH."

There are other ways to program the PRO-2041 and PRO-64, one of which is directly from a Microsoft EXCEL spreadsheet, but lack of space doesn't permit me to tell you about it here. Instead I will refer you to the developer of the MS EXCEL method, Cathy De Viney [cdeviney@intellinet.com], who has offered to freely share her Excel template by e-mail file attachment to inquirers. De Viney's template contains complete instructions for Excel 4.0 and later.

I'll try to maintain the latest versions of Plotkin's LOAD64.ZIP and De Viney's P64-2041.ZIP template on my FTP site in the PUB\MONTIMES directory for convenience of download. As usual, tech support for this and all my columns is freely available by e-mail and my Web/FTP sites.

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QSLing the Airlines

Welcome aboard! We've been getting a lot of mail from readers about reception reports. So, we've chosen that for our subject today.

For many years shortwave broadcast station enthusiasts have sent reception reports to stations they've monitored detailing program content, reception conditions, and other factors which they thought should be included.

Most of the stations to which they sent their reports would, in turn, send brightly colored cards and/or verification letters, thanking the listener for these reports. Since SW broadcasting stations beam their transmissions to listeners intentionally, they encourage letters from listeners describing how and where they received their stations' broadcasts.

We must keep in mind, however, that aviation communications are not meant for our eager ears. Consequently, it is important to remember that the recipient of your report in the Fiji Islands doesn't really care that someone in Boredomville, Illinois, monitored them working a flight over Suva. If the communications officer sends the listener a QSL letter or card, or confirms the reception some other way, it's only out of courtesy, nothing more. He's not dependent upon your reception report as would a shortwave broadcast station, and he is only concerned as to how the flights he was working were receiving his transmissions.

■ Do's and don'ts of QSLing

Okay, with the above in mind, let's say that you're still determined to send reception reports to aviation communications facilities. The contents of your reception report should be simple and concise. Remember the old KISS principle — Keep It Simple, Stupid!

The contents should include the following details: Date/time that you monitored the transmission (in UTC, please), the airline and flight number of the aircraft being worked, the name of the ground station, and the frequency to which you were tuned (this is important when monitoring the HF aero bands as it's common for several ground stations to share the same frequency).

It's not necessary to rate the signal strength, etc; as we stated above, aero comms station personnel are not concerned as to how well their transmissions are being heard by ears other than those meant to receive them. Do include the mode of transmission: Was it VHF-AM or upper sideband?

It's okay to mention the type of transmission (position report, request for a Selcal check, request for a different altitude, etc.), but whatever it was, do not reveal the contents of the transmission in your report. A federal law — section 605 of the 1934 Communications Act — is explicit about this: A third party must not reveal the contents of a radio communication that was meant for another party. I strongly recommend that anyone who isn't familiar with this law make it a point to look it up at the local public library.

If you wish, you may include the type of receiver and antenna you have. Also, there's nothing wrong in mentioning something about yourself, such as your interest in monitoring aviation communications. You may even want to send a picture of yourself with your monitoring equipment. Once, I sent a photo of myself with my receiver along with a reception report to a HF enroute station, and the station manager reciprocated by sending me a photo of some of his staff at their radio consoles — a real, unexpected bonus!

Since you are requesting a verification of your reception report(s), it's important to have positive identification of the flights which you've monitored as well as that of the ground station to whom you are sending your report. Consequently, it's a good idea to monitor that ground station for at least 20 minutes. This is where a tape recorder will come in handy to confirm the ground station and the flights it is working are identified correctly when you are preparing your reception report.

Remember that English is the international language of aviation, so even if your report is going to a ground station in a foreign country, they should have no problem understanding your report or its contents.

I've noticed, in some instances, foreign stations have a slightly more consistent verification return rate than do domestic stations. In my experience, foreign stations responded 72 percent of the time while North American (including states and territories outside of the mainland) stations had a 65 percent return rate.

Always send return postage with your reception reports. Enclose IRCs (international



return coupons) or mint stamps (see QSL Corner for a source for these) when sending your report to a foreign country. Send a 32-cent stamp only if you and the station are both located in the United States.

■ Sending a prepared card

Since aero enroute stations don't have their own prepared QSL cards, you will have to supply one to be completed by the station manager and then returned to you. It's not too costly to design your own and have them printed on postcard stock with your name and return address on one side, and reception confirmation information to be filled out by the recipient of your report on the other.

Make sure that your name and return address is legible on the other side of the QSL card and that you've included your country of residence as well as your street address.

Never hand write your report. Even if you have to use prepared reception report forms (PFCs) that you've had printed, the only part that should be hand-written is your signature! Keep in mind that the person who may be signing your prepared QSL card shouldn't also have to be trying to decipher your handwriting. If he does, your report may end up in "file 13" instead of being verified.

If you are not sure of the address of the ground station to which your sending your reception report, remember this experience I had. The first time I sent a reception report to the enroute ground station in Fiji, I had no idea where it should go, so I took a gamble and just addressed it to Manager - Air Ground Communications, Aero Enroute Station; Nadi Airport; Nadi, Fiji Islands. Unknowingly, I had sent it to exactly the right place! So, when you're unsure of the correct address, just make sure that you include the nearest airport name, Aero Enroute Communications Station; Attention, Manager of Air/Ground Communications; Airport name and city.

Next month, we'll discuss sending reception reports like the one pictured above to airborne stations (flights). This is a bit more complicated, but well worth the effort. Also, we'll have some airline company names to start you off.

Until then, 73 and out.

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WHAT'S NEW?

TELL THEM YOU SAW IT IN MONITORING TIMES

Winter Reading ...

If Christmas tapped you out and the weather has you trapped indoors, you can still indulge your radio hobby. The first of the year is when the new editions of your favorite resources (plus some new ones) are hot off the presses. Thanks to the publishers who sent us the following new books and press releases for 1998.

Emergency Survival Communications

"Be prepared"; that's not only the Boy Scouts' motto, but that of the majority of radio communications hobbyists and professionals alike who consider themselves a step ahead of the masses when it comes to informational access.

Dave Ingram's new release,



Guide To Emergency Survival Communications, outlines the communications systems—scanner, shortwave, and satellite—which can be monitored in time of need: amateur radio, CB, federal networks, worldwide news services, weather networks, satellite GPS, and more.

Chapters outline in depth how to choose and build your communications post, including emergency power sources, and even ways to keep in touch via radio with your friends and neighbors without taking an FCC license exam.

Considerable detail is given to choosing amateur radio gear, shortwave receivers, scanners, antennas, and to signal propaga-

tion characteristics of various frequency ranges, as well as the users of various scanner bands.

Guide To Emergency Survival Communications, published by Universal Electronics, is \$19.95 plus shipping from Grove Enterprises (800-438-8155).

AM Radio Log



The National Radio Club announced the new *NRC AM Radio Log* for the 1997-1998 DX season. This invaluable reference for AM hobbyists has been updated through September 1997.

Believe it or not, this 310-page annual is in its 18th edition! It comes in its usual 8-1/2" x 11" size, 3-hole punched, loose leaf

format and lists over 5,400 AM radio stations from the United States and Canada.

The entries consist of location, frequency, call letters, format, news network, station address, station slogan, and day and night transmitter powers. There are cross references by city and by call letter.

