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Aerial Magic
By Mike May

Your mobile phone, the gas meter under the stairs and the vending machine down the hall could soon make use of a small, weird antenna that sprang from a ham radio operator’s attempt to operate out of his Boston apartment ten years ago.

Repeating geometric shapes called fractals form the basis of a new approach to high-gain, small-size antenna construction. Our feature includes a sidebar by the inventor and some suggestions for doing your own experimenting. Story starts on page 22.

Our cover image is a study in fractal designs by John J. McDonough; The inset shows a tiny broadband monopole based on a fractal pattern (Patent Pending, Fractal Antenna Systems).

Reviews:
Bob Parnass says, for him, the tiny Icom IC-R2 scanner was love at first sight (p.92). Another alternative-power radio has been added to Baygen’s competition — the Info-Mate 837; Magne pits it against the original wind-up radio (p.90). You gotta get a license to use Motorola’s new TalkAbout Distance Radio — it goes the distance by adding GMRS frequencies to FRS channels, but you can’t access the repeaters (p. 87); DXtreme SWRLgold V3.0 will make you throw away your paper log forever (p.88); those who have used spectrum display units find them indispensable but often unaffordable — the AVCOM SDM42A makes it cost-effective (p.96).
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"Privacy" Bill Resurrected as HR 514

A Special Report by Rachel Baughn, editor

The House of Representatives, anxious to show some accomplishments in the 106th Congress, has posted a number of "non-controversial" bills for quick action. One such bill is HR 514, introduced by Congressman Heath Wilson of the House Subcommittee on Telecommunications, Trade and Consumer Protection. The bill is identical to the final form of HR 2369, which passed the House last session with only one opposing vote.

HR 514 passed the House with equal ease in February. The only hope radio hobbyists have of resisting the bill is when it is referred to the Senate Commerce Committee, which last year did not act on it.

What's wrong with HR 514? Isn't this the version that several hobby spokesmen have called "the best we could hope for?"

While HR 514 is immensely improved from HR 2369 as Rep. Tausin originally introduced it, there are two objections to it: (1) It is redundant legislation—duplicating, on almost every point, already existing regulations in the US Code, and (2) in its eagerness to close all potential loopholes, the bill may also close the door to any future for scanning in a digital world. Its troubling and contradictory requirements could come to haunt radio hobbyists, manufacturers, and even the Federal Communications Commission, which is tasked with carrying out the bill's mandate.

Is "More" Always Better?

Let's take the redundancy issue first. Although the U.S. Code is fragmented and complicated, that doesn't mean it is improved by adding more legislation on top of it. The issues the bill was designed to address — equipment modification, eavesdropping on phone calls or paging services, and divulgence of such intercepted communications — are already well covered by existing law, found in three primary locations: Title 47 US Code Section 302; Title 47 US Code Section 605; and Title 18 Part I Chapter 119. In spite of this, HR 514 seeks to duplicate or unnecessarily complicate these existing laws.

The perception that such legislation is needed may arise in part because enforcement of existing restrictions (such as publication of the content of cellphone conversations) has been rare or extremely selective. However, in response to pressure from a number of sources, this is changing. Also, the Federal Communications Administration (FCC) has been prompt in posting clarifications and fact sheets to the public via the Internet when it is evident that there is confusion in interpretation of regulations.

HR 514 adds substantial text to the language regulating scanning receivers — the only radio equipment singled out for such micromanagement by Congress. It does help bring several existing restrictions together in one place, but it reinforces a misguided approach to privacy enhancement. It forbids specific technology and frequency ranges, rather than allowing the industry to devise ways to avoid reception of the protected communications — a task it has proven it can do.

And that brings us to the second objection — the threat to future product development.

Equipment Authorization

HR 514 instructs the FCC to deny equipment authorization to any scanning receiver that is capable of receiving, or of being readily altered to receive, frequencies allocated to the domestic cellular or personal communications services. Nor can the receiver be easily equipped with digital decoders for cellular radio telecommunications, personal communications, protected specialized mobile radio services, protected paging services, and any encrypted radio transmission. (Protected is defined as "secured by an electronic method that is not published or disclosed except to authorized users."

On the other hand, the bill says in regard to privacy protection for shared frequencies: "The Commission shall, with respect to scanning receivers capable of receiving transmissions in frequencies that are used by commercial mobile services and that are shared by public safety users, examine methods, and may prescribe such regulations as may be necessary, to enhance the privacy of users of such frequencies."

This is an acknowledgment of the fact that Chapter 119 allows the public to listen to unscrambled public safety agency communication (along with a substantial number of other allowed services). Today, however, a great number of public safety agencies share frequencies with or lease space from commercial mobile services which interface with a variety of protected telecommunications services. These agencies share both frequencies and technology with services that are protected under this bill — and such sharing can only be expected to increase in the future.

If scanners are denied access to shared frequencies and to the technology, they are denied their future. New criteria for spectrum conservation and flexibility mandate that the future will be digital. It has largely been assumed that the APCO 25 standard being promoted by public safety advocates will use a digital standard, but one that will be available to the public so that compatible scanners may also be designed.

But public safety agencies aren't waiting for APCO-25-compliant radios to be developed by (for example) Motorola: they are signing on with Motorola's proprietary digital systems ... and with Nextel, or whoever promises to deliver whatever is top priority for the client. For some agencies top priority is cost; for others — though they may not admit it publicly — it is shutting out the criminals, the media, and the public.

Although today's trunk tracking scanners have managed to develop nonproprietary technology to follow public safety agencies using sequential trunked systems, this bill would prohibit development of such technology if the agencies were to move to a proprietary digital system. APCO 25 may be too little, too late, if it arrives at all.

There is one ray of hope in the wording. Scanner manufacturers might have the freedom to develop a decoder to receive digital public safety communications because the fact that specialized mobile radio frequencies are not declared off limits, if the receiver is allowed to decode the data channel to enable receiver control, conversations on private services are not being decoded.

It's the FCC which is handed the gnarly task of determining how to allows access to public safety communications while protecting the privacy of commercial mobile services. If it comes to a choice between public access and big business, this House bill leaves no doubt as to which way the decision will go.

For a full text of HR 514 and how existing legislation would read with the new text, see our website at www.grove-ent.com/hmpgnt.html.

"Privacy" Bill, continued on page 101
FCC Proposes Low Power Radio Broadcast Service

Pirates may be ineligible unless "rehabilitated"

At a January 28 public meeting, the Federal Communications Commission took the first step toward creating relatively low cost community "alternative voice" radio stations. It proposed to introduce Low Power FM (LPFM) broadcasting which has not been available since 1978. The proposal launches the FCC itself into what is likely to be tremendous controversy and a predicted "land rush."

The text of the 64-page Notice of Proposed Rulemaking (NPRM) in Mass Media (MM) Docket 9925, is posted in web text without footnotes at http://www.fcc.gov/Bureaus/Mass_Media/Notices/1999/fcc99006.txt or in its entirety in Word Perfect version at .../fcc99006.wp. Public comments are invited on or before April 12, 1999, and reply comments on or before May 12, 1999.

The Notice proposes to create new 1000 Watt (LP1000) and 100 Watt (LP100) FM stations, and to reduce rules regulating FM stations on adjacent frequencies. With an antenna height of 60 meters, LP1000 stations could serve an 8.8 mile radius, the FCC said, while LP100 stations could serve 3.5 miles from 30 meter height.

The NPRM comes after the Commission received several petitions to create LPFM services, as well as some 13,000 inquiries last year from persons wanting to start low power stations. Last year also saw intense activity by "pirate" unlicensed "micro radio" stations. Former pirates who refused to shut down their stations may not have access to LPFM licenses unless the pirates could demonstrate that they had "rehabilitated" themselves. But we did not slam the door on those people," said Mass Media Bureau chief Roy Stewart.

The NPRM covers many LPFM issues including:

Status. LP1000 stations would be primary on the frequency, while LP100 stations would be secondary and must accept any interference they may receive.

Type of station. Should LPFM stations be commercial, noncommercial, or both?

Ownership. Existing broadcasters could not own or have any marketing agreements with a LPFM station. No one could own more than one LPFM station in the same community.

Electronic filing. The FCC proposed that license applications be filed electronically.

Filing windows. Short "windows" of only a few days would limit the applications, but the FCC asked for comment on longer windows or a first-come procedure.

Auctions. More than one applicant for an available frequency would have to be resolved by auctions, but the FCC asked for comment on other means. Implications are that lotteries, not auctions would be used to resolve multiple noncommercial applications.

To clarify: The FCC did not propose to create micro radio stations (110 W); it is only accepting comments on micro radio. (This matter caused amusing confusion at the FCC LPFM press conference: Roy Stewart told reporters that the FCC is proposing micro radio, while FCC engineer Keith Larson repeatedly indicated that the FCC was not proposing such stations.)

Groups representing noncommercial and micro radio interests cautiously praised the proposal, while the National Association of Broadcasters (NAB) fumed that LPFM would "devastate" the FM band. NAB warned that LPFM could harm the "inband onchannel" (IBOC) approach to digital radio adopted in the US.

The Chairman Speaks

At the FCC, LPFM is largely a campaign of Chairman William Kennard, whose passionate speech at the public meeting provided much insight into his motivation for pushing low power radio and bucking incumbent broadcasters.

Mr. Kennard said, "We all know that as more and more stations become concentrated in fewer and fewer hands, there are fewer opportunities for people who want to use the airwaves to speak to their communities."

"Questions have been raised in this proceeding already about interference. Will we create a class of new low power stations that will wreak havoc in the FM band? Of course we won't do that. This agency is the guardian of the spectrum ... But I believe that this agency has always been at its best, has had its shining moments, when it has authorized new services for the public, often over the vehement objections of incumbents.

"We did that with cable television. We did that with direct broadcast satellites. We did that with the digital audio radio service. We did that with low power television."

"And that's what LPFM promises to do. We will be mindful of interference concerns. We will be mindful of the need to ensure that the broadcast industry has opportunities to convert to digital.

"So, today I want to challenge the existing broadcasters to work with us, to find ways that we can have a low power radio service that coexists with the incumbent services. So that we can work together to maximize the use of the public's airwaves for the benefit of all Americans."

Chairman Kennard also asked the industry not to use "interference concerns as a smoke screen for other matters," meaning a fear of greater competition.

Key concerns and a dissenting opinion

Commissioner Susan Ness said that three issues will be in the forefront in LPFM:

1. Whether LPFM should be open only to noncommercial entities;
2. Whether LPFM would affect IBOC, and
3. Whether LPFM would create undue interference to full power stations.

FCC Commissioner Harold Foster-Roth said he had already voted no on the NPRM. The FCC later released his opposing statement, which contains some interesting key points:

- Very few new stations could be licensed in major urban markets even if the second and third adjacent channel protections were completely dropped.
- New York City could have no LP1000 stations or LP100 stations.
- LPFM is supposed to help minorities and women, but there is no way to ensure that they get the licenses.
- The FCC proposed to impose strict ownership restrictions on LPFM, but Congress removed such limits in the Telecommunications Act of 1996. Some believe consolidation of radio ownership is bad, but Congress made it the law.
- Instead of LPFM, people could buy existing stations, buy air time on the stations, or communicate via "...amateur radio, email, Internet home pages, bulletins and flyers."
- LPFM enforcement will be a drain on the FCC and will require it to micromanage even the smallest stations.

Washington Whispers, continued on page 102
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**Dissenting Voices**

Although public opinion expressed in the newsclippings forwarded to M7 have all seemed favorable to the Federal Communications Commission (FCC) proposal for low-power FM stations (see page 4) it should surprise no one that the Notice of Proposed Rulemaking should have at least two vocal opponents: the National Association of Broadcasters and Rep. Billy Tauzin (original sponsor of the “privacy” bill now known as HR 514).

Rep. Tauzin said in a letter to FCC Chairman Bill Kennard, “The policy, political, economic and budgetary ramifications of this undertaking are potentially staggering.” Tauzin and the NAB have both cited a “devastating” potential for interference. Kennard maintains that “the radio airwaves are big enough for all of us.”

Most of the news stories make the point that since restrictions were eased in the Telecommunications Act of 1996 (a move intended to increase competition), independent stations have been taken over by conglomerates and “the programming has grown more formulaic, narrow and dull.” Local and minority ownership and news have decreased.

---

**FCC Communications**

FCC Commissioner Harold Furchtgott-Roth cast the one dissenting vote against the NPRM, stating that, although some think consolidation of radio ownership is bad, Congress made it the law. He also recently argued against the 20% increase in the FCC’s budget proposed by President Clinton, saying “The purpose of the 1996 law was to foster competition and reduce regulation. ... That shouldn’t require a larger budget.”

Some say such competition is just what the NAB is afraid of. So far, Kennard is standing firm; he told an NAB conference last year, “We cannot deny opportunities to those who want to use the airwaves to speak to their communities simply because it might be inconvenient to those of you who already have these opportunities.”

---

**Amateurs Mourn Hussein**

Radio amateurs around the world mourned the death of Jordan’s King Hussein, JY1, on Feb. 7th. The Middle East’s longest-reigning ruler, he’d been Jordan’s king for 47 years, taking the throne when he was just a teenager.

Hussein was a life member of the American Radio Relay League, which valued his support in obtaining new amateur bands at the 1979 World Administrative Radio Conference. Hussein regarded his 1983 contact with Owen Garriott, W5LFL, on board the Space Shuttle Columbia, as a high point in his Amateur Radio activity. He also participated in the historic 1995 joint Israel-Jordan JY74X operation on Mt. Nebo.

Hussein’s friend Bruce “Blackie” Blackburn, W4TA/JY9BB of St. Petersburg, Florida, called him “one of the world’s most respected amateurs.” “He was a wonderful guy, interested in everything and everyone,” he said. He insisted on being addressed merely as Hussein on the air. MT’s assistant editor Larry Van Horn experienced the same informality in an unforgettable contact with JY1 in the 1970s.

All members of the Jordanian royal family automatically have Amateur Radio privileges in Jordan.

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**Experimental 5-MHz License**

The FCC has issued an Experimental Radio Service license to the ARRL to permit two-way tests in the vicinity of 5 MHz, the most likely site of the next amateur HF band. The license, call sign WA2XSY, was issued to a group of 15 amateurs. They will conduct experimental, two-way RTTY and SSB transmissions within the band 5,100 to 5,450 MHz.

“The idea is to show that an amateur allocation there will improve our emergency communication capabilities by filling the gap between the 3.5 and 7.0 MHz bands,” said ARRL Executive Vice President David Sumner, K1ZZ. Sumner pointed out that several of the participants are phone net members in the Caribbean and Gulf area who frequently handle hurricane-related traffic and now must alternate between 75 meters and 40 meters. Other participants are members of a nationwide digital data-forwarding network.

Participants in the WA2XSY experiment may run up to 200 W effective radiated power. Multiband trap dipole capable of operation on 80 and 40 meters as well as at 5 MHz will be employed at each station location. Operation by participants will consist of short transmissions to determine propagation characteristics.

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**Bombarded by Radio**

Although a few companies, such as Skandia Insurance Company in Sweden, have officially recognized that some people are “electrically sensitive,” you can carry this sensitivity thing too far. One of our readers regularly submits stories from a section of his paper called “News of the Weird.” Here’s one for April:

The story, which originated in the Philadelphia Inquirer, concerns an unnamed man who was refused a gun-carry permit. He had told a panel of the Philadelphia Dept of Licenses and Inspections that he needed the gun to protect himself from “dwarf drug dealers” who were...
“Beaming radio waves” onto him by satellite and reading his mind. His lawyer argued there was no evidence introduced before the panel that his client was not of sound mind.

Apparently the man had had an earlier permit revoked when he showed up at a hospital with his head wrapped in tin foil because he was experiencing pain from radio waves.

Cellular radiation

In 1997, a Swiss magazine (Kitip) investigative article compared the radio frequency (RF) radiation from the antenna of 16 cellular handsets, and concluded that style was more important to manufacturers than safety. In fact, several of the antenna developers said they did not even own equipment to measure the radiation. The magazine acknowledged that all units were within the required limit of 2 watts per kilogram, but said that they varied widely. Those which fared best seemed to use longer antennas directed away from the head and used the body of the cellphone as a shield.

We recently heard of a device called RangeStar, claiming to boost the signal of PCS phones (1850-1990 MHz) by 100 percent while reducing radiation to the head by 50 percent. Call 877-966-3712 or visit their website at www.rangestar.com. Tell them to work on a cellphone version!

The Appeal of Pursuits

“There is a market for everything,” said the journalist at the LA Times who reported somewhat derisively on a paging service launched on the Internet by Ken Kuwahara, a Los Angeles-area police officer. For an introductory fee of $1 a year for a basic membership in PursuitWatch, Kuwahara will make sure you know about every cop pursuit shown live on local TV (about one a week).

The article said that local stations report a jump in ratings whenever regular programming is preempted to show a chase. Why? It’s the same reason listening to the scanner is so popular. As KTVD, Phoenix, AZ news director Dennis O’Neill, puts it, “There’s something about watching news happen live.”

According to The Arizona Republic, police in Phoenix had chastised the media for getting in closer than the police, who hang back so suspects won’t know they’re being followed. But a recent incident forced a grudging compliment from Sgt. Dave Trombi. “These guys are real experienced pilots. A lot of times the media helicopters are instrumental in search-and-rescue-type scenarios.”

Sgt. Trombi, like many Phoenix residents, had been watching Bruce Haffner, pilot of a KTVD news helicopter, follow a van through rush hour traffic. According to Haffner’s on-air account (barely acknowledged by the newspapers or police) he had been listening to his scanner when he became aware that a chase was taking place on the highway below him. At one point, law enforcement officers apparently lost the vehicle, which was weaving in and out of traffic, pulling U-turns and driving the wrong way. Police policy, especially during rush hour, is to keep well back to avoid escalating the chase and endangering lives.

Bruce was able to locate the vehicle and, keeping far enough above and behind the vehicle that he hoped it would not realize it had been spotted, notified the police that he had the vehicle in sight.

Two men were suspected of robbing a dry-cleaners and fleeing in a stolen vehicle. After a 10-mile chase, (police were eventually able to position a helicopter with Haffner’s guidance) they were arrested in Tempe.

Take a bow, Bruce. Some of the wording in HR 514 is specifically targeted at the media. But if it restricts their access to the activities of our public servants, we’ll all be the losers.

The Trouble with Towers

When is a public utility not a public utility? Answer: when it’s a commercial cellular or PCS provider. Although Congress has extended many protections and perks to these new systems, they have not allowed them to totally over-rule local zoning ordinances. The FCC and federal courts are both working to force local administrations and wireless communications carriers to work together. It is “one of the most contentious issues I have faced as the chairman of the FCC,” William Kennard has said.

Local efforts have forced a few towers to be dismantled for failing to receive proper authorization (Palm Beach County, FL), or for failing to follow zoning restrictions (near Victoria, British Columbia), or have received a stay on further construction until issues are resolved.

Although the Telecom Act of ‘96 disallowed health concerns as grounds for denying a tower construction permit, it does say the company must work with local zoning agencies to find a mutually-agreeable site. The Virginia 4th Court of Appeals upheld this local authority in a ruling which was summarized as follows by one of the attorneys: The decision, issued in a case involving the City of Virginia Beach and AT&T Wireless PCS and several other wireless providers, concludes: (1) cities need not issue detailed written decisions in order to support a decision to deny construction of a tower; (2) a decision to deny a request for permission to construct a tower can be based on the complaints of ordinary citizens that the tower will damage the neighborhood; (3) denial of a tower sitting request is not inherently discriminatory; and (4) provisions of the Telecommunications Act which state that a city may not enact laws prohibiting the provision of cellular services do not prevent a city from denying individual applications for approval of a sitting request.

As is always the case when battling big businesses or powerful lobby groups, local citizens have found it useful to organize and to share information. The Internet makes that easier than ever before. If you want to know what your community can do, two sites will get you started: Cellular Tower Coalition at www.cellurtower.com/ and F.A.C.T.S. (Families for Appropriate Cell Tower Siting) at http://Uranus.flipag.net/nopolges/

"Communications" is written by Rachael Baughn, from clippings provided by our readers: Anonymous, New York; Harry Baughn, NC; Chet Copeland, VA; Ken Dupuis, NY; Leslie Edwards, PA; Jim Frimmel, TX; Dale Newton, VT; Doug Robertson, A; Brian Rogers, MI; Ed Schwartz, IL; Richard Sklar, WA; Larry Van Horn, NC.
The Random Length Wire Antenna

By Joseph J. Carr, K4IPV

If you look in the owner's manual of almost any high frequency shortwave receiver you will find instructions on how to build a random length wire antenna. "Improves performance" we are fond of saying. Antenna books, such as my Receiving Antenna Handbook, almost always discuss this type of antenna. But how well does this antenna perform? Let's take a look.

The Antenna

The random length wire antenna is of the general class called Marconi antennas. These antennas are unbalanced with respect to ground. Figure 1 shows the antenna studied for this article. It consists of 100-feet of #14 AWG copper wire. The receiver end of the antenna is 10 feet off the ground, while the far end of the antenna is 30-feet off the ground. These dimensions were chosen because they represent a "typical" form of antenna used by many shortwave listeners.

This antenna has a quarter wavelength resonant frequency close to 5 MHz. The "standard wisdom" would say 4.68 MHz, but the actual figure depends on a number of factors that are hard to predict.

Modeling Software

One way to evaluate antennas without owning a multi-million dollar antenna instrumentation range is to use antenna modeling and simulation software. I used Nee-Win Basic for this project. Nee-Win Basic is based on the NEC engine, which is a big brother of the public domain mini-NEC 3 that you can download from various Internet sites.1

The software will perform the numerical electromagnetic calculations needed to determine the antenna pattern, and then will plot them in graphical form (if requested to do so). It will also calculate the gain over isotropic for each individual angle around the compass.

Gain over Isotropic?

The isotropic gain of an antenna is a theoretical construct that compares the gain of a real antenna with the signal level that would be produced by a perfectly spherical point source radiator. The isotropic gain is taken to be 0 decibels (dB). The gain of the antenna under consideration is then compared with the 0 dB isotropic radiator, and is expressed in dB (usually labelled "dBi" to indicate that decibels over isotropic is used). A half wavelength dipole, for example, has a gain about 2.1 dBi (i.e. above isotropic). This method of measuring gain is a handy way by which antenna engineers characterize and compare antennas.
Model Set-Up

The antenna’s physical parameters were entered into the modeling program. The Nec-WIN software allows various types of ground to be selected. I selected “rolling hills, rich soil” as the standard ground for this study. There were other selections, and some of them might be more typical of the ground in your area, but I felt that this selection was reasonable for a large percentage of readers.

One of the possible ground selections is the “perfect” ground, and that is the default value. But it is also somewhat meaningless because the nature of the ground can seriously affect antenna performance.

Once the parameters were entered the calculations were performed at 3 MHz, 5 MHz, 7 MHz, 9 MHz, 11 MHz, 15 MHz, 20 MHz and 25 MHz. The 3 MHz frequency is below the quarter wavelength resonance point, while the 5 MHz frequency is close to, or at, the resonant point. All other frequencies are above the resonant point. According to standard wisdom, these antennas work best at the quarter wavelength resonant frequency and higher.

A VHF frequency (160 MHz) was also examined. The reason will surprise many readers. At VHF, an HF random length wire will work as a long wire with many wavelengths of radiator. This fact makes the antenna provide gain that exceeds the gain at HF by a considerable amount. Impedance matching is sometimes a bit tricky, but at some frequencies it is easily done.

I first saw the use of HF antennas on VHF in the early 1960s when I was using a ham station owned by a club. There were two antennas, a 75-meter half wavelength dipole, and a 14-element VHF Yagi. I accidentally connected the wrong antenna to a 2-meter (144-148 MHz) ham transmitter. The transmitter loaded up (meaning the impedance was within range) and signal reports were favorably compared with the Yagi.

In addition to the pattern, the following results parameters were tabulated: gain (dBi), beamwidth (degrees) and front-to-back ratio (dB).

The gain will give you a relative idea of how sensitive the antenna is to incoming signals. If the gain is negative, then the antenna has a loss compared with isotropic. For example, if the gain is calculated at -16 dB, then it is -16 dB below isotropic, and -18.1 dB below a half wavelength dipole (-18.1 dBd).

The beamwidth is the angle, in degrees, between the -3 dB points on the antenna’s horizontal or “azimuthal” pattern. The -3 dB points are called the “half-power points” and are the standard points at which antenna beamwidth is measured. This parameter is a measure of its directivity, and tells you something about the directions from which signals are accepted and rejected.

<table>
<thead>
<tr>
<th>FREQUENCY</th>
<th>GAIN (dBi)</th>
<th>BEAMWIDTH (Deg.)</th>
<th>F/B RATIO (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 MHz</td>
<td>-16.84</td>
<td>N/A</td>
<td>1.31</td>
</tr>
<tr>
<td>5 MHz</td>
<td>-19.60</td>
<td>N/A</td>
<td>0</td>
</tr>
<tr>
<td>7 MHz</td>
<td>-18.35</td>
<td>116</td>
<td>4.75</td>
</tr>
<tr>
<td>9 MHz</td>
<td>-17.66</td>
<td>124</td>
<td>4.02</td>
</tr>
<tr>
<td>11 MHz</td>
<td>-18.80</td>
<td>N/A</td>
<td>2.48</td>
</tr>
<tr>
<td>15 MHz</td>
<td>-16.68</td>
<td>106</td>
<td>2.0</td>
</tr>
<tr>
<td>20 MHz</td>
<td>-14.70</td>
<td>92</td>
<td>1.76</td>
</tr>
<tr>
<td>25 MHz</td>
<td>-13.40</td>
<td>82</td>
<td>1</td>
</tr>
<tr>
<td>160 MHz</td>
<td>6.55</td>
<td>26</td>
<td>3.97</td>
</tr>
</tbody>
</table>

TABLE 1 - Results of the Nec-WIN frequency runs

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www.americanradiohistory.com
Results

Table 1 shows the tabulated results for the random length Marconi modeling project. Notice that all of the HF band gains are less than isotropic, so the antenna will not work as well as a dipole. But then again, we know that to be true from experience. The resonant half wavelength dipole will work better on its own frequency, although performance deteriorates rapidly off resonance.

At the frequencies at which the -3 dB beamwidth could be calculated, the values vary from 82 to 124 degrees on HF. Notice, however, that the beamwidth is a lot narrower (26 degrees) on 160 MHz. This value is consistent with the higher gain on that frequency (6.55 dB).

The front-to-back ratio tells you something about the relative gain between the maximum lobe and some other point on the antenna. On a Yagi, for example, the pattern is essentially unidirectional, so the F/B ratio is the ratio of the gain between the front and the back of the antenna (and the value is usually quite high).

On a dipole, the F/B ratio is 0 dB because it receives equally well in both directions (Fig. 2). In this case, the notions of “front” and “back” are a bit nonsensical because the antenna is bidirectional. Perhaps a more meaningful measure in that particular case is the front-to-side ratio. The gain in the two directions perpendicular to the wire (90 and 270 degrees in Fig. 2) is about 2 dB. But the notches off the ends of the dipole are -34 dB.

Now let’s take a look at the random length Marconi at various frequencies other than

FIG. 2

Azimuthal pattern of a half wavelength 7.15 MHz dipole, spaced quarter wavelength above ground (shown for comparison). Antenna axis is 0-180 degrees.

Marconi pattern at 3 MHz. This antenna will have maximum pick-up at 180 degrees (the 30-foot high end), and minimum pick-up at the receiver end of the antenna (0 degrees).

resonance. Figure 3 shows the gain at 3 MHz. Notice that it is basically a shallow cardioid something like certain radio direction finding antennas. The antenna axis is 0-180 degrees, so this antenna will have maximum pick-up at 180 degrees (the 30-foot high end), and minimum pick-up at the receiver end of the antenna. The gains at 120 and 240 degrees are approximately the same as the forward gain. The modeling software declared the beamwidth as “not applicable” (N/A), the gain as -16.4 dBi and the F/B ratio as 1.31 dB. At this frequency the Marconi will attenuate signals arriving from 0 degree direction.

At 7 MHz the pattern develops a couple backlobes (Fig. 4). I call this pattern the “teddy bear” for want of a better name. The gain was -18.35 dBi, the beamwidth 116 degrees and the F/B ratio was 4.75 dB.

FIG. 3

FIG. 4

Marconi pattern at 7 MHz

Marconi pattern at 11 MHz

When the frequency is increased to 9 MHz (Fig. 5) the “teddy bear” develops pinched ears. The gain is -17.86 dBi, and the beamwidth increases to 124 degrees. The F/B ratio is 4.02 dB, so is only marginally worse than the F/B ratio at 7 MHz.

At 11 MHz the teddy bear ears become less pinched (Fig. 6). The gain is -18.8 dBi, and the F/B ratio is 2.48 MHz. For some reason I don’t understand the software declined to declare a beamwidth.

When we get to 15 MHz (Fig. 7) the teddy bear dissolves into a multi-lobed pattern. In addition to the two backlobes, a pair of sidelobes has appeared. The gain is -16.68 dBi, and the beamwidth of the maximum lobe (at 180 degrees) is 106 degrees. The F/B ratio is 2.4 dB. This type of antenna is beginning to pick up signals from nearly all directions except 0 degrees. At the 0 degree point, however, there is a deep (40 dB) null, so signals from that direction are all but suppressed.

The pattern at 20 MHz is similar to that at 15 MHz, except that we now have two pairs of sidelobes. The gain is -14.7 dBi, and the beamwidth is 92 degrees. The F/B ratio is
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1.76 dB. The notch at 0 degrees is -36 dB.

At 25 MHz, a third set of sidelobes appears and the main lobe gets pinched in. That is, by the way, quite common with antenna patterns. It is like a balloon. That is, if you push in at one point some other points will expand outwards. The gain at 25 MHz is -13.4 dBi, the beamwidth is 82 degrees and the F/B ratio is 1 dB.

Now, let's look at the real surprise. At 160 MHz, in the VHF band, the Marconi antenna develops a large number of sidelobes. There is a main lobe at 0 degrees, and a minor lobe (almost as high as the main lobe) at 180 degrees. The two larger lobes are along the antenna wire, which is what is expected of a very long long-wire antenna. The gain is +6.55 dBi, and the beamwidth drops to a narrow 26 degrees. The F/B ratio is 3.97 dB. These numbers are not as good as a respectable 160 MHz Yagi or multi-element cubical quad, but they do indicate substantial performance at that frequency.

**Conclusion**

The random length Marconi antenna is an easy to construct and convenient antenna. But its performance varies considerably with frequency. As a result, you will see different results from different directions on different frequencies. The patterns in this article explain why you will see such differences in your listening.

1 You can also get mini-NEC 3, plus other software, on the CD-ROM that comes with my book Antenna Toolkit, published by Newnes. It is available from Amazon Books (http://www.amazon.com).
Listening for high frequency (HF) signals on the lower shortwave bands, 2.3 and 5 MHz, is not for the faint of heart. Weak signals, lightning crashes, and — on nights with good reception — a panoply of interfering signals are the lot of all listeners. At these low frequencies, the only simple way to make a major improvement in reception is with an appropriate antenna. For most of this century the simple antenna of choice has been the Beverage.

**H. H. BEVERAGE**

Some famous pioneers of radio techniques are remembered because their inventions still carry their names. For example, oscillator configurations are named for Colpits, Hartley and Clapp. Howard H. Beverage, W2ML, tried a number of antennas for reception of transatlantic telephone circuits. While working for RCA, he experimented at 1.2 MHz — what is now the center of the AM broadcast band. He found that very long wires close to the ground produced excellent results, including low noise reception and good directivity.

Because of the proximity to the ground, the antenna is not efficient and thus not suitable for transmitting. Efficiency in reception is not a requirement at the frequencies of interest, as most signals are too strong, not too weak. The problem is sorting the ones of interest from the rest.

**BEVERAGES FOR AMATEURS**

An important challenge for amateurs, after the shutdown of operation during World War I, was to get signals across the Atlantic. In 1921 the fledgling American Radio Relay League (ARRL) in 1921 sent Paul Godley, 2ZE, to a beach in Scotland with modern (for then) receivers to listen for amateur signals from North America. His antenna of choice was the Beverage. Godley filled half a logbook page with reception reports. When the accomplishment was reported in ARRL’s monthly magazine, *QST*, it said, “Get out those exclamation points Mr. Printer, because we got across!” This story was recently retold in *QST*.1

Radio amateurs moved to higher frequencies, driven away by commercial interests who wanted uncontested access to the lower frequencies. So, amateurs went up the radio spectrum, only to find that long distance (DX) communication was easier the higher the frequency, especially with smaller antennas and low power. The shortwave revolution was underway.

At the higher frequencies the Beverage antenna had no advantage, so the design was largely forgotten. For years after World War II, amateur operation of the 160-meter (1.8-MHz) band was restricted because of the Loran (long range navigation) system that operated within these channels. Once the Loran restrictions were removed, operation again became popular on 160, which also resulted in a new search for DX contacts.

Then, ARRL announced a new operating award, Five Band DXCC, for communicating with 100 different countries on five bands. Probably the most difficult aspect of the new award was the requirement for communication on 3.5 MHz, the 80-meter ham band. For both applications, reception from long distances brought the Beverage back to preeminence for reception.

**SIMPLE OR COMPLEX?**

John Devoldere, ON4UN, in his excellent book *Low Band DXing,* describes a number of Beverage designs, from simple to reversible to balanced wires thousands of feet long.

For those who don’t have a farm or a backyard the size of multiple football fields, most of these antennas are impractical. However, John also mentions a simple Beverage that resembles an inverted V of wire, low to the ground at the high point and descending to ground level at either end. The V provides a configuration that does not allow much stray pickup on the downlegs of the antenna, enhancing directivity. Does it work? You bet!

This writer built a field of Beverage antennas atop one high point in the seven-mountain range in central Pennsylvania. The results of these long, single-wire antennas were outstanding. The easy test was to monitor the broadcast band. At the flick of a switch, different stations from different directions could be heard on the same frequency, with little or no interference to each other.

A change in employment led to a move first to Minnesota and then to Wisconsin. Reception was bad to impossible on the lower HF bands with regular wire antennas. The land available was too way too short to accommodate even ON4UN’s shortest design. The question became, could a very short Beverage be useful and effective? A search of literature came back with a resounding “no.” But then, there was also no indication that anyone had ever tried.

With a number of trips to South America scheduled for business purposes, this writer thought it would be useful to listen to broadcasts from various countries in the region to listen to local language usage. The Latin band of 4.8 to 5.1 MHz was the place to listen (from Wisconsin). But, something better than a long wire antenna would be needed.

---

1. Inspiration for the Beverage antenna is also credited to John Devoldere, ON4UN, who was an early experimenter with short antennas. His antenna was similar to the Beverage but had a different configuration. The Beverage antenna is often referred to as the "Beverage" in the amateur radio community. It is important to note that the design and characteristics of the Beverage antenna have evolved over the years, with different variations and improvements to improve performance and reduce size. The Beverage antenna is a popular choice for DX contacts and shortwave listening due to its simplicity and effectiveness in receiving weak signals.

---

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**FIG. 1**

![Diagram of the Backyard Beverage. All of the parts listed below with RS part numbers are Radio Shack.](image)

1. Stranded antenna wire, 70 ft, two needed (RS 278-1329)
2. Egg antenna insulators, kit of two, (RS 278-1335), used at the ends of the antenna.
3. Dog bone insulator (RS 278-1136) used to insulate the high point of the antenna.
4. 4 foot ground stake (RS 15-530).

**A BEVERAGE FOR THE BACK YARD**

The antenna that evolved in shown in Fig. 1. The size was determined by the space surrounding the house and the components available from Radio Shack. The center point is suspended from a corner of the house, some 8 to 10 feet above ground. The two ends droop to ground level. One end is held in place by a tent peg. The other requires a ground connection, which is provided by a short ground stake.

The feed end of the Beverage has a broadband transformer to match the impedance of the antenna (typically 400 to 500 ohms) to 50- or 72-ohm coaxial cable that provides connection to the receiver. The construction of this transformer is given in Fig. 2. Three wires are twisted together with five turns per inch. The wires must be color coded in some way so that the individual conductors can be identified for connection once the transformer is fabricated. Your author used hookup wire with different colors. An alternative is to employ enamel-coated wire color coded with fingernail polish or any other color source.

Once the wire bundle is wound around the toroid core, the end connections should be soldered together in the pattern shown in Fig. 2. In this implementation, the transformer is built into a small aluminum box. Another version was just soldered together including the feed cable and the ground connection, which was then covered with RTV silicone sealer. Either method works, although the latter is less expensive and avoids the problem of weatherproofing the box. For the box, a plastic freezer bag sealed with freezer tape will last one winter season. The coaxial connector should still be coated with silicone sealer to prevent moisture damage.

In this design, the far end of the Beverage is unterminated, which means that the antenna will exhibit a bidirectional characteristic. For most monitoring purposes, this is not a problem, especially if there won't be a lot of strong signals from the back side. In this case, the rear of the antenna was going to be aimed at Siberia, not a hotbed of activity on the Latin band.

Terminating the Beverage at the far end with a 420-ohm carbon resistor will provide more unidirectional reception — with emphasis toward the terminated end. However, the grounding required at both ends of the antenna becomes more extensive — almost impossible over relatively nonconductive soil. Try the terminated version if you wish, but don’t expect too much.

**AIMING**

A very short Beverage has a wide coverage pattern off both ends (if unterminated). However, it is directional with good nulls (i.e. no reception) off the sides. Thus, it is vital to get the wire oriented in the correct direction. Your writer has found that local maps can be unreliable to determine north; a compass is usable if you have an accurate instrument, and if it is not surrounded by a lot metallic objects such as house wiring, power and telephone lines.

You also need to determine the difference between magnetic north and true north for your location. These data are available, but there is a simpler method. Watch your local TV or the weather TV channel and determine sunrise and sunset for your area. Divide the times by two to find local “high noon.” At that time, on a sunny day, drive a stake into the ground and note the shadow that results. It points very close to true north.

Once you have north determined, a protractor on the ground can show the offset needed for your wire antenna. In my case I wanted 25 degrees offset from the north/south line.

**RESULTS**

For those who have never tried a Beverage, the first evening of monitoring will be nothing like what you have heard before. If you have another antenna, make sure to use an antenna switch so that you can do a quick comparison. Both the comparison between antennas and what you will hear on the Beverage will convince you that the small investment in the simple wire antenna was well worth the expense.

A good first check of the antenna is always on the AM broadcast band. With a copy of the *World Radio-TV Handbook* in hand, check the stations that have near clear channels around the U.S. (Sad to say, there are not any “true” clear channels any more.) A first check from Wisconsin showed excellent reception from broadcasters in Lexington, Memphis, and Atlanta — just the correct direction for a path across to South America. Then, on to monitoring the Latin band.

If you listen every night for several hours,
FIG. 2 — Diagram of the matching transformer. The assembly is housed in a 2-3/4 x 2-1/8 x 1-5/8 aluminum box (RS 270-235). See the text for an alternative assembly method.

J1 — Binding post (RS 274-662).

J2 — Coaxial connector, female (RS 278-201).

T1 — 7 trifilar turns of wires, prewound together at 5 turns per inch, on Amidon FT-114-75 toroidal core. Any wire size from #20 to #30 will work, insulated or enamel-coated will work. The Radio Shack kit (RS278-1345) contains suitable wire. The wires should be color coded in some manner to allow appropriate connections. (Toroid cores are available from Amidon Associates, 250 Briggs Ave., Costa Mesa, CA 92626.)

sooner or later you are sure to hear almost everything. To evaluate the Backyard Beverage your author decided to limit the monitoring to two hours per night over four nights in late November and early December.

To determine if the receiver employed made a difference, the output of the Beverage was fed to an Icom 751 and to a Grundig 400 Yacht Boy. In general, the results between the popularly priced Grundig portable and the sophisticated ham radio transceiver were not much different — in situations with heavy interference, the selectivity and the bandpass tuning of the Icom were helpful, but only marginally. It would seem that the antenna is much more important than the receiver for this frequency band.

The results of the listening tests are shown in Chart 1. Clearly the little Beverage provided excellent results. The chart tells us that one may want to study Portuguese rather than Spanish, as stations in Brazil dominate the log. Of course, Brazil also covers a good deal of the land mass of South America. With such long distances to cover, shortwave broadcasting is extensively utilized in Brazil by domestic stations.

Because the antenna is bidirectional, two unexpected stations were heard. One was the time station in Irkutsk, Russia, on 5004 MHz. The other was China CNR2 broadcasting from near Beijing.

Requiring only a hank of wire and a transformer that is easy to fabricate, you might want to try a Backyard Beverage. It works well from the broadcast band to over 7 MHz. The antenna is clearly for the winter season. Once the grass starts to grow, and the lawn needs mowing, the Beverage can be put away to await the next low frequency DX season.

**BLAKESLEE FOOTNOTES**


---

**Latin Band Log (Chart 1)**

This chart shows stations monitored over a total of 8 hours on four days.

<table>
<thead>
<tr>
<th>Freq</th>
<th>Country</th>
<th>Station</th>
</tr>
</thead>
<tbody>
<tr>
<td>4755</td>
<td>Brazil</td>
<td>R. Educacao</td>
</tr>
<tr>
<td>4765</td>
<td>Brazil</td>
<td>R. Rural</td>
</tr>
<tr>
<td>4780</td>
<td>Ecuador</td>
<td>R. Oriental</td>
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<tr>
<td>4790</td>
<td>Peru</td>
<td>R. Atlantida</td>
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<td>4799.8</td>
<td>Ecuador</td>
<td>R. Popular</td>
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<tr>
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<td>Brazil</td>
<td>R. Atahualpa do Amazonas</td>
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<tr>
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<td>Honduras</td>
<td>R. Voz Evangelica</td>
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<tr>
<td>4825</td>
<td>Brazil</td>
<td>R. Cancio</td>
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April 1999 MONITORING TIMES 15
Constructing an L-Band Feed Horn

R eaders of Monitoring Times have observed the gradual transition of international broadcasts, weather facsimile images, and communications from HF (high frequency) to satellites. The serious monitor has therefore had to change from a simple antenna and HF receiver to dishes, feed horns, LNAs (low noise amplifiers), Bias-Ts, and receivers capable of hearing these signals, which are often located in the L-band (1 to 2 gigahertz) portion of the radio spectrum.

One of the items needed for this transition to satellites is a feed horn. There are few sources of feed horns which will operate in the L-band where Inmarsat and several other popular communications satellites are located. This project will show you how to construct a circularly polarized feed horn; finally, you can switch from GOES 8 to GOES 9 without having to go outside and rotate your standard feed horn!

For years, experimenters have used a coffee can as the cavity with a single probe inserted in the can, but notwithstanding the problem of a rusting coffee can after a few months, that approach creates problems relating to the polarity of the signals. In order to achieve the proper polarity, it is often necessary to purchase an expensive combiner and a phasing harness, further increasing the signal loss.

The feed horn featured here is circularly polarized and needs no further attachments or harnesses. Your low noise amplifier is attached to the feed horn N connector, and the coaxial cable is attached to the connector on the output of the LNA — and you are ready to listen to the satellites.

This feed horn will receive signals from about 1500 to about 1700 MHz. While it will not provide optimum performance without tuning with a sweep generator or some other method, it will work “as is” and give you many hours of listening pleasure. If you do get access to a sweep generator to tune the feed horn, you can easily obtain a return loss of at least 25 dB at 1691 MHz.

While the same feed horn is available from Swagur Enterprises ready-made or in kit form, here’s how to build it yourself:

Construction

Begin by collecting the materials listed in the materials list at the end of the article (or purchase the kit).

To prepare the can or enclosure, refer to Figure 1. Measure the flange (outer ring) of the N connector you have selected. Its size will determine the size of the hole you must make in the backplane of the enclosure (can). The size will usually be either 3/8-inch (0.375") or 5/8-inch (0.625"). Next, make a mark in the exact center of the backplane of the can.

From this center point, measure outward 0.850-inch and draw a circle. Then mark three equally spaced locations (i.e. 120 degrees apart) on this circle. Note: this dimension is very important! You will be aligning these three holes with the three holes you will be drilling in the disk, as well as with the three holes you will be making in the PVC pipe later. Be very careful to get these holes spaced properly.

Now drill clearance-size holes (No. 42 drill) to accommodate three 2-56 size screws. Countersink the holes so the three flat headed 2-56 screws will lie flat and flush with no protrusion above the back plane of the can.

Photo 1 shows what the completed feed horn looks like. Notice the single N connector protruding from the rear of the can.
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Using the diameter of the ring (flange) around the N connector as the size, make a hole in the center of the back plane of the can. This size hole will allow the N connector to remain flush with the surface of the back plane of the enclosure (can). It is recommended that if you have a punch, use it instead of drilling to make a cleaner hole.

**Figure 2** shows two views of the disk (seen on edge), the PVC pipe, the coil and the way it is connected to the N connector. Look closely at it and how it all fits together. This assembly will slide into the can and be secured by the three 2-56 flat head machine screws. The three screws hold the entire assembly together.

Now construct the disk as shown in **Figures 1 and 2**.

**Figure 3** shows the detail of construction for the PVC pipe. Be sure to “true up” the ends of the PVC so it will stand at 90 degrees to the disk when attached. Note there are three holes on each end of the pipe. The holes on the end opposite the slot will be used to hold the cover in place. Thread them also.

Be sure to locate the slot so it does not interfere with any of the three holes in the pipe. This kind of PVC can be found at most hardware stores. It is simply regular drain pipe used in plumbing projects. It measures approximately 1.5 to 1.6 inches inside diameter and about two inches outside diameter.

**Figure 4** shows how the N connector is attached to the disk which fits inside of the can. Note how the flange is attached to the disk. When you make the hole in the can it should clear this flange. The entire assembly will be held in place with the three 2-56 screws which go through the can, then pass through the holes in the disk and finally are screwed into the PVC pipe which you will have threaded on both ends to receive the 2-56 screws.

**Figure 5** shows how to prepare the copper tubing for making the coil. With a hammer or vise, flatten about 0.3-inch on one end of the tubing. Center punch the middle of the flat area and drill a hole just large enough to let the center conductor of the N connector fit snugly into the hole.

Now refer to **Figure 2** once again. Wind three turns of copper tubing around the PVC pipe in the direction shown. We recommend you temporarily attach the N connector to the disk and the disk to the PVC pipe as follows:
1. Attach the N connector to the disk
2. Solder the end of the copper tubing to the N connector.
3. Then, let the copper tubing stick out of the slot in the PVC pipe.
4. Temporarily attach the disk to the PVC pipe.
5. Wind the coil.
This anti-clockwise spiral assumes you will be pointing the feed horn at a dish. If you do not want to use the feed horn that way, you may want to wind the coil in the opposite direction. The dish reverses the circular polarity, so if you want right hand circularity and are using a dish, then wind the coil as shown (i.e. left hand).

Figure 6 and the photo give an overall view of how all of the parts fit together. The main points are that (1) the flange of the N connector is flush with the back of the can (i.e. flange slides into and does not rest on the back of the can), and (2) the three 2-56 screws hold it all together by resting in the countersunk holes in the can and through the disk and then are screwed into the PVC pipe. Now drill a 1/8-inch drain hole approximately 1.1-inch from the rim of the can.

Finally, attach a cover which is transparent to microwaves using the three threaded holes in the end of the PVC pipe. If you do not know if your cover will pass microwaves, put it in your wife's microwave oven for a few seconds. If it gets warm, it is absorbing microwaves. If it stays cool to the touch, you probably can use it. Most black covers have carbon imbedded in them and cannot be used.

If you use 2-56 screws to fasten the cover in place, do not tighten the screws. Leave about 1/16-inch of the screw showing. Otherwise the cover may pop off in the hot weather.

Construction Notes

The dimensions given for the placement of the turns of the coil in Figure 2 are approximate. If you want to tune the feed horn, you will find these dimensions will change. We provide them for those who do not have access to a sweep generator or similar device for tuning the device.

When trying to determine if a coil is clockwise or anticlockwise, look at the way you would turn it to get it to screw into the ground or some other object. If you had to turn it anticlockwise, it would be left hand circular. If on the other hand, you had to turn it clockwise to get it to screw into the ground, it would be right hand circular.

When attaching the copper tubing to the N connector center conductor, try to get the end of the tubing as close to the connector as you can without shorting it to ground. This will improve its impedance and make it work better. You might want to round off the end of the flattened tubing to reduce the chance of shorting the corners to ground.

If this article tantalizes you, but need more convincing before you build, imagine receiving your own weather facsimile pictures on 1691 MHz off the GOES bird. Or order a reprint of “Microwave Monitoring: INMARSAT Loud And Clear” Part I, by John Wilson. Part one is a comprehensive picture of who uses the satellite and what traffic you can expect to hear -- including actual loggings by the author. Wilson used the traditional coffee can feedhorn (constructed in Part II), but now you can benefit from the development of the Swagur Horn and get better results from a simpler design. If you already have the receiver that covers the frequencies, why not give the satellites a try?

Stu Gerske is President and CEO of Swagur Enterprises, Inc. He has developed a complete line of INMARSAT and weather satellite interception products.

Parts Listing

1. Can (enclosure) per figure 1.
2. Aluminum for disk per fig. 1.
3. PVC pipe per figure 3.
4. 3/16" x 19" copper tubing.
5. 1 each N connector.
6. Six each 2-56 flat head stainless steel machine screws.
7. Cover for end of can.
8. No. 42 and 50 machine screws.
9. One each 2-56 tap.

Footnote:

1. Kit of materials: As a convenience for readers of Monitoring Times magazine, Swagur Enterprises will make available for a limited time, a kit of most of the materials needed for this project. It will consist of all of the items listed above except for the drills and taps. None of the items will be drilled or prepared except for the disk which will fit into our enclosure (can) and have a center hole and the three holes for the 2-56 screws. Price $87.50 plus shipping (U.S.). The already-constructed feedhorn is $120. Please contact us at 608-592-7409 or e-mail us at swagur@execpc.com. Our web site is located at www.swagur.com.


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April 1999   MONITORING TIMES  19
A Volunteer for the US Coast Guard Auxiliary

By Dan Renfro, WA4PXV

I've always known a little bit about the U.S. Coast Guard Auxiliary, mainly through their frequency assignments or occasional magazine articles. Such was the case a few years ago when The Lake Norman Magazine published a small story on the local auxiliary unit in North Carolina.

I wrote the author a note to pass along to someone in the auxiliary. A few months passed, but I received no reply. Then one day I heard a distress call on 156.800 MHz (marine channel 16). After the third call I went back to the vessel and got the necessary information, called my local sheriff's department to let them contact the appropriate agency, and maintained radio contact throughout the event.

About two hours later one of the Coast Guard Auxiliary units called me on the radio to thank me. When he found out where I was (about forty miles from Lake Norman) he could hardly believe I would be able to talk to him — much less talk to a boat on the water. He asked if I might know Dan Renfro who also lives in Hickory, North Carolina, and works on radio equipment. I assured him that I was he. He had my letter right there in front of him.

Basically I had said that I was a radio engineer and like to put together radio systems; and that if the Coast Guard Auxiliary wanted some help in that area, I would do what I could. I had plenty of equipment in the 136-150 MHz range, radios, filter cavities, antennas, etc. There was a mountain almost on top of the lake that would be very nice for them.

I had an ulterior motive: there were at least two VHF paging transmitters that were always causing problems by not having filters, having loose RF connectors, and bad installations. An emergency services group could put more pressure on the paging companies to clean up their systems — providing a fringe benefit to the ham radio community!

Unfortunately for my scheme, the fellow on the phone said there was not enough activity to support a radio repeater. I guess I would just have to continue playing Civil Air Patrol (CAP), ham radio and a few other special projects I was involved with.

A few years later my radio and CAP buddy, Reid McKay, WA4DSZ, mentioned he was going to a Coast Guard Auxiliary meeting down at Lake Norman. They might want to start a unit at Lake Hickory. He volunteered to drive, so we both went. Within a few months we were charter members of the US Coast Guard Auxiliary, Lake Hickory Flotilla 17-03. Right off we passed the communications test and got our stations checked out.

Lake Hickory is quite long, and boat-to-boat VHF is, at best, probably five to six miles. Reid, with a 3 dB gain vertical and 4-element beam, could just barely cover the entire lake, but a lot of areas were spotty. I have a 9 dB gain, 4-dipole array pointed toward the lake, and although my distance is 5 miles from the lake, I have greater altitude than Reid's lakeside location.

We tossed around the idea of a remote base somewhere and asked about radio link channels. Yes, they were available, but no one knew exactly what to do to request them. The entire auxiliary is authorized 143.280 MHz for use within the US and its possessions. After several lunch discussions, we drew up some plans, using one Motorola Micor on 143.280 simplex and another one on 156.300, 156.800, 157.050 and 157.100 — all simplex with a control board being set up in cross band mode. We would also use a scan head for the marine channels with priority being set on the dialed-up channel — all controlled by DTMF (dual tone multi-frequency touch-tone system).

It worked pretty well, but the limitations of using a simplex channel would soon become apparent. Only someone who was highly skilled could operate changing channels in a dense radio traffic environment.

Reid has a mountain top amateur radio site just north of Lake Hickory and that is where we placed this system. We used a 3-element DB Products heavy duty beam pointed at Lake James (west about 40 miles) for the 156 MHz and a Hustler G-7 ground plane for the 143 MHz. Off the side of the beam was Lake Norman, and we achieved almost total coverage of that lake also.

Fine Tuning the System

Every month or so a "bug" would show up, requiring a trip to the mountain. The system was completely battery-powered (I never rely on the power company during emergencies), and after some excessive-use days the charger would not always catch up. Then one day... Boom! A direct lightning strike to the 440 MHz ham repeater melted that radio and...
severely damaged all the other equipment.

The Coast Guard was top priority, so within a week it was back on with new power amps, squelch boards and scan board. A week or two later the VHF ham repeater got back on and a year later ... the UHF, which still has problems with the new radio.

We had proved how beneficial the system was, even with its limitations. We went up the chain of command for a set of repeater channels. After a month we were basically told to pick our own channels and when the new system is on the air to advise them what the frequencies were. Wow! If the Civil Air Patrol was like that, we could have some humdinger systems.

Anyway, I got out a lot of frequency manuals and my “outdated” government master file to find some suitable channels. On my initial start list, I had about 250 channels. As the list got smaller and smaller, I finally settled on 143.575 MHz for the input and 149.050 MHz for the output.

I got another 142-150 Micor for the repeater, and this time I got a DOE surplus Motorola Syntor X for the link radio. I programmed all the government marine channels in it with different scan lists per priority channel. We can now disable the scan if needed and change channels even while the link is receiving — the marvels of full duplex.

One problem with the link radio scan is if someone does not specify what channel is being used, it can be very difficult trying to figure it out. The repeater is standard carrier at all times and the link transmitter only activates when the proper subaudible tone is used.

The Hustler antenna was replaced by a heavy duty Celwave dual dipole and the three element beam got a new piece of 1/2-inch feedline thanks to the lightning strike. Lightning protection methods were stepped up quite a bit on all equipment.

With no filters at all (except the duplexer) the system worked fine except when using the link transmitter. When it was activated, the repeater receiver got severely overloaded. I put a 12-inch pass cavity on the receiver, then a 12-inch cavity on the transmitter (in case of mixing). Neither helped, so I left them on anyway. I would have to clean up the Syntor X transmitter.

The Syntor X, being a synthesized type radio, means the transmitter has much more sideband noise than an individual crystal-plexer-channel transmitter. This particular radio was designed for the 148-174 MHz range with no retuning. I already retuned the receiver preselectors for somewhat narrower bandspread, which helped the sensitivity about 10 dB, and I’m sure helped the front end selectivity quite a bit. Still, the transmit problem ... With almost one MHz between the lowest and highest frequency, a typical band pass filter would be useless. There are no tuning adjustments on the transmitter to help clean it up. Now what?

I did have some military receiver dual cavity pass filters that would cover the 156 MHz range. They are built really tough and in the past I have used them on 100 watt systems in both pass and reject configurations, so I knew they should hold up. But what about the bandwidth? Too much ... too little? The “Q” factor is much lower than a normal pass cavity, and I knew the bandwidth would be somewhat wide.

With my half-watt portable I tuned one up — it looked almost perfect. I could get the same loss at both frequency extremes. At another there was a change in tuning — very slight. Now for the real test. I used my 100 watt Motorola Maratrac and checked both extremes — about 70 to 80 watts out it was still looking good. I balanced the high power signals, then gave the filter its endurance test: about 15 minutes of 100 watts continuous input. The filter got warm but not hot and it stayed tuned.

Now for the freezer test! I unhooked the cables and carefully put the filter unit in my freezer, taking care not to move the tuning knobs. After a few hours, I hooked it back into the test setup. At one frequency extreme, there was no effect, but at the other there was maybe 2 more dB or less as the power there was 40-50 watts. Good enough for me. We had our one meg bandpass filter — the system worked perfectly by adding it to the link radio.

Catawba Valley on the Air

The repeater identification is “U.S. Coast Guard Auxiliary Catawba Valley Radio” or many times just, “Catawba Valley Radio.” The Morse code ID says “USCG AUX,” but only on 149.050. Unless the system is in use, most of the time we leave it on the all-scan so any traffic on marine channels 6, 16, 21, 22, 23, 81, 82, and 83 will be rebroadcast on 149.050 — a scanner in the sky, so to speak.

On the average summer day at midafternoon, the receiver consistently picks up Louisville, Kentucky; Charleston, South Carolina; and Tybee, Georgia. During some mild band openings, New Orleans, Louisiana; Miami, and Clearwater, Florida; and Boston, Massachusetts, have been easily copied. I’m wondering what a major band enhancement will bring in! I’ve also been thinking about adding a remote-controlled antenna switch and putting up another link antenna to better cover the Lake Norman area.

Besides playing radio, the Coast Guard Auxiliary is lots of fun. Many training activities take place on the water. There’s also lots of classroom training available for those who wish to stay on land. Also, my area is authorized one weekend per month to go to a Coast Guard base on the Atlantic for training or being crew members alongside them. Just think ... actual high seas rescue missions!

If you have some time available and want to meet some really great folks, then look toward the U.S. Coast Guard Auxiliary. If a unit is not very local, try checking out the Civil Air Patrol. Both of these emergency service organizations have much to offer anyone with some interest and expertise in radio communications.

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North Carolina Lake Coast Guard Auxiliary Channel Assignments

All are US channel plan

Channel 21: Falls Lake, Roanoke Rapids Lake, Tar River, Moss Lake, Lake Hickory, Lake James, High Rock Lake, Hyco Lake, and Lake Reidville

Channel 23: Harris Lake, Badin Lake, Lake Gaston, Lake Norman, and Lake Townsen

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April 1999  MONITORING TIMES  21
Fractal antennas are better at picking up signals and can receive them over a wider range of frequencies ... but nobody is exactly sure why.

When Nathan "Chip" Cohen decided to set up a ham radio system at home, he hit a snag. The lease for his apartment in the center of Boston stipulated that he could not erect an antenna outside the building. Without an antenna he couldn't send or receive radio signals. A small problem, but the answer he came up with has changed his life.

Instead of using a conventionally shaped antenna, Cohen made something entirely different. He cut a sheet of aluminum foil into the shape of a mathematical pattern known as an inverse Koch curve and stuck the pattern onto a sheet of paper. An inverse Koch curve is a fractal that looks like a series of triangles stacked on top of each other like a pagoda. Like all fractals it is "self similar" — it appears the same regardless of the scale at which it is viewed.

Cohen connected the foil to his radio receiver to see if it might serve as a covert antenna if he mounted it outdoors. To his surprise, the fractal foil pattern worked well and for a while Cohen was able to continue his hobby without arousing suspicion. "It didn't seem very revolutionary at the time."

That was in 1988. Today, Cohen's experiment has made him a pioneer in the new field of fractal antenna design. It turns out that fractal antennas have many advantages over their conventional counterparts. For a start, they are smaller — a fractal antenna for a mobile phone can be made the size and shape of a 35-millimeter photographic slide and can be built into the casing. It could even be printed like an integrated circuit. Fractal antennas are also better at picking up signals and can receive them over a wider range of frequencies.

But there's a challenge ahead. While the
new antennas are set to be used in everything from mobile phones to huge receiving arrays, physicists are being left behind. Nobody is exactly sure why fractals make such good antennas. Now the race is on to find out.

Strike a chord

Antennas work rather like the strings of a piano. When struck, a piano string vibrates at a specific wavelength. Because the ends of the string are fixed and cannot move, the wavelength must be some multiple of this distance. The simplest resonance will have a wavelength that is twice the length of the string. A similar effect occurs when a conducting wire is "struck" by radio waves. The waves induce a variable current along the length of the wire, and since this current must be zero at the ends, the wavelength of any current fluctuations can only be some multiple of the wire’s length. And the longer the wavelength, the longer the antenna must be to receive it.

In practice, the range of frequencies an antenna can broadcast and receive can be varied by changing the electrical properties of the circuits to which it is connected. Looping the antennas or adding small perpendicular wires to it also changes properties such as its capacitance and inductance. It is even possible to predict the performance of certain shapes using equations that describe the electromagnetic behavior of materials.

Those equations were developed in the 1980s by James Clerk Maxwell. "You can solve Maxwell’s equations fairly straightforwardly for uniform curvilinear antennas — that is, things like loops — or straight wires," says Cohen, who is now chief technical of

Contrary to this illustration in New Scientist, soldiers will not have a Minkowski fractal molded into their helmets. Chip Cohen corrects the record in the sidebar story.

Fractal Antenna Twists and Turns

By Nathan "Chip" Cohen, Ph.D.
Boston University and Fractal Antenna Systems, Inc.

In 1988, I set off on an entertaining and educational effort to build antenna elements using self similar "fractal" shapes. But I kept it private. As a radio astronomer with a Cornell doctorate I knew this was one of those activities one dared not tell one’s colleagues — too strange. It could be perceived in the same vein as coal hanger car antennas and broken, twisted TV rabbit ears.

In my first efforts, I built fractal antennae for my 2 meter rig in my studio apartment. Pressed for time and resources, it remained a personal and modest pastime for many years. As the data got better in quality and quantity I knew I had to eventually write it up. And by 1994 I braved the waters and submitted to a well-known ham journal.

It was turned down as an April Fool’s joke, in February no less.

That bizarre rejection set the tenor for some of the last years’ less meaningful moments, putting out fires that never should have started. The adjacent article by Michael May is a major case in point. First published in New Scientist, this is an intriguing depiction of fractal antennas. But after it came out, odd things began to happen: I got vicious e-mail; use net posts self-righteously talked about fraud; colleagues would make excuses to skip lunch dates. I felt like I was wearing a scarlet A for "Antenna."

After reading the article I knew what had happened: this was a different version from the one I fact-checked, no doubt edited for publication. This editing pass made some errors — in part combining phrases which then over-generalized the meaning — that, justifiably, offended the tastes of the antenna gurus. So let’s set the record straight:

1) A fractal antenna is a small resonant antenna which, when used to shrink two to four times, provides very good efficiency. But it will not produce a high performance, very tiny antenna. So don’t expect 10 dBi on 80 meters with a fractal 2 feet high.

2) Fractal antennas can provide gain, small size, and broad bandwidth. But they will not provide all three at the same time.

3) Fractals are naturally very broad bandwidth devices. But this ultrawide bandwidth happens at the higher frequencies, where the antenna is electrically large.

4) Soldiers do not walk around with the Minkowski pattern on their helmets, contrary to the New Scientist illustration. I didn’t say this. The pictures and graphics I provided New Scientist were not used.

Fractal antennas have recently — as just published in the journal Fractals — resolved a 42 year puzzle and redefined what makes up a frequency independent antenna. Self similarity ends up being one of the two geometric requirements for frequency independence. Log periodic antennas are fractal antennas and they meet both requirements. But other fractal designs have the same frequency independent qualities and they don’t look like log periodic. Frequency independent antennas enter a new era.

I note that not everyone was thrown off by this article. Pat, G3VA, in his "Technical Topics" column, initially was critical of the New Scientist material (RadCom, April 1998) but afterwards went and read my articles. He did a major turn-around (RadCom, June 1998). So despite the April issue you are now reading, this is not an April Fool’s joke.

What does all this mean? In practice, it means that at least some of your future antennas will use fractals. You might not want to build a 160 M fractal curtain, but chances are you’ll see fractal designs at HF, and most certainly at VHF and higher.

I’ve helped this along by writing almost a dozen articles for hams and experimenters. I’ve also set up a ham page on the Hyperlink: http://www.fractenna.com URL, which includes my tiny 10 M fractal quad Yagi (see the figure in the second sidebar) and other fractal designs to experiment with.

Now it’s your turn: here is a wonderful opportunity for hams and hobbyists to experiment, mostly in cheap, bent wire, with a state of the art technology, initially — and proudly — ham-grown.
A fractal is a rough or fragmented geometric shape that can be subdivided in parts, each of which is (at least approximately) a reduced-size copy of the whole. Fractals are generally self-similar and independent of scale.

There are many mathematical structures that are fractals. Fractals also describe many real-world objects, such as clouds, mountains, coastlines, roots, branches of trees, blood vessels, and lungs of animals, that do not correspond to simple geometric shapes.

Benoit B. Mandelbrot invented the word: "I coined fractal from the Latin adjective fractus. The corresponding Latin verb frangere means 'to break': to create irregular fragments."

These mathematical constructs provide the basis for new art forms like this Mandelbrot fractal, helped develop digital compression techniques for moving images, and apparently have practical applications beyond what we can even guess.

The big surprise came when Cohen added the second and third iterations. To his amazement, the gain remained the same as that for the square-wave shape, even though the antenna became more compact.

A fractal antenna’s resonance—the wavelengths to which it responds—also change as iterations are added. And in a way that is hard to explain. Researchers believe that a number of processes are at work. The iterations add smaller line segments to the fractal, and each of these can act like an individual antenna that responds to shorter wavelengths. In addition, the iterations add bends to the antenna, and that changes its capacitance and inductance. This process is called fractal loading and the result is that the antenna resonates at both shorter and longer wavelength signals. Because of this, the range over which the antenna can receive signals—its bandwidth—grows.

While increasing the number of iterations makes the antennas smaller without reducing gain, there is a practical limit to how small they can get. This is because the diameter of the wire must also get smaller to accommodate the tiny bends. Smaller wires have higher electrical resistances, making them less efficient at picking up and sending radio signals. "There are certainly diminishing returns—on most antennas—for iterations above, I'd say, five or six," says Cohen.

Maxwell’s dilemma

Higher-order iterations create problems for physicists, too. Calculating an antenna’s performance with Maxwell’s equations depends on the distribution of electrical current along it. For simple shapes, like lines and loops, the equations can be easily solved. But no solutions exist for most fractals, and scientists must use what are known as numerical approaches to find the current distribution.

Numerical methods are far from perfect because they make assumptions about the way the antenna works. One way of doing this is to assume that each segment operates as an independent straight-line antenna. "You divide the antenna up, and you find the cur-
In December 1998, a fractal design application in the form of a small beam antenna was put to the test by Dr. Nathan Cohen, N1IR, who is also a radio astronomer and assiduous radio amateur (see his sidebar clarification to Mike May's feature article). Using the fractal Yagi on top of a short tower, he made thousands of radio contacts all over the world from the company's facilities in Massachusetts.

The small fractal antenna made contact on 10 meters with dozens of stations in Europe using only 1 watt. Contacts with stations in Palau, Papua, and many other exotic Pacific locations were accomplished successfully with only 2 watts. (For comparison, typical cell phones use about one watt of power to accomplish local transmissions to cell sites.)

This patent pending design is available to experimenters from the Fractal Antenna Systems' website at www.fractenna.com. Hobbyists interested in learning more and experimenting with fractal antennas are invited to an email reflector set up specifically for such discussions at www.onelist.com. Search on "fractal antenna" and follow the instructions. Posts are made via fractalantenna@onelist.com.

rent on each length, " explains Dwight Jaggard, an electrical engineer at the University of Pennsylvania.

This approach works well for a few iterations, but higher-order iterations contain large numbers of segments that vary in size over many orders of magnitude. The numerical techniques simply cannot cope.

Just how this can be solved is not clear, but Doug Werner, a mathematician at Pennsylvania State University, has some ideas. "You might be able to take advantage of the scaling in some clever way to avoid doing the numerical computations at every scale," he says. It is possible that the first few iterations could reveal a pattern that can be applied to additional iterations. But so far no such methods exist and the performance of many fractal antennas can only be assessed after they have been built.

Large cigars

While some researchers continue to improve their numerical methods, others are attempting to incorporate fractal antennas in real devices. In the near future, says Cohen, fractal antennas will be used inside cellular and cordless phones, replacing the conventional wands. Fractal Antenna Systems has developed the "fractal micropatch," which is smaller than a 35-millimeter slide and about as thick. It can simply be stuck inside the casing of a phone. Previously, the smallest antenna that could work inside a cellular phone was the size of a large cigar.

In a year or two, says Cohen, "you will see fractal antennas as part of wireless devices in things like electricity meters and vending machines." These devices will communicate through cellular phone lines to report meter readings or the need for restocking. Small antennas could even reduce the bulk of equipment carried by military radio operators in the field. Soldiers of the future might even keep in touch with their operational base through fractal antennas built into their helmets.

These little devices, dreamt up to beat an antenna ban, look set to revolutionize the design of radio transmitters and receivers. Perhaps one day they could do the same for the leases on apartments in Boston.

Mike May is an associate editor of the magazine American Scientist. This article is reprinted with permission from the British magazine, New Scientist.
Consumer Electronics Show 1999

There are few things in life that stir the mind like a gigantic roomful of toys. If you like gizmos, gadgets, and other cool stuff (grown-up toys as it were), then the annual Las Vegas Consumer Electronics Show is the place to be. What’s your pleasure? Flat screen TVs, HDTV, AutoPC? No? Then how about scanners?

At each Consumer Electronics Show (CES), Uniden America provides a prominent booth in the main show hall. For 1999, Uniden moved its booth to the show floor, close to the Microsoft booth. (Microsoft was showing AutoPC and Windows CE applications, their new cordless phone with PC attachment, and a few other non-software trinkets.)

A key Uniden product line, of course, is cordless phones, of which Uniden is the largest manufacturer in the world. Therefore a great portion of their booth is devoted to this seemingly essential household appliance—the latest and hottest being a cordless phone with “Long Distance Manager.” With each long distance call, a centrally located server will check its database of all the major phone companies as well as all the insufferable 10-10 providers. It will choose the best rate for the customer at the time, even basing its decision on how long the customer, on average, calls a particular number, and put the call through.

Why should a scanner column care about cordless phones? Well, for one thing, Uniden is also the world’s largest manufacturer of scanners; the health of this company across all of its product lines could impact the category that interests us as well. All right, all right, so I’ll tell you about the scanners!

Uniden had, perhaps, rested on its laurels a bit following the blistering success of the TrunkTracker line. Trunking systems had turned scanners and consumers off to public safety monitoring prior to 1997. TrunkTrackers have stabilized the hobby and have brought back an energy and interest in scanning, even though the gathering storm of digital is still hovering on the horizon.

Trunk tracking scanners, combined to a small extent with software such as Trunker and TrunkTrac (the development platform for the original TrunkTracker), have for now restored the customers’ faith in the hobby. The advent of the BC-235, BC-895 and their Radio Shack variants (PRO-90, PRO-91, 2050, 2066), and high-end products such as the AOR-8200 and the flexible new models from Opto, have brought the fun back into the hobby and offered the consumer a choice of products.

At this year’s CES show, Uniden announced another major breakthrough in trunking technology: the ability to track GE/Ericsson analog trunked radio systems. The first model which will offer this feature will be the BC-245XLT TrunkTracker II (or, as I call it, the “T2”) portable scanner. The unit shown was only a mock-up—a BC-235 case with a small change to the key assignments and display. The sign above the unit had words to the effect of “Trunktracking now with G-Tracker,” which is the Uniden in-house name for the GE/Ericsson trunked system tracking technology. The unit is also designed to have “SmartScanner,” which is a very easy-to-use system for acquiring and programming your scanner over a phone line—no PC or CD-ROM required.

Before reviewing some of the anticipated features of the BC-245, it must be remembered that the radio was not yet out of its development phase at presstime. Features and capabilities may very well change prior to production. Here is just a partial new feature list, with the caveat that some of these items may not make the final cut:

- GE/Ericsson trunktracking
- VHF/UHF & 900 MHz Motorola trunktracking
- Multiple system trunktracking
- Simultaneous trunked and conventional scanning
- Status bit operation, allowing automatic reception of emergency and other calls from another talkgroup
- SmartScanner programmability
- Upgraded display backlighting
- Railroad service search with frequency/American Association of Railroads channel “flip-flop” (Frequencies active during the rail service search will show both the frequency and the assigned channel number, similar to the way the marine service search currently works in the BC-235.)

Because the 245 will use the same case as the 235, there will be no change to the batteries and there will be no alpha capability. Uniden does hope to have the radio available by the late spring or early summer.

Other radios shown were the new Sportcat BC-180 (triple conversion and with...
standard keypad operation) and a new line of "clock-radio" scanners. These radios are small base units that will fit great on your night table, provide a clock radio, alarm, AM-FM, weather, and a 30-100 channel scanner depending on the model. This is a unique and welcome application for a scanner (night table space is at a premium).

**Mose CES News**

- Sony did not have a scanner at the show. Perhaps the company has so many product lines that they had to put a limitation on their show offerings. A Sony rep said that they did display their scanner at COMDEX and that the product is doing very well.
- RCA did not show their scanner within the main hall of the show. They may have had it at another hotel for dealers only, as they did last year.
- High-end players such as AOR have displayed at CES in the past, but they were not there this year. (It is incredibly expensive to have both at this show.)
- ICOM had a booth reserved but did not come! This was a shocker. Last year they showed their PCR-1000 as well as other models. This year we went looking for their booth (which was in the show directory) and found an empty slot on the show floor.
- RELM/FOX/AK America made a last-minute decision not to come to CES, reportedly because they had nothing new ready to display.
- Radio Shack never has a booth at the show.
- OptoElectronics also never has had a booth at CES, but they do show at other, more specialized, conventions.

Admittedly, these events are primarily to show off new product lines, which may explain why Uniden was alone in having scanners on display. Reaction to their new models at the show was quite good. Customers were very pleased to see a redesigned Sportcat; they liked the idea of the clock-radio scanners as a new take on the product, and they certainly were very pleased that the second major trunking format was being addressed with the 245 "T2."

**Connecticut State Police - When will they ever change?**

The Connecticut State Police installed their now antiquated low-band radio system in 1940. For nearly two decades the agency has been researching how to upgrade or replace the system that has so bedeviled troopers, who claim to fight the constant battle against "dead zones.

Motorola was selected to install an 800 MHz trunked radio system for the state but there have been recent serious snags. The state is demanding extremely high coverage capabilities and Motorola, according to news reports, has countered that this will require more frequencies and more towers, and of course greater expense. Is this a dance we've seen before, from both public agencies as well as manufacturers? Stay tuned to 42 MHz, for quite a while to come!

**Bringing that old scanner back to life**

In this hobby of ours one of the most difficult resources to find is a scanner repair center. Scanners are such a specialized product that you would only trust your gear to someone who has been in the business for years and who understands the product. Radio and Uniden do scanner repair work, but they generally will not have the components for '70s and early '80s vintage models (it's worth checking with them, though, to see what they can do for a particular unit).

G&G Communications, owned by Gerry Oliver, has been in the business of scanner repair for probably longer than he cares to remember. Gerry purchased old parts from the manufacturers years ago and has the knowledge and components to fix most any model. The only problem with G&G is that, with their fine reputation, they are often backed-up, so be prepared to be without your scanner for some time. The new address for G&G Communications (Gerry Oliver) is 7825 Black Street Road, LeRoy, NY 14482. Only the street address was changed. Their phone number is still (716) 768-8151.

**A mammoth system grows some more**

We recently received the following e-mail from the Forest Hill, Texas, Fire Department. It's nice to have data direct from the horse's mouth.

Dear Sirs: Please be advised that the City of Forest Hill Texas Fire Department has joined in with the City of Fort Worth, Texas, Public Safety System. Please find below a list of our talkgroups.

19280
19312
19344
19376
19408
19440

Roland R. "Mac" McCormick III, KF4LMT, shared the following Savannah/Chatham County, Georgia, (Type II SmartZone) Trunked Repeater System information. Thanks also goes to David Carter and James Brummett for their contributions to this list.

**Frequencies:**


(There appears to be at least one too many frequencies here. The maximum for a trunking system is 28.)

There is also a site on Tybee Island, Georgia, that uses the following frequencies:

868.8875, 868.3875, 867.6875, 866.8875, 866.2375

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19472
19504
19536
19568
19600
19632
19664
19696
19728

(Unfortunately no ID usage was provided.)