The price for nonmembers is as follows: USA & Canada \$22.95, Europe US\$24.00, Latin America US\$ 23.50, all others US\$ 28.00. Send to: National Radio Club, Publications Center, P.O. Box 164, Mannsville, NY 13661-0164.

World Radio TV Handbook

If 18th edition sounds impressive, how about 52nd?! The *World*

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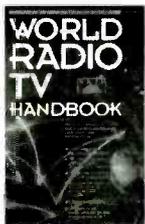
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Radio TV Handbook's 1998 edition is now available, and if you are a shortwave broadcast listener you owe it to yourself to keep this reference always close at hand.

Last year's edition made several welcome modifications requested by readers in response to a *WRTH* survey. One of those is the alphabetical organization of international broadcasters. As editor Andy Sennitt puts it, "to find the schedule for a particular country, you only need to know the alphabet and don't need a degree in geography." Domestic radio and television broadcasting is still listed alphabetically within regions.

There is no other publication which strives to cover the entire broadcasting spectrum worldwide—AM and FM, long, medium, and shortwave—and in all languages, with full transmitter and station contact information. In fact, the full tele-

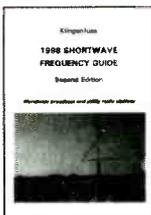
vision listing is back in the latest edition, since there will be no separate satellite guide this year.

The 1998 *World Radio TV Handbook*, published by Billboard Books, is available for \$24.95 from Grove Enterprises (800-438-8155) or your favorite radio hobby dealer.

1998 Shortwave Frequency Guide

The two venerable, frequency and information directories, *Passport to World Band Radio* and *World Radio TV Handbook*, are published in the fall and at the first of each year, respectively. Each has its strong points and is complementary to the other.

A newcomer on the scene



adds one more, equally complementary approach to surfing the airwaves. Only in its second edition is Jeorg Klingenfuss' *Shortwave Frequency Guide*, with exhaustive, up-to-date information compiled by Michiel Schaay from the Netherlands.

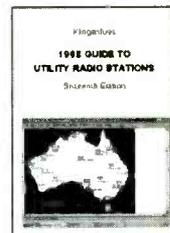
Stations are organized in a quickly-scanned format in both alphabetical and by-frequency listings. Information includes language, time on and time off, target area, and transmitter site (alpha list) or relevant remarks (by-frequency list). Sections for shortwave clandestine and utility stations are included as well. The book is strictly a frequency directory, however, without addresses or station contact information.

Published by Klingenfuss Publications, the book is available in the U.S. for \$36.95 from several *MT* advertisers, including Grove Enterprises (call 800-438-8155).

1998 Guide to Utility Stations

Also updated for 1998 are several other essential resources from Klingenfuss Publications, the new *1998 Guide to Utility Stations* foremost among them. This 15th edition covers worldwide non-broadcast radio services on shortwave: aero, diplo, maritime, meteo, military, police, press, and telecom.

The book also covers data systems monitoring and decoding: included in the new edition are dozens of sample screenshots of analysis/classification/decoding/display equipment such as those manufactured by Applied Signal Technology, Daimler-Benz Aerospace, Guillet, Medav.



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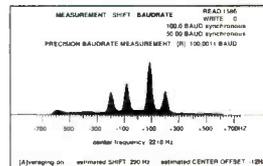
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This unique reference book lists just everything: abbreviations, addresses, call signs, codes, explanations, frequency band plans, meteofax, NAVTEX, and press schedules, modulation types, all Q and Z codes, and much more. It is the ideal companion to the 1998 *Shortwave Frequency Guide* for those "other" stations on shortwave!

The *Klingenfuss Guide to Utility Stations* is also carried by Grove Enterprises (for \$39.95) and many other dealers.

All the Above on CD-ROM

The 1998 Super Frequency List on CD-ROM combines the clandestine, domestic, and international broadcasting services frequencies of the *Shortwave Frequency Guide* with the complete database of frequencies from the 1998 *Guide to Utility Radio Stations*. Also included are 960 abbreviations and 15,400 formerly active frequencies—all on one compact disk for PCs with Windows.

Not only can you browse through all that data in milliseconds, but you can search in next to no time for specific frequencies, countries, stations, languages, call signs, and times as well.

The software has been completely revised and now features DLL interfaces for Radio Manager (SHOC), RCON (Lowe), and Visual Radio (Liedtke).

The 1998 Super Frequency List's most attractive feature is its word search. For example, in the broadcast database BC98, entering the words "bbc - en - 12:34" takes you, in less than a second, to 39 entries with all BBC frequencies worldwide broadcasting in English at 12:34 UTC.

Klingenfuss Publications offers a special package price if you order the CD, the *Shortwave Guide*, or the *Utility Guide* in any combination. For inquiries or to order fax ++49 7071 600849, email klingenfuss@compuserve.com, visit <http://ourworld.compuserve.com/homepages/Klingenfuss/homepage.htm> or write Klingenfuss Publications, Hagenloher Str 14, D-72070 Tuebingen, Germany.

Communications Receivers, 4th Ed.

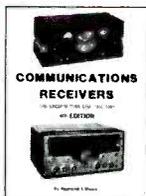
For flea market and hamfest addicts among our readers, Raymond S. Moore's newest release, *Communications Receivers, 4th Edition*, is a pictorial bonanza of vacuum-tube communications receivers from 1932-1981. Featuring much better photography and typeset than previous editions, this expanded and revised edition contains some 448 photos of 750 receivers. Accompanying text describes dates of manufacture, tube complement, frequency ranges, and other important features.

Whether your passion is military receivers, Hallicrafters, Collins, or any other of dozens of old-time manufacturers, it will be found in this elegant collection at a bargain price.

Communications Receivers is only \$19.95 plus shipping from Grove Enterprises (800-438-8155).

Police Call, California Style

California scanning enthusiasts are richer for having Gene Hughes, founder of the leading scanner directory, a radio-active resident. Each year Gene prepares *Police Call, Southern California Edition*—an in-depth frequency guide for that state, featuring law enforcement, fire, rescue, federal government, military, forestry, aircraft, amateur repeaters, news media, theme parks, and mall security listings



in detail.

Next time there is a major incident, look up FEMA, Nuclear Regulatory Commission, FAA, Interagency Mobilization Plan, and more. And a free list of corrections is available at mid-year from the author.

Police Call, Southern California Edition is \$12.99 plus \$3 postage from Public Safety Radio Data, 362 Union St., Doylestown, PA 18901.

Illegal Police Surveillance

If you're not already a paranoid, you may be one once you read *Illegal Police Surveillance!* Are you the subject of unwarranted (or warranted) surveillance? George Roberts takes us on an anecdotal, illustrated tour of the surveillance spectrum.

Topics include agencies and companies who do the intrusive listening, the equipment used, countersurveillance (debugging) methods and equipment, frequency ranges commonly used, samples of bugging and debugging equipment advertised, techniques used to conceal—and discover—surreptitious listening devices, and the author's own extensive text describing the devices and their uses.

Some of the equipment and stories are dated, some are quite new. But the broadside of the work is quite informative and worth the price of the book.

Illegal Police Surveillance is \$24.97 plus \$3 shipping from Comet Press, PO Box 31421, Dayton, OH 45437.