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www.americanradiohistory.com
SCANNING REPORT

(continued)

Talkgroup IDs

County Law Enforcement:
1616 Chatham County PD Emergency
1648 Chatham County PD Common
1680 Chatham County PD Dispatch 1
1712 Chatham County PD Dispatch 2
1744 Chatham County PD Dispatch 3
1776 Chatham County PD Dispatch 4
1808 Chatham County PD Detectives 1
1840 Chatham County PD Detectives 2
1872 Chatham County PD Detectives 3
1904 Chatham County Animal Control
2672 Chatham County SO
2704 Chatham County SO A3 Information
2768 Chatham County SO A8
2928 Chatham County SO K9
2960 Chatham County SO A5 Car to Car
3024 Chatham County Courthouse Security
4240 Westside Common
4304 Bloomingdale PD 1
4336 Bloomingdale PD 2
4368 Bloomingdale PD 3
4496 Port Wentworth PD 1
4528 Port Wentworth PD 2
4560 Port Wentworth PD 3
4786 Thunderbolt PD
4912 Garden City?
4944 Garden City PD 1
4976 Garden City PD 2
5328 Pooler PD 1
5360 Pooler PD 2
6096 Savannah International Airport Police
6128 Savannah International Airport
7088 BOE Campus Police Channel 1
7152 BOE Campus Police Channel 3

County Fire and EMS
2352 Chatham EMS Dispatch
2416 Med Common
2448 EMS Administration
3440 Memorial Medical Center ER
3472 Candler Hospital ER
3504 St. Joseph's Hospital ER
3568 Chatham Fire Dispatch
4592 Port Wentworth Fire
5040 Garden City FD

Southside Fire and EMS
3248 Southside Fire and EMS Admin
3824 Southside Fire and EMS Dispatch
3856 Southside Fire and EMS Division 1/ TAC 1
3888 Southside Fire and EMS Division 2/ TAC 2
3920 Southside Fire and EMS Division 3/ TAC 3
3952 Southside Fire and EMS Division 4/ TAC 4
3984 Southside Fire and EMS Division 5/ TAC 5
4112 Southside Fire and EMS Medic 1

County EMA
6224 Chatham County Emergency Management CEMA 1
6256 Chatham County Emergency Management CEMA 2
6288 Chatham County Emergency Management CEMA 3
6320 Chatham County Emergency Management CEMA 4
6352 Chatham County Emergency Management CEMA 5

County Public Works
3152 Chatham County Public Works Special Ops 1 (?)
3184 Chatham County Public Works Special Ops 2
3280 Chatham County Public Works
3312 Chatham County Public Works
3344 Chatham County Public Works
4656 Port Wentworth Public Works
5552 Chatham County Mosquito Control
5744 Chatham County Public Works - Computer Tests
6704 Chatham County Public Works
6832 Chatham County Public Works
6864 Chatham County Public Works
6960 Chatham County Building Inspectors
7024 Chatham County Public Works - Recreation

Unidentified County Channels
3120
4208
5776
5840
5904
5968
6384
6448
6512
6576

Savannah Police
32784 Savannah PD A1 Car-to-Car
32816 Savannah PD A2 Precinct 1&2 Primary
32823 Savannah PD "Across the Board" from A2
32848 Savannah PD A3 Information Crosspatch
32851 Savannah PD A3 & A6 Information Crosspatch
32880 Savannah PD A4 Car-to-Car
32912 Savannah PD A5 Precinct 3&4 Primary
32919 Savannah PD "Across the Board" from A5
32944 Savannah PD A6 Information
32947 Savannah PD A6 & A3 Information Crosspatch
33072 Savannah PD A10 CSI, Traffic, Detectives
33079 Savannah PD "Across the Board" from A10
33104 Savannah PD A11 CSI, Traffic, Detectives
33111 Savannah PD "Across the Board" from A11
33136 Savannah PD A12 CSI, Traffic, Detectives
33168 Savannah PD A13
33175 Savannah PD "Across the Board" from A13
33296 Savannah PD A16 Command
33456 Savannah PD Common
33489 Savannah PD?
34484 Savannah PD?

Savannah Fire and Emergency Services
36880 Savannah Fire and Emergency Services Dispatch
36887 Savannah Fire and Emergency Services Dispatch (night)
36912 Savannah Fire and Emergency Services
36976 Savannah Fire and Emergency Services Fireground 1
37008 Savannah Fire and Emergency Services Fireground 2
37040 Savannah Fire and Emergency Services Fireground 3
37072 Fire Common

City Public Works
49200 City of Savannah Public Works
49232 City of Savannah Public Works
49264 City of Savannah Public Works - Computers
49296 City of Savannah Public Works - Computers
49352 City of Savannah Public Works
49392 City of Savannah Public Works
49424 City of Savannah Public Works
49464 City of Savannah Public Works
49488 City of Savannah Public Works
49520 City of Savannah Public Works - Water Distribution
49552 City of Savannah Public Works
49584 City of Savannah Public Works - Sewer Maintenance
49616 City of Savannah Public Works
49648 City of Savannah Public Works
49776 City of Savannah Public Works
49808 City of Savannah Public Works
49872 City of Savannah Public Works
50000 City of Savannah Public Works
50032 City of Savannah Public Works
50064 City of Savannah Public Works - Park and Tree
50096 City of Savannah Public Works - Traffic Engineers
50128 City of Savannah Public Works - Cemetery
50160 City of Savannah Public Works - Street Maintenance
50192 City of Savannah Public Works
50224 City of Savannah Public Works
50256 City of Savannah Public Works
50320 City of Savannah Public Works
50352 County-Wide Common
50384 City of Savannah Public Works
50512 Traffic regarding TRS

There were reports in early February that this system went down for a time. We were unable to verify it before press time. Any comments on this, or updates to the material above, would be appreciated.
COMMUNICATIONS ELECTRONICS INC.

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Bearcat 330XT-L-T 300 channel base/mobile scanner $359.95

Bearcat 885XT-L-T 300 channel TrunkTracker base scanner $319.95

Bearcat 785XT-L-T 100 channel base/mobile scanner $179.95

Bearcat 485XT-L-T 300 channel base/mobile scanner $229.95

Bearcat 985XT-L-T 400 channel handheld scanner $269.95

Bearcat 148XT-L-T 10 channel weather alert base scanner $109.95

Bearcat 806XT-L-T 4 channel handheld scanner $129.95

Bearcat 60XT-L-T 30 channel handheld scanner $79.95

Bearcat BCT12-42 information mobile scanner $144.95

Bearcat BCT12-42 information mobile scanner $144.95

ICOM PC1000-A computer communications scanner $474.95

ICOM R10 handheld wideband communications receiver $399.95

RELM RW6801 51 Watt 45 channel VHF transceiver $454.95

RELM SMV4009 45 Watt 51 channel VHF transceiver $439.95

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Frequency Coverage: 144-174-512 MHz.

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When I first got into shortwave utility listening at some ridiculously young age, I really wondered why receiver manufacturers bothered to put in any frequencies above 21 megahertz (MHz). Sure, I knew that high frequency (HF), went all the way to 30, but I never seemed to hear anything there. Finally, I decided that they just liked to advertise wideband equipment.

Then the solar cycle, which had been in the doldrums, went into its active mode. Before long, most of the best DX (listening at a great distance, which can be either geographical or psychological) was actually above 21 MHz. And now, in 1999, this is about to happen again.

Already, we’re hearing utility stations that haven’t been logged in several years. Most notable are the US broadcast auxiliaries in their FM (frequency modulation) allocation from 25,870 to 26,470 kilohertz (kHz). This band has become popular with talk stations who need undelayed program feeds to news and traffic reporters in the field, or for audio feeds in general. WFLA, a Florida talker on 970 kHz AM (amplitude modulation), is now being reported worldwide on 25,870 FM. The Voice of America would like to get this kind of coverage from one little transmitter!

Well, solar peaks are like this. Anything can, and usually does, happen. If it’s strange now, just wait until optimum traffic frequencies on some paths go clear into VHF. The surprises have just begun.

Solar Cycles

Everyone’s heard of “sunspots” and how they come and go every eleven years. They’ve been observed for centuries. We’re in cycle 23, as they count these things, and the peak is expected in late 2000 or early 2001. Now, here’s the kind of millennium celebration we like!

Radio propagation is anything that gets the wattage to your cottage, but for us it’s mostly from the ionosphere’s “F” region. Since the space shuttle orbits right in this charged layer, around 250 miles up, we’ve all seen it on television. More accurately, though, we haven’t seen it: There’s not much there. What’s really astounding about HF is how much of what we hear depends on gases so thin that only instruments can tell them from a vacuum.

In fact, this region is so thin that free electrons can last a long time, by electron standards anyway, until recaptured by another ionized atom. In this interval, they’re available for radio wave propagation. More sunspots mean more extreme ultraviolet from the sun, more ionization, more free electrons, and better signals. Especially on hobby-grade equipment, this can very easily turn an uncopyable mumble into a voice that jumps right out of the speaker.

Of course, too much of a good thing can alter the ionosphere in ways that are very bad for HF. Thus solar peaks are one of those good news/bad news things. When it’s good, it’s awesome. When it’s bad, go fishing.

Geoalert?

Solar peak listening is a bit like hunting. You need to be in the right place at the right time. Just as some people study the migration routes of ducks, we study the habits of electrons. One of the best weapons in our arsenal is WWV’s little “Geoalert” bulletin.

The Geoalert, which stands for “Geophysical Alert,” is on the standard time and frequency station WWV, Colorado, at 18 minutes after every hour. It’s also on WWVH, Hawaii, beaming out toward the Pacific, at 45 minutes past the hour. WWV uses 2.5, 5, 10, 15, and 20 megahertz (MHz). WWVH is the same, minus the 20 MHz. For our purposes, “WWV” means both stations.

Like all WWV bulletins, the length is limited to 45 seconds, so they talk fast. A typical one goes something like:

“Solar-terrestrial indices for 25 January follow. Solar flux, 138, and Boulder A index, 7. The Boulder K index at zero hours Universal Time on 26 January was one, repeat, one. Solar-terrestrial conditions for the last 24 hours follow. Solar activity was moderate. The geomagnetic field was quiet to unsettled. The forecast for the next 24 hours follows. Solar activity will be low to moderate. The geomagnetic field will be quiet to unsettled.”

Huh? If you’re new to this, I can’t blame you for thinking it’s gibberish. I certainly used to, until I read up on it. Now I’m such a WWV addict that I get every single Geoalert by e-mail. That’s one every 3 hours. That’s eight per day, 56 a week, 2000 a year, forever. Ahhh, heaven.

Decoding the Numbers

The amount of astrophysical knowledge conveyed in these 45 seconds would fill books. Here’s the short version:

Solar flux is a fancy name for microwave radio noise from excited hydrogen around sunspots. It’s measured daily, preferably at solar noon, in tiny fractions of a watt per square meter called “solar flux units.” It never goes much lower than 65 solar flux units, meaning no sunspots at all, or much higher than 327, the peak in the last cycle. We like it between 90 and 250, give or take a few solar flux units for the time of year.

The A and K indices are fancy names for how much the Earth’s magnetic field has moved in the past 24 and 3 hours, respec-
vitably, as measured in Boulder, CO. Now, who wants to know that? Only power and phone companies, pipeline operators, satellite controllers, scientists, and HF radio users. Geomagnetic data has been collected, massaged, scaled, smoothed, regressed, and generally more fussed over than any other numbers, except maybe stock market prices.

The K index is actually the more timely of the two, being three hours old at most. It uses a rather odd whole-number scale from 0 — no fluctuation at all, to 9 — a very severe “magnetic storm” condition that can affect every system on this planet. The day’s eight K indices are rescaled into the more linear A, which ranges from zero into the hundreds. See Table I for WWV’s geomagnetic field ranges.

For us, the A and K indices indirectly measure aurora. This vast electric current, streaming towards the polar regions, increases greatly with any solar particle ejection. It’s a major cause of geomagnetic storms, and it also tears up HF signals like nobody’s business.

The first audible effect is a fast signal flutter. This can turn into a smearable, rather Dopplersque gurgle resembling psychedelic music. Signals also weaken, then go away. Such deterioration is always present in the polar regions, but it worsens and moves steadily down toward the equator as the “storm” progresses.

To sum all this up, higher solar fluxes are better (for higher frequencies), up to a point. Lower A and K indices are always better, period. However, they interact. Propagation forecasters always balance off the previous day’s solar flux with its A index.

Solar flux below 80 or 90 means mediocre reception, except on lower frequencies. We’re averaging well over 100 now, so this is not a problem. Any sustained increase over this level is very good for higher HF propagation, especially in fall and winter, provided the A and K stay low. If they don’t, it’s nature’s way of telling you to go fishing.

Following these three numbers come the observations and forecasts. “Solar activity” is the number and size of flares. WWV’s ranges of solar activity are very low, low, moderate, high, and very high.

Solar flares are eruptive events that occur around sunspots when their twisted magnetic fields explode. Were the Earth anywhere near one of these, it would be instant toast. At our distance, though, we get X-ray bursts and occasional streams of protons. These are mostly a hazard to satellites.

Large flares, the huge X-ray emitters, become far more common in solar peaks. These X-rays reach us at the same time we see the flare, and instantly thicken the daylight ionosphere, causing it to absorb signals. Most of the time, this effect is barely perceptible, but in extreme cases HF will instantly go away, noise and all, for up to an hour. This is a very unsettling effect to hear. To simulate it, go turn your radio off. It’s that quiet!

Flares also create radio bursts that can unrealistically inflate the solar flux. In January, we got a daily flux over 280, but it didn’t really count. Usually if the daily flux is something ridiculous like 900 they’ll correct it before we even see it, but other times they wait until later in the day. In the January case, the real thing finally turned out to be more like 170, which is still pretty good.

We’ve already talked about the “geomagnetic field.” The voice ranges are based directly on the A and K indices, and go from quiet through unsettled to active, and finally into the “storm” levels. A list of these ranges appears at the end of this column.

Finally, WWV leaves a few seconds at the end where astronomers can drop in warnings of any solar happenings that we might want to know about. These include flares, proton events, and solar cap absorption of signals. In January of most years, you’ll also hear “stratwarm alerts.” This stands for “stratospheric warming,” an unexplained, winter phenomenon over Siberia, with some poorly understood effects on climate and radio.

The solar and magnetic readings of the Geolert have the greatest effect in the Northern Hemisphere’s autumn. Due to the Earth’s position in October and November, good numbers can really do some spectacular things. Skip frequencies can go well into VHF.

Well, folks, have a good hunt!
### Abbreviations used in this column

<table>
<thead>
<tr>
<th></th>
<th>PACTOR</th>
<th>Packet Telemetering</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Force Base</td>
<td>Over Radio</td>
<td></td>
</tr>
<tr>
<td>AM</td>
<td>RSA</td>
<td>Republic of South Africa</td>
</tr>
<tr>
<td>ANDV</td>
<td>RTTY</td>
<td>Radio Teletype</td>
</tr>
<tr>
<td>Camspac</td>
<td>SAM</td>
<td>Special Mission</td>
</tr>
<tr>
<td>Coast Guard</td>
<td>SELCAL</td>
<td>Selective calling tones</td>
</tr>
<tr>
<td>CW</td>
<td>STS</td>
<td>Space Transportation</td>
</tr>
<tr>
<td>FEMA</td>
<td>ARQ</td>
<td>Swedish block length</td>
</tr>
<tr>
<td>MARS</td>
<td>UNID</td>
<td>Unidentified</td>
</tr>
<tr>
<td>MFA Ministry of Foreign Affairs</td>
<td>UK</td>
<td>United Kingdom</td>
</tr>
<tr>
<td>NASA National Aeronautics &amp; Space Administration</td>
<td>USS</td>
<td>United States</td>
</tr>
<tr>
<td></td>
<td>VIP</td>
<td>Very Important Person</td>
</tr>
</tbody>
</table>

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

**Utility Loggings**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>0914</td>
<td>Unid - US Navy MARS station controlling weekly Federal Highway Administration Net. Went to “F-23,” 5755.5. Announced winter net time of 1530, at 1435. (Paul Bunyan-MO) This is now called the Region 7 Federal Agencies Network. 4821 is F-14. Goes to F-23 at 1540, 7743 at 1550, and 9185 at 1555. -Hugh</td>
</tr>
<tr>
<td>0017</td>
<td>1540.0 Oklahoma SECURE (State Emergency Capability Using Radio Effectively) -Hugh, weekly Wednesday net at 1608. Went to 7477 at 1608. (Bunyan-MO)</td>
</tr>
<tr>
<td>0000</td>
<td>5435.5 Andrews-US Air Force “Mystic Star” control, calling SAM 00300 (C-20H) on F-226, at 0210. (Paul Bunyan-MO)</td>
</tr>
<tr>
<td>0000</td>
<td>5700.0 Abnormal 20-US Air Force, H1, test count at 0516. (Perron-MO)</td>
</tr>
<tr>
<td>0000</td>
<td>0620.0 Unid-Probably US Army Corps of Engineers, with auto linking tones at 1609. (Bunyan-MO)</td>
</tr>
<tr>
<td>0000</td>
<td>6739.0 Architect-Royal Air Force, UK, working unid aircraft who wanted his position passed to Blue Star (US Navy, Puerto Rico), at 0603. (Jeff Haverlah-TX)</td>
</tr>
<tr>
<td>0000</td>
<td>6761.0 Raid 91-US Air Force KC-135 tanker, arranging refueling of Reach 5238, US Air Mobility Command, at 0315 (Al Stern-FL)</td>
</tr>
<tr>
<td>0000</td>
<td>6768.0 Unid-Cuban “Cut Number Station,” with 5-letter CW code groups at 1300. (Cam Castillo-Panama) (Same people as the “Atencion” -Hugh)</td>
</tr>
<tr>
<td>0000</td>
<td>6825.0 FAV22-French Army, Mons-Valenier, with CW exercise at 1010. (Ary Boender-Netherlands) Cuban cut numbers, in CW at 1202. (Castillo-Panama)</td>
</tr>
<tr>
<td>0000</td>
<td>6855.0 Unid-Cuban 5-letter CW cut numbers at 0912. Same station and format at 1224, and again on 6854.1 kHz at 1300. Also 6333 at 1236. (Castillo-Panama)</td>
</tr>
<tr>
<td>0000</td>
<td>6983.0 Unid-Cuban “Atencion” numbers in AM at 0215. (Castillo-Panama)</td>
</tr>
<tr>
<td>0000</td>
<td>7348.0 WGY908-FEMA region 8, Denver, CO, calling WGY957, FEMA, NE, at 1631. (Bunyan-MO)</td>
</tr>
<tr>
<td>0000</td>
<td>7508.0 ZRO2-Petoria Meteorological, RSA, with fax weather charts at 0636. (Bob Hall-RSA)</td>
</tr>
<tr>
<td>0000</td>
<td>7669.9 FTD-Unknown French military, testing RTTY at 2200. (Jean-Marie Langlade-France)</td>
</tr>
<tr>
<td>0000</td>
<td>8010.0 New York-NY Radio, NY, North Atlantic NAT-C net air traffic control with Iceland Air flight at 1701. (Perron-MD)</td>
</tr>
<tr>
<td>0000</td>
<td>8096.0 Gander Radio-Gander, Canada, working KLM 78, North Atlantic NAT-A net, at 1809. (Perron-MD)</td>
</tr>
<tr>
<td>0000</td>
<td>8892.0 Unid-Distorted numbers in Spanish, sounded like “Atencion” or “Spanish Lady,” at 0400. (Haverlah-TX) Interesting freq check, right on US Air Force Global -Hugh</td>
</tr>
<tr>
<td>0000</td>
<td>9016.0 WAR 46-US Joint Alternate Command Post, PA, calling WAR 46 Mobile, no joy, at 1520. (Roger C. Roth-USA)</td>
</tr>
<tr>
<td>0000</td>
<td>9120.0 Shark 22-US Air Force, Panama, working Lobo (Joint op center, Howard AFB, Panama) along with Relief 06, at 2300. (Bunyan-MO) Probably Honduran hurricane aid -Hugh</td>
</tr>
<tr>
<td>0000</td>
<td>9462.0 WGY901-FEMA region 1, MA, working WGY912, FEMA Special Facility, VA, on “F-24.” Stations did link-quality check and went to “F-34” (1221), at 1534. (Bunyan-MO)</td>
</tr>
<tr>
<td>0000</td>
<td>10194.0 WGY908-FEMA region 8, working WGY937, at 1641. (Bunyan-MO)</td>
</tr>
<tr>
<td>0000</td>
<td>10420.0 FIDB-French Air Force, Nice, France, CW marker at 1420. (Boender-Netherlands)</td>
</tr>
<tr>
<td>0000</td>
<td>10883.0 Navy 50515-US Navy aircraft working Andrews AFB, at 2301. (Bunyan-MO)</td>
</tr>
<tr>
<td>0000</td>
<td>11053.5 SAM 60201-US Air Force VIP aircraft, getting to groove from Andrews AFB on “F-891,” at 1927. (Bunyan-MO)</td>
</tr>
<tr>
<td>0000</td>
<td>11175.0 JGO 05-Unknown aircraft making phone patch to Delta Ops, who called them “Great Americans,” whatever that means, at 1015. (Pedro, UK) SAM 401-US Air Force VIP flight, patch via Andrews to SAM Command, but lost circuit to higher precedence traffic at 2023. (Haverlah-TX)</td>
</tr>
<tr>
<td>0000</td>
<td>11309.0 Santa Maria-Santa Maria Aeradio, Azores Islands, working various commercial aircraft at 1216. (Boender-Netherlands)</td>
</tr>
<tr>
<td>0000</td>
<td>11340.0 Santa Maria, working Air France 3440, at 1822. (Boender-Netherlands)</td>
</tr>
<tr>
<td>0000</td>
<td>11345.0 SDJ-Stockholm Radio, Sweden, selcal check with Premiair flight, at 1521. (Boender-Netherlands)</td>
</tr>
<tr>
<td>0000</td>
<td>12353.0 WXC9104-Tug Monitor w/position report for WPE, Jacksonville, other tugs heard too, at 1830. (Jay Steimiel-AR)</td>
</tr>
<tr>
<td>0000</td>
<td>14822.0 Unid-RTTY telext test, using several callsigns, at 1300. (Langlade-France)</td>
</tr>
<tr>
<td>0000</td>
<td>14570.0 CIQ3-Mossad, Israeli numbers in English, with weird French accent, at 14444, and different day at 1450. (Steimiel-AR)</td>
</tr>
<tr>
<td>0000</td>
<td>15088.0 CAMSPAC Point Reyes-US Coast Guard, CA, calling Straight 801, no joy, at 1801. (Bunyan-MO)</td>
</tr>
<tr>
<td>0000</td>
<td>16107.0 Stockholm-Swedish MFA, messages to all consulates in Sweden ARQ, new frequency for this one, at 2304. (Hall-RSA)</td>
</tr>
<tr>
<td>0000</td>
<td>16984.5 PPR-Rio de Janeiro Radio, Brazil, with RTTY weather and shipping bulletin, in either Spanish or Portuguese, at 0525. (Hall-RSA)</td>
</tr>
<tr>
<td>0000</td>
<td>17135.0 Cutter 55, or similar sounding, probably an aerial tanker, working what sounded like Cutter 56, then back to UHF at 0335. (Bunyan-MO) On a Russian maritime RTTY channel? I love it! -Hugh</td>
</tr>
<tr>
<td>0000</td>
<td>17519.0 WGY908-FEMA, working WGY912 on “F-53,” at 1712. (Bunyan-MO)</td>
</tr>
<tr>
<td>0000</td>
<td>18183.4 MPA-Angarica MFA, New York, with long message in French to Algiers and Geneva, in Coq-8 at 1300. (Bob Hall-RSA)</td>
</tr>
<tr>
<td>0000</td>
<td>19131.0 Atlas-Drug Enforcement Agency, IA, giving Voice of America broadcast frequencies to unid aircraft, Atlas noted that he was reading them from Monitoring Times, at 2200. (John Maky-AR) It’s the April issue, but I swear I did not make this one up! -Hugh</td>
</tr>
<tr>
<td>0000</td>
<td>20198.3 Cape Radio-US Air Force, Cape Canaveral Air Force Station, FL, calling King 53, at 1714. (Bunyan-MO)</td>
</tr>
<tr>
<td>0255.0</td>
<td>22555.0 UUI-Odessa Radio, Ukraine, CW marker at 1201. (Boender-Netherlands)</td>
</tr>
<tr>
<td>0000</td>
<td>23337.0 Thule-US Air Force, Thule Air Base, Greenland, with unknown station at 1827. (Bunyan-MO)</td>
</tr>
<tr>
<td>0000</td>
<td>25910.0 WJFP-FM program audio from religious broadcast stations in Ft. Pierce and West Palm Beach, FL, also on 25840, at 1623. (Bunyan-MO) See Utility World for more on these broadcast simulcasts. -Hugh</td>
</tr>
</tbody>
</table>

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Catch Coquelet-8 Before It’s Too Late

This month’s column continues our focus on increasingly complex HF digital transmission systems with a look at Coquelet-8 and its two chief users — the Ministry of Foreign Affairs (MFA) and Customs agencies of Algeria.

The reasoning behind the urgency in this month’s column title is that both of these organizations have recently been heard experimenting with new and considerably more complex modes. MFA Algiers has been spotted using the Racal MSM1250 “SkyFax” modem on a number of embassy circuits, and Algerian Customs have specially modified commercial PacTOR modems. In all likelihood, as in many other recent cases, a gradual migration to the new equipment will take place sooner rather than later. First, let’s take a look at each of this month’s guests...

**Algeria’s Diplomatic Service**

MFA Algiers, or to use its ITU callsign, 7RQ20, can be heard nearly every weekday (except Fridays) and at weekends on a variety of frequencies (see Table 1) with messages to many embassies across the world.

**Table 1: Commonly logged MFA Algiers frequencies**

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>10993.64</td>
<td>MFA Algiers</td>
</tr>
<tr>
<td>10993.78</td>
<td>MFA Algiers</td>
</tr>
<tr>
<td>10996.37</td>
<td>MFA Algiers</td>
</tr>
<tr>
<td>13428.40</td>
<td>MFA Algiers</td>
</tr>
<tr>
<td>16315.40</td>
<td>MFA Algiers</td>
</tr>
<tr>
<td>16315.74</td>
<td>MFA Algiers</td>
</tr>
<tr>
<td>16316.30</td>
<td>MFA Algiers</td>
</tr>
<tr>
<td>16318.40</td>
<td>MFA Algiers</td>
</tr>
<tr>
<td>16318.50</td>
<td>MFA Algiers</td>
</tr>
<tr>
<td>16315.40</td>
<td>MFA Algiers</td>
</tr>
</tbody>
</table>

Messages, nearly always in plain text, are most often sent in French, but the ATU-80 Arabic alphabet is also used on occasions. Coquelet-8, at the higher speed of 26.67 baud is most often used, switching to 13.33 baud if the going gets tough. Messages follow a standard format and also contain a header which readily identifies both the sender and recipient of the message. Here’s an example:

**Table 2: Example Algerian Embassy Dakar to MFA Algiers**

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1230z</td>
<td>MFA Algiers</td>
</tr>
<tr>
<td>1/10</td>
<td>MFA Algiers</td>
</tr>
<tr>
<td>exp embdg</td>
<td>MFA Algiers</td>
</tr>
<tr>
<td>dakar</td>
<td>MFA Algiers</td>
</tr>
<tr>
<td>mae/dgac/dcee/sdvqam algier</td>
<td>MFA Algiers</td>
</tr>
</tbody>
</table>

Note the “vci off,” short for “voici office” or “here is the office of.” The second line contains the sender, “expediteur,” and the last line, the destination.

Generally, the Algerians use dual-frequency operation on their networks. MFA Algiers broadcasts to a number of embassies on a single frequency, with embassies sending replies or return messages on a different frequency. Once the MFA completes the broadcast, embassies are asked by the MFA operator to reply from their own frequencies in turn. The MFA’s operators often use nicknames to identify the remote embassies during such exchanges, e.g., “dkr dkr dkr pse qsi!” when asking Dakar to confirm receipt. Most embassies use the same reply frequency when sending their confirmations or messages to Algiers.

**Algerian Customs**

Our other commonly logged Coquelet-8 user is the Customs headquarters in Algiers and its various outposts across this large country. Traffic has been noted on the following frequencies:

**Table 3: Algerian Customs Frequencies**

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4757.00</td>
<td>Customs Algiers</td>
</tr>
<tr>
<td>6911.38</td>
<td>Customs Algiers</td>
</tr>
<tr>
<td>7418.70</td>
<td>Customs Algiers</td>
</tr>
<tr>
<td>7808.62</td>
<td>Customs Algiers</td>
</tr>
<tr>
<td>7813.39</td>
<td>Customs Algiers</td>
</tr>
<tr>
<td>10011.39</td>
<td>Customs Algiers</td>
</tr>
<tr>
<td>10467.39</td>
<td>Customs Algiers</td>
</tr>
<tr>
<td>11251.38</td>
<td>Customs Algiers</td>
</tr>
<tr>
<td>11527.40</td>
<td>Customs Algiers</td>
</tr>
<tr>
<td>13853.70</td>
<td>Customs Algiers</td>
</tr>
<tr>
<td>13898.65</td>
<td>Customs Algiers</td>
</tr>
<tr>
<td>13933.64</td>
<td>Customs Algiers</td>
</tr>
<tr>
<td>13934.80</td>
<td>Customs Algiers</td>
</tr>
<tr>
<td>13936.39</td>
<td>Customs Algiers</td>
</tr>
</tbody>
</table>

Messages are usually long lists of imports and exports at various checkpoints, or impounded goods. The procedures used in these networks are virtually identical to those in use on Algeria’s diplomatic service. Here’s an example header:

**Table 4: Example from Customs Office Ouargla to Oran**

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>zzct cr09 ay06 09 05.96 efb</td>
<td>Customs Algiers</td>
</tr>
<tr>
<td>pp ou cr hfr efb</td>
<td>Customs Algiers</td>
</tr>
<tr>
<td>off ouargla to or 1291 le 12/11/95 a 16h00hl</td>
<td>Customs Algiers</td>
</tr>
<tr>
<td>exp:mm:le chef de l’inspection divisionnaire des douanes a ouargla</td>
<td>Customs Algiers</td>
</tr>
<tr>
<td>des:mm:le chef de l’inspection divisionnaire des douanes a oran</td>
<td>Customs Algiers</td>
</tr>
</tbody>
</table>

Note the use of the “off” keyword to identify the sender of the message. As can be determined from the “pp” line or copy list in the example of Table 4, operators at each of the 30 or so towns, whose customs offices are equipped with Coquelet-8, identify their locations with three letter abbreviations. HQ in Algiers is identified by “alg” or “dgdi” (Directeur General des Douanes).

**Decoding Coquelet-8**

As its name suggests, Coquelet is an MFSK (multi-frequency shift-keyed) system using eight tones. The tones are spaced by a meager 30 Hz which demands a narrow filter and a receiver capable of tuning in 10 Hz steps or better, as well as a steady tuning hand for satisfactory results.

The Wavecomm and Hoka decoders are all capable of handling Coquelet-8; in the case of the Hoka this sometimes requires the purchase of a “special” package. Decoding Coquelet-8 is relatively simple with one of these decoders. All that’s required is to tune the center frequency of the decoder to the mid-point of the 4th and 5th tones, and the decoder will do the rest.

In all but a few cases, this will quickly produce French or ATU-80 Arabic text. Those that aren’t decoded or produce garbage on screen are usually a rarely used Mark II version of the system, supported only by the newer Wavecomm units and the Hoka Code 30.

Coquelet-8 is also easy to identify by ear. Try one of the MFA Algiers frequencies listed, and you will soon hear the characteristic key-up, short idle, and traffic sound of the system. It goes something like daaaaaaaah, diddle-liddle-liddle, followed by the rhythmic, flute-like sound of the main traffic.
The shortwave transmission season now designated A-99, from the last Sunday in March (or first Sunday in April when Daylight Savings Time starts, in the case of some US stations), is expected to bring lots of moves to higher bands than last year at this time, as we approach the next sunspot maximum.

Unfortunately, at our press time, few of the new schedules were yet available. Recent changes made in late winter are probably no longer relevant. Besides frequency changes, the usual one-hour timeshifts due to DST in Europe and North America on some stations, but not on others, lead to further confusion. We suggest you seek out the latest info for stations of interest to you on the internet. With more and more libraries providing free public internet access, there’s little excuse any more for not using this resource!

**BBC Comes Clean on 3-Year Plan**

After denying earlier leaked reports that BBC would be terminating its German service, BBC confirmed this on Feb. 10, trying to put a positive spin on the following three-year plan (gh):

**World Service plans to meet the broadcasting challenges of the next three years with a major investment programme in the internet, a repositioning of the English programming and the expansion of FM distribution. The following plans were announced by Chief Executive, World Service, Mark Byford:**

Twelve World Service language services will be fully multimedia in both text and audio by 2002. All language services will be in real audio on the internet by 2005. Two continuous streams of English programming will be introduced — a 24 hour news stream, World Service News, and a stream of high quality general programmes called World Service Plus, both available on the internet and satellite 24 hours a day.

More FM frequencies for World Service will be sought with the aim, wherever possible, of being on FM in every capital city of the world within five years — while still maintaining a strong, core shortwave network, particularly in the least developed and politically sensitive parts of the world.

The two new streams of English programming will allow the mix of World Service programmes to be specially adapted for listeners in different parts of the world. This means that while World Service listeners on shortwave will continue to hear the present “rich mix” of news and general programmes, listeners to World Service on FM in cities such as Berlin, Prague, Amman and Nairobi will be able to hear their own specially tailored version of World Service compiled from the programmes available on both streams.

In parallel to these investments, World Service has looked hard at its existing services against the media background at the turn of the century. The following are the key changes:

The German language service will close. In the developed world, the World Service strategy is to target the cosmopolitan audience of opinion formers and decision makers, primarily through the English Service. Recent audience research shows that a quarter of opinion formers in Berlin listen to the World Service, but nine out of ten listen in English. Spending will be focused on an enhanced English service, and on broadcasting in FM in Germany in order to serve this target audience.

Shortwave coverage will be reduced in regions where this does not endanger the ability of audiences to access World Service programmes (e.g. where FM frequencies are available). Moreover, shortwave coverage will remain fully protected in areas of the world where local broadcasting arrangements could be threatened by political instability (via Dave Kenny, British DX Club)

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**ANGOLA** Grey clandestine VORGAN - a Voz da Resistência do Golgo Negro - operated by UNITA resumed broadcasts in Jan as peace shattered. 0700-0900 UTC on 5950 kHz, 1200-1430 on 11830, 1900-2100 on 7100 (Luso-Americano via Rui Pires, Portugal, Clandestine Radio Watch)

**ANTARCTICA** LRA96 - Radio Nacional Arcángel San Gabriel. A new 10 kW shortwave transmitter from CCA Electronics in Atlanta, Georgia, is now going to the Antarctic Territory. With this the station will cover all Antarctic Territory with its programs and may broadcast 24 hours if necessary. The old transmitter was purchased in 1982 and could only broadcast two hours a day. The new transmitter will broadcast on 6030, 11955 and 15475 kHz, and will be operated by the personnel of Base Esperanza. Currently the transmitter is in Base Maramba, and will go to Base Esperanza in the icebreaker ship Almirante Irizar. Expected to start operations in Feb (Gabriel Ivan Barrera, Argentina, Electronic DX Press)

**AUSTRALIA** Rumor from reliable sources: Deutsche Welle, Ni-K, and Merlin are negotiating to lease and operate the Cox Peninsula transmitter site which Radio Australia has not been allowed to use for the past sesquiyear (Mike Bird, RN Media Network)

**BAHRAIN** Gulf News Agency (WAKH) in Arabic daily F1B 75 baud RTTY to ME/AF; 0500-1500 14764v, 9197v; 1500-2100 14764v, 4043v. Often does not start sending items until well after the nominal start, and traffic after 1500 is infrequent (BBC Monitoring)

**BRAZIL** The status of shortwave and tropical bands in Brazil: There are currently 62 stations transmitting on SW, with two more to be installed in the states of São Paulo and Minas Gerais. Data is from the Ministry of Communications. On the tropical bands there are 78 stations, also with two more to be installed, one in Amazonas, and another in Rondonia.

The state with the greatest number of SW is São Paulo, 21 frequencies. SP also leads the tropical list with 15, while Amazonas has only 9. I wonder which two are the SW stations to be installed? In São Paulo, it may be R. 9 de Julho. Some states have SW vacancies. Ceará has two, which should be for the old Ceará Radio Clube, Maranhão has one, which should be for the old Timbiras which once used 19 meters.

On tropical bands, the number is much greater: 542 channels; the state of São Paulo alone has 60 available (Célio Romais, RGS, radioescutas) I assume the 542 figure includes possibility of piling up several stations on each frequency, much like mediumwave (gh)

**BULGARIA** Radio Bulgaria planned to stop broadcasting in Spanish March 27 for economic reasons, according to a report on the Cadena DX net by Marino Pace. We call upon everyone to send protest letters to the station in order to save this service (Jorge Garcia Rangel, Venezuela)

**CANADA** Alan Maitland, the voice of CBC Radio’s As It Happens for almost 20 years, 1974-1993, died Feb 11 in Vancouver of heart failure. He was 78 (Steve Merli, Canadian Press, via Mike Cooper)

**COSTA RICA** RFPI heard announcing in
Spanish, but never in English, a postal code attached to their box number: Apartado Postal B6-0150, Santa Ana (gh)

*Continental of Media* additional times on RFPJ: Tue 2000, Wed 1200, sometimes also Wed 0400, Sun 2200, Mon 0630 (gh)

*Chiapas: El Mundo Habla* was a single half-hour in Spanish on behalf of the Ejecutivo Zapatista de Liberación Nacional broadcast by RFPJ in January; it got a lot of publicity thanks to a Feb. 1 story in *Bired* by Christian Jones. Meanwhile, RFPJ continued with a weekday Chiapas newscast in English at 2155, 0555 (gh)

A local community in a remote area of Costa Rica, which feels isolated, and is 20 km wide, wants to set up a SW station, since the FM band is claimed by commercial broadcasters, following the RFPJ model, and RFPJ has also agreed to assist (James Latham, RFPI Millennium Dreams)

*Radio For Peace International Annual Report*: In 1998, there were 14 students, interns, and volunteers, who collectively contributed a total of 37 months of work (not including paying Institute of Progressive Communications-IPC students). Over the past 11 years, there have been several hundred volunteers.

RFPJ's budget for its first year of operation in Costa Rica was only $16,000. The 1998 budget of Earth Communications to run RFPJ was $186,093, including $52,000 in donated goods and services. This includes the office, which is 100% volunteer. Full time salaries went to only five people.

*Technical Upgrades in 1998*: Frequency synthesizers replace crystal-controlled; once antennas are returned, RFPJ can change frequency quickly if necessary to avoid deliberate jamming, rather than wait 3-4 weeks for new equipment. Key components now on hand include a tube for the 10 kw transmitter in addition to one for the 30 kw. A full-power 3 hp blower and motor are on standby. Brown-outs and voltage fluctuations are a continuing problem.

*Antennas*: Four new ones were built and installed in 1998:

- For 21450 kHz - Five element yagi at 105 feet, and directional control
- For 15050 kHz - High gain yagi, on tower, increased to 200 feet high with addition of three tower sections
- For 6975 kHz - Four element cubical quad just below the yagi at about 198 feet high. Very high given. Boom is 55 feet long, 50 feet tall and wide, but not much wind resistance. Backup bi-directional control array to improve coverage toward the south, still under construction.
- A high-speed computer was added, allowing sending and receiving programs on internet, subject to limitations of the only ISP in Costa Rica.

*FM transmitter* on 101.3 has a stronger signal; soon to be installed on a mountain, increasing coverage further, something much anticipated by the Spanish department.

Planned new programs in 1999 include: *Deep Ecology for the XX Century* (a New Dimensions production); *Wisdom Radio Network* programs *Voices of Vision*. RFPJ hopes to exchange staff and training with Channel Africa.

*IPC* (intensive Spanish lessons and radio training) plans four sessions in 1999 in May, June, July and August; so far May has been confirmed. A minimum of four students is required for each session.

*Paz* the Cat, who runs the station, knocked RFPJ off the air whilst chasing spiders, jumping up and down on some equipment, disconnecting several mini-disc and recording machines; and the day before had to clean her hair out of a VHS recorder where she had been sleeping.... (excerpts from Martin A. Morales, Miami Herald via Mike Cooper)

*Cuba* [non] Jose “Pepe” Collado, a carpenter and labor leader, has been appointed to chair the Advisory Board for Cuban Broadcasting, including R. Marti. A pep rally at Florida Int'l University gave him a pat on the back and sent the U.S. Senate the message to confirm him as soon as possible.

*Ethiopia* [non]. V. of United and Free Ethiopia, clandestine, appears to be dead; no longer heard on previous schedule or mentioned on Ethiopian National Congress website (Hans Johnson, Cumbre DX)

*Germany* DW heard promoting a news program in simple German for those learning the language, Alltag deutsch. Too bad other stations don't do likewise (Tim Hendel, AL) DW* Plus* for Feb showed this as a 20-minute weekly program on Thu 0935, repeated 4-hourly, i.e. 1335, 1735, 2135, Fri 0135, 0535 (gh)

*Greece* In a letter of Dec 21, Dionisos Angelogiannis of ERJ says he has been overloaded with work and continues to be. In his new position, he hopes to find some money to install the new VOA-donated transmitters in Avils and Thessaloniki. It is a big installation and the substructure in Avils is not good. New building has to be done, electrical supply has to be increased (John Babbis, MD)

*Honduras* The 4930.6 station in San Pedro Sula, R. Costeña, also calls itself Ebenézer 12-20, after the biblical name (Henrik Klemzet, Sweden)

*Iran* [non]. More on WWCR's Persian program Fri/Sat 1100-1200 on 12160. The program is IDing as “Radio International” (the English word “International” is used in the Persian ID). Reception reports are requested to BM Box 1499, London WC1N 3XX or to fax +1-416-515-6722 (Toronto, Ontario). The program mentions that a sister program in Kurdish is broadcast “on the same wavelength” and at the same time on Thursdays. It’s hard to gauge the political flavour of the station from a quick check. The program includes a talk on the “stupid” and “disgusting” antics of Iranian intellectuals, but doesn’t appear to say what it favours for Iran’s future (fewer intellectuals perhaps?). (Chris Greenway, BBC Monitoring, via Review of International Broadcasting)

*1998* Calls it’s first year of operation. In exact translation it’s *Radio Question International* (P. Mohazzabi, World of Radio) The music used behind the identification of Radio Posesh is from Jethro Tull’s “Thick as a Brick,” a piece recorded in 1972, and occupying both sides of an LP (Frank van Gerwen, Castricum, Netherlands)

*Italy* Nexus-BA, Italy’s satellite station has been displayed in Berlin for moving RKL relay onto adjacent 3980 to 2030-2230, contrary to regulations and threatening the existence of IRSS (Alfredo Cotroneo, IRSS)

*Jordan* Just when the world’s attention was focused on Jordan at the death of King Hussein, R. Jordan replaced its English SW broadcast on 11690 kHz with Arabic. Way to go! It was, however, as usual, clashing with RTTY; we wonder if the king, more a ham than a SW listener, ever tried to pick it up while in the US? (gh)

*Norway/Gabon* Concerning the Africa No. 1 takeover of the old NRK Fredrikstad Thomson transmitter, Alfred Andersen of NRK confirmed MCM International (owner of Africa No. 1 in Gabon) paid NOK $20,000 for the SW transmitter, including all spare parts, and the almost complete second transmitter (TR-2351) formerly used in Sweden.

*Africa* No. 1 will use it all as spares for their current units. All together the parts probably represent a $1000 donation to NRK. It bought new from Thomson-AEG; some of the parts are even hard to find these days. In this view, the sellout at 20,000 dollars seems little. But, the alternative for NRK would have been a costly scrapping of the equipment.

*Africa* no 1, represented by their chief engineer Joseph Mouglabi, already have collected transmitters from Fredrikstad, as understood, and they have covered all costs involved in disassembling, packing and shipping. They also hired former engineers of the station to help them with the job.

*Vanuatu* Parts have been taken care of by the NRK Museum (for a planned museum at the NRK broadcast centre in Oslo), the NRK regional office in Fredrikstad, the Norwegian Teleuseum, and Norkring - the company responsible for transmitter operations in Norway. What is left (building and premises) are being sold to the City of Fredrikstad. A former engineer with the Fredrikstad transmitter plant has been documenting the history of the station. This on-going project was ordered by the National Archive of Norway and is paid for by NRK (Bertil Erjford, “DX-News” via British DX Club)

Radio Norwegian Ceases issuing QSLS. I have received a note dated Jan 7 from Radio Norwegian International advising that reception reports will no longer be verified, due to “tight economic budgets and reduction of staff.”

The Technical Manager Olav Grimdalen is interested in reports, even though he cannot send out QSLS and his address is: Post og Telelyset, Box 524 Centrum, 0105 Oslo. One wonders whether some international broadcasting stations understand anything at all about listener feedback (Bob Padula, *Electronic DX Press*)

*Papua New Guinea* According to press reports, the National Broadcasting Corporation is to undergo a major revamp and become fully incorporated. The NBC’s longest serving radio personality, Anton Kaut, has been appointed to head the new commercial division that will market the network and gradually move into commercial broadcasting. NBC managing director Boski Tonny said the NBC is embarking on an exercise to strengthen its transmission to the provinces with the help of the Japanese Government, while Australia is assisting with the upgrading of mediumwave transmitters.

The newspaper also commented on the failures of the commercialized “Kalahar” service which, despite its early popularity with listeners, has not

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April 1999 MONITORING TIMES 35

www.americanradiohistory.com
been the “cash cow” the government hoped for. “It is hard to see how the commercialisation of the existing KUNO and remaining Kundu service stations can solve the NBC’s financial problems.”

The editorial bemoaned the demise of the Kundu provincial services which used to carry daily newscasts in up to six languages, with a wide range of extension programs contributed by public servants in national and provincial departments. “Education, agriculture, health, the range of extension programs contributed by the program and provincial stations. That invaluable information pipeline has become choked over the years by poor and unimaginative management, and the near total neglect of successive National Governments,” the paper said. (Matt Francis, Electronic DX Press)

**PERU** 5906.8 - R. Panamá, 2350-0120. The Peruvian noted in USA and in a tip via Glenn Hauser in Radio Enlace-RNW is Radio Panamá from Distrito Recopampa, Provincia de Cuzco, Dpto. de Cuzco. It’s a new station formed by the brothers Miguel y Segundo Delaibio (I am not sure of the surname). They have another station on 1400 kHz named La Voz de los Andes, and Miguel is manager of that, and Segundo of Radio Panamá. Slogan: Radio Panamá la Reina de la Sintonía, Said it was testing on 5900. Off the air at 0120, not heard in the mornings. I don’t believe that Radio Panamá is a religious station (Rafael Rodriguez R., Bogotá, Colombia).

Also heard on 5906.84 at 1105-1134, but the location is Lucmapampa, a sleepy village at altitude of 2624m (Takayuki Inoue Nozakura, JAPAN). Relámpago DX Logon Lucmapampa from the village, place, capital of Jorge Chávez district, 10 km SSE of Cusco on a spur from the main road to Cajamarca (Don Moore, IA).

R. Manantial, 5773.72, is a new station with Christian format heard at 1035-1116, tentatively from Jaen, Cajamarca, also with slogan La Voz del Norontente Peruano, very strong. Thanks to Henrik Klemetz for help with this (Jay Novello, NC) Name means spring or fountain as in source of water (gh)

**PUERTO RICO** AFRTS site-specific e-mail OSL received in 11 hours of e-mail report of the 6456.5 kHz outlet. They are broadcasting from the Naval Computer and Telecommunications Station, Isabela, Puerto Rico, with 10 kw. Message also said the outlet on 12669.5 comes from the Naval Computer and Telecommunications Area Master Station, Key West, FL, with 8 kw. Verie signer is Wayne E. Ettemicha, Broadcast Operations Specialist, ettemicha@mediacen.navy.mil (Rob Keeney, Overland Park KS)

Antenna in PR is a ground-based, omnidirectional wire with 30 foot diameter, in FL a 48-foot inverted cone from Boca Chica (Ettemicha via Wild Renn) (gh)

**ROMANIA** Radio Romania International’s 1300 UTC broadcast is occasionally at listenable level but one Friday was actually around 17806.3 with heterodyne against something more accurate; //17745.0 whilst the two 19 mb frequencies, 15335 and 15390, were quite weak and fluttery. The Romanian home service on 17850 had the usual internal noise sounding like self-inflicted jamming (gh)

**SPAIN** RER debuted a new DX program, Radio Waves, UT Sun 0025 0125, 0525 on 6055. Said they could never take Terry Burgoyne’s place (John H. Carroll, USA) New host is Justin Coe (Pete Costello, John Norfolk) (gh)

**SRI LANKA** Iranawila, the 13th VOA relay station, which has had more than its share of problems, is expected to be operational with at least two transmitters by June/July. They have already conducted some tests of their antennas. (Victor Goonetilleke, Sri Lanka) (gh)

**SUDAN**[non] The VOA 2250 Eritrea Renewal can be accessed at: http://www.safsudan.com/broadcast/2250.html (Roger Tidy, UKOGBANI)

**TIMOR EAST**[non] A Voz do Timor Leste is supposed to be via R. Portugal at 1200-1400 M-F on 17740. Although there are programs in Tetum and Portuguese, also for East Timorese living in Australia, this ID is not heard, and there is no mention of the PRETILIN Resistance Movement. Valter got the program ID in Tetum, Timor Loro Sae. I have been told that this means Timor of the Rising Sun, a traditional name for the island (Valter Aguiar and Hans Johnson, Cumbre DX) This transpired before the reported Indon- ees among the ranks of East Timorese independence (gh)

**TANZANIA** The six 500 kW Brown Boveri transmitters at TANAN have an interesting history. They were used at the Radio Free Europe/Radio Liberty relay site at Maxqueira, Portugal, from 1991 to 1994, perhaps one of most short-lived SW sites ever. In fact, the Maxqueira transmitters were moved just as VOA was constructing its new site at B智t, Morocco. The new nearby sites were used by VOA and RFE/RL to transmit to the same countries in the same languages at the same times. The end of the Cold War, budget cuts, and the consolidation of VOA and RFE/RL engineering operations resulted in the closing of the Maxqueira site. Three of the transmitters are now testing at TANAN, and three will come on line at a later this year. (Kim Elliott, VOA Communications World via Tom Sundstrom, via BC-DX)

VOR station is now on regular operation from Jan 15. Timan is very strong and should be very well received in SE Asia and China, as it is heard at super strength in India and Sri Lanka one more hop away; following according according to detailed monitoring so far:

<table>
<thead>
<tr>
<th>Tx</th>
<th>UT</th>
<th>Freq</th>
<th>Service</th>
<th>Language</th>
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<tbody>
<tr>
<td>TIN-01</td>
<td>0800-1000</td>
<td>13650</td>
<td>Net P</td>
<td>(Eng)</td>
</tr>
<tr>
<td>1000-1100</td>
<td>13650</td>
<td>Net R</td>
<td>(Chin)</td>
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<tr>
<td>1100-1200</td>
<td>13790</td>
<td>Net RFA1</td>
<td>(Lao)</td>
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<td>1200-1300</td>
<td>13790</td>
<td>Net RFA3</td>
<td>(Khmne)</td>
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<td>1300-1400</td>
<td>15250</td>
<td>Net R</td>
<td>(Chin)</td>
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<td>1400-1500</td>
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<td>Net RFA1</td>
<td>(Cant)</td>
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<td>Net RFA1</td>
<td>(Mand)</td>
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<tr>
<td>1600-1900</td>
<td>13735</td>
<td>Net RFA1</td>
<td>(Mand)</td>
<td></td>
</tr>
<tr>
<td>1900-2000</td>
<td>11740</td>
<td>Net RFA1</td>
<td>(Mand)</td>
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</table>

It took Vietnam about a week to start jamming 15470 at 1400-1500 with no less than three transmitters. One is a badly humming rifle-like, another open carrier, and a third with Hanoi domestic service (Victor Goonetilleke, Sri Lanka, DSWCI DX Window) Reminding us that anti-freedom-of-the-press Communists are still in control (gh)

**U.S.A** WRMI, 9955, relay in Spanish of R. Praga, Czech Republic, at 2230 in clear at times when gave entire Spanish schedule not mentioning WRMI relay, but at 2250 check, Cuban bubble jammers had started up, and still going against R. Vaticano relay at 2315. I thought Fidel was trying to be friendly to the Catholic church? (gh)

**WMLK** - Their new vertical array antenna, mounted between the two upright red and white masts that support the (sagging) log period, was visible from Interstate 78 westbound while passing the transmitter site near Bethel, PA. They also have installed a new sign with callsign and frequency information which can be seen from the road. (Brett Saylor, PA, Cumbre DX)

WBCQ - Allan Weiner has asked me to pass along the information that he may no longer be contacted by e-mail. He has decided to give up on e-mail because of the large number of negative and hateful messages received over the past several months. He asks that anyone who needs to contact him please phone him at the station in Monticello. (Dan Lewis, wbcq.net)

During summer DST from April 5, remember that all WBCQ and WWCR programs, including World of Radio shift one UT hour earlier, usually on the same frequencies. After WWCR cancelled in Feb our first airing Thu at 2130, we made WBCQ the first airing, by phone-feed minutes after usual production, Wed at 2200 on 7415. However, summer shift to 2100 limits it to daytime absorption. For our latest schedule see: http://www.angelfire.com/ok/worldofradio

WGTG - David Franz of WGTG told us by April they were moving to sideband exclusively, except for religious programs on the weekends. This saves so much money in utility bills and transformer tubes, he’ll be cutting his hourly rate for commercial customers. Mon and Fr 7:00-7:30 ET he has a program, Ask WGTG, in which he answers questions about radio, about the station, about sideband broadcasting, etc., and recommends Monitoring Times to new listeners, he says. He says he is considering a program on ham radio including some on-air code practice (Racial Baughn)

KVOH - On at least two occasions in Jan, High Adventure Ministries was on 5975 kHz in the 0700-0800 period clashing with BBC-Antigua which in turn used that frequency that morning from 0800 (Ivan Grishin, Ont.) Possibly punch-up error for 9975? (gh)

RFPi not only has a Far Right Radio Review but a Far Right Web Review at: http://www.clark.net/lpub/cwilkins/ftp/rfww.html (Chet Copeland, Review of International Broadcasting)[non] VOA Communications Worldtested via Dushanbe, Tajikistan, Sun 0930 on 15605, but there were numerous problems actually getting the program on the air (gh)

ZIMBABWE 2BC Radio 4 reactivated 5012 kHz at 0300-0415+, but subsequently kept switching around among 3396 and 4828 (Brian Alexander, PA)

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

Gayle Van Horn

0000 UTC on 17820
PHILIPPINES: VOA relay. Special English broadcast noted 0030-0058, fair signal quality and good audio. (Lee Silvy, Mentor, OH)

FEBF Manila on 1307 at 11995. Country Crossroads program of interviews and C&W music. (Mark J. Fine, Remington, VA)

Radio Philippines on 15330, //17730, 13770 to 0331 in English/Tagalog. (Walter Salaminw, Victoria BC, Canada/Hard Core DX)

0000 UTC on 21740
AUSTRALIA: Radio Australia. World newscast. (Bob Fraser, Cohasset, MA) At Your Request music program to ID and 2300 news. (Larry R. Zamora, Garland, TX) Broadcast news at 2200 on 21740. (Dean Burgess, Manchester, MA) Station address: GPO Box 4286, Melbourne VIC 3001, Australia.

0005 UTC on 6479.7
PERU: Radio Altura. Spanish huayno music with regional items of fair signal quality. Peru’s Radio Satelite on 6725.6 at 0025-0045; Ondas del Rio Mayo 6797.7 at 2340-0005, “alegria y armonia, canciones por el corazon.” (Michael Schnitzer, Hassfurt, Germany/HCDX) (Harold Frodge, Midland, MI)

0015 UTC on 9485
BULGARIA: Radio Bulgaria. Events & Developments feature on reforms in the Bulgarian Army. (Bob Fraser, Cohasset, MA) Answering Your Letters on 7375 at 0300. (Jim Boynton, Newton, MA)

0024 UTC on 15425
SRI LANKA: SLBC. Signal tone at tune-in to drum signal at 0027. South Asian music to time tips at 0030. Very weak signal. // 9730 stronger, co-channel German speaker’s interference. (Salaminw, CAN) Unknown language to station ID. (Silvi, OH; Frodge, MI)

0035 UTC on 6055
SPAIN: Radio Exterior Espana. Review of a French play based on the life of King Charles I of Spain. (Fraser, MA)

0040 UTC on 9685
IRAN: VOIRI. ID to report on religious minorities in Iran. (William McGuire, Cheverly, MD)

0110 UTC on 9420
GREECE: Voice of Greek music to ID. (McGuire, MD) Station on 15485 at 1800 into Spanish service 1815. (Boynton, MA)

0200 UTC on 9475
EGYPT: Radio Cairo. Egyptian music into news at 0215. Fair signal quality. (Boynton, MA) Press Review on 9990 at 2140. (Hownload, UK)

0210 UTC on 11705 USB
CUBA: Radio Havana. English broadcast very good signal without interferences, not // on 6000. Parallel frequency carrying Spanish speech. (Silvi, OH) Mailbag Show on 13720, 2111-2118+. (Frodge, MI)

0315 UTC on 11690
SEYCHELLES: FEBA: Good signal in Farsi over Voz Cristina (which was stronger SEYCHELLES: FEBA: Good signal M) CUBA: Radio Havana. English broadcast very good signal without interferences, at 0315 in presumed Swahili to 0345*. (Pol Urmandy, Oamaru, New Zealand/HCDX)

0400 UTC on 15325
BRAZIL: Radio Gazeta. Poor to fair Portuguese programming with religious service. (Ormandy, NZ/HCDX)

0645 UTC on 4960
SAO TOME: VOA relay. African news items to regional music. 0530*. (Frodge, MI) English news and ID 2050 on 4950. (Willi Passmann, Muelheim, Germany)

0730 UTC on 17790
ROMANIA: Radio Romania Intl. Feature on holidaying on the Black Sea Coast. (Dave Howship, Birmingham, UK/SNW) 1730 on 15565. (Boynton, MA; Frank Hillton, Charleston, SC)

1140 UTC on 9650
CANADA: Radio Korea Intl. English commentary on the new European currency which may replace the U.S. dollar worldwide and diminish U.S. world influence, fading signal. (Fraser, MA)

1200 UTC on 11840
KHAZAKHSTAN: Radio Almaty. Ava Maria vocals to 1208, announcer’s program updates. Signal fairly clear but weak and barely audible. (Fine, VA)

1235 UTC on 7130
TAIWAN: Radio Taipei. English commentary on Taiwan calling it “an armed island” into pop bumper music to station ID and Chinese music. (Fraser, MA) Taiwan’s Voice of Asia on 9985, 2157-2200* in German and English. (McGuire, MD)

1249 UTC on 21510
UKRAINE: Radio Ukraine Intl. English music program to frequency quote, good signal. (Fine, VA; Howship, UK; Salmanw, CAN) Station address: Kreshchatik str, 26, 25301 Kiev, Ukraine.

1506 UTC on 17535
ISRAEL: Kol Israel. Foreign Minister visits Moscow on Middle East peace progress, //15650. Stock market reports to business updates and weather to 1530*. (Zamora, TX; Howship, UK)

1700 UTC on 11690
JORDAN: Radio Jordan. Station interval signal to ID and regional news. National weather forecast, U.S. political news headlines. (McGuire, MD) Station address: P.O. Box 1041, Amman, Jordan (Hownload, UK)

1745 UTC on 7515

1749 UTC on 4790
PAKISTAN: Radio Pakistan. Music to Holy Koran recitations, 1759 open carrier. (Liangas, GRC/HCDX)

1802 UTC on 4828
ZIMBABWE: ZBC. Poor signal of station, possibly relaying BBC broadcast. Strong interference from Voice of Mohajed at 1803 and at 1805 by a jammer. (Liangas, GRC/HCDX)

1941 UTC on 3325
PAPUA NEW GUINEA: Radio West New Britain. Native drums to regional choir music and brief station information. Continued choir vocals to 2000 NBC network news into regional Pilgim, // 4890 NBC-Port Moresby. (Karl Van Rooy, Netherlands/HCDX)

1950 UTC on 11900
KUWAIT: Radio Kuwait. English rock and rap music to “this is Kuwait” ID at 2000, Interference from UK’s Merin Network One on 11900 at 2000. (Frodge, MI; Howship, UK; Hillton, SC)

2044 UTC on 5050
TANZANIA: USB to avoid Togo on 5047. Afro music to 2050, recitations, commentary to mentions of “Zanzibar” in local language. Anthem to 2100*. (Frodge, MI; Hillton, SC)

2100 UTC on 11954.75
ANGOLA: Radio Nacional. Heard for several hours with enjoyable local Portuguese programming, time slips just before 2100, short fanfare, no obvious ID until 2103 with time check and two “Radio Nacional Angola” IDs. Very good signal! (Salaminw, CAN/HCDX) Address: Caixa Postal 1329, Luanda, Angola.

2115 UTC on 11620
INDIA: All India Radio. English vocal music program to 2119, // 7410. (Frodge, MI; Salmanw, CAN; Boynton, MA) AIR-Port Blair 4760, 2325-23335 in Hindi to national anthem, local ID and newscast. (Schnitzer, Germany/HCDX; Liangas, GRC/HCDX)

2113 UTC on 15500
MALI: China Radio Intl. China News featuring a story on the oldest bamboo book discovered, //11975, good signal but fights with equal power Voice of America. (Fraser, MA; Hillton, SC)

2250 UTC on 4965
BOLIVIA: Radio Juan XXIII. Spanish. Pop music segments to regional headlines. Bolivian audible; Radio Eco 4702.2 at 2305-2315 with news headlines; Radio Perla del Acre 4800 at 2315-2325. (Schnitzer, Germany; Hassfur, Germany)

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.

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www.americanradiohistory.com
Thanks for all the letters in response to last month's opener, "Sign of the Times?" With an overwhelming response, DXers agree our radio hobby is in the midst of major changes, with predictions of more to occur, not to mention the constant changes in QSL policies among stations. (Aren't you glad you read MT?)

Our Atlanta, Georgia, contributor, Bill Holscher, reminded me that England's Merlin Network One has ceased sending QSL cards until October 1999, this according to MNO's Eric Wiltsher. Perhaps some friendly persuasion via email might assist your reply rate at eric@mno.net or mno@cix.co.uk. The station's website is at http://www.mno.co.uk/

Lee Silvi of Mentor, Ohio, sent word of changes in Voice of Russia's QSL policy that states, "we apologize for the delay in posting our correspondence, which is caused by our station's budgetary constraints. At the present time we reply to listener's letters by email only." Reports may be sent via cyberspace to letters@vor.ru; VOR's website is http://www.vor.ru.

Tom Banks of Dallas, Texas, also reminded me recently of Radio China International's English website at http://english.cri.com.cn with an email link for reports to crient@mail.cri.com.cn. Thanks, Tom.

MT's Glenn Hauser passed some QSL news from Radio Korea International. This being the Year of Architecture, RKI has initiated that theme for both shortwave and Internet reception reports. Several designs will be issued throughout the year. Program details may be addressed to: Overseas Service, Korean Broadcasting System, 18 Yoidong, Youngdungpo-gu, Seoul, Republic of Korea 150-790. KBS website: http://www.kbs.co.kr. Click on the Radio Korea International link, http://rki.kbs.co.kr/rki/index.htm - Email rki@kbsnt.kbs.co.kr.

Just received word of new QSL changes? Or maybe you have a question or column idea. Your cards and letters are always welcome. Send your mail to QSL Report, c/o Monitoring Times, P.O. Box 98, Brasstown, N.C. 28902. If you'd like a personal reply please enclose an SASE. If the Internet has become your forté, send me your email at: gayle@grove.net. Please keep us informed of these changing times in radio!

CHILE

Radio Voz Cristiana, 11690 kHz. Full data logo postcard unsigned. Received in two weeks for an English report and one mint stamp. Station address: P.O. Box 2889, Miami, FL 33144. (Randy Stewart, Springfield, MO)

COSTA RICA

AWR, 6975 kHz. Full data transmitter site card initialed by A.P. Verification for special broadcast of Wavescan on World of Radio via RFPI. QSL stamps, stickers, postcards, newsletter and reception report cards enclosed. Received in 25 days for an English report and two mint stamps. Station address: c/o AWR Wavescan, Box 29235, Indianapolis, IN 46229. (Bill Wilkins, Springfield, MO)

FM

CBHN-89.5 MHz. Full data prepared card verified by Greg Miller. Two different metal lapel pins for CBC Radio 60 & CBC Radio One. Received in three weeks for an FM report and mint stamps (returned with reply). Station address: CBC, Box 3000, Halifax NS Canada B3J 3E9. (Robert Ross, London, Ontario, Canada)

MEDIUM WAVE

CKBL, 1150 kHz AM. Verification letter signed by Jason Mawr-Program Director. Received in 10 days for a taped report. Station address: Okanagan Radio Unlimited, 300-435 Bernard Ave., Kelowna BC Canada V1Y 6N8. (Patrick Martin, Seaside, OR)

KCCF, 1550 kHz AM. Verification letter signed by Chuck Lee-Program Director. Received in 53 days for an AM report. Station address: P.O. Box 847, Ferndale, WA 98248. (Martin, OR)

KDIA, 1640 kHz AM, Vallejo, California. Received second verification letter in one month, (several follow ups had been sent) signed again by Clifford Brown III-Program Assistant. Received for an AM report. Station address: 7677 Oakport St., # 105, Oakland, CA 94621. (Martin, OR)

KIQN, 1010 kHz AM. Partial data letter signed by Christopher Wilde-Program Director, plus coverage map. Received in 23 days for a taped report. Station heard with night power of 13 watts. Station address: Eagle Gate Plaza, 60 East Temple # 120, Salt Lake City, UT 84111. (Martin, OR)

KWTL, 700 kHz AM. Verification letter signed by Dickie Shannon-Program Director. Received in 11 days for a taped report. Station address: 312 East South Temple, Salt Lake City, UT 84111. (Martin, OR)

NICARAGUA

Radio Miskut, 5770 kHz. Full data personal letter from Evaristo Mercado Perez-Director. Received in 10 1/2 months for a Spanish report, tape and one US dollar. Station address: RAAN(Region Autonoma del Atlantico Norte) Nicaragua. (Stewart, MO)

NORWAY

Radio Norway International, 9945 kHz. Full data Trolls card signed with illegible signature. Received in 70 days for an English report of last English broadcast. Station address: 0340 Oslo, Norway. (Brian Bagwell, St Louis, MO)

PIRATE

Betty Boop Radio, 6955 kHz USB. Full data Betty Boop cartoon sheet signed by Rollo Verndigh/Keelo Verndigh. QSL received for Free Radio Weekly pirate logs of July 23 and October 31, broadcast via Radio Eclipse. QSL maildrop: P.O. Box 28413, Providence, RI 02908. (Harold Frogge, Midland, MI)

He Man Radio, 6955 kHz USB. Full data Green Tales Jurrens sheet unsigned. Received in 56 days for a pirate report and three mint stamps. QSL maildrop: P.O. Box 109, Blue Ridge Summit, PA 17214. (Frogge, MI)

Jerry Rigg Radio, 6955 kHz USB. Full data 21st Century Pirate Hunter sheet unsigned. Received in five weeks for a pirate report and three mint stamps. QSL maildrop: Providence, R.I. (Wilkins, MO)

Radio Garbanzo, 6955 kHz. Full data Farewell to P.I. sheet signed by F.F. (Fearless Fred). Received in 148 days for a pirate report and three mint stamps. QSL maildrop: P.O. Box 1, Belfast, NY 14711. (Frogge, MI)

RUSSIA

Voice of Russia, 11675 kHz. Full data QSL card noted as transmitter via Krasnodar, unsigned plus a typewritten note stating new QSL policy. Station address: ul. Pyatnitskaya 25, Moscow 113326, Russia. (Lee Silvi, Mentor, OH)

USA

American Forces Radio and TV Service, 12689.5 kHz via Naval Computer and Telecommunications Area Master Station, Key West, Florida. Partial data email form letter from Wayne E. Eternicka-Broadcast Operations Specialist. Received in five days for a snailmail report. Mr. Eternicka's email address: eternicka@mediacen.navy.mil. Postal address: Naval Media Center, Navsta Anastasia Bldg 168, 2701 S. Capitol St. NW, Washington, DC 20573-3819. (Stewart, MO)
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web: www.grove-ent.com
e-mail: order@grove-ent.com

www.americanradiohistory.com
**HOW TO USE THE SHORTWAVE GUIDE**

1: **Convert your time to UTC.**

Eastern and Pacific Times are already converted to Coordinated Universal Time (UTC) at the top of each page. The rule is: convert your local time to 24-hour format; add (during Daylight Savings Time) 4:5, 6, or 7 hours for Eastern, Central, Mountain or Pacific

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

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

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

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

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<tr>
<th>Letter</th>
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<td>S</td>
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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 “v” (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
- **na:** North America
- **ca:** Central America
- **sa:** South America
- **eu:** Europe
- **af:** Africa
- **do:** domestic broadcast
- **om:** omnidirectional
- **as:** Asia
- **au:** Australia
- **pa:** Pacific
- **va:** various
- **S:** Singapore
- **F:** Fiji
- **W:** Wrangel Island
- **af:** Africa
- **me:** Middle East
- **E:** England

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.

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**Hot News**

- **BBC SINGAPORE.** The Radio Corporation of Singapore announced the start of its introductory DAB Digital Radio Service for this island country of three million people. BBC World Service is available on FM 93.8 24 hours daily.

- **DAB PORTABLE RECEIVER.** Roberts Radio, Roke Manor Research, Loughborough University and World Radio Network are jointly developing a new portable DAB receiver to be built in Great Britain. Prototypes will be tested by the end of 1999 and the units will be in the hands of retailers by the year 2000.

- **ODXA MILESTONE.** The Ontario DX Association is celebrating its 25th anniversary and has been issued the callsign XL3D in place of VE3ODX for the period 25 March thru 25 April 1999. Visit [http://www.durhamradio.com/odxa/index.html](http://www.durhamradio.com/odxa/index.html) for membership information and sample columns and publications.

- **ELECTRONIC DX PRESS.** Australia's Bob Padula, the driving force behind the EDXP Newsletter and publisher of Padula Books, has restructured his electronic newsletter for shortwave broadcast DXers. Individual recipients are now asked to contribute a small $5 fee semiannually to offset the cost involved in the production of an outstanding electronic periodical that brings the latest shortwave broadcast news directly to your desktop. The EDXP website at [http://members.tripod.com/~bpadula/edxp.html](http://members.tripod.com/~bpadula/edxp.html) provides all the details and gives you an opportunity to request a sample copy.

- **HARD-CORE-DX.** Risto Kotalampi of Finland provides a free mailing list service for DXers [http://www.best.com/~rko/hard-core-dx/](http://www.best.com/~rko/hard-core-dx/). Categories of E-mail reports are limited to rare and difficult to hear shortwave and medium wave stations. Wonderful exchanges of topical information occasionally arise like the recent interchange of messages on the design and use of beverage antennas. Check the web site for the procedure to subscribe to the HCDX mailing list.

- **SHORTWAVE.** The increase in the number of recent requests for DX Computing's demo diskette of Macintosh software and utilities for DXers (see the ad in this current issue) seems to reflect a rise in the number of new Macintosh users who are in the radio hobby. The popularity of the new Mac computer (tops overall in computer sales during the Christmas holidays) may have had a positive effect on radio hobbyists who are first-time buyers of computer equipment, since it is unlikely that very many PC/Windows users would be willing to sacrifice their monetary investment in software and accessory equipment. This may be a sign that these computer buyers are now into radio; a very good indicator than our hobby is doing well.

- **SPRING FORWARD.** The seven days between Palm Sunday and Easter Sunday is this year's week of limbo, a time when most of the world has already switched over to Daylight Savings Time (DST) on March 28th, but North America is still on Standard Time until April 4th. Why can't we all get together?

- **WORLD RADIO NETWORK.** You'll find in this month’s Selected Programming a lot of entries for WRN. You won’t find this international programming on HF frequencies; you'll find it on your satellite dish. See page 62 for how to tune in WRN1 and 2. Check WRN’s website at [www.wrn.org](http://www.wrn.org) for the latest summer schedule changes, not yet available at presstime.
Sundays
0000 Australia, Radio: RA News. Five or ten minutes of world, Australian, and regional news.
0000 Swiss Radio Intl via WRNY (NAm): World Radio Switzerland.
0000 UK, BBC London (as): World News. Broadcasts on the hour or fifteen minutes in the British time zone.
0010 UK, BBC London (as): Agenda. The series examines the key ideas and trends.

Mondays
0000 Swiss Radio Intl via WRNY (NAm): World Radio Switzerland.
0020 Switzerland, Radio: Swiss News.
0035 UK, BBC London (as): Download. Each week a half hour programme on practically any topic under the sun.

Tuesdays
0000 Swiss Radio Intl via WRNY (NAm): World Radio Switzerland.
0015 UK, BBC London (as): Discovery. In-depth look at scientific research.

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www.americanradiohistory.com
It was nice to see a picture in the February issue on page 21 of Rodger Broadent of Radio Australia — I remember when he was an announcer at Radio Netherlands around 1972, as I remember seeing his picture in one of the Radio Netherlands program guides that were sent out at that time.

Maryanne Kehoe, Georgia
**Frequencies**

0300-0400 Anguilla, Caribbean Beacon 6090am
0300-0400 Australia, ABC/Katherine 50255
0300-0400 Australia, ABC-Tent Creek 48195
0300-0400 Australia, Radio 969005 12080us 1524055 154155
0300-0400 Austria, CS/DefenceForces R 1479005
0300-0400 Canada, CBN (CBC Quebec) 96250
0300-0400 Canada, CFRX Toronto 90700
0300-0400 Canada, CFPN Calgary 60305
0300-0400 Canada, CHCN Halifax 6130
0300-0400 Canada, CHSN St John's 61630
0300-0400 Canada, CKVZ Vancouver 6156
0300-0400 Canada, CHCN Montreal 6153
0300-0400 Canada, CHCI Ottawa 6155
0300-0400 China, China Radio Intl 9696
0300-0400 Costa Rica, Radio Peace Intl 6915
0300-0400 Cuba, Radio Havana 600000 96200 11055 13065
0300-0400 Czech, Czech Rep, Prague Intl 7345
0300-0400 Ecuador, RCJQ 91450
0300-0400 Egypt, Radio Cairo 8475
0300-0400 Germany, Deutsche Welle 9365 9635 97000 11750
0300-0400 Germany, Deutscher Minist 5910
0300-0400 Germany, Radiokanal R, Radio Cultural 3300
0300-0400 Guatemala, GBC/Voz de la 39900 39500
0300-0400 Japan, Radio/NHK 17801 17825 21610
0300-0400 Kenya, Kenya BC Corp 49850 49350
0300-0400 Lesotho, Radio 6900
0300-0400 Malaysia, Radio 7250
0300-0400 Mexico, Radio Mexico Intl 539
0300-0400 Moldova, Radio Moldova Intl 7550
0300-0400 New Zealand, R NZ Intl 17675
0300-0400 Papua New Guinea, NBC 96750
0300-0400 Philippines, R Pilipinas 11805 11805
0300-0400 Russia, Radio of Russia WS 7125 71800 98800 98750
0300-0400 Russia, Voice of Russia 12000
0300-0400 South Africa, Channel Africa 9585
0300-0400 Singapore, Singapore R 6150
0300-0400 Sri Lanka, Sri Lanka BC 6950 9700 15435
0300-0400 Taiwan, Radio Taipei Intl 5055 9690 11745 11825
0300-0400 Thailand, Radio 9055
0300-0400 Turkey, Voice of 7260

**Selected Programs**

**Sundays**
0300 Australia, Radio, PA News. See S 0005.
0300 Radio Prague via WRN1 (NAm) News.
0300 Radio Prague via WRN1 (NAm). News.
0300 Austria, Radio Feedback. Roger Brett answers letters and discusses new programs, reception problems, and questions about Austria.
0300 Austria, Radio Correspondent's Report. See S 0040.
0300 Austria, Radio Intern (W). A Letter from Austria.
0300 UK, BBC London (af). Wright Round the World. Steve Wright's brand new show with listeners' requests and dedications.
0303 R Austria Intl via WRN1 (NAm). Report from Austria.
0304 R Austria Intl via WRN1 (NAm). Pastimes.

**Mondays**
0300 Australia, Radio, PA News. See S 0000.
0300 Radio Prague via WRN1 (NAm). News.
0304 Radio Prague via WRN1 (NAm). The Arts.
0310 Austria, Radio Austria Talks Back. Austrians talking about issues of the day with Sandy McCusker.
0312 Radio Prague via WRN1 (NAm). The Magic Carpet.
0303 R Austria Intl via WRN1 (NAm). The News from Vienna.
0307 Radio Prague via WRN1 (NAm). History/Czech.

**Tuesdays**
0300 Australia, Radio, PA News. See S 0000.
0303 Radio Prague via WRN1 (NAm). Current Affairs.
0305 Austria, Radio Austria Talks Back. See S 0230.
0307 Radio Prague via WRN1 (NAm). Spotlight.
0305 Radio Prague via WRN1 (NAm). Music.
0305 R Austria Intl via WRN1 (NAm). The News from Vienna.
0305 R Austria Intl via WRN1 (NAm). Report from Austria.

**Wednesdays**
0300 Austria, Radio, PA News. See S 0000.
0300 Radio Prague via WRN1 (NAm). News.
0307 Radio Prague via WRN1 (NAm). Current Affairs.
0307 Radio Prague via WRN1 (NAm). Talkback.
0305 Austria, Radio Austria Talks Back. See M 0310.
0315 Radio Prague via WRN1 (NAm). Viking Point.
0305 Radio Prague via WRN1 (NAm). Music.
0305 R Austria Intl via WRN1 (NAm). The News from Vienna.
0305 R Austria Intl via WRN1 (NAm). Report from Austria.

**Thursdays**
0300 Austria, Radio, PA News. See S 0000.
0300 Radio Prague via WRN1 (NAm). News.
0305 Radio Prague via WRN1 (NAm). Current Affairs.
0305 Radio Prague via WRN1 (NAm). Talkback.
0305 Radio Prague via WRN1 (NAm). History/Czech.

**Fridays**
0300 Australia, Radio, PA News. See S 0000.
0300 Radio Prague via WRN1 (NAm). News.
0303 Radio Prague via WRN1 (NAm). Current Affairs.
0303 Australia, Radio Australia Talks Back. See M 0310.
0305 Radio Prague via WRN1 (NAm). Music.
0305 R Austria Intl via WRN1 (NAm). The News from Vienna.
0305 R Austria Intl via WRN1 (NAm). Report from Austria.