Cruiser's Radio Guide

No, we're not talking about showing off your wheels downtown on a Saturday night with the boom box blasting! Instead, for nautical enthusiasts, the *Cruiser's Radio Guide* by Roger Krautkremer is an indispensable, information-packed handbook for maritime interests, hams and non-hams alike.

Beginning with licensing re-

quirements, the easy-to-read companion moves through application procedures, into explaining all of the basic radio services, and on through operational procedures.

A comparison of amateur and marine radio is presented authoritatively, along with a discussion of related equipment and antennas. Fully half the book is a compendium of valuable tables, from HF and VHF maritime frequencies, schedules of international maritime radio networks, emergency nets and procedures, radio glossaries, rescue center contacts, and more.

Cruiser's Radio Guide is \$19.95 plus shipping from Grove Enterprises.

Grove Publication Becomes Monthly



Satellite Times, which began its existence as a bi-monthly magazine in September 1994, has now come of

age: it became a monthly publication with the January 1998 edition!

ST has attracted some of the best-known writers in the field of satellite observation and reporting. It also covers related topics of radio astronomy and weather observation.

With double the number of issues per month, *ST* subscription rates are now identical to those of *Monitoring Times*. Ask for a sample copy if you've not seen one for a while by calling 800-438-8155.

Books and equipment for announcement or review should be sent to "What's New?" c/o *Monitoring Times*, P.O. Box 98, 7540 Hwy 64 West, Brasstown, NC 28902. Press releases may be faxed to 704-837-2216 or e-mailed to mteditor@grove.net.



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Lowe HF-250E Tabletop Receiver

When Lowe introduced the handsome HF-250 in 1995, it earned a four-star rating in *Passport to World Band Radio*—worthy praise indeed, but not equal to the five stars awarded to top-gun tabletop receivers. So when Lowe announced that an HF-250E model would be forthcoming, hopes soared.

For good reason. Longtime *Passport* readers will recall a similar history with the previous model, the HF-225, introduced in 1989. It performed well, but when the “E” (for “Europa”) version was introduced later on, it offered improved performance at a premium price. Sold at the same time as the “basic” ‘225, the ‘225E soon acquired a small but devoted following from DXers and program listeners who valued the receiver’s unusual combination of high performance, quality construction and minimalist controls.

■ Only one version now offered

The Lowe strategy is a bit different this time—the HF-250E is touted as a higher performance replacement for the HF-250, which has been discontinued. Among the improvements to the ‘250E, Lowe states, are “magnetically shielded coils and higher spec switching diodes and capacitors are used in the bandpass filter stages. This gives a much lower receiver noise floor, better suited to topical band DXing for example.” Also, the AM-mode 10, 7 and 4 kHz (nominal) bandwidths of the ‘250 have been replaced by 7.0, 4.5 and 3.5 kHz (nominal) bandwidths.

This was music to our ears. However, as we shall see, while some aspects of performance improved, some things actually got worse.

■ Several useful features...

First, let’s give the HF-250E the “once over.”

The HF-250E tunes from 30 kHz to 30 MHz in the amplitude-modulated (AM), lower-sideband (LSB), upper-sideband (USB), continuous-wave (CW) and narrowband-FM (NBFM) modes. It also



The Lowe HF-250E is a good-sounding, fine-performing radio. But is it as good as the plain old ‘250 used to be?

has double-sideband and selectable-sideband synchronous detection of AM-mode signals, which are used by world band and AM band broadcasters.

A display indicates which mode has been selected. Also included are an analog signal strength meter, indicators for synchronous lock, memory mode, and an X.XXX.X MHz orange frequency readout. The HF-250E tunes in exacting 8 Hz steps, but following a questionable Lowe tradition displays only to the nearest 100 Hz. There are 255 memory channels that store frequency, mode, and filter settings, as well as three AM-mode bandwidths, a bandwidth for SSB and an audio filter for CW.

On the front panel, there is a 1/4-inch headphone jack and metal knobs for power/volume and tone. A bank of five pushbuttons controls a surprisingly wide variety of functions, including memory-channel (preset) operations, attenuator, bandwidth selection, and megahertz tuning jumps.

Back in the hollow-state days, when receivers had no direct frequency entry through keypads, a time-honored technique for frequency hopping was to grab the flywheel-assisted knob, then give a hefty flick of the wrist. Driven by the flywheel’s inertia, the knob would spin like dragster wheels, burning rubber to the next frequency range.

Likewise, the 250E’s metal knob, which includes a tuning dimple, spins freely. Aided by variable-rate tuning, the digits zip by on the frequency display like a calculator on steroids.

Atop the receiver is a rectangular slot, which serves as an acoustical port for the

receiver’s speaker/handle, as well as a place to store the infrared remote control. On the bottom of the cabinet are two plastic flip-down feet to tilt the receiver to a comfortable operating angle.

The back panel is home to inputs for both wire and coaxial antenna feedlines, a switch for choosing among high- and low-impedance or whip antennas, as well as connectors for computer control, external loudspeaker, record output and external AC adapter.

■ ...but two helpful features omitted

In short, the HF-250E is packed with just about all the goodies that most world band listeners might need or want. Notably missing, however, are two helpful features that faint-signal hunters use to pry DX catches from a recalcitrant ionosphere: a tunable notch filter and passband tuning.

■ Beautiful, rock-solid metal cabinet

If there were a prize for the best receiver cabinet, the Lowe HF-250E would win hands down. It is the only receiver with sculpted, machined metal panels on both the front and the back. Controls aside, the rear of the ‘250E looks almost as good as the front. It is incredibly solid, gorgeous construction. This may not quite be the radio equivalent of the Movado Museum watch, but it comes close.

■ Worthy performance, but not equal to prior model

In most characteristics of receiver performance, the ‘250E comes off well. Each of the

four bandwidths has excellent shape factors and ultimate rejection, a step forward over the "non-E" version. At our lab, the 7 kHz (nominal) bandwidth measures 5.8 kHz, while the 4.5 kHz (nominal) bandwidth actually measures 4.9 kHz.

Thus, these two bandwidths are actually separated by only 0.9 kHz—far less than the 2.5 kHz indicated in the manufacturer's specifications. Because these two important bandwidths are, for all practical purposes, virtually identical, the receiver's bandwidth actual flexibility is much less than is suggested by the published specifications.

The dynamic range is only fair-to-good when measured at 20 kHz separation points, but is a bit better at the more-demanding 5 kHz separation. Although plenty good, this is a regression from the previous version. Similarly, AM-band sensitivity, measured at 1 MHz and 2 MHz, is only good, whereas it had been good-to-excellent in the original HF-250. Nevertheless, these variations are small enough to be accounted for by sample-to-sample differences.

Our measurements of overall audio distortion are also not as encouraging with the '250E as they were with the '250. AM distortion, which had been excellent-to-superb, has slipped to good-to-excellent. Overall distortion in the single-sideband mode is virtually nil when the volume is low, but becomes only good when the volume is increased. And AM-synchronous distortion, which on the original '250 measured as good, excellent and superb at various audio frequencies, has slipped to fair, good and superb in the "E" version.

Bottom line, the Lowe HF-250E is a good-sounding, fine-performing radio. But it's not quite as good as the plain old '250 used to be.

■ Long-distance remote, but with limitations

Also unimproved in the HF-250E is the infrared remote control, which features a bizarre keypad layout and *no* volume control.