**Satudays**
0300 Australia, Radio, PA News. See S 0000.
0300 Radio Prague via WRN1 (NAm). News.
0305 Australia, Radio, Book Reading. See F 2305.
0306 Radio Prague via WRN1 (NAm). Current Affairs.
0305 Australia, Radio, News. See F 2305.
0312 Radio Prague via WRN1 (NAm). Pottsgrove.
0307 Australia, Radio. Rural Reporter. See W 2305.
0307 R Austria Intl via WRN1 (NAm). The News from Vienna.
0307 UK, BBC London (af). People and Politics. Background to the British political scene.
0307 R Austria Intl via WRN1 (NAm). Report from Austria.
**FREQUENCIES**

<table>
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<th>Time</th>
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<td>UK, BBC World Service</td>
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**SELECTED PROGRAMS**

**Sundays**

<table>
<thead>
<tr>
<th>Time</th>
<th>Station/Program</th>
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<tbody>
<tr>
<td>0400</td>
<td>Austria, Radio RA News, See S 0000.</td>
</tr>
<tr>
<td>0403</td>
<td>Polish Radio Warszawa via WRN1 (NAm). The News from Poland.</td>
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**Mondays**

<table>
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<tr>
<th>Time</th>
<th>Station/Program</th>
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<tr>
<td>0400</td>
<td>Australia, Radio RA News, See S 0000.</td>
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<tr>
<td>0403</td>
<td>Polish Radio Warszawa via WRN1 (NAm). The News from Poland.</td>
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**Tuesdays**

<table>
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<tr>
<th>Time</th>
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<tbody>
<tr>
<td>0400</td>
<td>Australia, Radio RA News, See S 0000.</td>
</tr>
<tr>
<td>0403</td>
<td>Polish Radio Warszawa via WRN1 (NAm). The News from Poland.</td>
</tr>
</tbody>
</table>

**Hauser's Highlights ALASKA: KNLS**

* For the A-99 season, KNLS is using 9615 kHz for most of its broadcasts, including English both at 0800-0900 and 1300-1400.

www.americanradiohistory.com
Sundays

0600-0700 Swiss Radio Int via WRNH (NAM): World Radio Switzerland.
0600-0700 Australia, Radio Ockham’s Raor. Robin Williams with straight, sharp talk about science.
0600-0700 UK, BBC London (af): John Peel. Tracks from newly released albums and singles from the contemporary music scene.

Mondays

0600-0700 Swiss Radio Int via WRNH (NAM): World Radio Switzerland.
0600-0700 Australia, Radio Ockham’s Raor. Robin Williams with straight, sharp talk about science.
0600-0700 UK, BBC London (af): John Peel. Tracks from newly released albums and singles from the contemporary music scene.

Tuesdays

0600-0700 Swiss Radio Int via WRNH (NAM): World Radio Switzerland.
0600-0700 Australia, Radio Ockham’s Raor. Robin Williams with straight, sharp talk about science.
0600-0700 UK, BBC London (af): John Peel. Tracks from newly released albums and singles from the contemporary music scene.
FREQUENCIES

0900-1000
Albania, Tana World R 9605eu
0900-1000
Anguilla, Caribbean Beacon 6000am
0900-1000
Australia, ABC/Alizee Spgs 2310do
0900-1000
Australia, ABC-Katherine 2430do
0900-1000
Australia, ABC/Tent Cities 2250do
0900-1000
Australia, Radio 5060es 9580es 11880es 17750es
0900-0930 st
Bhutan, Bhutan BC Service 5030do
0900-1000
Brazil, ABC/Katherine 2430do
0900-1000
canada, CFRX Toronto 5070do
0900-1000
canada, CFUP Calgary 5070do
0900-1000
canada, CHC Halifax 5070do
0900-1000
canada, CKUZ Vancouver 5160ao
0900-0956
China, China Radio Intl 15201ao 17359ao
0900-1000
Costa Rica, PRC Peace Intl 5975am
0900-1000
Cuba, HLCB 5645do 21455ao
0900-1000
Ecuador, RTA 15165ao
0900-1000
est. Guineas, RF East Africa 15165ao
0900-1000
Est. Guineas, Radio Africa 15165ao
0900-0950
Germany, Deutsche Welle 5160do 5655as 11775as 12955as
0900-1000
Germany, Deutsche Welle 5154af 5141of 178005ao 178155ao
0900-1000
Germany, Survise Radio 5890eu
0900-1000
Germany, Voice of Hope 5875eu
0900-1000
Germany, Overcomer Minist 1381ao
0900-1000
Ghana, Ghana BC Corp 4951ao 81205ao
0900-1000
Guam, TWR/KTBN 15201do 15360ao
0900-1000
Guatemala, GBC/Voice of 5290es 5295do
0900-1000
Italy, RRS 7129oa
0900-1000
Kenya, Kenya BC Corp 4385ao
0900-1000
Lesotho, Radio 4620ao
0900-0915
Libera, LCN/R Liberia Intl 5100ao
0900-1000
Malaysia, Radio 7259oa
0900-1000
Malaysia, RM/StudioKuala 5890es
0900-0930 st
Malta, VO Mediterranean 11770do 11839eu
0900-1000
N. Malesa Is, Ketha Saipan 9355es 15659es
0900-1000
Namibia, NBC 6065ao 6715ao
0900-1000
New Zealand, R NZ Intl 8100ao
0900-1000
Nigeria, Radio/Ibadan 6065ao
0900-1000
Nigeria, Radio/Kaduna 4791oa
0900-1000
Nigeria, Radio/Lagos 3326ao
0900-1000
Papua New Guinea, NBC 4991ao
0900-1000
Singapore, RCP Singapore 6150ao
0900-1000
Solomon Islands, SBC 5503ao
0900-1000
Tanzania, Radio 5059ao
0900-1000
UK, BBC World Service 6055as 6910ao 6915ao 6945oa 6910ao
0900-1000
USA, KJAI Dallas TX 5810ao
0900-1000
USA, KTFN Salt Li City UT 7510ao
0900-1000
USA, KXW/Neahku HI 9950ao 11569ao
0900-1000
USA, WSCQ Monticello ME 7411ao
0900-1000
USA, WVR/Boiling Spring AL 8326ao 7259ao 7457oa
0900-1000
USA, WHR/Nobleville IN 7615ao 7735ao 7915ao
0900-1000
USA, WUCR Upton KY 7491ao 13595ao
0900-1000
USA, WVNO New Orleans LA 7765ao 9455ao
0900-1000
USA, WWS/Cayman Islands SC 7735ao 9455ao
0900-1000
USA, WCRC Nashville TN 2390ao 32109ao 5071ao 9591ao
0900-1000
Zambia, Christian Voice 6085ao
0900-1000
Zambia, Nat BC Corp 6185ao 6065ao
0900-1000
Zimbabwe, Zimbabwe BC 4835ao 5011ao
0900-0910 st
Croatia, Croatian Radio 6165ao 7185ao 9380ao
0915-0930
Guam, TWR/KTBN 15339ao
0915-0945 st
UK, BBC World Service 6185ao 5789ao 11755ao 17539ao
0930-0935 ao
Albania, Tana World R 99685ao
0930-1000
Australia, R Australia Intl 11765ao 21699ao
0930-1000
canada, CKXJ Toronto St John's 6190ao
0930-1000
canada, Georgia, Georgian Radio 11910ao
0930-1000
canada, TWR/KTBN 5685ao
0930-1000
Netherlands, Radio 7920ao 5920ao 12053ao
0930-1000
Philippines, FEBC/R Intl 11635ao
0930-1000
Albania, Tana World R 99685ao
0945-1000
UK, BWC World Service 6065ao 5995ao 11445ao 11495ao
0945-1000
UK, WRMI/Matala Intl 9955ao

www.americanradiohistory.com
Frequencies

1200-1300 Australia, Canberra, Beacon 11715 kHz
1200-1300 Australia, ABC/Alpine Seven 2310 kHz
1200-1300 Australia, ABC/Katherine 2485 kHz
1200-1300 Australia, ABC/Tennis Creek 2326 kHz
1200-1300 Australia, Radio 6059 kHz 6306 kHz 9690 kHz
1200-1300 Botswana, Radio 4803 kHz 4830 kHz 7253 kHz
1200-1300 Brazil, R Nacional Bras 15445 am
1200-1300 Canada, CBC/Quebec City 11905 kHz
1200-1300 Canada, CBC/Radio Canada 6095 kHz
1200-1300 Canada, CBC/NB 6136 kHz
1200-1300 Canada, CBC/Prince Edward Island 6162 kHz
1200-1300 Canada, CBC/Radio Canada In 6162 kHz
1200-1300 China, China Radio Intl 6950 kHz 6984 kHz 7385 kHz 4556 kHz 9715 kHz 11605 kHz 11675 kHz 11906 kHz
1200-1300 Ecuador, HCJB 6959 kHz
1200-1300 Egypt, Egypt Radio 11715 kHz 15425 kHz
1200-1300 France, France Radio Intl 1200 kHz
1200-1300 Germany, Sunrise 1200 kHz
1200-1300 Guatemala, Radio 6090 kHz 6130 kHz
1200-1300 India, Voice India Radio 4760 kHz
1200-1300 Iran, V Dio 11604 kHz 11675 kHz 11906 kHz
1200-1300 Italy, IRIS 7120 kHz
1200-1300 Jordan, Radio 11606 kHz
1200-1300 Kenya, Kenya Highland 4352 kHz
1200-1300 Lesotho, Radio 4860 kHz
1200-1300 Lithuania, Radio 7265 kHz
1200-1300 Malaysia, RTM 5980 kHz
1200-1300 Malaysia, RTM 9550 kHz
1200-1300 Namibia, NBC 6006 kHz 6115 kHz
1200-1300 Netherlands, Radio 9040 kHz 9890 kHz
1200-1300 New Zealand, NZ Intl 9016 kHz
1200-1300 Nigeria, Radio/Badna 6056 kHz
1200-1300 Nigeria, Radio/Kaduna 4717 kHz
1200-1300 Palau, KuNH, Voice of Hope 9955 kHz 9995 kHz 9998 kHz
1200-1300 Papua New Guinea, NBC 4890 kHz
1200-1300 Poland, Polska Radio Warszawa 9056 kHz 7370 kHz 9520 kHz 11306 kHz
1200-1300 Singapore, Radio Singapore Intl 2811 kHz 2851 kHz 2871 kHz
1200-1300 Switzerland, Swiss Radio Intl 9356 kHz
1200-1300 Taiwan, Radio Taipan Intl 9610 kHz

Selected Programs

Sunday

1200 Australia, Radio RA News, See S 0000
1200 Radio Australia via WRN1 (NAm): RA News, See S 0000
1200 UK, BBC London (af): Play of the Week (from 1130) See S 1130
1200 UK, BBC London (af): Play of the Week (from 1130). A different radio drama program each week.
1200 Australia, Radio Country Club (Par 1): ABC’s program of contemporary and traditional country music with Richard Porteous (1st Hour).
1205 UK, BBC London (af): From Our Own Correspondent, See S 0005
1205 UK, BBC London (af): Letter from America, Alastair Cooke shows his immense view of contemporary American life.
1235 Radio Australia via WRN1 (NAm): Asia Pacific.

Monday

1200 Australia, Radio RA News, See S 0000
1200 Radio Australia via WRN1 (NAm): RA News, See S 0000
1200 Australia, Radio Late Night Live. See M 1205
1205 UK, BBC London (af): Outlook. See M 1205
1210 Radio Australia via WRN1 (NAm): Asia Pacific.

Tuesday

1200 Australia, Radio RA News, See S 0000
1200 Radio Australia via WRN1 (NAm): RA News, See S 0000
1200 Australia, Radio Late Night Live. See M 1205
1205 UK, BBC London (af): Outlook. See M 1205
1215 Radio Australia via WRN1 (NAm): Pacific Focus.

Propagation Forecasting

Jacques D'Ayvignon, VE3VIA 248 Towerhill Road Peterborough, ON K9H 7N1 Canada

Distributor ASAPS Propagation Software E-mail: monitor@rac.ca

April 1999 MONITORING TIMES

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www.americanradiohistory.com
GRUNDIG
Gives you the World

Grundig leads shortwave radio into the new Millennium!
When radio was introduced, back in the 1920's — to pluck voices and music out of thin air — people thought it was magic. With Grundig, it still is! No other manufacturer rivals Grundig for "that European sound." Voices have an "in-the-room" quality and clarity — even from half a world away.

German-engineered quality... German-engineered sound... when people think of shortwave, they think of Grundig. Grundig has specialized in shortwave since the late 1950's, and in North America, shortwave radios are all we sell.

Critics reviews of Grundig models include
Best of Category... Superior Performance... Ergonomically Better... Superb Sound Quality... An Excellent Choice

We listen, too.
We're very good at listening — to our customers. Our engineers design each model so it's easy, intuitive, and convenient to use. Critics call this "great ergonomics!" And Grundig models always deliver top performance for the price. Critics call this "bang for the buck."

www.americanradiohistory.com
Rated Best in Its Class.
Grundig's Yacht Boy 400PE has received rave reviews from the shortwave press for combining a wealth of sophisticated features in a sleek titanium-look package that doesn't cost a fortune. It incorporates features found on stationary shortwave systems that cost thousands, such as outstanding audio quality, precise 1 kHz increment tuning, up/down slewing, frequency scanning, signal strength indication, and single-sideband signal demodulation.

But the advantage mentioned most often in the reviews is its ease of use for the novice listener. In moments you can listen to foreign broadcasts beamed to North America.

Soon, you will be scanning the airwaves to tune in exotic music programs and sports events from faraway locales. The YB-400PE even picks up shortwave amateur (ham radio) broadcasts and shortwave aviation/military frequencies (cockpit-to-tower communications). The possibilities for family fun, education, and enjoyment are boundless.

For travel or home use, Grundig adds a dual-time travel clock with snooze and sleep timer. The FM band is stereophonic with your headphones. The lighted LCD panel is easy to read in the
Yacht Boy 400PE
The Best in Value!

dark. Comes with a form-fitting pouch, integral telescoping antenna and advanced external antenna on a compact reel, carry-strap, ac adapter, earphones and complete instructions.

Made by Germany’s Grundig.
World leader in shortwave radios, the 400PE measures just 7-3/4”L x 4-1/4”H x 1-1/4”W; weighs only 20 oz. It slips easily into your carry-on for travel and fits on a nightstand, office credenza, or yacht cabin console. One-year warranty.

Grundig's Yacht Boy 400PE Named Editor's Choice.
Passport To World Band Radio is regarded as the leading authority of the shortwave industry. Here’s what their testing expert wrote about the Grundig Yacht Boy 400PE:

"Best performance for price size category, and among the choicest portables of any size, at any price."

"The 400's FM performance is right up there with the very best among world band radios."

Please call our shortwave hotline and talk to the experts: 800-872-2228.
Grundig sets the standard for customer service.
Grundig supports the industry's only Toll-free Shortwave Hotline. Consumers and dealers can call 1-800-872-2228 in the United States or 1-800-637-1648 in Canada weekdays from 9am to 4pm Pacific Time. You can speak with a real live shortwave expert, not an automatic message machine. Grundig even answers questions for those who own other brands, for whom no such toll-free hotline service is available!

Grundig warranty service is the best.
Any problems? We fix them fast. Dealers know that customers will be taken care of! Dealer support service is first-rate, too. Remember, all we sell in North America are shortwave radios. We specialize! We do it best!

Watch this space for Grundig's biggest product announcement in years!
Shortwave enthusiasts and Grundig dealers will have an extra-special reason to celebrate the new millennium—the most important Grundig product announcement in years!
### Frequencies

<table>
<thead>
<tr>
<th>Time</th>
<th>Country</th>
<th>City, Call Sign</th>
<th>Frequency</th>
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<tbody>
<tr>
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<td>Austria</td>
<td>Radio Vienna</td>
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<tr>
<td>1500-1600</td>
<td>Brazil</td>
<td>Rádio梵蒂冈</td>
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<td>Canada</td>
<td>CBC, Vancouver</td>
<td>13530</td>
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<td>1500-1600</td>
<td>Canada</td>
<td>CFCF Toronto</td>
<td>12580</td>
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<tr>
<td>1500-1600</td>
<td>Chile</td>
<td>Radio La República</td>
<td>15840</td>
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<td>1500-1600</td>
<td>China</td>
<td>China Radio</td>
<td>15220</td>
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<td>Radio Caribe</td>
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<td>RFI</td>
<td>15400</td>
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<td>1500-1600</td>
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<td>Voice of America</td>
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<td>23400</td>
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</table>

### Selected Programs

**Sundays**

- **1500 UTC**: Australia, Radio PA News, S 0000
- **1500 UTC**: UK, BBC London (af), World News, S 1400
- **1500 UTC**: UK, BBC London (as), World News, S 1400
- **1500 UTC**: Australia, Radio Axis Pacific, S 1110
- **1500 UTC**: UK, BBC London (af), World News, S 1400
- **1500 UTC**: UK, BBC London (as), World News, S 1400

**Mondays**

- **1500 UTC**: Australia, Radio PA News, S 0000
- **1500 UTC**: UK, BBC London (af), World News, S 1400
- **1500 UTC**: UK, BBC London (as), World News, S 1400
- **1500 UTC**: Australia, Radio Axis Pacific, S 1110
- **1500 UTC**: UK, BBC London (af), World News, S 1400
- **1500 UTC**: UK, BBC London (as), World News, S 1400

**Tuesdays**

- **1500 UTC**: Australia, Radio PA News, S 0000
- **1500 UTC**: UK, BBC London (af), World News, S 1400
- **1500 UTC**: UK, BBC London (as), World News, S 1400
- **1500 UTC**: Australia, Radio Axis Pacific, S 1110
- **1500 UTC**: UK, BBC London (af), World News, S 1400
- **1500 UTC**: UK, BBC London (as), World News, S 1400

**Wednesdays**

- **1500 UTC**: Australia, Radio PA News, S 0000
- **1500 UTC**: UK, BBC London (af), World News, S 1400
- **1500 UTC**: UK, BBC London (as), World News, S 1400
- **1500 UTC**: Australia, Radio Axis Pacific, S 1110
- **1500 UTC**: UK, BBC London (af), World News, S 1400
- **1500 UTC**: UK, BBC London (as), World News, S 1400

**Thursdays**

- **1500 UTC**: Australia, Radio PA News, S 0000
- **1500 UTC**: UK, BBC London (af), World News, S 1400
- **1500 UTC**: UK, BBC London (as), World News, S 1400
- **1500 UTC**: Australia, Radio Axis Pacific, S 1110
- **1500 UTC**: UK, BBC London (af), World News, S 1400
- **1500 UTC**: UK, BBC London (as), World News, S 1400

**Fridays**

- **1500 UTC**: Australia, Radio PA News, S 0000
- **1500 UTC**: UK, BBC London (af), World News, S 1400
- **1500 UTC**: UK, BBC London (as), World News, S 1400
- **1500 UTC**: Australia, Radio Axis Pacific, S 1110
- **1500 UTC**: UK, BBC London (af), World News, S 1400
- **1500 UTC**: UK, BBC London (as), World News, S 1400

**Satndays**

- **1500 UTC**: Australia, Radio National News, S 0000
- **1500 UTC**: Australia, Radio Midland, S 0000
**Frequencies**

- 1600 UTC
  - Algeria, Radio Algiers Intl: 6175kHz, 6175kHz, 15180kHz
  - Angola, Cabo Verde: 1175kHz
  - Australia, ABC/AK Radio 2: 2100kHz
  - Australia, ABC/Kathleen: 2405kHz
  - Australia, ABC/Trinity Cross: 2205kHz
  - Australia, Radio: 5905kHz, 9905kHz, 11900kHz
  - Botswana, Radio 1: 4800kHz
  - Canada, CBC N Quebec: 9625kHz
  - Canada, CFRX Toronto: 6070kHz
  - Canada, CFTV Calgary: 5030kHz
  - Canada, CHCH Halif: 6130kHz
  - Canada, CKCN St John's: 6190kHz
  - Canada, CKOY Vancouver: 6190kHz
  - Canada, CJOY Ottawa: 6190kHz
  - China, China Radio Intl: 955kHz
  - Costa Rica, Voice of Peace Intl: 15050kHz, 21490kHz
  - Ethiopia, Radio Addis: 7165kHz, 9595kHz
  - France, Radio France Intl: 11615kHz, 11700kHz, 11995kHz, 12015kHz
  - Germany, Deutsche Welle: 15210kHz, 15330kHz
  - Germany, Sun City Radio: 5850kHz
  - Germany, Universal Life: 1194kHz
  - Germany, Good News World: 1194kHz
  - Ghana, Ghana BC Corp: 4915kHz, 59330kHz
  - Greece, 4KGE: 1201kHz
  - Greece, Voice of Greece: 3392kHz, 5950kHz
  - Iran, Radio: 9100kHz, 11775kHz, 13905kHz
  - Jordan, Radio: 11690kHz
  - Kenya, Kenya BC Corp: 4935kHz
  - Lebanon, Voice of Lebanon: 9890kHz
  - Lebanon, Radio: 4800kHz
  - Malaysia, Radio: 7295kHz
  - Namibia, NBC: 6005kHz, 8175kHz
  - Netherlands, Radio: 12390kHz, 12090kHz, 15585kHz
  - New Zealand, RNZ Intl: 6105kHz
  - Nigeria, Radio/Taban: 6050kHz
  - Nigeria, Radio/Idanre: 4770kHz
  - Nigeria, Voice of: 7225kHz, 15120kHz
  - Pakistan, Radio: 11720kHz
  - Pakistan, Voice of Pakistan: 9655kHz, 9695kHz
  - Papua New Guinea, NBC: 4805kHz
  - Russia, Voice of Russia: 9635kHz, 12035kHz
  - South Africa, Channel Africa: 6005kHz
  - South Korea, Voice of Korea Intl: 5975kHz, 9515kHz, 9760kHz

**Selected Programs**

- **Sundays**
  - 1600 UTC: Australia, Radio OA: 5900kHz, 6190kHz
  - 1600 UTC: Radio France Intl via WRNI (Nam): News
  - 1600 UTC: Australia, Radio: The National Interest. Terry Linn takes an in-depth look at the world's major events.

- **Mondays**
  - 1600 UTC: Australia, Radio OA: 5900kHz, 6190kHz
  - 1600 UTC: Australia, Radio Music: Paul Petzer presents music from a variety of cultures.

- **Tuesdays**
  - 1600 UTC: Australia, Radio OA: 5900kHz, 6190kHz
  - 1600 UTC: Radio France Intl via WRNI (Nam): News

- **Wednesdays**
  - 1600 UTC: Australia, Radio OA: 5900kHz, 6190kHz
  - 1600 UTC: Radio France Intl via WRNI (Nam): News
  - 1600 UTC: Australia, Radio: Women Out Loud. A weekly radio program documenting, exploring and challenging the conditions of women's lives.

- **Thursdays**
  - 1600 UTC: Australia, Radio OA: 5900kHz, 6190kHz
  - 1600 UTC: Radio France Intl via WRNI (Nam): News
  - 1600 UTC: Australia, World Radio News Service.
  - 1600 UTC: Radio France Intl via WRNI (Nam): News

- **Fridays**
  - 1600 UTC: Australia, Radio: 5900kHz, 6190kHz
  - 1600 UTC: Radio France Intl via WRNI (Nam): News
  - 1615 UTC: UK, BBC London (af): Fast Track. See M 1615

- **Saturdays**
  - 1600 UTC: Australia, Radio: 5900kHz, 6190kHz
  - 1600 UTC: Radio France Intl via WRNI (Nam): News
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</tbody>
</table>

Unfavorable conditions: Search around the last listed frequency for activity. (P) denotes circuit across polar auroral zone; reception may be poor during ionospheric disturbances.

An excellent textbook on radio emission from the sun at metre wavelengths.

The Solar Terrestrial Environment
The Sun and Solar-Related Terrestrial Disturbances, Richard Thompson, published by IPS Radio and Space Services, Sydney, Australia. A comprehensive guide to the sun and its effects on the solar terrestrial environment.


A big book and hard to obtain a copy; but a magnificent reference publication on all aspects of the subject.


Next month you will have the second part of this bibliography; in the meantime, good DXing.
Ah, you’re a beginner! Welcome! All of us were once there. Even longtime shortwave listeners can experience difficulty sorting out what’s on when.

I can remember how I felt back in the 1960s when I first tuned that Heathkit GR-54 — overwhelmed! Of course, it was a happy sort of overwhelmed — a seemingly endless adventure willingly embarked upon that always offered the prospect of a new surprise. Even today, I still feel that excitement and sense of anticipation.

“So, old timer,” you ask (Hey, watch it!), “Where do I start?” Here are a few suggestions.

**How About News?**

The single most cited reason given for listening to shortwave is news — the opportunity to gain new perspectives on current events. When public interest in world affairs rises, so does the sale of shortwave radios.

Despite the current criticism you might hear leveled at the **BBC** for its recent “repositionings,” the **World Service** remains the premier newsgathering and disseminating broadcasting organization on the planet. The coverage is comprehensive even if every news cast or news program isn’t. Apart from the hourly news bulletins, you might try these regular current affairs programs:

- **Newshour (Daily 1300, 2100) and The World Today (Daily 2200-0700 depending on stream)** — Of the two, I prefer Newshour for its more comprehensive and in-depth approach.
- **The World Today** has been derided by some as “BBC Lite,” which may be too harsh. But its similarity to CNN’s approach to news does leave me a bit cold.

**Insight (M-F 1645, 2345; T-A 0345)** gives a quarter-hour examination of one topic in the day’s news — a comprehensive, concise and well-presented daily briefing.

- **Caribbean Report (M-F 1100, 1209, 2115)** is the only regular daily program on shortwave focused on this region. (Radio Habana Cuba also does considerable reporting on the Caribbean, but does not have the reputation the BBC enjoys.)
- **Focus on Africa (Africa stream, daily 1705; M-F 1830) and Network Africa (Africa stream, M-F 0330, 0430, 0530, 0630)** are the programs on which Africans say they rely for accurate reporting of events and issues on their continent. That should prove enough of an endorsement for us.
- **Outlook (M-F 1205, 2305)**, the program which has defined the term “news magazine” for many for decades, is a mixture of hard and soft features, interviews and reports on people, places and events.

**Beyond the BBC**

Among the programs of other international broadcasters providing some excellent regional coverage, you might try sampling:

- **As It Happens (RCI, M-F 2230)** telephones into the world’s hot spots for “on the scene” reports and eyewitness accounts of events as they were occurring. Try this one also for a fresh and dispassionate approach to reporting on the United States.
- **VOA News Now** (around the clock) has also been derided as a CNN-like “light” approach to news. It is worth sampling if only to gain insight into what the world is being told about itself and us by the US’s official broadcaster. Also, to be fair, recent efforts have been noted to place an emphasis on third world children’s health issues and reduce the repetitiveness of some of the content.

**Newsline (R. Nethelands, M-F 2335; T-A 0035, 0435)** is a quarter-hour report where you are likely to hear a perspective or topic unexamined by others.

**Newslink (Deutsche Welle, T-A 0105, 0305, 0505)** focuses primarily on Europe with reports, interviews and a continent-wide press review.

**Sixty Degrees North (R. Sweden, M-F 1230, 1430; T-A 0230, 0330)** reports on Sweden and the Nordic region with a review segment at the end of each week.

**Asia-Pacific (R. Australia, M-H 2310; T-F 0010, 1005, 1105, 1505; A 0030, 0430, 0830, 1030)** provides the most comprehensive and reliable coverage of this region which is home to half the world’s population.

**Latin American News and Studio Nine (HCJB T-A 0100, 0400)** provides the only regular extended treatment of Central and South America for English-speaking listeners and highlights, in turn, medicine, history, environmental matters, business and travel in Latin America.

If you like phone-in shows, three worth trying are Newslink (BBC, S 1400), Australia Talks Back (R. Australia, M-F 0310, 1705) and Talk to America (VOA, M-F 1710).

**How about Music?**

Yes, even a novice knows that shortwave is far from CD quality. But even with its acknowledged imperfections, shortwave provides a depth and range of musical genres unavailable from your local stations and maybe even your local record store. Here are some tuning suggestions:

- For an eclectic blend of world and other music, try **Music 52/15 (R. Netherlands, W 0053, 0453)**, Global Village (RCI, A 2305), Roots and Wings (RCI, S 2305), Andy Kershaw’s World of Music (BBC, Africa stream, F 0230; A 1930) and The Planet (R. Australia, M-F 1315).

Several listeners I know have a passion for traditional and contemporary African music.

**Music Time in Africa** (VOA African Service, S 1730, 1930) is a personal favorite.

A powerful French language commercial station broadcasting from Gabon, Africa Numero UN, is often well heard at least in the eastern half of North America between 0500 and 2300 on 4890, 9580, 15475 or 17630 kHz. Much of the station’s schedule is filled with a nice variety of African tunes.

**All India Radio** programs a good measure of subcontinental music. I like the instrumental pieces, but have yet to acquire an adequate appreciation for the vocal arrangements. So, too, stations originating from the Muslim nations will provide the listener with copious amounts of Arabic and Middle Eastern music.

**How about your Favorite Places?**

A third approach would be to concentrate your listening on stations originating from one or more favorite countries or regions. Listen daily to a particular station to gain a sense of their style of broadcasting, the topics they cover and the aspects of their society or culture they emphasize. Take note of what you like and what you don’t. Then move on to another station or nation.

Of course, all this is only the tip of the iceberg! Watch this column from month to month for suggestions in other topic areas or do some further exploring on your own.

Whatever approach you take, use that new radio enthusiastically as a gateway to new experiences.

Until May, good listening!

[Consult MT’s Shortwave Guide for frequencies. BBC listings are for the Americas/Europe stream unless otherwise indicated. Programs and times are subject to change.]

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**IT’S BACK AND BETTER THAN EVER**

**The Worldwide Shortwave Listening Guide**

Edited by John Figliozi

A “must” reference for every shortwave program listener!

$8.99 at all Radio Shack stores. Catalog No. 62-1335

April 1999  MONITORING TIMES  61
### INTERNATIONAL SHORTWAVE BROADCASTERS (via satellite)

**WRN One English to North America**

<table>
<thead>
<tr>
<th>Time</th>
<th>Station</th>
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<tbody>
<tr>
<td>0000</td>
<td>Radio Telefis Eireann (RTE) – Dublin, Ireland (Irish Collection)</td>
</tr>
<tr>
<td>0100</td>
<td>Swiss Radio International – Berne, Switzerland</td>
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<tr>
<td>0130</td>
<td>Monday-Friday: Channel Africa – Auckland Park, South Africa</td>
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<tr>
<td></td>
<td>Saturday: The Way Ahead and New Horizons</td>
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<tr>
<td>0200</td>
<td>Sunday: Glenn Hauser's World of Radio</td>
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<tr>
<td>0230</td>
<td>Polish Radio – Warsaw, Poland</td>
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<tr>
<td>0330</td>
<td>Radio Canada International – Montreal, Canada</td>
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<tr>
<td>0500</td>
<td>Radio Australia – Melbourne, Australia</td>
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<tr>
<td>0500</td>
<td>Voice of Russia – Moscow, Russia</td>
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<tr>
<td>0530</td>
<td>Radio Prague – Prague, Czech Republic</td>
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<tr>
<td>0530</td>
<td>Radio Vlaanderen International – Brussels, Belgium (Brussels Calling)</td>
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<tr>
<td>0630</td>
<td>Swiss Radio International – Berne, Switzerland</td>
</tr>
<tr>
<td>0630</td>
<td>YLE Radio Finland – Helsinki, Finland (Regional broadcasts from various parts of Finland in Finnish)</td>
</tr>
<tr>
<td>0700</td>
<td>YLE Radio Finland – Helsinki, Finland (News in Finnish)</td>
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<tr>
<td>0730</td>
<td>YLE Radio Finland – Helsinki, Finland (Variable programming in Finnish – often light music)</td>
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<tr>
<td>0800</td>
<td>YLE Radio Finland – Helsinki, Finland (News of the past 24 hours in Finnish)</td>
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<tr>
<td>0900</td>
<td>YLE Radio Finland – Helsinki, Finland (Light music in Finnish)</td>
</tr>
<tr>
<td>0930</td>
<td>YLE Radio Finland – Helsinki, Finland (Easy listening music)</td>
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<tr>
<td>0930</td>
<td>Announcements partially in English. Saturdays a phone-in for children in Finnish</td>
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<tr>
<td>1030</td>
<td>YLE Radio Finland – Helsinki, Finland (English programming)</td>
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<tr>
<td>1030</td>
<td>YLE Radio Finland – Helsinki, Finland (Documentaries and Theater of the Air in Finnish)</td>
</tr>
<tr>
<td>1200</td>
<td>YLE Radio Finland – Helsinki, Finland (Classical music with a preview in English)</td>
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<tr>
<td>1230</td>
<td>YLE Radio Finland – Helsinki, Finland (Eng nglish programming)</td>
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<tr>
<td>1230</td>
<td>YLE Radio Finland – Helsinki, Finland (Newsroundup in Finnish)</td>
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<tr>
<td>1300</td>
<td>YLE Radio Finland – Helsinki, Finland (Interval signal)</td>
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<tr>
<td>1330</td>
<td>Radio Austria International – Vienna, Austria (Germany Programming)</td>
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</tbody>
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**WRN Two Multi-Lingual to North America**

<table>
<thead>
<tr>
<th>Time</th>
<th>Station</th>
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<tbody>
<tr>
<td>0000</td>
<td>World Radio Network from National Public Radio</td>
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<tr>
<td>0030</td>
<td>Swiss Radio International – Berne, Switzerland</td>
</tr>
<tr>
<td>0100</td>
<td>Radio Australia – Melbourne, Australia</td>
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<tr>
<td>0130</td>
<td>Radio Sweden – Stockholm, Sweden</td>
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<tr>
<td>0200</td>
<td>Radio Prague – Prague, Czech Republic</td>
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<tr>
<td>0230</td>
<td>Radio Austria International – Vienna, Austria</td>
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<td>0230</td>
<td>Polish Radio – Warsaw, Poland</td>
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<tr>
<td>0330</td>
<td>Radio Slovakia International – Bratislava, Slovakia</td>
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<tr>
<td>0530</td>
<td>Sunday: Network Africa – Johannesburg, South Africa</td>
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<tr>
<td>0600</td>
<td>YLE Radio Finland – Helsinki, Finland (Announcements in Finnish and English)</td>
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<tr>
<td>0630</td>
<td>YLE Radio Finland – Helsinki, Finland (News of the past 24 hours in Finnish)</td>
</tr>
<tr>
<td>0700</td>
<td>YLE Radio Finland – Helsinki, Finland (Interval signal)</td>
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<tr>
<td>0800</td>
<td>Radio na Gaeltachtta (News in Irish)</td>
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**WRN One English to Europe**

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<tr>
<th>Time</th>
<th>Station</th>
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<tbody>
<tr>
<td>0030</td>
<td>Radio Budapest – Budapest, Hungary</td>
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<tr>
<td>0100</td>
<td>Swiss Radio International – Berne, Switzerland</td>
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<tr>
<td>0130</td>
<td>Radio Australia – Melbourne, Australia</td>
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<tr>
<td>0130</td>
<td>Radio Sweden – Stockholm, Sweden</td>
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<tr>
<td>0200</td>
<td>Tuesday-Saturday: National Public Radio All Things Considered (repeat)</td>
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<tr>
<td>0300</td>
<td>Tuesday-Saturday: Canadian Broadcasting Corporation As It Happens</td>
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<tr>
<td>0400</td>
<td>Radio Prague – Warsaw, Poland</td>
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<tr>
<td>0430</td>
<td>Monday-Friday: Radio Budapest – Budapest, Hungary</td>
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<tr>
<td>0500</td>
<td>Sunday: Global Horizons World Radio</td>
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<tr>
<td>0530</td>
<td>Radio Austria International – Vienna, Austria (German Programming)</td>
</tr>
<tr>
<td>0600</td>
<td>Swiss Radio International – Berne, Switzerland</td>
</tr>
<tr>
<td>0630</td>
<td>Radio Slovakia International – Bratislava, Slovakia</td>
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<tr>
<td>0800</td>
<td>Radio Australia – Melbourne, Australia</td>
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<tr>
<td>0900</td>
<td>Radio Budapest – Budapest, Hungary</td>
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<tr>
<td>0930</td>
<td>Saturday: Global Horizons World Radio</td>
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<tr>
<td>1000</td>
<td>Radio Prague – Prague, Czech Republic</td>
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<tr>
<td>1030</td>
<td>Radio Canada International – Montreal, Canada First Edition</td>
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<tr>
<td>1100</td>
<td>Sunday: Radio Canada International – Montreal, Canada (News and Venture Canada)</td>
</tr>
<tr>
<td>1200</td>
<td>Sunday: Radio Canada International – Montreal, Canada (World News and The Mailbag)</td>
</tr>
<tr>
<td>1300</td>
<td>Tuesday-Saturday: National Public Radio All Things Considered (repeat)</td>
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<tr>
<td>1330</td>
<td>Sunday-Monday: Radio New Zealand International, Wellington</td>
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<tr>
<td>1330</td>
<td>Saturday: Global Horizons World Radio</td>
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<tr>
<td>1500</td>
<td>Radio Budapest – Budapest, Hungary</td>
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<td>1530</td>
<td>Radio Sweden – Stockholm, Sweden</td>
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<tr>
<td>1600</td>
<td>Swiss Radio International – Berne, Switzerland</td>
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<tr>
<td>1630</td>
<td>Polish Radio – Warsaw, Poland</td>
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<tr>
<td>1700</td>
<td>Radio Telefis Eireann (RTE) – Dublin, Ireland (Irish Collection)</td>
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<td>1900</td>
<td>Swiss Radio International – Berne, Switzerland</td>
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<td>2000</td>
<td>Radio Austria – Melbourne, Australia</td>
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<tr>
<td>2030</td>
<td>Radio Slovakia International – Bratislava, Slovakia</td>
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<tr>
<td>2130</td>
<td>Sunday: Network Africa – Johannesburg, South Africa</td>
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<tr>
<td>2200</td>
<td>Radio Sweden – Stockholm, Sweden</td>
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<tr>
<td>2230</td>
<td>Radio Prague – Prague, Czech Republic</td>
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<td>2300</td>
<td>Radio Austria International – Vienna, Austria</td>
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<td>Polish Radio – Warsaw, Poland</td>
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<td>2330</td>
<td>Radio Budapest – Budapest, Hungary</td>
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</tbody>
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**MONITORING TIMES**

April 1999
SATELLITE RADIO GUIDE

INTERNATIONAL SHORTWAVE BROADCASTERS / SCPC SERVICES

Sunday: Public Radio International Prairie Home Companion until 1300 UTC/1400 CET
1200 Monday-Friday: National Public Radio Morning Edition
Saturday: National Public Radio Fresh Air
1300 Monday-Friday: National Public Radio Morning Edition
1400 Monday-Friday: Radio France International – Paris, France
Saturday: Sunday: Radio Memphis
1500 Monday-Friday: Voice of Russia – Moscow, Russia
Saturday: Radio New Zealand International – Wellington
Sunday: Voice of America Communications World – Washington, DC USA
1530 Adventist World Radio
1600 Radio Australia – Melbourne, Australia
1700 Monday-Friday: Caribbean Tempo from CANA Radio/Vatican Radio – Vatican City (World News)
Saturday: Glenn Hauser’s World of Radio
Sunday: Radio Denmark – Copenhagen, Denmark (Copenhagen Calling)
1800 Monday-Friday: Radio Slovakia International – Bratislava, Slovakia
Sunday: Notre Dame This Week and Health Watch
1830 Radio Teleis Eireann (RTE) – Dublin, Ireland (News and Sports)
1900 Radio Vlaanderen International – Brussels, Belgium (Brussels Calling)
1930 Monday-Friday: Channel Africa – Auckland Park, South Africa (repeat)
Saturday/Sunday: Radio Memphis (until 2030 UTC)
2000 Monday-Friday: Radio Budapest – Budapest, Hungary
Saturday/Sunday: Radio Memphis (continued)
2030 Radio Sweden – Stockholm, Sweden
2100 YLE Radio Finland – Helsinki, Finland
2130 Polish Radio – Warsaw, Poland
2200 Voice of America – Washington, DC USA
2300 Monday-Friday: Public Radio International The World
Saturday: Sunday: National Public Radio All Things Considered

WRN Two Multi-Lingual to Europe
Hotbird-4, 13 degrees East, transponder 13 (Quantum TV) 10.933 GHz, H-Polarization, audio subcarrier 7.74 MHz. Note that programs listed below with an asterisk (*) are subject to pre-emption without notice. All times BST/UTC+1 hour (for Central European Time add 1 hour).

<table>
<thead>
<tr>
<th>BST</th>
<th>Station</th>
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<tr>
<td>0000</td>
<td>WRN1 European schedule</td>
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<td>0100</td>
<td>WRN1 European schedule</td>
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<td>0930</td>
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<td>1200</td>
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<td>1530</td>
<td>Monday-Friday: Radio Studio Delta Saturday/Sunday: WRN1 European schedule</td>
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<tr>
<td>1630</td>
<td>Vatican Radio – Vatican City</td>
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<td>2230</td>
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<tr>
<td>2300</td>
<td>Monday-Friday: Radio Studio Delta Saturday/Sunday: WRN1 European schedule</td>
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</tbody>
</table>

**Single Channel Per Carrier (SCPC) Services**

An SCPC transmitted signal is transmitted with its own carrier, thus eliminating the need for a video carrier to be present. Dozens of SCPC signals can be transmitted on a single transponder. In addition to a standard TVRO satellite system, an additional receiver is required to receive SCPC signals.

The frequency in the first column is the 1st IF (typical LNB frequency) and the second column frequency (in parentheses) is the 2nd IF (commercial receiver readout) for the SCPC listing. Both frequencies are in MHz.

**GE-2 Transponder-Vertical 13 (C-band)**

1178.70 (61.3) NASA space shuttle audio

**GE-3 Transponder-Horizontal 13 (C-band)**

1207.90 (52.1) Wisconsin Voice of Christian Youth (VCY) America Radio Network – religious programming
1204.25 (55.75) Wisconsin Voice of Christian Youth (VCY) America Radio Network – religious programming
1204.00 (56.0) SRN (Salem Radio Network) News
1201.50 (58.5) Wisconsin Voice of Christian Youth (VCY) America Radio Network – religious programming

**By Robert Smathers**
roberts@nmia.com

**Galaxy 6 Transponder 1-Horizontal (C-band)**

1443.80 (56.2) Voice of Free China (International Shortwave Broadcaster) Taipei, Taiwan
1443.60 (56.4) KBLA-AM (1580) Santa Monica, CA – Radio Korea
1443.40 (56.6) Voice of Free China (International Shortwave Broadcaster) Taipei, Taiwan
1438.30 (61.7) WWVRF-AM (13330) New York, NY – Spanish religious programming and music, 10 – Radio Vision Cristiana de Internacional
1436.50 (63.5) West Virginia Metro News – network news feeds

**Galaxy 6 Transponder 3- Horizontal (C-band)**

1404.80 (55.2) KCA-AM (650)/KTLK-AM (760) Denver, Colo. – news and talk radio

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**April 1999**

**MONITORING TIMES**
## SINGLE CHANNEL PER CARRIER (SCPC) SERVICES

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<td>KOA-AM (850)/KTLK-AM (760) Denver, CO—news and talk radio sports</td>
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<tr>
<td>1384.20 (75.8)</td>
<td>WSB-AM (750) Atlanta, GA—news and talk radio/Atlanta Hawks NBA radio network</td>
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<tr>
<td>1383.70 (76.3)</td>
<td>Motor Racing Network (occasional audio) NASCAR racing</td>
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<tr>
<td>1383.10 (76.9)</td>
<td>KIRO-AM (710) Seattle, WA—news and talk radio</td>
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<tr>
<td>1382.60 (77.4)</td>
<td>Soldiers Radio Satellite (SRS) network—U.S. Army information and entertainment radio/Army college sports</td>
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<tr>
<td>1382.00 (78.0)</td>
<td>Occasional audio</td>
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<td>1381.60 (78.4)</td>
<td>KEX-AM (1190) Portland, OR—news and talk radio/Portland Trailblazers NBA radio network</td>
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<td>1381.20 (78.8)</td>
<td>KJRR-AM (950) Seattle, WA—sports talk radio/Seattle Supersonics NBA radio network</td>
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<td>1376.00 (84.0)</td>
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<td>Canadian Broadcasting Corporation (CBC) Radio—North (Quebec) service</td>
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<td>Canadian Broadcasting Corporation (CBC) Radio—North (Western Arctic) service</td>
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<tr>
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<td>Canadian Broadcasting Corporation (CBC) Radio—North (Newfoundland and Labrador) service</td>
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<td>1006.00 (54.0)</td>
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<tr>
<td>1005.50 (54.5)</td>
<td>Canadian Broadcasting Corporation (CBC) Radio—North (Yukon) service</td>
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<td>1447.90 (52.1)</td>
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<tr>
<td>1447.60 (52.4)</td>
<td>Antenna Radio Noticias</td>
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<td>1447.20 (52.8)</td>
<td>La Grande Cadena Raza</td>
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<td>1447.00 (53.0)</td>
<td>XEMZA-AM 560, Manzanillo, Mexico</td>
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<tr>
<td>1003.70 (63.3)</td>
<td>In-store music</td>
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<td>1382.10 (77.9)</td>
<td>Learfield Communications/MissouriNet/Blues NHL radio network</td>
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April 1999 MONITORING TIMES 65
The Prosat P3500 DVB Digital Receiver

There was a time, just a few years ago, when analog satellite TV channels seemed to be disappearing faster than my chances for winning the lottery. The reason cited was the dreaded "D" word: they'd gone digital. As expected, there was a general wailing and gnashing of teeth as more than a million C-band viewers across the continent threw in the towel and signed up for the ubiquitous mini-dish systems which were promising so much for so little.

Still, those who bothered to hang on to their C-band dishes have found that the digital age did not spell the end to their entertainment; instead, it has proven an enormous benefit. In addition to the 200 analog C-band channels there are hundreds more unencrypted digital channels. And, if you add the audio services to that figure (the way they do on the mini-dish systems), there are over 700 channels, making the big dish the most versatile of all.

Free-To-Air

While General Instrument's DigiCipher II (DCII) configured 4DTV receiver was making all the digital waves in the U.S., the lesser-known Digital Video Broadcast (DVB) standard, a staple in Europe, was quickly catching on here as well. Just as its counterpart does, DVB uses the MPEGII standard, delivering crisp pictures and CD quality audio that digital viewers have come to expect. And, as with DCII, signals may or may not be encrypted. When the programmer chooses not to encrypt, the signal is said to be in the Free-To-Air (FTA) mode and is receivable by anyone with a DVB receiver wishing to tune in.

The past two years has seen an explosion of FTA DVB channels which are showing up not only on our domestic C and Ku-band satellites, but also on the many international satellites bridging the Atlantic. DVB viewers are treated to programming from all over Europe as well as North and South America, with all manner of programming in at least eight languages. What's more, these DVB receivers are reasonably priced, easy to operate, and can be configured into your current C-band system or set up as a stand-alone digital system.

Even though DVB satellite receiver sales top several thousand a month, they remain virtually unknown to most of the satellite industry. That's because they have been sold almost exclusively to the various communities of foreign nationals and immigrants for whom digital satellite TV is the only link to their homelands.

New Prosat 3500

One of the big players in DVB receivers is Prosat which has just released its new model, the 3500v3. There are only three small LEDs to break up the smooth black front of the unit. The LEDs show the receiver's status: red for "off"; green for "on"; and amber for "locked," which indicates it's receiving a digital data stream.

The 3500 has a drop-down door which allows the user to operate the receiver without the remote control. The back of the receiver has an extraordinary array of outputs. The signal output from the receiver can be seen either by using the "S" video output, the UHF modulator which has an output on any channel between 14 and 83 or the video and audio RCA output jacks.

The unit was originally designed for use in the European market and its heritage is seen on the back panel, where there is a SCART (Smart Card) connection for which there is no American use, and the UHF modulator jacks which have Euro-style connectors, though "F" connector adaptors are provided. Even the power plug has a Euro-adapter though it does operate on 110 volts. The back panel also features a VHF antenna input connection, to attach your outdoor antenna, and two data ports labeled "high speed" and "low speed." These ports are used to input the latest receiver data which can be downloaded from a website run by Prosat's distributor.

The 3500 has a full featured infrared (IR) remote control, which is light weight and has a simple layout with well spaced rubber buttons. One thing I look for in a remote control is range: how far and at how great an angle you can be from the receiver and still work the remote. The 3500 remote control has excellent range and a very wide angle for IR reception.

Plug 'n Play

The Prosat 3500 comes with a well written manual, but the best instruction comes from the superbly designed on-screen prompts which can tell you how to do everything from point your dish for any given satellite to how to change the digital reception parameters. They couldn't have made it easier.

When I pulled the P3500 out of the box I realized that I no longer needed the cumbersome "slave harness" to make it easy to combine this receiver with my analog one. That's because of the previously mentioned rear panel connections.

The next step was to point the dish at a typical satellite loaded with DVB transmissions. I chose Panamsat 5 because of all the interesting foreign broadcasts on that satellite. Once the satellite was acquired, I pressed the "menu" button on the remote, scrolled down to "satellite selection" and hit the "ok" button. The receiver searched the available transponders and stored the digital data pertaining to that satellite in memory.

After searching, I could view any available channels by pushing the "channel up/down" button as you might a VCR. I begin with a video on the screen from CCTV China. I know that because a crawling blue banner at the bottom of the screen tells me. After a few seconds the banner disappears.
on show number half NHK (Japan); (England); Deutsche Welle TV (Germany); on 3500 access signal PHOTO 5: Reitz satellites including viewer PHOTO the remote. One the screen. As Pressing “up,” can store the dozens Arabic channels; the viewer for reception and a handy signal meter which indicates signal strength. Photo Courtesy: Ken Reitz PHOTO 6: The “surf” button allows quick access to hundreds of channels. The Prosat 3500 can store up to 600 channels in memory. Photo Courtesy: Ken Reitz

Pressing “up,” the next CCTV channel pops on the screen. As I scroll through the channels there are three from CCTV; two from BBC (England); Deutsche Welle TV (Germany); NHK (Japan); two from Spain; RAI (Italy); half a dozen Arabic channels; and a dozen or more feeds including CBS and AP television news feeds. The satellite is brimming with unencrypted digital programming. There are a number of encrypted feeds as well. These show up as a black screen with no audio.

■ Prosat 3500 Features

One of the best features is the “surf” button on the remote. Pressing this brings up a screen which lines up the alphabet in two strips. Using the left/right buttons one may advance up or down the alphabet. Landing on a letter produces the channel options on three strips below. Using the up/down buttons one may scroll through the channels beginning with that letter. Pressing “ok” on any channel brings that channel to the screen.

It’s not long before you’ll find you’ve added several hundred channels. To sort them out, the Prosat has a short list of “preferred channels” available with the “prf-” and “prf+” buttons. This makes finding favorites extremely easy; otherwise you may have trouble locating your most frequently watched channels. Particularly because programmers, who insert the ID data on the data stream, often simply label the channels as “channel one” or “channel 1” or “ch 1.” You can appreciate the confusion this feature alleviates.

■ Mastering the P3500

As with using any modern electronic gear, whether it’s a computer or shortwave receiver, there’s a learning curve. Getting around on the remote control, navigating the on-screen menu, and using the advanced features takes a while to master. It took me a week to figure out how to tune in the extra audio subcarriers, for instance. But, once mastered, you’ll find this receiver amazingly easy to operate. The video ranks with the best available, the audio is simply beautiful. Try it on RAI’s opera subcarrier, Hispasat’s classical music channel, or MCM’s European rock music channel: it’s as clean as you’ll ever hear!

There are a few channels transmitted in the European PAL format, mostly on the Atlantic satellites, and they appear as black and white when tuned in on our sets. That’s the only drawback to this receiver, but this is a small point, since such channels represent only a small percentage of available programming.

Other important things to know are that this receiver does not receive Digicipher II or any other type of digital programming other than DVB standard; it has no decoder module (despite the “smart card” slot behind the front panel door) so programming currently in the clear may not be receivable if encrypted in the future; and there is virtually no “cable” type programming on any of these transmissions.

■ Future at Hand

One of the strongest points to the Prosat is that, with it, you can put together a very inexpensive stand-alone satellite TV system. With a good LNB/feed horn and a well designed dish as small as 4.5 feet, you can set up to receive FTA DVB broadcasts in a very limited space, though in northern parts of North America you’ll need a bigger dish. If you have a functioning C-band system you need only add the receiver to start watching.

If you add a Ku-band LNB you’ll see considerably more programming. Adding an actuator arm will also increase your channel capacity, but it isn’t necessary if your aim is toward receiving particular programming. For example, in Canada you may want to receive only CTV networks, Newsworld International, and The Weather Network, all of which went digital two years ago and can found on Anik E2 in DVB.

FTA DVB broadcasting brings the viewer a universe of fascinating programming from all over the world — imagine shortwave radio with pictures! It’s the future of such broadcasting and the best part is that the programming is free and the receiver is relatively cheap. So, next time you’re hunting for something interesting on TV besides HBO reruns, shopping shows, infomercials and phone sports events, tune into the unexplored side of digital world television.

[The Prosat 3500 retails for around $370, less 10% discount for MT readers, from PME, Digiear Sales, 6680 Lincoln Avenue Lockport, NY 14094; Fax 716-639-7779; Orders only at 877-463-3212; or visit their website at http://mpeg2-dvb.com]
Great Radio Reads

A

s any of you folks who have sub-
scribed to *MT* for more than a year
or so know, April, for reason lost in
the sands of time, has become the month
where Old Uncle Skip takes some time
to review the various books, software or other
media that helped to keep him from going stir
crazy through the winter months. While past
April review columns have had some sort of
theme to them, this year the reading presents
itself as more of a “mixed grill.”

If anyone continues to labor under the
false assumption that this hobby is going
south, you will see its continues vitality in the
number of books annually written for the
radio hobby. Almost any radio book short of
a graduate level engineering text surely has a
few things to offer even the newest beginner.
Here are a few that I found intriguing of late.

GUIDE TO EMERGENCY SURVIVAL
COMMUNICATIONS
How to Build and Power Your System
by Dave Ingram
Universal Electronics, Inc.
4555 Groves Road, Suite 12
Columbus, OH 43232
(614) 866-4605; Fax (614) 866-1201

A good radio system that keeps going
under any emergency situation is well worth
the effort. This book represents itself as a
comprehensive source of emergency equip-
ment and communications systems, and as
such it comes up to spec. This book takes a
wide view of all aspects of the radio hobby
including shortwave radio, amateur radio,
scanning, CB and the newer personal com-
munications systems.

It emphasizes the idea that, in emergency
and disaster situations, the ability to maintain
communications, one or two way, is impor-
tant. Mr. Ingram gives a good overview of
radio systems including hardware, antennas
and supportive equipment. Beyond this strong
background information, the book goes on to
discuss alternative power sources from simple
batteries all the way up to self-starting diesel
generator systems.

Though that may seem like overkill, I’m
sure it would be nice to keep the food cold
in the fridge while you’re listening in to the
world around you. The book goes well be-
yond the equipment alone, examining vari-
ous monitoring and operating strategies per-
tinent to radio use during difficult times. The
book includes a chapter on free-playing ra-
dios such as the Baygen unit and even in-
cludes a few simple design projects for crys-
tal sets.

Unlike some books that go to press half
obsolete, this one came with a very interest-
ing feature. A six page “update” of informa-
tion. The author updates this supplement
every three months in order to keep the ma-
terial as current as possible. This seems quite
useful in a hobby where frequencies and
suppliers change more often than some folks
change their socks. All of this information
plus strategies for increasing the storage life
of gasoline... Like I said, this book covers the
entire subject.

ELECTRONIC INVENTIONS AND
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the present day
Fourth Edition by G.W.A. Drummer
284 Pages; $40.00 US (aprx.)
Institute of Physics Publishing
Direc House Temple back
Bristol, BS1 6B England

If you remember your history, Radar was
one of the major inventions that won World
War II. Geoffrey Drummer was one of the
folks that worked on the development of
Radar back then. He went on to have a hand
in the further development of a couple of
minor electronic devices such as solid state
components and the integrated circuit.

After retiring from the process of inven-
tion, he became interested in the history of
invention. This fourth edition of *Electronic
Inventions and Discoveries* is just the book
for anyone who ever wondered who was
responsible for so much of what we enjoy
within the radio hobby and the wider world
of electronics.

The book takes several tracks to giving the
reader a complete notion of the history of
electronics. First the book examines the be-
inning and expansion of electronics fol-
lowed by the development of componentry
from tubes, through transistors and on through
integrated circuits. Next comes a series of
“Concise Histories of Audio, Radio, Radar,
Television, Computers and Industrial Elec-
tronics.” Each of these histories not only
gives insight into the individual subject but
sets it into its situation in the world. Chapter
ten lists inventions by subject. Further, each
sub heading is ordered by date so you can see
the flow of things.

The eleventh chapter has to be my favor-
rite. It is a concise (I’ll call it comprehensive)
description of each invention in date order.
Look up Short Wave Commercial Radio Com-
unication and you discover the story of
Holland’s L.J. van Boetzelaer. Look up
Radio Broadcasting and you find that Mr.
Drummer and I concur on the belief that this
honor falls to Dr. Reginald Fessenden in
1906, and not Dr. Lee de Forest a full year
later.

In this section you will learn many things
and you will find yourself reading this infor-
mation not as if it were a textbook but more
as if it were an adventure as you see the
growth of electronics through the years.

The book follows on with chapters on
electronics acronyms and abbreviation. There
are also bibliographies covering both inven-
tions and inventors. While you could easily
teach a good history course with this book it
is just as enjoyable as solid non-fiction read-
ing for anyone interested in the subject of
electronics, especially radio.

THE ARRL ANTENNA BOOK
18th EDITION
Editor R. Dean Straw N6BV
728 Pages plus 1 software disk (PC
format)
The American Radio Relay League
225 Main Street, Newington, CT
06111-1494
1-888-277-5289

www.americanradiohistory.com
Whether you are a ham or not, the American Radio Relay League's significant contributions to antenna theory apply equally to the general radio hobbyist. This latest 18th edition takes things yet another notch higher. Like its sister publication, The ARRL Handbook, the ARRL Antenna Book is a comprehensive collection of information on all aspects of antennas. Chapters cover both the hard theory and the practical construction of antennas for every segment of HF, VHF and UHF frequencies. Sections are also devoted to feedlines, propagation and mobile applications.

This book alerted me to an area of study to which I had not given a lot of thought — elevation angles and how they relate to how a signal travels over distance. This study includes indepth statistical information that makes the subject fully understandable, even to a beginner. Also, with the improvement in the sun spot cycle, the new tables on the solar cycle should be of use to any radio hobbyist.

The book once again includes an excellent software package of programs related to antenna design and propagation. If you have any desire to go beyond sticking a length of wire out of a window, this book belongs in your collection.

THE JOY OF QRP, Strategy for Success
By Adrian Weiss KB8EG-WORSP
163 Pages; $23.00 US
Milliwatt Books
526 N. Dakota St.
Vermillion, SD 57069

As you know from other columns, just like our own Rich Arland K7SZ and Ike Kerschner N3IK, I fool around a bit with QRP (low power) operations. In this book you can hear from somebody who doesn't just fool around: Ade Weiss takes his QRP very seriously. The Joy of QRP has been out of print for some years, but I am happy to say that Mr. Weiss has pleased many QRP people by putting this excellent book back into print.

I became involved in this aspect of the radio hobby after that initial print run ended and I was envious of folks who had the old book. Happily I now have my own. This single, densely-packed volume of information can take you from mildly interested in QRP to rabid Milliwatt status in short order. Through Ade's study of the subject you will learn the history and traditions of the QRP world, including information on the various clubs and organizations that support this aspect of the radio hobby.

You will also learn how to make QRP work through the study of propagation and operating techniques and strategies that stretch those diminutive signals to the far corners of the globe. Sections discuss building a station around commercial equipment and the joys of building homebrew QRP equipment. This includes the classic QRP design known as the Viking -5, Two-Band Five-Watt Transmitter, and includes printed circuit board patterns. To keep things on the up and up for those milliwatt awards, you will learn how to build and operate accurate power measuring equipment.

Every time I pick up this book (which is quite often) I unplug the antenna from my QRO (High Power) rig and plug it into my stock HW-8. If you plan to try your hand at QRP or if you just want to read up on this intriguing aspect of the radio hobby, you need to get The Joy of QRP. I'll be listening for you on the lower end of 40 meters.

PASSPORT TO WEB RADIO, Second Edition
Editor-in-Chief Lawrence Magne
144 pages; $19.95
International Broadcasting Services, Ltd.
Penn's Park, PA 18943
www.passport.com
ISBN 0-914941-46-1

I know some traditionalists are already warming up the tar and emptying the feather pillows but I'm going to review my fellow MT columnist's great book just the same. Personally, it took me quite a while to warm up to the notion of "bitcasting" or Internet Radio or whatever name finally gets hung on it in the end. This was not because I was a techno-luddite or anything; I just needed a book like Larry's first edition of Passport to Web Radio to turn me on to all the possibilities.

Since the first edition was published, netcasting has gone beyond being an experiment and a curiosity, to being a legitimate adjunct to traditional wireless broadcasting. Further, improved personal computers with a lot more horsepower and updated audio (and video) players make listening to this form of programming a turnkey operation. For example, while I am typing this, I am enjoying a soothing piano concerto by way of WFMT - 98.7 FM, Chicago, IL (wfmt@broadcast.com). Passport to Web Radio lists this and over 1500 other programming opportunities.

Grant it, this is not the sport of chasing DX, but it is excellent radio broadcasting that would otherwise be out of my reach, even through the best efforts of a hot receiver, low noise preamplifier, beam antenna, and the mother of all tropospheric ducts. As a radio monitoring hobbyist, nothing beats the rush of battling conditions to catch a rare signal for the purposes of confirmation. But when I'm listening for content, knowledge and enjoyment, I can do without the propagation fading and the static crashes. In other words, as a radio monitoring hobbyist who also likes to play with computers, I can honestly say I have access to the best of both worlds.

In the midst of the excellent program guide, featuring listings of as many of the current Internet broadcasters as publishing deadlines allow, the book is a further study of the impact of this new technology on both the broadcast industry and the listener. The idea that KFI (www.kfi640.com/programming/index.html) in Los Angeles, California, may be able to count on Old Uncle Skip in New Jersey listening in has some heavy implications attached to it for advertisers. True, my listening in on the other side of the country may be just a blip on the scope today, but Internet broadcasting is still in its infancy.

Passport to Web Radio is a great way to get a handle on this new technology. You'll also hear some great radio programming along the way.
Scanning the Weather Satellites

If you have any type of scanner that can cover the VHF band (specifically the 137 MHz region), and if you can feed it with an external antenna, there can be no easier and more fascinating way to introduce yourself to the world of satellites than by tuning to those that transmit weather images.

My first experiments with satellites (as an amateur) involved tuning to the amateur radio satellites, but despite the satisfaction of writing programs to decode the telemetry from UoSat-2 (AO-11), and getting intriguing results (showing the variation in the earth’s magnetic field in the satellite’s orbit), I only felt that I had “arrived” when I decoded my first weather satellite picture. That was nearly 15 years ago!

I would recommend to beginners that they should monitor some weather satellite signals, and then consider whether they want to jump in deeper and set up a full weather satellite station. Monitoring satellites is a very satisfying hobby, and with suitable equipment, you could well find yourself thoroughly absorbed in identifying the different satellites and recognizing their characteristics. After doing this for some time, you build up an expertise and may decide you want to develop the hobby further.

Many readers of Monitoring Times already have a general purpose receiver; check to see if it covers the 137 to 138 MHz band – this includes the majority of the weather satellite frequencies listed at the end of this column. Such receivers can “hear” the signals from weather satellites, even when fed by little more than a length of wire running somewhere outside the shack.

Such a minimal system should still bring in the birds – but don’t expect to be able to decode these signals and produce clear pictures; this minimal equipment is only suitable for listening – not decoding. In future editions I plan to include features on the specification of the hardware needed to receive good quality data.

Resurs lives!

Despite the announcement on the Resurs web site (see below) that Resurs 1-4 would be operational again by late January, I was still surprised to receive a transmission on January 28 at 1033 UTC. Resurs 1-4 has been silent on APT (automatic picture telemetry) frequencies in the 137 MHz band since last August, so the statements indicating a resumption of test transmissions seemed (at least to me) to be optimistic. A report of an APT transmission from Resurs was circulated late January 27th and my first image was received a few hours later. Resurs web site: http://www.ssc.se/sb/Resurs/index.html

FIG 1 - Resurs 1-4 January 28 at 1035 UTC

Unlike Meteor 3-5 – which does not transmit APT unless in sunlight – Resurs 1-4 came over the north pole transmitting a blank image. This has happened before. Within a minute or so, the spacecraft entered sunlight and the image quickly proved to be as good a quality as those seen last summer.

The signal strengths received from Meteor, NOAA and Okean satellites, although nominally similar, produce rather different results when run through decoding hardware/software. Differences in the level of amplitude modulation processing on-board each satellite can result in different gray scales. My home system is optimized for NOAA signals. Meteor weather satellites transmit a slightly stronger signal, so the gray scale for Meteor (or Resurs) satellites is a little distorted, sometimes leading to saturated whites as seen in figure 1.

After the success of Jan 28, I didn’t receive transmissions again, until just at prestime. Resurs 1-4 is currently transmitting good APT images on 137.85 MHz when in sunlight. Unfortunately, this does mean that it clashes with Meteor 3-5 when they are both above the same horizon. Perhaps Meteor 3-5 will be switched off?

Operational Weather Satellites

Meteor 3-5’s sunlight-only transmissions continued during the period when its orbit precessed through the plane of twilight. Meteor 2-21 ceased transmissions during mid-January; I suspect that it was switched on to provide northern hemisphere Meteor users with images during the period when Meteor 3-5’s transmissions were out of range. By late January, transmissions could be heard during the last minute or so of each northbound (daylight) pass – just up to the latitude where it enters the northern twilight region.

FIG 2 - Meteor 3-5 1610 UTC February 7

Careful checking of the edge of Resurs and Meteor images reveals an interesting difference. Meteor edge telemetry shows a sequence of vertical columns that change structure every several seconds. This is the aperture indicator; a careful check during a pass shows that these six black or white columns can be interpreted as on or off binary states. At the time of switch-on/off,
the dark column is at its widest — interpreted as 111111. The binary nature of this column can be seen; sequences of ones and zeroes can be identified and the equivalent decimal numbers (63, 62, 61 etc.) show that the aperture is at its widest just after (or before) entry to the nighttime part of the orbit.

Resurs images do not (so far) show this number sequence. Adjacent to the gray scale in their images is a vertical column with no additional data.

**NOAAs-12, 14 and 15**

The three NOAAs continue to show seasonal changes of illumination characteristic of their individual orbits. The morning NOAA-15 pass, the midday NOAA-14 pass, and the evening NOAA-12 pass show the improving level of contrast in the visible-light section.

**Okean and Sich**

Chances are high that newcomers to the weather satellite scene will not yet have heard either of these satellites. They are not really weather satellites (like Meteors or NOAA), but their (rare) transmissions are invariably APT format on 137.40 MHz, so they always attract our attention! Sich-1 and Okean-4 (a.k.a. 1-7) are oceanographic satellites carrying radar and a microwave sounder. Both systems are power-hungry, so transmissions rarely last more than a few minutes.

Several transmissions were reported received from both satellites during January. In early February, I logged some unusual transmissions from Okean-4, made during northbound passes over the mid-Atlantic. Transmissions mostly occur during passes when the spacecraft is over Russia. These were not long enough for me to reconfigure my computer for APT reception.

I receive Primary Data User Station (PDUSS) information from Meteosat-7 using a DOS program — and therefore needed a few minutes to load Windows. Following this experience, I decided to set up a dedicated DOS computer for the PDUSS monitoring, and another for APT operations.

A few years ago I contacted the Russian Space Monitoring Information Support (SMIS) laboratory, and their staff kindly sent me documents explaining about Okean and Sich operations, including the specification of spacecraft equipment.

Instrumentation consists of a four-channel scanning radiometer (MSUM), an X-band side-looking synthetic aperture radar (SLR), and a microwave radiometer (RM). Unlike the Meteor telemetry format, transmitted images often include combinations of these instruments. (NOAA images also comprise two wavebands.)

The scanning radiometer has four channels: 0.5-0.6 nm; 0.6-0.7 nm; 0.7-0.8 nm and 0.8-1.0 nm. This last band is similar to NOAA channel-2 imagery, and is usually included in transmissions. Resolution across the track — as seen from Sich’s altitude — reaches 1 km, and along-track resolution reaches 1.7 km. The radar scanner has a carrier frequency of 9.52 GHz (equivalent to a wavelength of 3.15 cm). Its swath width is 450 km, with spatial resolution of 1.3 km and 2.5 km. The microwave radiometer operates in the 36.5 - 36.8 GHz band (equivalent to 8 mm).

My thanks to SMIS for providing detailed information about on-board systems. SMIS laboratory: http://smis.iki.rssi.ru/ SCANEX http://scanex.ss.msu.ru/

**FIG 3 • Okean-4 image August 9**

Figure three shows a fairly typical (and complex!) image received from Okean-4 during a southbound pass over Britain some weeks after launch. The right edge shows a column of numbers commencing with “1020.” This number increments each minute; it is the number of minutes elapsed since midnight in Moscow — three hours ahead of UTC. Below this (and probably too small to be reproduced fully) is a small gray scale. Below the scale are ten numbers identifying the state of the on-board equipment.

The image occupying much of this frame is from the (nominally) visible-light band, and shows the northern half of Britain. The small inset picture — showing Scotland — is a radar image. The left-hand inset is the microwave image — which ends shortly after reaching Scotland.

These are the scanners that apparently drain most of the power during imaging sessions, leading to transmissions being kept short. The radar unit is limited to about 15 minutes operation, and the scanning radiometer for about 30 minutes.

Barely visible in the original image are the two vertical gray scale bars on either side of the microwave image. Transmissions from Okean and Sich are rare, but a few are heard far away from “home” territory — so do listen for them!

**Feng Yun-2**

The flow of data from the Chinese geostationary weather satellite Feng Yun-2 has continued. My spot check of their web site produced the latest images from all three wavebands. The water vapor band image was the only one presented without grid lines so I have included it — see figure 4.

http://nsmc.cma.gov.cn

**FIG 4 • Feng Yun-2 water vapor image from 0502 UTC on February 7, 1999, courtesy National Satellite Meteorological Center China.**

**Frequencies**

| NOAA-14 transmits APT on 137.62 MHz |
| NOAA-12 and -15 transmit APT on 137.50 MHz |
| NOAA transmit beacon data on 137.77 or 136.77 MHz |
| Meteor 3-5 transmits APT on 137.85 MHz when in sunlight |
| Resurs-1-4 may resume APT on 137.30 MHz |
| Okean-4 and Sich-1 sometimes transmit APT briefly on 137.40 MHz |
| GOES-8 and GOES-9 use 1691 MHz for weather facsimile |

April 1999 MONITORING TIMES 71
The National Disaster Medical System

A disaster (manmade or natural) can occur anywhere and anytime. Such catastrophic events quickly overwhelm the resources available to local public safety officials. Imagine for a moment a terrorist attack on a major US city. Suppose the incident involves a major explosive device (larger than that used in the World Trade Center bombing) detonated at a crowded convention center in Portland, Oregon, with an associated container of nitrogen mustard gas.

Local medical personnel are dealing with a patient mix including both trauma and mustard gas contaminated patients. This incident generates over 1,000 casualties, quickly overwhelming the local Portland medical facilities. The Governor of Oregon requests a Federal Disaster Declaration, and the Federal Emergency Management Agency activates the National Disaster Medical System (NDMS). As a result, some patients are evacuated to other areas of the country for treatment using military transport aircraft.

**What is it?**

The National Disaster Medical System (NDMS) is a federally coordinated system that augments the nation’s emergency medical response capability. It makes sure that the federal response, when assisting state and local authorities in meeting a major medical or health disaster, is well-coordinated and integrates participating agencies. It also provides support to the military and Veterans Health Administration medical systems in caring for casualties evacuated back to the US from overseas armed conflicts.

Can I hear NDMS communications on my scanner? Absolutely. J. Howell recently posted the following excellent list of NDMS related frequencies to the SCAN-L email list. According to Mr. Howell, the information was compiled from handouts obtained at the 1995 NDMS conference in Nashville, Tennessee.

**More on 120.375 MHz**

Our segment in the latest edition of *The Fed Files* on the Justice 120.375 MHz air frequency generated a lot of snail and email. Our good friend Tom Kneitel of *Popular Communications* magazine reports that from Long Island this frequency is heard in use by the Washington Air Route Traffic Control Center (ARTCC) at their Falls Church, Virginia, remote site for high altitude air traffic control (ATC) operations.

In those areas of the US where this frequency is being used for ATC operations, there is likely an alternate Justice frequency, and Tom may have found one of them. He reports monitoring Drug Enforcement Administration (DEA) aircraft with air-to-air and air-to-ground communications on 120.775 MHz operating in New Jersey; this may be the alternate frequency in areas where 120.375 isn’t available.

Two other areas of the country with known 120.375 MHz ATC activity are at the high altitude sector remote at Rockford, Illinois, for the Chicago ARTCC and Montgomery, Alabama, approach control facility (service into Maxwell AFB). Folks in those areas may want to check for Justice activity on 120.775 MHz in case the same alternate frequency is in use there as well.

And for you adventurous types, here are three more frequencies in the 120 MHz range.

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**TABLE 1: U.S. GOVERNMENT DISASTER RELATED FREQUENCIES**

<table>
<thead>
<tr>
<th>Usage</th>
<th>Frequency Input (MHz)</th>
<th>Frequency Output (MHz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health &amp; Human Services Department</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nationwide VHF low</td>
<td>41.470 (Shared Nationwide with the Department of Education and Coast Guard nationwide)</td>
<td></td>
</tr>
<tr>
<td>Nationwide Direct Channel 1</td>
<td>413.425</td>
<td></td>
</tr>
<tr>
<td>Nationwide Repeater Channel 2</td>
<td>408.050</td>
<td>413.425</td>
</tr>
<tr>
<td>National Disaster Medical System (NDMS)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NDMS Direct Channel 1</td>
<td>419.600</td>
<td></td>
</tr>
<tr>
<td>NDMS Repeater Channel 2</td>
<td>408.000</td>
<td>419.600</td>
</tr>
<tr>
<td>NDMS Shared Direct Channel 3</td>
<td>418.050</td>
<td></td>
</tr>
<tr>
<td>NDMS Shared Repeater Channel 4</td>
<td>408.400</td>
<td>418.050</td>
</tr>
<tr>
<td>HHS California</td>
<td></td>
<td></td>
</tr>
<tr>
<td>San Francisco Local Operations Channel 1</td>
<td>164.300</td>
<td></td>
</tr>
<tr>
<td>Richmond Local Operations Channel 2</td>
<td>171.2375</td>
<td></td>
</tr>
<tr>
<td>Federal Emergency Management Agency Urban Search and Rescue Cache VHF/UHF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nationwide Military Liaison Channel 1</td>
<td>139.225</td>
<td></td>
</tr>
<tr>
<td>Nationwide Military Liaison Channel 2</td>
<td>141.725</td>
<td></td>
</tr>
<tr>
<td>Nationwide Military Liaison Channel 3</td>
<td>141.875</td>
<td></td>
</tr>
<tr>
<td>Nationwide Cache Repeater Channel 1</td>
<td>165.6625</td>
<td>164.8625</td>
</tr>
<tr>
<td>Nationwide Cache Repeater Channel 2</td>
<td>408.400</td>
<td>418.575</td>
</tr>
<tr>
<td>Nationwide Cache Direct Channel 1</td>
<td>418.575</td>
<td></td>
</tr>
<tr>
<td>Nationwide Cache Direct Channel 2</td>
<td>164.8625</td>
<td></td>
</tr>
<tr>
<td>FEMA Region 9 California</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operations Direct Channel 1</td>
<td>140.325</td>
<td></td>
</tr>
<tr>
<td>Operations Direct Channel 2</td>
<td>142.425</td>
<td></td>
</tr>
<tr>
<td>Operations Direct Channel 3</td>
<td>142.975</td>
<td></td>
</tr>
<tr>
<td>Operations Direct Channel 4</td>
<td>143.000</td>
<td></td>
</tr>
</tbody>
</table>

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Mr. Howell also reports 149.150 MHz in use by several DMATs nationwide. A thousand thanks to Mr. Howell for this fantastic report on a little-known government system.

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used by an entirely different government agency that you might want to program in your scanner. Keep an eye on 120.325, 120.425, and 120.825 MHz and let us know if you hear any non-ATC traffic on these frequencies.

**MT's Government Master File**

We continue our exploration of the VHF high government frequency band, started in the December 1998 issue of the *Fed Files*, by profiling the 164.0-164.9875 MHz range in Table 2. See you in two months for another edition of *The Fed Files*. Until then, good hunting.

### TABLE TWO: FEDERAL FREQUENCY ALLOCATIONS: 164.0-164.9875 MHZ

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Agency/Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>164.0000</td>
<td>Low power, non-voice up to 1 kHz bandwidth splinter frequency (after 1/1/2005)</td>
</tr>
<tr>
<td>164.0375</td>
<td>Army, Energy ( Nationwide), FBI, Forest Service (Region 2)</td>
</tr>
<tr>
<td>164.0500</td>
<td>BLM, Fish/Wildlife Service (Nationwide), Interior (Nationwide), Park Service, Veterans Administration</td>
</tr>
<tr>
<td>164.0625</td>
<td>Agriculture ( Nationwide), GSA, NASA, National Science Foundation, Navy, Post Office, Veterans Administration</td>
</tr>
<tr>
<td>164.0750</td>
<td>BLM, Fish/Wildlife Service (Nationwide), Interior (Nationwide), Park Service, Veterans Administration</td>
</tr>
<tr>
<td>164.0875</td>
<td>BLM, Fish/Wildlife Service (Nationwide), Interior (Nationwide), Park Service, Veterans Administration</td>
</tr>
<tr>
<td>164.1000</td>
<td>BLM, Fish/Wildlife Service (Nationwide), Interior (Nationwide), Park Service, Veterans Administration</td>
</tr>
<tr>
<td>164.1125</td>
<td>Agriculture ( Nationwide), Agriculture Extension Service, Agriculture Research Service, Air Force, Animal/Plant Inspection, Coast Guard (District 9), Corp of Engineers, FBI, Forest Service (All Regions), Geologic Survey, NASA, Park Service, Navy</td>
</tr>
<tr>
<td>164.1250</td>
<td>Agricultural Research Service (Nationwide), Agriculture Extension Service, Animal/Plant Inspection, Coast Guard (Region 1/2/4/5/8/9/10), BLM, Fish/Wildlife Service (Nationwide), Interior (Nationwide), Park Service, Veterans Administration</td>
</tr>
<tr>
<td>164.1375</td>
<td>BLM, Fish/Wildlife Service (Nationwide), Interior (Nationwide), Park Service, Veterans Administration</td>
</tr>
<tr>
<td>164.1500</td>
<td>BLM, Fish/Wildlife Service (Nationwide), Interior (Nationwide), Park Service, Veterans Administration</td>
</tr>
<tr>
<td>164.1625</td>
<td>BLM, Fish/Wildlife Service (Nationwide), Interior (Nationwide), Park Service, Veterans Administration</td>
</tr>
<tr>
<td>164.1750</td>
<td>BLM, Fish/Wildlife Service (Nationwide), Interior (Nationwide), Park Service, Veterans Administration</td>
</tr>
<tr>
<td>164.1875</td>
<td>BLM, Fish/Wildlife Service (Nationwide), Interior (Nationwide), Park Service, Veterans Administration</td>
</tr>
<tr>
<td>164.2000</td>
<td>BLM, Fish/Wildlife Service (Nationwide), Interior (Nationwide), Park Service, Veterans Administration</td>
</tr>
</tbody>
</table>
Welcome aboard! Today, we are going to start with a review of an exciting air traffic control (ATC) simulation. In comparing the many ATC simulations that I have used over the years, ATCC stands head and shoulders above all of them. The many features that it offers are nothing short of ultra-realistic. To quote the overview page in the user's guide, "Air Traffic Control Center is a highly realistic simulation of actual radar sectors in the New York, Chicago and Los Angeles Air Traffic Control Centers. You take the position of the radar controller guiding both small and large aircraft into and out of some of the busiest airports in the world! (as well as in Center airspace between the airports)."