What is the point of a TV-like wireless remote that has the great advantage of working from across a room, which can turn the

receiver on and off, mute the audio, change modes and bandwidths, control the attenuator and presets, and even slew frequencies (albeit at an agonizingly tortuous crawl)—and yet, has a weird and unhandy keypad layout...and no ability to adjust the volume?

■ Finding it

Purchasing this rugged little receiver may take some doing. Lowe's North American distributor, EDCO, which shares facilities with EEB in Virginia, may or may not be handling this model by the time you read this; if so, the price should be \$1,299.95. EEB's Website (www.eebradio.com) has not been responding for many weeks, now, but EDCO can be reached by phone at (703) 938-8105.

Additionally, Lowe, which routinely handles orders worldwide, can be reached at www.lowe.co.uk, although it has no secure "https" order page to ensure the confidentiality of credit card orders. Via Lowe, the '250E is £680.00 (about \$1,125) plus shipping and, where applicable, VAT or customs duties.

■ Overall: no improvement

In the end, the HF-250E represents a half-step forward and a tiptoed step backward. In the 1998 *Passport to World Band Radio*, it retains its four-star rating—but just barely.

■ Last of Lowe's HF-225 "Europas" at Reduced Price

Speaking of Lowe receivers, at last check Lowe has been having a clearance sale of earlier tabletop models at reduced prices. These include VAT, which doesn't have to be paid on exported units: £599 (about \$835 plus shipping and customs for export) for the HF-250, and £499 (about \$700 plus shipping and customs for export) for the venerable HF-225 "Europa."

Incredibly, the just-introduced Lowe SRX100, which we evaluated in the October

'97 *MT*, has already been relegated to the remainder bin. Its clearance-sale price is £119 (about \$170 plus shipping and customs for export).

This factory sale is almost certainly the last chance to get a new Lowe HF-225 "Europa." Lowe is at info@lowe.co.uk, or by mail at Chesterfield Road, Matlock, Derbyshire DE4 5LE, England.

■ Sangean ATS 305 and Siemens RK 757 Available in Europe, But not North America

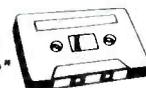
Sangean's new digital ATS 305 portable with world band and FM-stereo with RDS is now available in parts of Europe and Australasia. As reader Rickie Buck points out, it is also sold in much of Europe as the Siemens RK 757.

That's the good news. Less encouraging is that, according to normally reliable sources, Sangean has no plans to bring it into North America, even though it was being featured in December on its California Website (www.sangean.com).

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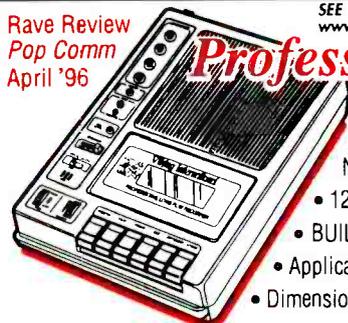
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Innovative Scanner Patents of the '80s & Beyond

Back in June 1997, we summarized several scanner patents from the 1970s and told how to obtain copies of patents. We continue the discussion with scanner patents from the 1980s forward. Recall that while some scanner patents contain information about scanner circuitry and internal firmware design you won't find in a service manual, other patents may not have resulted in commercial products.

January 1983, Multifrequency Scanning Receiver with Priority Frequency Monitoring

General Electric's Johannes Vandegraaf designed a priority scanning system somewhat different from the one found in most scanner radios. The radio in both schemes scans a series of non-priority channels and stops when a squelch circuit indicates the presence of a signal. Vandegraaf's scanner contained a "pause detector." His scanner monitored traffic on the non-priority channel until there was a pause in speech or sound, at which point it switched to the priority channel. If the squelch opened on the priority channel, the scanner remained there, otherwise it resumed monitoring the non-priority traffic.

The common priority sampling scheme used today interrupts a signal in mid-sentence, while Vandegraaf's invention waited for a pause. His work resulted in patent 4498194, assigned to GE in February 1985.

June 1989, Scanning Radio Receiver

Did you ever replace the CPU clock crystal in your scanner so it would scan faster, only to find your "turbo-charged" scanner would then skip over active frequencies instead of stopping on them? The scanning and searching speed of most synthesized scanners is limited by two factors: the speed at which the synthesizer can "settle" onto a new frequency, and the time required to determine whether a signal is present on frequency.

When a station is received in FM mode, the receiver is "quieted," and there is little or no background noise ("hiss"). In conventional

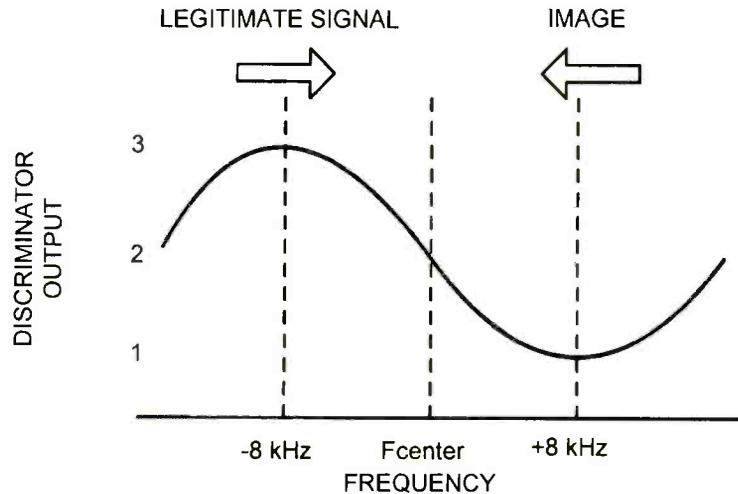


FIGURE 1: Simplified S-curve output from digital discriminator showing a legitimate signal can be discerned from an image (from patent 5212817, see text).

scanners, a post-detection high pass filter separates noise from speech. A rectifier is used to convert the noise to a steady DC voltage. The presence of DC voltage indicates noise is present and no signal is being received. A capacitor is used in the noise rectification process, but charging the capacitor requires time so the scanner must wait for the capacitor to charge before "knowing" whether a signal is present.

As part of an effort to build a super fast scanner, Noel Atkinson, William Ahlmeyer, and Ben McCormick replaced the slow noise rectifier/capacitor circuit with a "high tech" ADC (analog to digital converter). Their ADC was contained within a CPU and converted multiple samples of the noise detector output signal to digital values.

Successive values were averaged and compared against a reference threshold, set by the squelch control knob. If the averaged samples rose above the threshold, the scanner was stopped and unmuted. A signal present/absent determination could be made very quickly, with 10 samples taken in under 2 millise-

conds. Converting the noise signal to digital form allowed the squelch hysteresis to be determined by firmware executed within the CPU. All good squelch circuits require hysteresis to prevent weak, fluttering signals from "popping" the squelch open and closed rapidly.

Patent 4,947,456 was assigned to Uniden America Corporation in August 1990 for this innovation, which is a key element in the Bearcat Turbo Scan models, e.g.

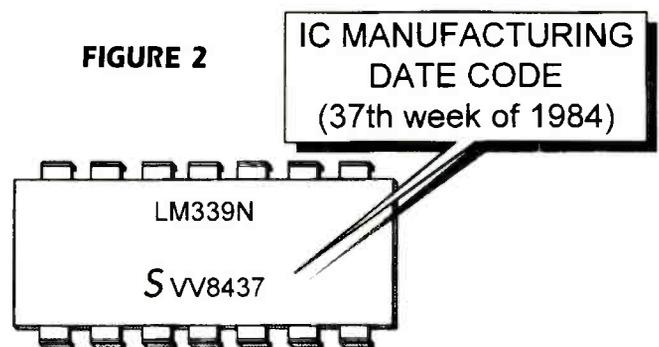
BC3000XLT and BC9000XLT.

November 1989, Fast Scanning Radio Receiver with Frequency Data Base Management by Remote Processor

Byron Bowles and Lowell G. Atkinson (Noel's twin brother!) patented a scanner which was programmable via an external computer, connected via an RS232 interface. Frequencies were automatically sorted into successive order, permitting a faster scan rate. The scanner used a non-volatile EEPROM (electronically erasable, programmable, read-only memory) to hold frequency information.

Since the life of an EEPROM is shortened each time data is written to it, a separate RAM

FIGURE 2



Examine the IC manufacturing date to help determine equipment manufacture date.

was also used to hold frequencies for sorting and manipulation. Frequencies would be copied from the RAM to the EEPROM only if the user changed them through the controls or via the remote computer.

These ideas were incorporated into the AOR AR-2515 scanner, which is actually depicted on the patent. Bowles and Atkinson were granted patent 5153161 in November 1992, assigned to Crum Development Corporation (an affiliate of ACE Communications of Indiana).

■ September 1990, Ultra-High-Speed Scanning System

Output from the ADC described in the "Scanning Radio Receiver" patent followed a known sequence of values, known as an "S-curve," as the receiver was tuned across a signal. Noel Atkinson exploited this phenomenon to determine whether the receiver was tuned to the center or off to one side of a signal — especially important when searching for signals up or down the band. His idea was firmware-based implementation of the older analog "window detector" circuit discussed last month.

Wouldn't it be great to have a scanner which skips silently over unwanted images while searching? Atkinson's algorithm could, in some cases, discern an image or spurious response ("birdie") from a legitimate signal, because some images appear to tune backwards causing the A/D converter to produce a sequence of values reversed from what one expects when tuning an actual transmitted signal (fig. 1).

Atkinson's idea was recognized by patent 5212817, granted in May 1993.

■ Other Scanner Patents

As we wrote last month, printed copies of US patents may be purchased for \$3 each, but you must know the patent number. Credit card orders are taken over the telephone by the Assistant Commissioner for Patents at (703)305-4350. If you have Internet and WWW access, you can search a patent database and view portions of patents at no charge by using the IBM patent server at www.patent.womplex.ibm.com.

There are other scanner patents which, while not being major breakthroughs, you may find interesting:

- 4521915 - Processor controlled, scanning radio receiver having tabular storage of service band frequency codes
- 4573210 and RE33157 - Null initiated method and system for monitoring a priority channel

- 4932074 - Rapid scanning radio with multi-mode local oscillator control
- 5014348 - Self-programming scanning radio receiver
- 5199109 - Multi channel scanning receiver with improved signal strength detecting circuitry
- 5465402 - Automatic frequency transfer and storage method
- 5483684 - Automatic frequency search and storage method
- 5551071 - Channel sorting scanning receiver
- 5577076 - Scanning receiver for receiving a signal by scanning frequency of received signal

■ Protect Your Display from Scratches

Alan Bosch, KD4FRK, uses 3M clear vinyl tape to protect the lenses on his scanners and walkie-talkies from scratches. Alan says the tape is available "in 3/4 and 1-1/2 inch widths, can be trimmed with a razor blade, sticks like skin, and is practically unnoticeable in place."

The tape can be replaced with a fresh piece when it gets scuffed. Thanks for the suggestion, Alan.

■ Dating Your Radio

When was your scanner made? Radio Shack scanners are dated using the month number, followed by the letter 'A,' followed by the last digit of the year (e.g., 12A5 could mean December 1985 or 1995). Electra and Uniden scanners employ different date coding schemes.

What about other brands of electronic gear? You can estimate an electronic gadget's approximate age by examining the 4 digit

date codes stamped on the integrated circuits and printed circuit boards (fig. 2). The gadget must have been manufactured after the most recent date stamp.

■ Thanks, Doc

Thanks go to Jim Boehner, MD, N2ZZ, for furnishing circuit information and volunteering his scanners as "guinea pigs" for experimentation.

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Big Receiver in a Little Black Box

It's 1998, and receivers which are capable of being controlled by computers are certainly nothing new. But over the past four years a few manufacturers have taken the bold step of reducing the receiver to an internal computer card which can *only* be controlled by computer. Not a tuning or volume knob in sight.

This receiver concept has been available for the high-spending military and commercial users since the early 1980s. But it wasn't until ComFocus introduced their SoftWave product in 1993, followed by Rosetta Labs' WinRadio in 1996, that consumers had a chance to buy such a product.

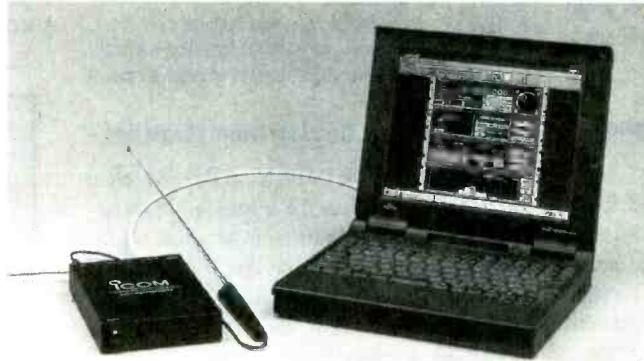
Now a third manufacturer has joined this elite group. Enter ICOM's IC-PCR1000; but with a new twist and some very flexible control software.

What's the twist? Prior to the ICOM product, computer-based receivers have required the user to install them, or one component, in a computer expansion slot. Plugging these expansion cards into slots deep within the PC pretty much limited the use of the receiver to that one computer. ICOM's IC-PCR1000 changes that and gives its owner much more portability. IC-PCR1000 does not require any internal computer hardware additions or modifications.

Let's look at what the IC-PCR1000 is, and you'll soon see what I'm talking about.

■ Digging In

Unpacking the IC-PCR1000 box (strangely labelled "Receiver Interface"), can leave people saying, "Is that all there is?!" The box contains an 8 inch x 5 inch x 1.2 inch thick



The PCR1000 running on a notebook computer.

black box, a serial cable, two 1.4M floppy disks, a power cube, a whip antenna and a very thin, 12 page, instruction pamphlet. Not a PC expansion card in sight!

The black box is the business end — a 0.01 to 1300 MHz (cellular is blocked) receiver. On its small front face it has a power switch and light. Antenna, serial port, power jack, earphone and 9600 packet data connections reside on the back panel. (See Figure 1.) On the top cover is a small internal speaker.

■ All That In There?

The feature functions which are incorporated in the IC-PCR1000 are very impressive: 0.01 to 1300 MHz range, seven modes, IF shift, real-time band scope, noise blander, voice scan control, S-meter and squelch, to name a few. The receiver uses a triple superheterodyne circuit, common to many ICOM designs. The frequency resolution (the frequency step that receiver can be tuned to) is 1 Hz, while the stability is +/- 3ppm at 1300 MHz (quite good for a consumer oriented product).