"This program is intended not so much as a game, but as an accurate simulation of actual air traffic control situations that exist hour by hour in the crowded skies. Whether you are using this simulation as a training tool for a career in Air Traffic Control, or you just want to see what it's like in the controller's chair, Air Traffic Control Center will let you experience one of the most mentally challenging occupations in the world."

Some of the best features this sim includes are pilot communication in standard ATC phraseology and plain English, and a training program that allows you to practice controlling at the sectors before taking tests to become certified to work "live traffic." Once certified, your performance is rated as your career progresses.

ATCC is published by Xavius Software; their web address is: WWW.Xavius.Com or 6 Cranbrook Rd. #204, Cockeysville, MD 21030 USA, Tel.(410)667-3597. The ATCC program comes on a CD and is priced at $59.95. Though the web site says the product I reviewed is out of print, there will be a new version coming early this summer which will include even more sectors and features and also be upgradeable for those who already have an earlier version.

You will be able to buy ATCC from Flight Sim Central; their phone number is (800) 477-SIMS. They also have a full complement of other aero simulations, including many add-ons for the latest version of Flight Sim. If you subscribe to Full Throttle, you may notice their ad on the back page.

Murphy's Law

Many of our readers who are pilots have asked me to rerun the examples of Murphy's Law as applied to General Aviation. As you know, we aim to please, so here they are!

1. Home base will always be 5 minutes beyond the maximum range of your plane at last planned stop.
2. Winds aloft reports will only be accurate in the case of direct headwinds.
3. Answers on FAA exams (or ham exams) will be equidistant from your computed answers.
4. A dropped tool will hit a spot where it will do maximum damage (Murphy's Law of selective gravitation).
5. The component most likely to fail will be the least accessible.
6. A fail safe circuit will not only fail, it will destroy others as it does so.
7. Operating manuals will express dimensions in the least usable form.

Thanks to Bob Stevens for the above. Remember, those laws also apply to radio.

Frequencies

A Delta Air Lines Captain from Salt Lake City has contributed a map that Delta pilots use to reference which company radio frequency they should be using. The captain also included some Salt Lake City International Airport frequencies (MHz) for our readers in that area:

- 118.300 - East Runway Tower
- 119.050 - Center Runway Tower
- 119.950 - Salt Lake Center Eastbound
- 121.100 - Approach Control North
- 121.650 - Ground Control Runways 35 & 17
- 121.900 - Ground Control Runways 34 & 16
- 122.950 - Unicom
- 123.050 - Lifeflight Helipad
- 124.300 - Approach Control
- 124.900 - Approach Control North
- 125.700 - Approach Control North and West
- 126.650 - Approach Control West
- 127.300 - Clearance Delivery
- 127.700 - Salt Lake Center Westbound
- 128.100 - Approach Control South
- 129.075 - Alpine Airlines Ops
- 129.425 - United Parcel Service
- 129.500 - United Airlines Operations
- 130.100 - Delta Company Ops
- 130.500 - Delta De-Ice Ops
- 130.600 - Southwest SLC Operations
131.225 & 129.900 - Delta Maintenance
131.275 - Delta De-Ice
131.400 - Skywest De-Ice Ops
131.450 - Delta Ramp
131.925 - Federal Express Ops
132.650 - West Runway Tower
134.500 - Approach Control East

Bob Schultz (MN) sends an updated listing of Minneapolis / St. Paul (MSP) International Airport:

118.300 - East Runway Tower
119.300 - MSP Inner Approach (N or E of Approach Rwy)
121.650 - Ground Control Runways 35 & 17
121.800 - MSP Ground (N)

121.900 - MSP Ground (S)
123.475 - Flight Service Station
123.950 - MSP Tower for Rwys 12L/30R
124.700 - MSP Departure (S or E of App. Rwy)
126.350 - MSP Outer Approach (Planes on this frequency are always handed off to

119.300
126.700

126.950 - MSP Inner Approach (S or W of Approach Rwy and Rwys 4/22
127.925 - MSP Departure (N or W of App Rwy)
129.925 - Write-ups for Northwest Airlines (NWA) & Continental
130.750 - NWA Gate Assignments
131.700 - NWA Dispatch
131.900 - NWA Dispatch & Maintenance
133.200 - MSP Clearance Delivery
135.350 - MSP VHF ATIS
135.475 - also MSP Outer Approach (Planes on this frequency are always handed off to

126.950
143.750, 143.950, 148.125, 143.900, 148.150 - Civil Air Patrol
272.750 - MSP UHF ATIS

460.675 - Continental Ground Support
460.725 - United Ground Support
460.750 - Delta Ground Support
460.850 - TWA & NWA Ground Support

Thanks, Bob!

Thanks, Captain! That’s all for this month, until May, 73 and out!
One of the everlasting mysteries faced by the new AM DXer is “why am I hearing WZZZ on 1300 instead of WYYY? WYYY has twice the power and is 100 miles closer!” “Why is WABC-770 booming in, but WEVD isn’t coming in at all? They’re both 50,000 watts.” Most people think power is the only factor that determines the coverage of an AM station; all 5,000 watt stations should have the same coverage. But it isn’t nearly that simple.

Most U.S. and Canadian stations use directional antennas at night. These antennas radiate better in certain directions than they do in others, and the difference can be dramatic. Let’s take the example of station WWLS-640 in Moore, Oklahoma. This station uses 1,000 watts at night into a directional antenna (protecting 50,000 watt Class A station KFI in Los Angeles). Their “effective radiated power” in the direction of Los Angeles is all of 5 watts! But at an azimuth of 28°, roughly the direction of Minneapolis, the effective power is over 2,000 watts. A listener 50 miles west of Moore would probably hear little or nothing from WWLS, while one 50 miles northeast would get an excellent signal.

How does a directional transmitting array work? Strangely enough, the station intentionally interferes with itself! Of course, if you transmit two signals on the same frequency from two different antennas, they interfere with each other, even if they come from the same transmitter. Since they’re “saying the same thing,” you don’t hear two different programs mixing, and since they’re on exactly the same frequency, you don’t hear any “heterodyne” between the signals. But they do cancel and reinforce each other. By adjusting the proportion of the transmitter’s power sent to each antenna, the distance between the antennas, and the phase (how long it takes the power to reach each antenna), you can predictably adjust the cancellation and reinforcement.

Physically, a directional array doesn’t look any different from a non-directional antenna — except that there’s more than one tower. Almost always, if an AM station has more than one tower, it’s using a directional antenna, at least at night. There will be a “phasing” cabinet somewhere, for adjusting the phase and power split between the antennas, on various frequencies and powers. WMBS’s 1,000 watts on 590 kHz covered 162 miles — the same as a 50,000 watt station on 1110 kHz. If you’re listening to WSM-650 during the day in central Alabama and can’t figure out why you can’t hear WLAC-1510, this is your answer.

**Bits and Pieces**

Surprisingly, there’s no expanded-band news this month. The Virginia station on 1650 is still testing (and being widely heard) but has not officially come on the air yet.

- CBF-690 Montreal is now off the air. They ran a tape for several days asking listeners to tune to 95.1 FM, then shut down the AM transmitter completely. (Some DXers say this is the first time they’ve ever heard the CBF calls used on the air!) As I write, CBM-940 is still on the air, but I suspect they too will be off by the time you read this. Take advantage of this situation while you can, as applications are being heard for new stations to replace CBF and CBM. I suspect these stations will be back on the air, though with different call signs and programming, by the end of the year.

- Ed Chichorek N2ZNX in New Jersey wrote with information on a format change at a widely-heard 50,000 watt station. WQEW-1560 in New York City was for many years classical-music outlet WQXR-AM. When nostalgia music station WNEW-1130 became business-news WBBR, WQXR became WQEW and took over the nostalgia music. Now, the station has been leased to Disney for eight years and has begun carrying the “Radio Disney” children’s programming.

- Several readers have sent their expanded-band loggings. Greg Majewski KDI1X in Connecticut heard KCJJ-1630 and WBDH-1680, and the “mystery station” on 1650 with continuous music. (I’m pretty sure this is WHKT in Virginia) Greg is using a Drake R8 with 109-ft. “Carolina Windom” ham antenna and a Palomar 4:1 balun. Tim Caldwell N1RIW on Cape Cod is also hearing the “mystery station,” along with WBAH-1660, WNML-1670 (and tentative WTDY underw. WMDM-1690, and WCMQ-1700.

What’s beaming its way to your receiver? Write me at Box 98, Brastown NC 28902-0098, or by email to w9wi@bellsouth.net. Good DX!
Chris Lobdell, founder of the Free Radio Weekly internet pirate DX newsletter, has announced his retirement after 160 weekly issues. FRW emerged to fill the void caused by the Cumbre DX shortwave broadcast internet newsletter’s policy of excluding pirate information. Chris and his colleague Niel Wolfish have maintained an excellent service for three years.

Chris’ place has already been taken by new rotating editors Niel Wolfish, Harold Frogge, and Greg Majewski, all of whom are regular MT readers. FRW remains free to contributors, with a modest fee required for those who wish to get the newsletter in their email without sending in logs, QSL’s, or other pirate news. If you need more information on the publication, send an email inquiry to Niel Wolfish via his niel@ican.net address.

**New ACE Address**

Pat Murphy and Steve Rogovich, president and publisher of The ACE bulletin of the Association of Clandestine radio Enthusiasts, have announced that the ACE postal address is changing. Correspondence, including subscription inquiries at $21.00 in the USA, $24.00 US to Canada and Mexico, and $40.00 US elsewhere via air mail, should now go to PO Box 15830, Chesapeake, VA 23328. Pat and Steve note that the old address will be phased out toward the end of 1999.

Monitoring Times covers unlicensed broadcasting each month, but virtually all serious pirate chasers will also want to take advantage of the excellent information available in Free Radio Weekly and The ACE. Tell them that MT sent you! FRW concentrates on pirates, while ACE covers pirates, clandestines, microcasting, numbers stations, and other odd unlicensed radio transmissions.

**Europirates Audible**

Mike Prindle says that he recently heard Laser Hot Hits on 6220 kHz around 0800 UTC. Our regular contributor Ranier Brandt of Germany notes that plenty of European pirates are active every weekend, mostly using frequencies between 3900-4000, 6200-6300, 6900-7000, and 7330-7500 kHz. North American reception is best from the east coast around North American sunset and European sunrise.

**Illinois 1710 kHz Pirate**

Several MT readers, including the well-known Adrian Peterson of Adventist World Radio, report hearing an unidentified pirate on 1710 kHz, apparently from somewhere in Illinois. With the new expanded medium wave band in place, AM pirates have moved up to this frequency from their former range around 1610 kHz. When Adrian is not producing DX programs or sending out QSL cards for AWR, he’s still DXing at the dial of his receiver!

**Clandestine Items**

Gary Neal is happy to say that a report to the Voice of Sudan’s e-mail address of sudanvoice@umma.org resulted in a QSL certificate in his mailbox in about six weeks. Meanwhile, Martin Schoeck’s Clandestine Radio Watch newsletter notes that the Angolan clandestine Vorgan has returned to the air, despite the Angolan peace settlement. Its schedule is 0700-0900 UTC on 5950 kHz, 1200-1430 UTC on 11380 kHz, and 1900-2100 UTC on 7100 kHz. You can check for the latest developments at http://www.qsl.net/yb0rm/etland.htm on Nick Grace’s wonderful Clandestine Radio Intel web site.

**Shortwave Pirate Activity**

Pirate radio stations heard by our readers last month all used frequencies within 500 kHz of 6955 kHz, typically from two or three hours before sunset until at least 0500 UTC. Morning and afternoon broadcasts increase on the weekends. Programming formats and contact maildrops (when known) are listed here.

**Blind Firth Radio** - Dr. Napolin features all oldies, all the time. (Merlin)

**He Mon Radio** - He Mon mixes rock music, bagpipes, and sports coverage. (Blue Ridge Summit)

**Indira Calling** - They are one of two active pirates of licensed SWBC station All Indio Radio. (Providencia)

**K-BILLY** - This new one features rock, but little is known about it. (None announced)

**Radio Amazones** - This Europirate rocker sometimes uses North American relay transmitters. (Yerby)

**Radio Azteca** - From Stoker’s DX humor is always hilarious. (Belfast)

**Radio Baghdad** - A typical Iraq parody with ads for camel sales. (None)

**Radio Bingo** - As the ID implies, this station broadcasts a bingo game. (none, uses radiobingo@vbkex.com)

**Radio Blondegens** - This South American pirate, with Latin music and Spanish announcers, sometimes uses North American relays. (Merlin)

**Radio Doomsday** - Nemesis’ old shows, with excellent production...
April Showers Towers!

With the arrival of spring, thoughts naturally turn to antenna projects, hamfests and other outdoor pursuits. A favorite sport for many longwave listeners is tracking down local beacons. With this in mind, I thought now might be a good time to review the most common types of antennas you'll see at longwave sites.

At one time, the standard antenna used at nondirectional beacon (NDB) sites was the flat top “Tee” (Fig. 1). This antenna looks similar to a half-wave dipole commonly used by hams, but it has an important difference — the two halves are not insulated from each other. Electrically, the antenna is one continuous piece in order to maximize its “metal mass” and thus, its efficiency at low frequencies (LF). An extensive ground system and an antenna tuner make this a fairly effective antenna for beacon service.

Starting in the mid-1980s, many new or refurbished Federal Aviation Administration (FAA) beacons have been equipped with vertical “top hat” style antennas (Fig. 2). This compact, free-standing design has two advantages — it requires minimal real estate, and it provides improved efficiency over horizontal wire type antennas. A crew of workers can install this antenna in less than a day with the help of a medium-duty bucket truck. Many low frequency experimenters (“lowfers”) use homebrew top hat antennas in the 160-190 kHz license-free band.

Yet another form of LF antenna is the “hot tower” (Fig 3). In this arrangement, the tower structure itself acts as the radiating element, and it is isolated from the ground with one or more base insulators. These antennas are found at some beacon sites, and also at utility stations operating below 150 kHz.

West Coast Net...

David Curry (CA) advises that there is a very active lower group in the Burbank, California area. Operators gather on Saturday mornings at 9 a.m. local time between 184 and 186 kHz, depending on interference conditions. These transmissions are in single sideband (SSB) mode, so you’ll need to turn on your receiver’s beat frequency oscillator (BFO) to hear them. According to David, some stations are also active on Sunday afternoons around 4 p.m.

Loggings

This month’s loggings are from Dick Pearce (VT). Dick is using a new wire antenna he put up during the winter months, and from the loggings in Table 1, I’d say his efforts have paid off nicely.

A quick note for those submitting logs — I’ll take them any way I can get them, (e-mail or postal) but it is helpful if they are submitted in the form shown below (Freq/ID/Location). Feel free to send your loggings (local or DX) to: Below 500 kHz, P.O. Box 98, Brassington, NC 28902. I’ll use as many as possible in a future issue of MT.

See you next month!

**TABLE 1. BEACON LOGGINGS**

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<td>HMY</td>
<td>Lexington, OK</td>
</tr>
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Grove’s improved SP-200B Sound Enhancer is really six products in one. Just look at its many features and capabilities:

- Top quality speaker; also includes headphone jack
- Hand-crafted hardwood cabinet
- Adjustable notch/peak filter (30 dB, 0.3-6 kHz)
- Recorder activator
- Audio amplifier (2.5 W @ 10% THD, 8 ohms)
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Try the new Grove SP-200 Sound Enhancer with your receiver, scanner, or transceiver and enjoy the latest in speaker sophistication; you’ll agree this is truly a keynote speaker!
We have all come to expect that wireless telephones require a base station. Cordless telephones in the home need a base that is connected to the jack on the wall. Cellular telephones communicate with nearby antenna towers, connecting your call to a cell site base station. The obvious drawback is, when the telephone is out of range of the base station, you’re out of touch.

Instead of building towers and antennas every few miles, what if you put the base station inside a satellite orbiting 480 miles overhead?

**Iridium**

That’s exactly what a $5 billion satellite communications venture named Iridium has done. Led by Motorola, Iridium uses sixty-six satellites in low earth orbit to link portable handsets to a dozen ground stations scattered across the globe. After a decade of planning and a year and a half of rocket launches, the world’s first handheld global satellite-based personal communications system began commercial operation on November 1, 1998.

Iridium is designed to provide telephone service in areas not covered by terrestrial networks. When a subscriber is in a remote area, the handset operates through the satellite network. When the subscriber moves within range of a compatible terrestrial network the handset operates over that network. The basic satellite phone can be clipped into a “cellular cassette” that wraps around the phone and provides the necessary communications hardware for several types of terrestrial networks. Four different cassettes are available:

1. **Global System for Mobiles (GSM) at 900 MHz**
2. **Code Division Multiple Access (CDMA)/Advanced Mobile Phone Service (AMPS)/Narrowband AMPS (NAMPS) at 800 MHz**
3. **Time Division Multiple Access (TDMA)/AMPS at 800 MHz**
4. **GSM at 900 and 1800 MHz**

The Motorola Series 9500 satellite phone weighs about 16 ounces and is reminiscent of the first generation “brick” cellular telephones. It is advertised to have two hour talk time and 16 hour standby, and uses a removable, credit card-sized Subscriber Identity Module (SIM) to hold customer information. It transmits digitized speech at 2400 bits per second in L-band between 1616 MHz and 1626.5 MHz at an average power level of half a watt.

Working through local service providers, Iridium sells handsets for about $300 and charges anywhere from $2 to $10 per minute for air time. In the United States, Sprint PCS is the exclusive provider for Iridium service. Customers are accessible via their Sprint PCS telephone number while traveling internationally, and receive a single bill from Sprint PCS containing all local and international charges.

By the end of 1998 Motorola had produced 35,000 phones and was making about a thousand per day. The only other handset supplier, Kyocera of Japan, has apparently been unable to meet Iridium performance standards and thus does not yet have their phones on the market.

Data and fax services are expected to be available this summer.

Iridium activated their “World Page” service on November 15, 1998, providing worldwide paging to customers for about $160 per month. A pager retail for $500, supports up to 200 characters per message, and even works aboard aircraft. PageNet is the exclusive service provider in the United States. At the end of 1998 Motorola and Kyocera together manufactured 3,500 pagers and have a combined capacity to make 8,000 pagers per month.

Motorola’s series 9501 Pager is receive-only with built-in satellite signal strength measurement and supports four frequencies in L-band:

- **Primary:** 1626.437500 MHz
- **Secondary:** 1626.395833 MHz
- **Tertiary:** 1626.145833 MHz
- **Quaternary:** 1626.104167 MHz

Getting such a complicated system off the ground has not been without problems. The original start date of September 23 was delayed due to a “lack of mileage” and insufficient testing, according to Iridium CEO Dr. Ed Staiano. Instead, 2,000 beta testers were selected to perform subscriber trials for five weeks. At that time Dr. Staiano confidently predicted that 100,000 phones would be in use by the end of the year. Despite waived monthly service charges, half-price activation fees, and free handset-to-handset calls, financial statements filed by Iridium in January reported only 3,000 subscribers. Current company predictions place the number of subscribers at the end of this year somewhere between 500,000 to 600,000.

Besides a disappointing subscriber count, it appears Iridium has suffered the loss of a dozen satellites. Nineteen launches orbited a total of 86 satellites, while only 66 are necessary for full operation. At the end of 1998 Iridium reported eight spares in orbit, leaving 12 as non-operational. Last fall a total of seven were known to have failed, so an additional five have apparently become unusable since then.

For those of you who would like a close-up look at an Iridium satellite, visitors to the National Air and Space Museum in Washington, D.C., will be able to see one, donated last year by the Motorola Satellite Communications Group.

**Globalstar**

Another satellite-based personal communications service, Globalstar, has finalized launch plans after losing a dozen satellites last fall. On September 9, 1998, a Zenit-2 rocket launched from Baikonur Cosmodrome in Kazakhstan failed 4-1/2 minutes into flight,
destroying the 12 Globalstar satellites on board.

In January Globalstar announced a new schedule after the United States, Russia, and Kazakhstan signed an agreement covering the launch of U.S. satellites from Baikonur. By the time you read this four satellites should be going up about every month, some on Soyuz rockets from Baikonur and others on Delta II rockets from the United States. A total of 32 satellites are expected in orbit by July, and 52 by December.

The Globalstar system, when completed, will comprise 48 active low earth orbit satellites and a network of gateway earth stations, providing telephone service to remote users. While similar in basic concept to Iridium, Globalstar believes they can offer comparable service at a lower cost by using more complex communications techniques and less expensive satellites. A significant portion of Globalstar's market is expected to be fixed telephone service in areas with little or no existing infrastructure.

Globalstar is an international consortium of companies led by Loral Space and Communications, and has raised $2.9 billion so far. An additional $600 million will be needed to complete the system and start commercial service, now slated for September. More than 300,000 user terminals have already been ordered from Ericsson, Qualcomm, and Telital.

System testing has been underway since the launch of eight satellites in February and April of last year, and several public demonstration calls were placed last September. Five gateway earth stations are operational now, with an additional 11 expected to be in operation at the end of this year.

AT&T

Back on earth, AT&T's Digital One Rate plan (see the December 1998 PCS Front Line) has proven to be very popular. At the end of 1998 there were 850,000 subscribers, all added since the product launch last May. AT&T will spend $2 billion to upgrade their national network, increasing digital coverage areas from 50 percent to 80 percent.

Overall, AT&T has 7.2 million wireless customers, almost two-thirds of whom use digital phones. 1.29 million new subscribers signed up last year, 440,000 in the fourth quarter alone.

Sprint PCS

Sprint PCS also did well, ending 1998 with more than two and a half million subscribers. In January Sprint PCS activated their Chicago system, competing directly with traditional cellular carriers Ameritech and Cellular One as well as rival PCS provider AT&T Wireless. Their primary advertising claim appears to be the fact that they have a 100 percent digital network, although their coverage areas are somewhat less than the mixed analog and digital areas of AT&T. Sprint PCS has also been troubled by a higher than industry-average churn rate, meaning more customers are leaving Sprint than are leaving other carriers.

AirCell

The Federal Communications Commission (FCC) has long prohibited the use of cellular telephones on aircraft in flight, citing interference concerns. A transmitter operating several thousand feet above the ground has a much wider coverage area and can create havoc with a cellular system that expects cell phones to be on or near the ground.

Colorado-based AirCell, Inc., has convinced the FCC to grant a waiver and allow their specially-modified cellular telephones to operate on board aircraft. AirCell uses a number of techniques to reduce the amount of interference they may cause to existing cellular carriers.

Ground stations are located in rural areas, where ambient radio noise is relatively low. This allows the AirCell aircraft transmissions to be very low power, typically five milliwatts or less. AirCell also utilizes horizontal polarization from specially designed aviation antennas, further isolating their transmissions from those of the vertically polarized terrestrial cellular systems. Signaling is done on non-traditional control channels, further limiting non-participating systems from potential confusion.

AirCell operates as a reseller, buying airtime from cellular license holders in the 825 to 894 MHz frequency band. Their ground equipment is co-located with existing cellular base stations, providing a link into the public switched telephone network (PSTN). With antennas pointed slightly upward, a typical ground station has a range of about 80 miles, and AirCell is planning on operating as many as 150 across the United States.

Presently AirCell has reseller agreements with 13 carriers, mostly small ones, as many larger cellular companies oppose the whole idea. AT&T Wireless, AirTouch, BellSouth and others have objected to the waiver on the grounds that the system may interfere with their networks. The FCC's waiver is good for two years, but can be modified or rescinded if it can be proven that AirCell interferes with normal cellular system operation.

Based on their FCC filing, AirCell's primary market is owners and operators of general aviation aircraft, who until now have relied almost exclusively on VHF radio voice communication. Currently AirCell serves as a VHF backup, but future plans call for it to deliver weather, air traffic, airport, and flight information to pilots while they are enroute. Such a real-time data link has obvious safety value for pilots, passengers, and people on the ground.

Customers purchase an aircraft-qualified cellular transceiver from AirCell through a local fixed base operator (FBO) or avionics shop and have it installed in their aircraft. The monthly service fee is $45 and airtime is $1.75 per minute to any number in the continental United States.

Warning for Sony Wireless Telephones

Sony Electronics has informed the FCC that some of their wireless telephones may operate at radio frequency power levels above safety guidelines. Affected telephones were made and distributed in the first half of 1998 and have FCC Identification Numbers L5ACMDB and L5ACMDB2. Although these phones are no longer on the market, approximately 60,000 made it into the hands of consumers. Sony has established a program to notify customers of the potential problem, and to test and adjust the phone should that be necessary. Questions about this program should be directed to Sony Electronics at (888) 914-7669.

That's all for this month. As usual, more information on these and other topics is available on my website at http://www.decode.com, and I welcome electronic mail at dan@decode.com. Until next time, happy monitoring!
Single-ended power supplies were covered in my March-94 and June-94 columns. Now we take a quantum leap to the dual-polarity power supply — the kind required by certain esoteric op-amp circuits.

Until now, I’ve ensured that all my op-amp circuits use single-ended power supplies to make it easy on you hard working folks who need “maximum bang for the buck.” However, I ran into a circuit that you won’t want to miss, but it requires a dual polarity power supply: plus and minus 12V. Fortunately, it’s not too tough, and there are some easy alternatives.

Next month’s project is a four-level FSK data decoder interface that, with a freeware program, can decode some elusive and mysterious signals out there on the airwaves. If you want to jump ahead for what’s coming, see Table 1 for a list of Web Site references to this 4LFSKDDI circuit and all that it can do. If you don’t need technical guidance, these sites can single-handedly steer you into an exciting sideline of decoding data from the airwaves.

This month, we build a dual polarity power supply. Even if you have no interest in next month’s 4LFSKDDI, you can still profit from this month’s project.

**Basics of a Dual Polarity Power Supply**

A dual polarity power supply consists of two separate power supplies, each referenced to ground, one with a (+) output and the other with a (-) output. Figure 1 graphically depicts the simplest dual polarity power supplies.

There it is, two 9V batteries in series with their common point as ground, and equal but opposite outputs at A and B. Here is what you need to know about this (and most) dual power supplies:

- The voltage at A with respect to G is +9V.
- The voltage at B with respect to G is -9V.
- The voltage at A with respect to B is +18V.
- The voltage at B with respect to A is -1V.

In general, “with respect to” means where to put the black lead of the voltmeter. So if you were to put the red lead at A and the black lead at G (ground), the voltmeter would read +9V.

Also per Figure 1, you can string a couple of “wall warts” together for an easy +/- power supply. For many of you, this might be the simplest and most effective approach. Radio Shack’s “wall warts” tend to be expensive, but you can get them for next to nothing on the surplus market. Hosfelt Electronics is a major supplier of low cost dc adapters: [http://www.hosfelt.com/index.htm](http://www.hosfelt.com/index.htm) or (800) 524-6464.

Ground in the dual polarity supply goes to external circuit ground or common. The (+) output goes to all points in the circuit that need a (+) supply voltage, and the (-) output goes to all points that require a (-) supply.

**A Practical Dual Power Supply**

Figure 2 is the schematic diagram of a practical dual-polarity “filtered” power supply. In some cases, this may be all that’s needed for non-critical circuits. Figure 2 is your basic building block, even if it needs to be regulated, which we’ll get into ahead.

Check Figure 2 for the Radio Shack part numbers. I didn’t give part numbers for the fuse and fuseholder, LEDs, power cord, box, and switch. These are personal preference items frequently found in the junk box. You’ll need a metal box, say about 5” wide by 3” high by 6” or so deep. It should be considerably larger than the transformer, which should be bolted to the case off in a rear corner, out of the way.

Drill a 3/8” hole in the rear; slip a rubber or vinyl grommet into the hole and pass the power cord into the hole. Tie a half-hitch knot on the inside so the cord can’t pull out.

Hot-glue, super-glue, or epoxy the bridge rectifier to the floor of the box near the transformer with the leads pointing up. Drill holes in the front panel for the light emitting diodes (LEDs), and holes in either the front or rear panel for the switch and fuseholder. Install these items and secure them in the holes.

Hot-glue or epoxy will secure the LEDs in the absence of mounting hardware.

Wire up the primary side of the power transformer, T1, per Figure 2. Observe all safety precautions and be sure the power cord isn’t plugged in. Use heat-shrink tubing to cover all solder joints and exposed 110-Vac contacts. You can use hot glue or silicone rubber to coat switch and fuseholder lugs, if need be. The idea is to make it impossible to get shocked, even with your grubby mitts in the box when it’s plugged in. A shock from 110-Vac can be lethal!

Solder the center tap lead from the transformer secondary to the circuit ground output lead. Solder the other secondary leads to the “ac” pins of the bridge rectifier (which lead goes to which ac pin doesn’t matter.)

Solder the (+) lead of C1 to the (+) lug of...
the bridge rectifier. Solder the (+) lead of C2 to the (+) lug of the bridge rectifier. Solder the remaining leads of C1 and C2 together, and then to the ground output lead. Do NOT ground any part of the power supply to the metal box, except a three-wire power cord where the green wire must be bolted to the chassis.

Wire up R1, R2, and the LEDs per Figure 2. Radio Shack’s #274-662 make great output terminals. You’ll need two pair. The common ground should feed both black terminals, while the (+) output feeds one red terminal and the (-) output feeds the other red terminal. Triple check all your work.

When you’re sure everything’s perfect, connect a voltmeter to Points A and B; plug in the ac power cord, and turn S1 on. The voltmeter should indicate about 37V dc. Refer to the Measurement Table inset in Figure 2 to confirm that other voltages are close.

What To Do With This Power Supply?

Maybe nothing. Look at the measurements in Figure 2. ±18v isn’t very useful. However, the more current drawn from this power supply, the more the voltage drops. At the transformer rating of 450-ma, the output DC is roughly ±12v. The output will fluctuate, depending on the load, so you really can’t be sure of a given output. Let’s fix it now!

Regulating Your Power Supply

Regulators produce constant specified outputs over a range of current demands. Popular regulated supply voltages include ±5v, ±8v, ±9v, ±12v, and ±15v. You can add one or more if you want more than ±10v. Since you shouldn’t need more than ±12v, ±15v, and ±18v, you can add one or more if you want more than ±12v, ±15v, and ±18v. It’s a pretty good bet that the ±12v, ±15v, and ±18v you should design for is ±10v or ±12v. In the meantime, remember that you must regulate your output current with a regulator for each desired output. Multiple outputs can be “stacked” with parallel inputs from Points A, G, and B on the filtered power supply in Figure 2. See Figure 5.

I won’t task you with theory here, but you should learn about three-terminal regulators. These cheap little transistor-looking devices accept unregulated dc inputs and put out a rock-solid dc at precise levels. Outputs are fairly immune to variations of input voltage and current and variations of output current. There are important things to know about three-terminal regulators. The input voltage must be a minimum of 3 volts greater than the designed regulated output. For instance, a 12V regulated output requires a minimum 15V input to avoid “dropout.” More is fine, up to about 35V or so.

Secondly, there is the matter of heatsinking (cooling). Larger TO-220 three-terminal regulators are designed to mount to a chassis or heatsink to dissipate heat. Smaller TO-92 “low power” regulators don’t need heatsinks.

Lastly, you need to know about the numbering system for three-terminal regulators. The prefix “78” means a positive (+) voltage regulator, whereas “79” means a negative (-) voltage regulator. The last two numbers indicate the regulated voltage: 7805 is a ±5V regulator and 79L12 is a ±12V regulator. Four-digit numbers like 7805 and 7912 imply the larger TO-220 package, good for over 1-amp of output current with proper heatsinking. Low power types, like 78L05 and 79L12 are good for up to 100-ma of output current. We will use the smaller type in this month’s project. They’re cheap at less than a buck apiece.

In Closing

Next month’s exciting project is known to work on as low as ±5V, but ±12V is ideal. Anything over 18V will blow up the circuit, and anything over 13V might not be healthy for the computer. If you want the easiest way out and still be ready, Figure 1 works fine. If you choose “wall warts,” a pair of 9Vdc adapters is ideal. 12V adapters are out because their output at the lower current required by our circuit (16-ma) is 15V or more. A pair of 9V batteries or a pair of 6V-9V “wall warts” work fine; regulators not needed. Just be ready, because we’re going to have some fun!

Support for this and all my columns is freely available by e-mail. If you’re not computerized, please include an SASE with postal requests.

E-mail: bccheek@cts.com
WWW: http://ourworld.compuserve.com/homepages/bcheek
FAX: (619) 578-9247 anytime
Postal: PO Box 262478, San Diego, CA 92196-2478

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The theme of this month’s issue of Monitoring Times is antennas, so let’s consider just what an antenna is, and some of the things an antenna can do.

A generally acceptable definition of an antenna is that it is a device for transmitting or receiving radio waves. The “device” referred to usually consists of one or more conductors arranged to make transmitting or receiving of the radio waves happen as the operator wants them to happen. That is, we may design an antenna with a particular configuration, and with particular dimensions, such that the antenna will do more than simply transmit or receive radio waves. Let’s see what some of these things are.

Some things an antenna can do

Antennas can tune: One thing we can do with an antenna is tune it to the frequency of the signal we want to receive or transmit.

That’s right, for most antenna designs, an antenna acts as a tuned circuit. For instance a conductor cut to be one-half wavelength long at a particular frequency will actually be tuned to that frequency. This conductor will give a greater response to signals of that frequency than to signals at frequencies to which it is not tuned. In addition, this tuning function can help reject unwanted signals and thus avoid overload and intermod problems. So, although any random length of wire can serve as an antenna, one tuned to (resonant) at the frequency of operation can sometimes give improved reception.

By the way, old timers knew and used tuned antennas to determine the length of the waves they transmitted or received with their spark-coil transmitters and coherer receivers. In the earliest days of wireless the antenna was actually the only tuned circuit in the entire system!

Antennas can focus: Another thing which an antenna can do for us is to focus its responsiveness in the direction of the station which we want to receive, or to which we want to transmit. Antennas which do this possess what we call “directivity.” Antenna of this sort are often called “beam” antennas because the more directive ones tend to focus their signals into a beam somewhat like the beam from a car’s headlight.

Antennas can “amplify”: Antennas can also seem to “amplify” signals which they receive. That is, an antenna with a high level of what we call “gain” will give a greater output of signal (in a specific direction or directions) as compared to an antenna with less gain.

You might think that high-gain, high-directivity antennas are the most desirable, but this is not always the case. Sometimes we want to be able to hear signals which arrive from any direction. For this a “nondirectional” antenna, such as the quarterwave groundplane is very desirable. The quarterwave groundplane antenna is relatively low in gain; however, it is quite possible to have higher gain in a nondirectional antenna (for example the coaxial, collinear groundplane).

But higher gain usually comes at the cost of increased price and complexity of the antenna, and the lower-gain quarterwave has gain entirely sufficient for most applications.

And, on the shortwave bands where received-noise level often determines the quality of signal reception, increased gain is often of no particular value. So sometimes gain and directivity are desirable, sometimes other factors are more important.

Antennas can determine how far away we can communicate: Most of us already know that mounting a VHF-UHF, or microwave antenna higher will often lead to being able to communicating over a greater distance. This is because raising an antenna will increase the line-of-sight path between that antenna and the antennas with which it is to communicate.

On the other hand, consider the MF and HF bands where skywave communications is involved. Here the vertical angle at which the antenna best receives its signals, or best launches its signals, determines the vertical angle at which the signal contacts the ionosphere. This angle determines how far away from its transmitting antenna the skywave signal will return to earth. Antennas favoring
low vertical-angles provide good support for long-distance (DX) skywave communications. Those favoring higher-angle vertical signals support shorter distance communications better (see fig. 1).

And so: ... antennas usually are not simply just a wire in the sky. They have several jobs to do, and, with proper design, they often do those jobs quite well.

Where's the Hum?

What has become of the mysterious hum that was recently so widely heard around the globe? The hum was reported to annoy and irritate persons in spots as disparate in location as California, New Mexico, Maine, Montana, and Scotland. Some describe the sound of the hum as something like a truck idling in the distance, others describe it as a low-pitched hum that is so loud as to be quite disturbing.

MT reader Bob Burnett, who reports regularly hearing the hum, describes its sound as "... like a 60-cycle hum... buzz on a failing phosphorescent light ballast..." MT reader Norman Lynagh sent in a newspaper article from Scotland reporting about a woman kept awake by the hum, saying that it sounded like the running of a pump or a bus. Government scientists there were reported as interviewing people and setting up equipment to study the hum.

Although there have been no definitive findings, there have been various suggestions as to the hum's origin. These range from its actually being a truck or pump running in the distance to energy from outer space, or sonic or electromagnetic waves following the conductivity of the earth. The reports of its frequency estimated as 60-Hz brings to mind Tesla's work which used the earth as a transmission medium for electrical power distribution.

Although some writers have considered the hum nothing more than a hoax, the consistency of claims concerning it has reportedly initiated serious scientific investigation by governmental agencies in both this country and abroad. If the hum turns out to be due to electromagnetic wave action, then we radio monitoring enthusiasts could possibly think of it as a radio wave in the "basement" of the radio frequency spectrum. If any readers have any new information on this subject I'd be pleased to hear about it.

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peak of antenna books to most hams and chances are good the call W6SAI will come up, as Bill Orr has produced more accurate published information about antennas than any other single individual. Bill has been around ham radio since the early 30s, and is well known for his Editors and Engineers Radio Handbook. In addition he has produced handbooks on Yagi beams, quads, vertical, and wire antennas, and has written numerous magazine articles on the same subjects.

His latest effort, W6SAI HF Antenna Handbook, is a compilation of easy-to-build, effective antennas. Bill has researched most of the popular antennas and improved many of them. The first two chapters are devoted to theory and feedlines; especially interesting is a section in chapter two dealing with hardware and accessories.

Chapter three deals mainly with multiband antennas like the G5RV, Windom, or off-center-fed (OCF) and simple antennas that perform well for DXing. A wide variety of multiband dipole antennas and various methods of feeding and supporting them follows in chapter four. Chapter five is devoted to transmitting and receiving loop antennas, including the cubical quad and other high gain models. The sixth chapter is devoted to 160 meter antennas with something for almost everyone. Chapter seven describes numerous transmatches and matching devices.