The IC-PCR1000 can be powered by the included mains power supply or any well-regulated 13.8 volt DC supply having a 0.5 amp capability. Published sensitivities are around 0.3uV for 10 dB of signal across the spectrum in the SSB/CW modes. Not great. But not bad.

Selectivities are spec'ed between 50 kHz to 2.8 kHz at -6dB.

Again, not great, but not bad. Always remember the old saying, "There are lies, big lies, and then come statistics."

■ Computer Requirements/ Installation

By today's standards, the IC-PCR1000's computer requirements can be inexpensively met: 486DX4, 16M Ram, 10M hard disk space, 640x480 display, 1.4M floppy drive, serial port, and either Windows 3.1 or Windows 95. For this review we will use an IBM 701C Thinkpad and Windows 3.1. Connecting the IC-PCR1000's black box to the computer is as simple as connecting a serial mouse. This, plus the connections of the antenna and "wall wart" power pack to the receiver, and the hardware is good to go.

The software installation is also very simple from the two 3.5 inch 1.4M floppies. Software installation time is less than two minutes and only requires the user to select the serial (COM) port where the IC-PCR1000 is connected. The result is an IC-PCR1000 program group containing the main program, an on-line help file, and a text file describing the product.



FIGURE 1 - IC-PCR1000 Back Panel

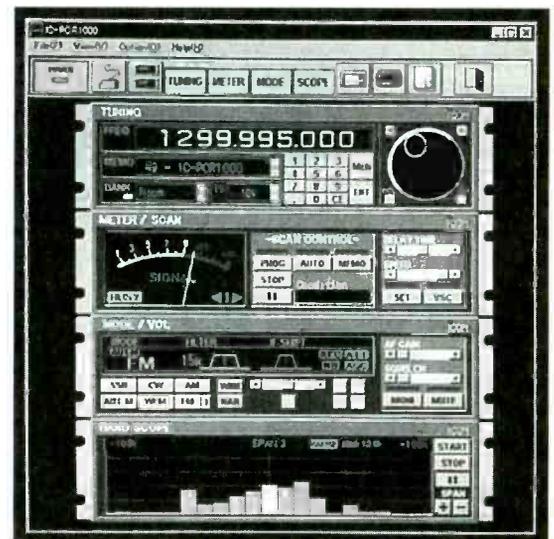
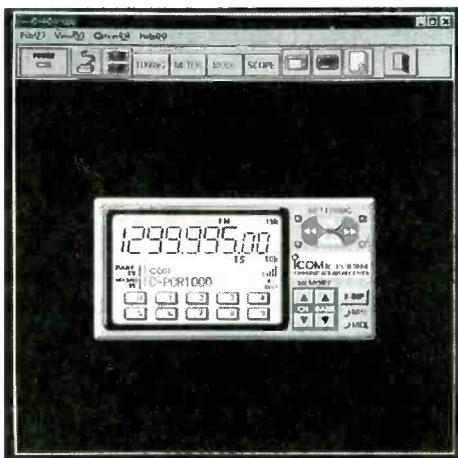


FIGURE 2 - Software Component Configuration



FIGURES 3 & 4 — Communications receiver and scanner-like formats.

■ Racking It Up

Double clicking the IC-PCR1000 icon brings up the “components” screen shown in Figure 2. The receiver is configured as a rack mounted group of components. Starting at the top of Figure 2 we can see the pulldown control menu bar, the tuning unit, the meter and scan panel, the mode/filter/volume panel, and finally, the band scope. The function buttons on all the units are clearly labelled and the on-line help explains their use in detail.

Frequencies can be entered in a number of ways. You can enter the desired frequency from the keyboard. Alternatively, moving the screen cursor to the tuning dial at the right of the top unit allows you to tune up and down via the left and right mouse buttons. Tuning step increment can be set using the TS button at the top right of the tuning knob, or the arrow buttons next to the TS display at the lower center of the panel.

■ Picture Worth 1000 Spins

If we direct our attention to the bottom tuning scope unit, we’ll find yet another method of tuning the IC-PCR1000. The scope shows signal activity above and below the tuned frequency, which is displayed at the center of the scope. The frequency “width” and scope resolution are determined by a combination of the center frequency, tuning step setting and span setting on the scope. However, the scope’s maximum frequency width is only +/- 200 kHz.

If we start the band scope scanning, via the button on the right of the band scope, active frequencies will appear as vertical bars. The height of the bar is proportional to the signal strength. Clicking on any part of the band scope tunes the receiver to that frequency. Pretty nifty.

One word of caution: The band scope scanning must be put in the STOP mode if the user desires the use of SSB or CW mode. These

modes will appear dead while the band scope is running. This drove me crazy for a half hour until I dug into the instructions and found this strange operation documented by ICOM.

■ Lots of Memory Channels

Storage of frequency, mode information and other parameters is performed via a combination of buttons. First, the memory bank is selected at the lower left of the panel. Then the memory channel within the bank is selected. Finally, pressing the MW (memory store) button, at the lower right of the tuning knob, stores the receiver’s current parameters. A table showing all memory banks and channels can be displayed via the top menu bar.

■ Mode/Vol and Lots More

The Mode/Vol unit also has the AGC and IF filtering/shift controls. The number and width of the available filters are dependent on the selected mode. These are straightforward in their operation. I wish I could say the same for the scan unit.

I personally found the Meter/Scan unit operation to be confusing. In fact, I found it so complex that I will not even attempt to give you a run-through. This unit does an awful lot. But, with little or no display indications of its settings, you’re always guessing: too many functions, too little displayed operator information. However, I did find that scans between two frequencies were fairly easy to run. Perhaps I just need more time with the scan set-up methodology.

■ Have It Your Way

To tell you the truth, without a seven foot high, blue steel colored, frame of metal, this component rack format felt contrived. Also, the functional layout was not the easiest if you are accustomed to a traditional receiver

control layout, such as the ICOM 7000, R9000 or R71.

With the click of a button on the pull down menu bar, the IC-PCR1000 can be transformed into two different receiver types: the traditional ICOM-like communications receiver in Figure 3, and a simpler, scanner-type radio, Figure 4. The communications receiver is my favorite. Anyone who knows their way around a high-end receiver will be very comfortable with this method. With the band scope tucked under the frequency display, it looks a lot like the ICOM’s top-of-the-line R-9000.

The graphics are excellent. All buttons are functional and the controls and display are very nicely arranged and labelled. It’s amazing how the simple placement of controls can give such a different “feel” of operation.

Finally, the scanner radio screen has an even simpler layout. The display exhibits a touchscreen-like quality. For example, in order to change the mode you click on the ghosted screen label. Of course, all functions are still available, but this method highlights the frequency and memory functions.

■ So ... How Well Does It Work?

For me to give you my humble opinion, you’ll have to wait till next time. If we have time, we’ll also try a quick comparison between ICOM’s IC-PCR1000 and Rosetta Lab’s WinRadio. Meanwhile check out ICOM’s website at <http://www.icomamerica.com/>. You may also want to have a look at the things happening at WinRadio’s site <http://www.winradio.com/>.

While on the web, connect to the CSP Technologies site to check out the ScannerBase software reviewed in November; the correct site address is <http://www.csp-tech.com>. Our apologies for the typo in that issue!

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Antenna Faults and How to Find Them (Part two)

Last month we discussed how to find antenna problems by visual inspection and by electrical continuity testing. This month we consider the concept of matching, its relation to SWR, and the worth of testing antennas for standing wave ratio (SWR) value.

■ SWR Concerns for Receiving Antenna Systems

All the following discussion is oriented toward receiving antenna systems. We'll cover SWR concerns for transmitting antenna systems at some later date. For receiving antennas it is of course necessary to get the received signal transferred from the antenna to its feedline, and then from the feedline to the antenna input circuitry of the receiver. Both these transfers are made more efficient if we "match" the circuit elements involved.

We match the antenna feedpoint to the feedline (point A, fig. 1) by insuring that the impedance of the antenna's feedpoint and the impedance of the feedline are equal. Similarly, we match the feedline and the antenna-input circuit by making sure that those two impedances are equal (point B, fig. 1).

A good match at point A means a low SWR at that point. It means more signal routed down the feedline. The higher the SWR at point A the more signal rejected by the feedline and reflected back to the antenna. Similarly, if the impedances are not well matched at point B, there will be a high SWR there.

This means that a significant amount of signal is rejected at the antenna input circuit and reflected back up the line. Some of this reflected signal energy will be re-radiated, some

lost in the ohmic resistance of the antenna, and some will return back down the line where it will be attenuated somewhat by loss in the feedline. But if the feedline impedance matches the receiver's antenna-input circuitry then the signal coming down the feedline is essentially all passed on to the antenna input circuit.

As you can see, high SWR values at point A or B indicate loss of received signal strength; having good matches at points A and B reduce these losses greatly. To facilitate matching at point B it is common practice for manufacturers to design receivers' antenna input circuitry to have 50-ohm impedance, and for the operator to utilize 50-ohm coaxial antenna feedline. Matching at point A can be facilitated by designing antenna systems with 50-ohm feedpoint impedance. Often, if the feedpoint impedance is far from 50 ohms, a matching circuit is used to improve the match.

■ High SWR? No Problem ...

Surprisingly, we can sometimes ignore high SWR values and still have excellent reception. Usually, strong signals will be received regardless of SWR levels. On the other hand, where noise levels are significant, the quality of reception is characteristically de-

termined not by the received signal level, but by the received noise level as compared to the received signal level (signal-to-noise ratio, or S/N). Lowering the SWR reduces losses to the received noise just as it reduces losses to the received signal. Therefore the S/N changes little, and signal quality is not improved. Therefore, where received noise is at significant levels, we can usually forget about keeping SWR low; for reception purposes, it just doesn't improve reception sufficiently to do it.

Received noise is usually at significant levels below about 15 to 30 MHz, but there are exceptions to this rule. For instance, some very rural locations and locations in the more northern latitudes are sometimes free of radio noise well down into the HF band. Connect and disconnect your receiver's antenna on these frequencies with the RF and AF gain high to hear your noise level (background "hiss"). As we move above 15 to 30 MHz (essentially VHF and higher), we find relatively little external noise. Note then, in such low-noise situations, that lowering the SWR values at the two junctions discussed above can be very influential in improving reception for less-strong signals.

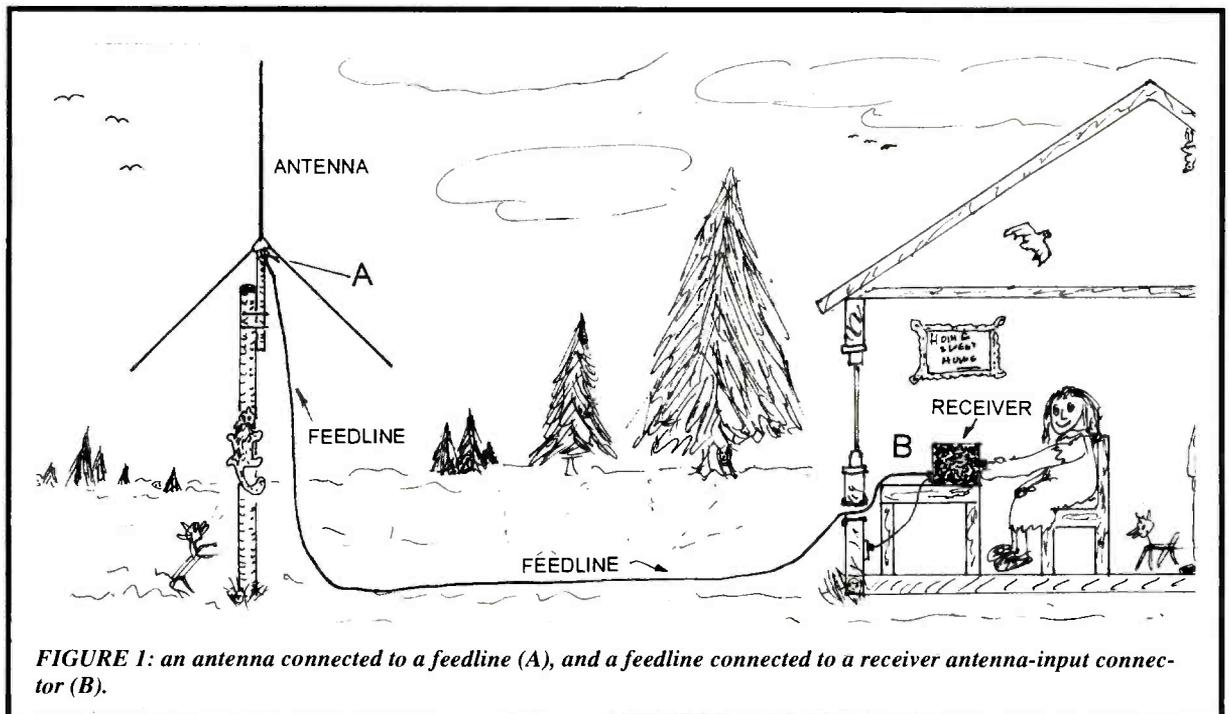


FIGURE 1: an antenna connected to a feedline (A), and a feedline connected to a receiver antenna-input connector (B).

■ A Side Effect

In situations where received noise is significant we needn't be too concerned with the quality of our feedline in the typical "HF or lower" receiving system. We shouldn't use lossy or damaged line, but ordinary, moderately priced feedline, or good used feedline, will give performance as satisfactory as that of new, higher-priced line. A bit of both signal and noise loss in the cable doesn't change the S/N. Keep in mind that feedline quality is much more important in radio-noise quiet spectrum like VHF and above, where using low-loss cable improves weak-signal reception.

■ So How Do I Get a Lower SWR When I Need it?

The easy way to get low SWR values at the junctions discussed above is to use a receiver with 50-ohm antenna input circuit (true of most modern receivers), use 50-ohm coaxial cable as your feedline, and use an antenna with a 50-ohm feedpoint. For example, consider that a ground plane antenna with radials drooped appropriately will present about 50 ohms impedance at its feedpoint. Assuming a 50 ohm receiver antenna input impedance, the use of 50 ohm feedline with this antenna results in a very low SWR at both points A and B.

Unfortunately, the feedpoint impedance of many antennas (for instance a horizontal dipole), varies with the antenna's height above ground. The *ARRL Antenna Book* covers the effect of antenna height on feedpoint impedance as well. If this all seems overwhelming, don't fret: an HF, receive-only antenna system has a great ability to perform well with high SWR levels (poorly matched).

In practical terms, what do we do if we suspect that we don't have a low SWR at a junction where we need it? We can measure it with a SWR meter and determine the SWR value directly. There are SWR measuring devices* available which function with no need of a transmitter to furnish their RF current. Instructions for using these devices vary, and are included with each device when purchased.

Some of these devices will also give you an indication of the attached circuit's impedance to help in deciding if the impedances involved are matched well. To reduce point A SWR, the feedpoint impedance of some antennas can be adjusted by adjusting element lengths, coil lengths, or tuning a capacitor. Instructions for these adjustments come with the antenna when it is purchased.

Next month, when we discuss resonance,

we'll have more to say about adjusting an antenna and its effect on SWR.

RADIO RIDDLES

■ Last Month:

I said, "There's one 'test antenna' that we always carry with us. Technicians often use this test antenna as a quick means to check whether a receiver is functioning or not. It is an extremely simple test. What is that test antenna and how do we use it?"

Well it may be surprising, but the human body is a decent antenna for many receiving applications where signal level is reasonably strong. Touching a finger to the antenna input connector on a receiver is a "quick and dirty" substitute antenna for some situations. Researchers have even found that our bodies can serve as *transmitting antennas* as well. Of course these tests were done at very low power levels!

■ This Month:

OK, so we can sometimes get away with ignoring SWR values in some receiving antenna systems. But how about resonance? Can we ignore that? Should our antennas be resonant at the desired operating frequency? So what if they're not?

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

* Autek Research, P. O. Box 8772, Maderia Beach, FL, 33738, phone: 813-886-9515; MFJ

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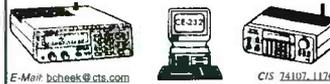
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CLOSING COMMENTS



By Bob Grove,
Publisher

Thanks, Larry; Welcome, Hugh

With this issue we bid a fond farewell to the monthly byline of Larry Van Horn—120 “Utility World” columns over a span of 10 years! That alone is quite a record in the publishing profession. Larry has ascended in the esteem of listening enthusiasts worldwide; his column is arguably the finest monthly utility contribution in the world, and his expertise will be missed.

Larry’s career with *Monitoring Times* didn’t start there, however; it began four years earlier as column editor of “Signals from Space.” Now Larry’s editorship has come full circle.

Our sister magazine, *Satellite Times*, is growing rapidly, a growth which demands more from its writers and editors. Beginning with its January issue, the formerly bi-monthly publication is being produced monthly. *ST*’s international reputation for timeliness, accuracy, and comprehensive coverage makes it a natural selection in the evolution of satellite publications. And no one can do it better than Larry.

■ The Torch is Passed...

Although Larry will continue to lend his breadth of experience and knowledge to *Monitoring Times* as its assistant editor, utility monitors will be heartened to learn that none other than Hugh Stegman will be taking the helm as editor of *MT*’s “Utility World”! Hugh has become a respected editor in his own right, earning that reputation from his many years as utility editor of the former Radio Communications Monitoring Association (RCMA). I often looked at Hugh’s listings and wondered where on earth (literally!) Hugh got all that stuff.

We are pleased that *MT* readers will now benefit from Hugh’s experience and enormous resources, blending his unique editorial style with the care and organization established by Larry. We are fortunate to have Hugh join *MT*’s stable of professional writers, and offer this official welcome.

While it was tempting to put tongue in cheek and title this month’s Closing Comments “Out with the Old, in with the New,” somehow I just couldn’t bring myself to do it! Such ironic humor usually gets me into trouble—especially since Larry’s not really leaving. He still sits across the hall from me, and I would have to face that stony stare every day after making that crack!

■ Anticipation ...

Speaking of what’s new, I had the privilege recently of appearing with two colleagues, Bob Crane of C. Crane and Fred Osterman of Universal Radio, on a VOA program hosted by Kim Elliott. A question posed to us by Kim was, “where is shortwave headed in the future?”

We all agreed that shortwave is here to stay; after all, it’s the easiest way to get immediate information worldwide, especially to underdeveloped countries without the need of expensive, specialized equipment. Internet and satellite may provide more reliability and better quality, but shortwave is already there and easy to tune in on a \$29.95 battery-operated portable.

Have you listened to shortwave lately? There’s no doubt that the sunspot minimum is over. As I type this editorial, I have my receiver tuning up to frequencies higher than I have in years, and there are signals there! Yes, receiving conditions are getting better and better, and for the next several years, worldwide reception—broadcast and utilities—will be the best in a decade. As the old radio announcers used to say, “Don’t miss this thrilling chapter—tune in tomorrow!”

■ Out with the New; In with the Old

This month I have a “new” amateur callsign affixed next to my name in the masthead. Actually, it’s a very old call. In 1951, as a spunky 13-year-old coached by my “Elmer,” Dave Crossley, W8BCO, I first got my Novice ham license, callsign WN8JHD. When I upgraded, the “N” was dropped.

When I moved to Florida, I was forced to relinquish my coveted call because I had moved out of the 8th call district. WA4PYQ was issued, and I was stuck with it for decades.

A recent rulemaking allowed me to reacquire my original call, and that I did—eagerly. I think that it is appropriate that this year, during which I lost Dave, my patient mentor, I was afforded the rare opportunity to regain a part of my past, the callsign Dave helped me get.

They say “You can never go back,” but I did. Listen for W8JHD on the ham bands, same voice, old call, with a little more pride.

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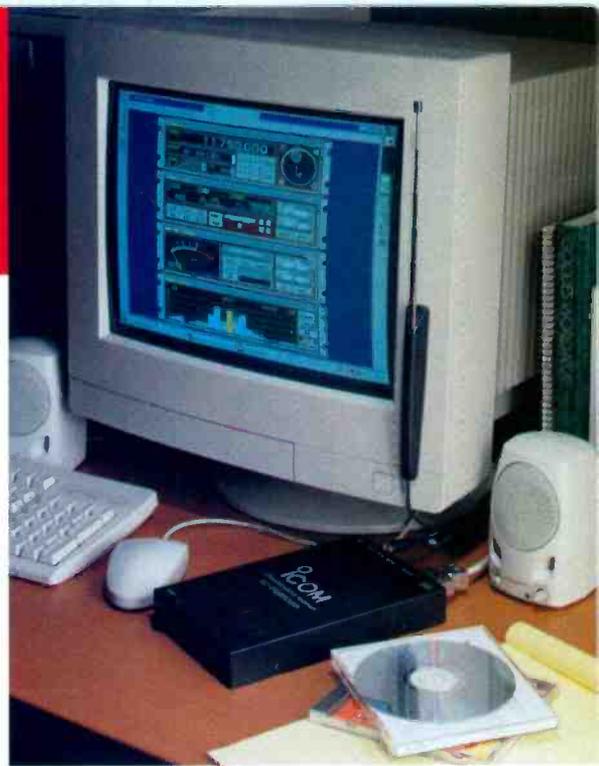
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