In recent years a number of antenna analysis programs for the computer have become available and can provide the user with a lot of information about a proposed antenna. Unfortunately, many of these programs are difficult to learn and can confuse the beginner. Bill’s eighth chapter discusses these programs and reduces much of the confusion.

Chapter nine details many inexpensive beam antennas the amateur can build and discusses the two-element versus three-element yagi. Also included is a practical cubical quad for 20, 15 and 10 meters. Chapter ten explains antenna instrumentation and how to use the various instruments available to the average ham.

If you have any interest at all in building antennas, this book is for you. I highly recommend the W6SAI HF Antenna Handbook. It is available from CQ Communications Inc., 25 New Bridge Rd., Hicksville, NY 11801 for $19.95 plus $4 shipping.

W6SAI HF Antenna Handbook

I have QST Magazine on CD dating from 1915 to present days, and I spend a lot of time reading the older issues of the magazine. One article in particular I think might be of interest to those of you who like to experiment with antennas. Published in the August 1940 issue, the article is entitled “The fixed rotary beam antenna,” by W2DKJ, Arthur Lynch.

The author describes a method of feeding and switching three “Pitchfork” antennas. While the Pitchfork is only 7/16th of a wavelength, it looks a great deal like an end fed W8JK. W2DKJ has erected his antenna as a vertical (see fig one).

Be sure to make moves simultaneously; if a player makes the move 6 to 10 (or f to j), be sure both players make that move on their board. It is a good idea to repeat moves to each other to be certain no errors are made. Also before starting play, be sure to tell your opponent if your pieces are in the 1 to 12 (a to l) sector or 21 to 32 (u to ff) sector.

If this catches on, it might be a good idea to set up frequencies where one can find a game. For example, I would suggest 3710 kHz on 80 meters CW, 28,355 kHz on 10 meters SSB; and 144.56 MHz FM on two meters. Of course, there may be other activities on these frequencies, so make adjustments accordingly.

**Band Conditions**

I am sure that anyone who has been active this past winter is aware of the superb conditions we have had on all HF bands. Ten and twelve meters have been producing DX from all over the globe at this location.

This is the time of year when conditions peak on the lower bands for working into the antipodes (the point on the globe opposite your location and therefore the furthest away); early morning and early evening will be the best times on 160, 80 and 40 meters.

**VHF AM**

Amplitude modulation has been catching on. I have noted considerable AM activity on both bands. This is a great idea, as simple rigs can be built or purchased inexpensively for these bands. So if you’ve been AMing, keep it up.

Last month I listed two e-mail addresses; the best to use is n3ik@hotbot.com, the other address has changed to n3ik@planetdirect.com. I do check both mail boxes several times weekly. 73 one and all de Ike N3IK.

**Out of the Past**

According to popular theory, checker [board] games originated in China, where they were played thousands of years ago. At least since the 16th century, however, checkers was also a popular game in Europe and, of course, America.

When the first American settlers arrived in this country, they brought with them the game of checkers. The game was not played in Europe until the 17th century, and then it was mainly a game of the upper classes. In the 18th century, checkers became a popular game among the common people, and in the 19th century it was a favorite pastime in all parts of the country. By the 20th century, checkers had become a national pastime, and it is still played today by people of all ages.

In the days when checkers was a popular game, it was played on a board that was usually made of wood or cardboard. The board had a set of squares, or "checkers," arranged in rows and columns. Each player had a set of checkers, which were made of wood, bone, or ivory. The checkers were usually colored, and the player who had the most checkers was considered to be the winner.

The game was played by two players, who took turns moving their checkers across the board. The object of the game was to capture the opponent's checkers by jumping over them. The player who captured all of the opponent's checkers was the winner.

Checkers was a simple, easy-to-play game, and it was popular among people of all ages. It was played in schools, in homes, and in taverns. It was also played on trains, ships, and even on the battlefield. Checkers was a game that everyone could play, and it was a favorite pastime for people of all walks of life.
Motorola’s TalkAbout® Distance GMRS Radio

A nyone who gets into using Family Radio Service handi-talkie will quickly discover that, despite their other admirable characteristics, they are limited in range. The manufacturers say “up to two miles,” and that can be achieved under ideal conditions.

But conditions are seldom ideal, and sometimes the reliable range of FRS radios is 1/2 mile to a mile. In a nutshell, that means FRS may not be the best choice for communicating between people who are likely to get separated by greater distances.

So when I saw “TalkAbout Distance” radios mentioned on Motorola’s website, I thought, “Great! They’ve solved the problem.” But there’s a trick here: while Motorola has spent considerable money building up the TalkAbout brand for FRS, TalkAbout Distance units are NOT FRS radios.

Nope, these are type-accepted for the General Mobile Radio Service. You may not legally operate these radios without first applying for, paying for, and getting a GMRS license.

This crucial fact is mentioned in small type on an end flap of the box and on page two of the Owner’s Manual, but strangely, it is not mentioned in a section of the manual entitled “Before You Can Talk” on page eight of the manual. Neither is a copy of the license application or the GMRS rules and regulations included in the box!

The TalkAbout Distance can operate on 10 channels:

<table>
<thead>
<tr>
<th>Channel</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>462.5625</td>
</tr>
<tr>
<td>2</td>
<td>462.5875</td>
</tr>
<tr>
<td>3</td>
<td>462.6125</td>
</tr>
<tr>
<td>4</td>
<td>462.6375</td>
</tr>
<tr>
<td>5</td>
<td>462.6625</td>
</tr>
<tr>
<td>6</td>
<td>462.6875</td>
</tr>
<tr>
<td>7</td>
<td>462.7125</td>
</tr>
</tbody>
</table>

... and more!

The Motorola TalkAbout Distance offers sparkling performance marred by tedious programming and no information display. But don’t forget that GMRS license!

Now, since you folks who read this column are usually a pretty sharp bunch, you may have already noticed what’s missing. That’s right: there’s no display of any kind. And that’s where the rub comes in. If the radio is in scanning mode, you can’t tell what channel is being received.

In addition, since the TalkAbout Distance can be programmed for the use of what Motorola calls “Interference Eliminator Codes,” (really Continuous Tone Coded Squelch System codes), there is no ready way to determine what, if any, code has been activated.

To activate any of the 38 Interference Eliminator Codes requires turning the radio on while holding down the push to talk button. A female robo-voice then announces the current code setting, for example, “Code Off.” Press the push to talk button, and the TalkAbout Distance scrolls, through audio announcement, through the available codes: “one... two... three...” and so forth. When you get to the code you want, release the push to talk button, and then press the monitor button to select and save the code setting. If you miss the code you wanted, you have to scroll through the entire list again (one... two... three...).

Once you have the desired code, you can then press the push to talk button to toggle between bandwidth settings for FRS and GMRS (12.5 kHz and 25 kHz, respectively). I found programming this radio to be tedious and borderline “user hostile.”

Fortunately, the performance of the TalkAbout Distance sparkles. Two watts give this radio far more range than any FRS unit I have ever tested. Motorola claims up to five miles, and that wouldn’t surprise me under ideal conditions. In addition, send and receive audio are crisp and clear. I walked over my standard test range in a drizzling rain and can also affirm that these radios are at least “weather resistant.”

The TalkAbout Distance comes standard with rechargeable batteries and a wall-wart charger. Suggested retail price is $259.99. A second model (not tested), the TalkAbout Distance DPS, offers the choice of rechargeable batteries or alkalines for $279.99. For more information, call 1-800-353-2729 or visit www.motorola.com/talkabout/talkabout.

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www.americanradiohistory.com
A few years back we found DXtreme Software’s Short Wave Reception Log, SWRL. It was easy to use alternative to a paper log book and didn’t cost your left arm. Well, since that time the people at DXtreme have been busy adding new features. The latest version, SWRLgold V3.0, is quite a bit more capable than the early version. Let’s take a look at this new version and see if it lives up to its fine lineage.

In order to include all the features, the program’s minimum requirements are: a Windows 95/98 environment, a Pentium 100, 16 Meg of RAM, SVGA (800x600) and a minimum of 5 MB of hard disk space. I remember a few years ago when the hottest flight simulators didn’t have such high hardware requirements. But today, if any program is going to effectively utilize Windows 95/98 these requirements are modest.

**Goodbye Paper?**

The program, which comes on four HD 3.5 inch disks, installed in under six minutes on my Pentium 233 (HP Pavilion 3266, running Windows 95). I used the Add New Hardware menu in the Control Panel for installations. The SWRL icon, which then appears in the Programs menu, is used to start the program displaying the Reception Log.

Figure One shows the “business” screen of SWRLgold V3.0, the Reception Log. Here the user adds station intercepts to the log, or searches the existing database for previous reception reports. Data entry is straightforward by filling in the Station field box, once the Add New box at the lower right is clicked. Notice how, once a frequency is entered, the wavelength is automatically displayed to its right. A nice touch. A new feature of V3.0 is that the frequency range is no longer limited to shortwave. You can now log stations from VLF to UHF. A sign of the times is the inclusion of Web and Email address fields; acknowledging the co-existence and melding of two different communications media.

**The Command Modules**

The Modules menu is important to the convenient operation of SWRLgold. Many of the fields, such as Country, once clicked, display a “pulldown” down arrow on the right. See Figure 2. This indicates that you can choose the required data from an existing list. For example, Vatican City was already in the countries list. Therefore all I did was click on it. The source of these pulldown menus are the modules.

Via the Modules menu, items can be edited, added or deleted from these pulldown lists. Figure 3 shows us the “countries module,” where other data (continent and CQ zone) are carried along with each country name; these appear in the pertinent reports and screens.

Now, new countries don’t appear that often. However, if you are lucky enough to have more than one receiver, or antenna, this list feature is very useful. Enter all of your receivers and antennae in their respective modules. Then a click on the down arrow is all that is ever needed to detail your exact listening station at the time of the intercept. This is important for your log maintenance, as well as for the slick, SWRL-generated QSL request.

A number of the other modules, such as the abbreviations list, are quite useful. The UDF field (user defined field) is a freebie field where you can decide to track a new reception variable; for example, the sun spot number.

**The Many Faces of a Computer Log**

A big difference between written logs and SWRL V3.0 is how the data can be recalled. Clearly, for a written log, the sequence that you wrote the data into the log is the only way you can recall, or look up stations. For example, most logs are “keyed” off the date/time of the intercept. The oldest intercept is in the beginning of the log, while the most recent is at the end.

Using SWRL V3.0 reports can be generated in many different ways using combinations of fields. For example, a list of all the European broadcast stations monitored, listed by frequency, can be viewed and printed. Alternatively, a report can be generated showing all the European stations listed by time of reception. Or all the French language stations ... I think you get the flexibility of this program’s report feature. The Reports menu give the user a whole host of report variations.

**Using SWRLgold V3.0**

All the help you could ask for is available in the program. One Help method...
comes in the form of detailed “what is this” notes which appear with a right mouse click over the object in question. The Help menu is extensive and dynamically accessed through click-on procedural steps. Within fifteen minutes most people can feel comfortable and confident. From there it’s just a matter of building your personal database.

The number and storage capability of comments and program content fields has been expanded. Now you don’t have to write in cryptic abbreviations to fit your program details in a small box. Finally, the QSL Imaging allows you to add a scanned image of the coveted received QSL. Of course, for this you need a photo/flatbed image scanner.

### Just in Case

Until you generate a report, all your data is at the mercy of the reliability your computer hardware. This is the case with any program. So don’t forget to back up your files often and on different removable media (floppy, zip, etc) ... just in case.

Speaking of “just in case,” after extensively exercising the program, I had only one “interesting” situation occur. When you minimize SWRLgold to the Windows 95 or Windows 98 taskbar, be sure to Restore the program before you Close it. If you inadvertently close SWRLgold while it is in the taskbar, the next time you start it, SWRLgold will appear in the taskbar only and you will not be able to maximize it or use it.

Fortunately, the people at DXtreme have already come up with an easy fix. If you accidently close SWRLgold while it is in the taskbar, perform the following steps:

1. Start the Notepad applet of Windows 95 or 98.
2. On the File menu, click Open. The Open dialog box appears.
3. In the Files of type list box, select All Files (*).
4. In the Look in list box and folder display area, navigate to the drive and folder where you installed SWRLgold.
   - If you accepted the default location when you installed SWRLgold, navigate to the C:\DXtremeSWRLgold folder.
5. Locate and single-click the RLWIND.DAT file and then click the Open button.
   - When the file opens, you will see a single line that contains four numbers; for example: 36000,36000,1920,348
6. Change these numbers to the following: 0,0,9500,6700
   - Be sure to enter the numbers exactly as shown; no spaces between numbers or commas.
7. On the File menu, click Save. Then close the Notepad applet.
   - When you start SWRLgold, it will appear at the top, left of your screen. Adjust the size of the Reception Log window.

DXtreme Software has posted this procedure on their web page and will fix this problem in a later version of DXtreme SWRLgold. For now, just remember to NEVER close the program when it is minimized on the taskbar. With this one exception, SWRL V3.0 was very well behaved and performed as advertised. SWRL V3.0 is the result of a professional effort, and it shows.

### Rapped Up

I think that SWRLgold V3.0 will make you throw away your paper log forever. It's available for $39.95 ($41.95 outside of N. America). For those who purchased a previous SWRL version, the price is $13.00. Check out their Web site: www.dxtreme.com/dxtreme. DXtreme Software, 26 Langholm Drive, Nashua, NH 03062.

Next time we’ll fire up the crystal ball and try to see what radio hardware (or is it software?) will look like twenty years hence. Surely, you can hold on a month to glimpse the next few decades. The future awaits.
Emergency Radio: Info-Mate Model No. 837

It was a moment of inspiration for British inventor Trevor Baylis: to create a radio powered by a windup generator—a receiver even the poorest African villager could afford to enjoy out in the bush, away from electricity. Since then, his hugely successful BayGen “Freeplay” radios, blessed publicly by no less than Nelson Mandela, have been produced by disabled and other African workers at BayGen Power Group’s plant in Cape Town.

Initial batches had generator springs of dubious quality, and radio reception was marginal, especially for the price. But things improved, and the combination of an innovative low-tech idea and socially conscious manufacturing made the Freeplay a “must run” story in newsrooms worldwide. The rest you know, and BayGen—now called Freepower Energy (800/946-3234 in the United States)—is off and running with a growing line of alternative-power electronic products.

■ When the going gets tough, the tough get cranking

While the appeal of Freeplay’s strategy to the socially concerned is obvious and real, its radios have also become “must have” items for survivalists, militia folks and others traditionally identified with the political right and populism. Yet another market in North America has been those living in areas prone to hurricanes, tornados, earthquakes, or potential civil unrest or terrorist attack. Legions of American gadget freaks have also helped swell the ranks of Freeplay owners.

The Y2K bug has probably been the most ballyhooed story since the Oval Office Romp, helping lead some concerned folks to become Instant Mormons by stocking up on emergency supplies of all sorts. This has only served to heighten the already-existing demand for emergency radios, particularly models which receive shortwave. After all, shortwave isn’t like local stations and the Internet. It is reliable, long haul, multinational and nearly impossible to censor, making it the ultimate vehicle for credible news in times of crisis.

■ World band radio, antidote to danger

During the initial revolutionary takeovers in Beirut and Tehran, various Western officials managed to escape thanks in part to information gleaned from BBC, VOA, Kol Israel and other world band newscasts. One key official, apparently the most sought-after by Islamic militias, called to thank me after his return, insisting that Passport to World Band Radio literally saved his life. His on-the-spot experience—daring through alleyways from safehouse to safehouse based on news reports from afar—makes any Tom Clancy novel pale by comparison.

■ Info-Mate’s high card: multiple power sources

Of course, nothing so juicy as the emergency radio market can go on indefinitely before competition appears, which it now has in the form of the Info-Mate 837 World Band Radio. Like the Freeplay, the 837 uses a hand-cranked generator to generate power. But unlike the shortwave version of the Freeplay, there is no windup spring; rather, the Info-Mate’s inboard generator is used to charge NiCd cells.

But, as pitchmen put it on late-night TV, there’s much, much more: a solar panel atop the set, a “wall wart” AC adaptor; and, oh yes, a plug for vehicle cigarette lighters—any of these can be used to charge the cells. A low-power battery indicator tips you off to get cranking, but it takes a disconcerting amount of wrist wrestling to charge those thirsty little cells: five tiring, boring minutes to get only an hour’s worth of playtime.

All this hand jive is fine and well if you’re holed up in a shelter fearing for your life, but it can get to be a first-class pain in the cuticles once the novelty wears thin. Soon, you may find yourself musing on the virtues of smoke signals or semaphores for electricity-free communication.

The 837’s solar option is much handier. The manufacturer claims that three hours of sunlight will provide enough juice for four to six hours of listening, and that on full charge the cells will provide roughly seven hours of reception. Of course, there is sunshine and there is sunshine, and our tests suggest that these are best-conditions numbers—high noon in Arizona, for example.

The four everyday “AA” rechargeable cells are nominally good for five years, and being removable they are easily replaced. The Freeplay, sans cells, suffers from no such limitation; it runs for half an hour from a single 20-second winding.

Otherwise, there’s no more to the 837 than to the Freeplays: a carrying strap, tuning knob, volume control and earphone socket. Missing altogether is an auto-fade dial light, which would be mighty handy in the dark when there’s no juice. The telescopic antenna swivels and rotates, which aids in reception and helps assure the antenna won’t be broken off at the base.

The 837’s power concept is more flexible and generally handier than the simple crank-to-power approach of the Freeplay. It costs the same, too: $99.95. The 837 is made in China, but includes Toshiba parts, and its solar cell is American-made.

The Freeplay, of course, is manufactured in South Africa. Two years back BayGen threatened to bolt to Brazil because of South Africa’s high tariff on imported electronic components, but this dispute was amicably resolved. Instead, within two-to-three years Freeplay Energy plans to add assembly plants in such disparate parts of the world as South America and India, according to Vaughan Wiles, president of Freeplay.
BROADCAST COVERAGE OF RADIO SPECTRUM

In addition to the more flexible power setup, the 837 receives VHF 59.165 MHz, which includes the Japanese FM band, the regular FM band, an air band, U.S. weather radio, and NTSC TV channels 2-6; also included is audio for NTSC TV channels 7-13. AM coverage goes all the way up to 1700 kHz, and shortwave reception is continuous from 4-24 MHz.

The Freeplay tunes much less of the radio spectrum. Units from current production cover AM 520-1700 kHz (earlier units stopped at 1600 kHz) and FM 87.5-108 MHz. Some Freeplay models don’t cover shortwave, but of the two that do one, the FPR1-A, tunes from 3.3-12 MHz; whereas the other, the FPR1-B, goes from 5.8-18 MHz. For North Americans and Europeans, the latter version makes much more sense, especially as we are now in a period of rising sunspot activity.

The FPR1-A and FPR1-B are scheduled to be replaced by one or more shortwave models around autumn of 2000. These are expected to be smaller, lighter, more efficient and user-friendly. However, it is not yet known whether the manufacturer plans to upgrade performance with such fundamental features as digital and keypad tuning, presets, dual conversion, tighter selectivity and the like found on most of the dozens of radios tested in the 1999 Passport to World Band Radio.

PERFORMANCE FAILS FLAT

While the Info-Mate 837 has several important advantages over the Freeplay, including relatively compact size, it isn’t in the same league when it comes to performance. Mediocre as the Freeplay’s reception is, it shines next to the 837 on virtually every count.

To begin with, the Freeplay has much more pleasant and powerful audio. Additionally, the 837’s tuning is sticky, tricky and coarse—about as bad as we’ve ever encountered. FM reception is bottom-drawer, too, and AM fares little better, with desired stations awash in spurious howls. Shortwave comes up, well, short, with poor sensitivity, poor selectivity and unbelievably bad image rejection.

The Freeplay has audibly better overall performance. Neither it nor the 837 has acceptable frequency readout, though. Shortwave tuning is reduced to hunting-and-pecking by ear, the way it was done back when President Nixon was still in office.

BETTER IDEA: OUTBOARD CHARGER FOR $19.95

Surely somebody should be able to come up with a $100-150 AM/FM/shortwave receiver with emergency power that does better than either the Freeplay or the Info-Mate 837. In the mean-time, a solution would be a separate outboard windup generator or solar battery charger.

Fortunately, Sun-Mate, which manufactures the Info-Mate line and other solar products, produces just such a charger, Model #698, for only $19.95. Of all the options for emergency radio powering, this probably makes the most sense for now. You buy the radio you want, then use the solar charger to power it along with anything else you might need which relies on battery power. Sun-Mate can be reached toll-free at (877) 786-6283, fax (818) 883-8171. www.sunmate.com, or 8223 Remmet Avenue, Canoga Park CA 91304.

Even more exciting is the Freeplay Standalone Generator currently being engineered. This advanced multivoltage windup device—probably cranked, but maybe with a yo-yo type pull string—is designed to be lightweight, small, efficient and user friendly. It is supposed to be able to provide enough power not just for radios, but also for such power-gobblers as laptop PCs and cellphones without requiring excessive cranking or pulling. No official date for introduction has been set, but given how these things usually unfold sometime in 2000 should be a reasonable estimate.

SONY INTRODUCES THE INNOVATIVE ICF-SW07 PORTABLE

By the time you read this, Sony will have introduced the compact-sized ICF-SW07. (Get it? Sam Sony’s “double-u-oh-seven,” as in James Bond’s “double-oh-seven.”) Actually, the itsy ICF-SW100S/E will always be the preferred spook radio, but the ‘W07 comes close.) It is basically an enlarged and enhanced version of the popular ICF-SW100S/E “clamshell” pocket portable, right down to synchronous selectable sideband and a snazzy multi-zone clock.

Like the ICF-SW100S, it comes with an armful of accessories, including an AN-LP2 active loop antenna made especially for the ‘SW07. This new antenna reportedly is electrically handswitched by the ‘SW07, and thus won’t work with other receivers. These will continue to have to use the existing AN-LP1—exact same thing, but with manual bandswitching.

Shortwave station schedules are stored on an inboard replaceable ROM. This provides the ready-to-go “smarts” for four dedicated buttons to scan for suitable channels of the BBC AFOA, Deutsche Welle and one other major station (RFI, Radio Nederland, Radio Japan, Radio Exterior de España or China Radio International, as you prefer). There is also a similarly performing fifth button you can self-program, along with ten conventional world band presets and another ten FM presets.

Because this is such an intriguing receiver, we are testing two samples exhaustively for several weeks in different parts of the world, and will report on our findings in MT as soon as the testing procedure is wrapped up.

Street price: probably less than $450. After all, it’s for Goldfinger. n’est-ce pas?

This equipment review is performed independently by Lawrence Magne and his colleagues in accordance with the policies and procedures of International Broadcasting Services, Ltd. It is completely independent of the policies and procedures of Grove Enterprises, Inc., its advertisers and affiliated organizations.

SOFTWARE FOR THE SHORTWAVE LISTENER

SWBC Schedules - Broadcast frequencies and programs, updated weekly $35/year
Smart Low Control 32 - NEW - Smart control for the Lowe HF-150 $25
Smart RB Control - Smart control for the Drake RB/DAB/BEI $45
Smart Audio Control - Audio scope and spectrum analyzer for your PC $25
SWBC Interval Signals - Turn your PC into a virtual shortwave receiver $50

FineWire
11252 Cardinal Drive * Remading, VA 22734-2032
http://www.croslink.net/finewire

RADIO DATABASE INTERNATIONAL WHITE PAPER reports contain virtually everything found during exhaustive tests of premium shortwave receivers and outdoor antennas. For a complete list, please send a self-addressed stamped envelope to RDI White Papers, Box 300M, Penn’s Park PA 18943 USA; or go to www.passport.com.
Icom IC-R2 Portable Scanner

In the world of portable scanners, size DOES matter. Regardless of how distracted I become, it’s never quite possible to forget I’m carrying a Uniden BC3000XLT, an AOR AR8200, or any of their contemporaries. That’s all changed with the new Icom IC-R2 portable scanner.

The new IC-R2 is tiny. It fits inside the palm of my hand and can share shirt pocket space with pens, cough drops, and other doodads. The 7-inch rubberized antenna, fitted with an SMA connector, is over twice as long as the radio. When loaded with batteries, the IC-R2 weighs merely 6.3 ounces versus the BC3000XLT’s 14.2 ounces.

**General Features**

The IC-R2 is made in Japan. It tunes the spectrum from 495 kHz to almost 1310 MHz, which affords coverage of the AM/FM broadcast bands, television audio, shortwave, and VHF/UHF. Users may choose AM, NFM, and WFM reception modes and 10 selectable tuning step sizes, ranging from 5 to 100 kHz. Continuous Tone Controlled Squelch System (CTCSS) decoding and CTCSS search are built in, along with the ability to program duplex frequency offsets.

The IC-R2 does not require a special, high cost battery pack — a sore point with hobbyists. Instead, the radio uses two common AA batteries and the US version is furnished with Saft 700 mAh NiCd cells. You cannot recharge batteries while they are inside the radio. Icom includes a night-light-shaped wall charger, model BC-127A/D, which holds and charges two or four AA NiCd cells in 7 or 9 hours, respectively.

I get about 5-1/2 hours of scanning between charges. Battery life can be extended when not scanning or searching by enabling the power saver. In addition, an auto power off function is configurable to turn the radio off after 30, 60, 90, or 120 minutes since the last key press.

The IC-R2 contains a single, detent control knob, used for tuning and navigating through menus of options. A side mounted function key (FUNC) is used in tandem with the knob and other keys, but requires a bit too much pressure for comfort.

The volume is adjusted using up and down keys. The squelch can be opened fully, set in an automatic mode or nine different thresholds by twisting the selector knob while pressing the side-mounted SQL key. While not nearly as handy as a simple squelch potentiometer, I found the squelch consistently well behaved across all frequencies and modes even at the lowest threshold.

A 1/8-inch three-conductor jack atop the radio is used for earphone or serial connection to a personal computer. Audio is sent to only one side of a pair of stereo headphones. When not in use, the jack is protected from dust by a captive rubber plug.

**Memory and VFOs**

There is no numeric keypad. The IC-R2 sports one variable frequency oscillator (VFO) and 400 channels, organized into eight banks of 50 channels each. Frequencies are entered into the VFO using a combination of the Band key and the top-mounted tuning knob.

To program a memory channel, you first tune the VFO to the right frequency and use menus to select other parameters. The IC-R2 can store the information in the next empty memory channel or you can choose a specific channel instead. Mode, tuning step size, and CTCSS code can be programmed for each memory channel. You can program a duplex frequency offset for listening on repeater inputs, too.

Like other Icom models, you can scan one memory bank at a time, not multiple banks.

The limit search lets you search for active signals between two frequency limits of your choosing. The little IC-R2 is big in this department — it provides 25 pairs of search limits! You can skip over frequencies during limit and VFO searches. Ordinary memory channels are used to store the locked out frequencies, so you can inspect them or set up the skip frequencies ahead of time.

There are three choices for when to continue scanning (or searching) in the presence of a signal: Resume, Pause, and Hold. A global rescan delay waits for the signal to drop and is programmable in six steps between 0 and 5 seconds. This is the type of scanning I use most often and appreciate being able to tailor the delay.

Instead of a rescan delay, you can choose to pause the scan for 2 to 20 seconds and restart the scan after that interval even if the station is still transmitting. The Hold setting halts the scan the first time the IC-R2 detects a signal. At 9 channels/sec., my IC-R2 scans and searches about 50% faster than the IC-R10 I tested in March 1997 MT, and that’s with CTCSS programmed into several channels.

The IC-R2 does not include an Auto Store search (a.k.a. auto memory write) as found in more expensive models.

**How Does It Play?**

I was pleasantly surprised that a radio as small as the IC-R2 produces good audio, both in amount and qual-

<table>
<thead>
<tr>
<th>MEASUREMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>IC-R2 PORTABLE SCANNER</td>
</tr>
<tr>
<td>S/N 01385</td>
</tr>
</tbody>
</table>

| Frequency coverage (MHz): | 495 - 1309.995, except 824 - 848.995 and 869 - 893.995 |
| Step sizes (kHz): | 5, 6.25, 10, 12.5, 15, 20, 25, 30, 50, 100 |
| Modes: | AM, WFM, NFM |
| NFM Sensitivity: | see graph |
| AM Sensitivity (12 dB SINAD): | 1.4 µV @ 0.5 MHz, 1.7 µV @ 1 MHz, 1.0 µV @ 5 MHz, 0.8 µV @ 10 MHz, 0.8 µV @ 20 MHz, 0.7 µV @ 30 MHz |
| FM modulation acceptance: | 9.9 kHz |
| Audio output (measured at earphone jack): | 69 mW @ 6.8% distortion, 82 mW @ 17% distortion |
| Intermediate Frequencies (MHz): | 266.7, 19.95, 0.45 |
| Image rejection due to 1st IF: | 95 dB @ 155 MHz, 38 dB @ 868.9 MHz, 74 dB @ 336.6 MHz |
| Practical memory scan speed: | 9 channels/sec. |
| Search speed: | 26 steps/sec. |
| Current consumption at 3 Vdc: | off - 0.09 mA, manual - 106 mA, scan - 109 mA, full volume - 178 mA |
| Lamp: | 10 mA additional |
| Battery saver: | after 5 sec. Manual mode. Low battery warning at 2.2 Vdc or less, Shutdown at 1.85 Vdc or less. |
Computer based communications receivers designed for a wide range of professional and amateur applications.

- Sophisticated virtual control panel
- Wide-band coverage
- Fast scanning
- Powerful tuning and scanning options
- External and internal models
- Rich variety of innovative features
- Complete multichannel systems available
- Custom solutions for radio frequency monitoring applications

Pioneering the Integration of Radio and Computers
Creating New Standards
The award-winning and immensely popular WiNRADiO WR-1000i is the world’s first commercially available PC-based wide-band communications receiver. Integrating advanced radio receiver technology and the computing power of a PC, it sets a new standard in radio communications.

The synergy of radio and computing technology provides all WiNRADiO receivers with many unique features which are hard to find on conventional communications receivers. These include a rich variety of tuning and scanning options, versatile memory and database facilities, and innovative user interfaces designed for flexibility and ease of use.

WiNRADIO 1000/1500 series
The 1000/1500 series products offer cost-effective solutions for a wide variety of applications. The products come in two forms: internal ISA-bus cards, and compact external units with an RS-232 interface (PCMCIA interface optional).

The advantages of an internal card model are in its neatness – there are no external cables required, no external interface ports are occupied, no external power supplies or extra desk space are needed. And if you wish, nobody needs to know that you have a scanning receiver hidden inside your PC!

Multichannel operation is simple to achieve, as up to eight WiNRADIO internal receivers can be used simultaneously in one PC.

Optional Portable Power Source
Many external radio receivers neglect user convenience with respect to the availability of a suitable portable power supply. WiNRADIO provides a suitable external power source, to meet the most demanding standards.

The WiNRADiO Portable Power Source is based on high-capacity, long-life nickel-metal-hydride rechargeable batteries, coupled with intelligent, fast-charging circuitry which saves the battery life and guarantees maximum charging capacity. (Suitable for external models WR-1000e, WR-1500e and WR-3100e).

Optional PC Card Interface
The PC Card interface (PCMCIA Type II) makes connecting a WiNRADIO receiver to a laptop or a notebook computer especially easy. The Plug-n-Play facility automatically registers the card, and the installation is very simple indeed. (Suitable for external models WR-1000e, WR-1500e and WR-3100e).

WINRADIO Software
The 1000/1500 Series software works on Windows 3.11, 95, 98 and NT. Impressive high-resolution graphics combine with a variety of useful features, all logically and intuitively laid out.

The WiNRADiO software sets new standards for computer-controlled radio receiver interfacing. Its features include automatic mode and step size selection, duplex separation, user-definable frequency offset, a rich variety of scanning modes including multiple-range scanning, virtually unlimited number of memories, and many other powerful features.

The Spectrum Scope facility displays real time activity on the bands. It is complemented by our graphic tuning facility called Visitune™ (patent pending). This facility allows you to tune the receiver continuously, using the mouse, across the frequency spectrum visible in the background.

Click on a peak and you are instantly tuned. Alternatively, keep the left button down and drag your mouse across a scanned spectrum – you will see the frequency cursor moving, the frequency display updating accordingly and the receiver will be tuned following your hand movements!

Both models are very well shielded from PC interference. We use specially developed shielding materials and innovative design methods to prevent any interference directly entering the receiver.
Optional Digital Suite Software
The optional WINRADiO Digital Suite is a collection of digital signal processing modules. Together, they represent a breakthrough in reception of digitally coded radio communications - never before has such a comprehensive collection been made available at such low cost and so elegantly integrated with a PC-based radio receiver.

The WINRADiO Digital Suite expands the power of a WINRADiO receiver with numerous digital processing facilities, including:

- WEFAX (Satellite Weather Fax)
- HF Fax
- Packet Radio
- Aircraft Addressing and Reporting System (ACARS)
- Digital Tone Multi-Frequency Signalling (DTMF)
- Continuous Tone Coded Squelch System (CTCSS)
- Signal Classifier
- Audio Oscilloscope and Spectrum Analyzer
- Squelch-controlled Audio Recorder and Playback

Optional Frequency Database Manager Software
The optional World Station Database Manager greatly simplifies the maintenance of frequency databases. It is fully integrated with the receiver software, and allows for instantaneous tuning to stations while browsing or searching within a database. Similarly, an unknown frequency can be readily identified by invoking the Database Manager.

The user can add, delete or edit database records as well as import data from other databases. The software comes with a ready to use database of over 300,000 stations world-wide.

WINRADiO 3100 series
Designed for government, military, security, surveillance and industrial applications, the WINRADiO 3100 series puts advanced radio receiver technology directly on a personal computer platform to create a complete spectrum surveillance and monitoring system.

The WINRADiO 3100 series receivers feature a practically unlimited number of memories, sophisticated search facilities, group allocations, automatic memory writing, exclusion list, frequency logging and much more. The in-built Task Manager makes it possible to program the receiver to perform many tasks automatically, and make decisions based on user-specified conditions. Up to eight independently operating receivers can be controlled by a single PC. The WINRADiO 3100 series receivers represent an ideal solution for high-performance automatic monitoring systems.

Complete Multichannel Systems
Until recently, the task of multichannel radio frequency surveillance and monitoring involved a number of separate radio receivers, audio recorders and other discrete components interconnected into bulky and expensive systems.

WINRADiO Multichannel Systems provide an elegant, fully integrated solution, specifically designed for computer-controlled automatic monitoring of frequencies ranging from below the AM broadcast band up to low microwave, in all major modulation modes.

Available in several configurations to suit specific requirements for radio frequency monitoring, the systems are designed to monitor radio frequencies on multiple channels simultaneously, record digitized signals on the hard disk for easy later retrieval, and perform automatic decisions based on received signals.

WINRADiO Multichannel Systems can be operated either manually or autonomously in unmanned remote locations. Remote operation and networking facilities are also available.

MS-8006 (six channel) Surveillance System
User-selectable audio compression methods make it possible to store weeks or months of continuous, simultaneous recording of all channels on the in-built hard disk.

WINRADiO Multichannel Monitoring System software allows the user to observe the status of all received channels on a single screen using virtual "micropanels" for each channel, each one of them fully expandable to a full size panel.

Each expanded control panel allows for independent operation of a high-performance scanning receiver with sophisticated functions such as automatic task scheduler, spectrum scope, DSP signal conditioner, signal strength recorder, programmable audio recorder, and many other features.
## Specifications

<table>
<thead>
<tr>
<th>Model Numbers</th>
<th>WR-1000i/WR-1000e</th>
<th>WR-1500i/WR-1500e</th>
<th>WR-3100i-DSP/WR-3100e</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type</strong></td>
<td>Triple superheterodyne</td>
<td>Triple superheterodyne</td>
<td>Triple superheterodyne</td>
</tr>
<tr>
<td><strong>Frequency range</strong></td>
<td>0.5-1300MHz*</td>
<td>0.15-1500MHz*</td>
<td>0.15-1500MHz*</td>
</tr>
<tr>
<td><strong>Tuning steps</strong></td>
<td>100Hz (5Hz BFO)</td>
<td>100 Hz (1Hz USB/LSB/CW)</td>
<td>100 Hz (1Hz USB/LSB/CW)</td>
</tr>
<tr>
<td><strong>IF shift</strong></td>
<td>-</td>
<td>+/- 2kHz</td>
<td>+/- 2kHz</td>
</tr>
<tr>
<td><strong>Audio output</strong></td>
<td>200mW into 8 ohm load</td>
<td>200mW into 8 ohm load</td>
<td>200mW into 8 ohm load</td>
</tr>
<tr>
<td><strong>Antenna connection</strong></td>
<td>50 ohm BNC</td>
<td>50 ohm BNC</td>
<td>50 ohm BNC</td>
</tr>
<tr>
<td><strong>Dynamic range</strong></td>
<td>65 dB</td>
<td>65 dB</td>
<td>85 dB</td>
</tr>
<tr>
<td><strong>Selectivity</strong></td>
<td>6kHz/-6dB</td>
<td>2.5 kHz/-6dB</td>
<td>2.5kHz/-6dB</td>
</tr>
<tr>
<td><strong>SSB, CW</strong></td>
<td>6kHz/-6dB</td>
<td>6 kHz/-6dB</td>
<td>6 kHz/-6dB</td>
</tr>
<tr>
<td><strong>AM</strong></td>
<td>6kHz/-6dB</td>
<td>17kHz/-6dB</td>
<td>17kHz/-6dB</td>
</tr>
<tr>
<td><strong>FM-N</strong></td>
<td>17kHz/-6dB</td>
<td>230kHz/-6dB</td>
<td>230kHz/-6dB</td>
</tr>
<tr>
<td><strong>FM-W</strong></td>
<td>230kHz/-6dB</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

*In some countries, certain frequencies may be omitted to comply with local government regulations.*

### Typical Sensitivity for WR-1000i/WR-1000e receivers

<table>
<thead>
<tr>
<th>Frequency Range</th>
<th>AM</th>
<th>CW/SSB</th>
<th>FM-N</th>
<th>FM-W</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5 - 1.5MHz</td>
<td>5.0μV</td>
<td>2.5μV</td>
<td>1.0μV</td>
<td>-</td>
</tr>
<tr>
<td>1.5MHz - 30MHz</td>
<td>1.0μV</td>
<td>0.5μV</td>
<td>0.5μV</td>
<td>-</td>
</tr>
<tr>
<td>30 - 1000MHz</td>
<td>1.5μV</td>
<td>0.7μV</td>
<td>0.5μV</td>
<td>2.0μV</td>
</tr>
<tr>
<td>1.0 - 1.3GHz</td>
<td>5.0μV</td>
<td>2.5μV</td>
<td>2.0μV</td>
<td>4.0μV</td>
</tr>
</tbody>
</table>

### Typical Sensitivity for WR-1500i/WR-1500e receivers

<table>
<thead>
<tr>
<th>Frequency Range</th>
<th>AM (1)</th>
<th>CW/SSB (2)</th>
<th>FM-N (3)</th>
<th>FM-W (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.15 - 0.5MHz</td>
<td>(5)</td>
<td>(3)</td>
<td>(3)</td>
<td>-</td>
</tr>
<tr>
<td>0.5 - 1.0MHz</td>
<td>5.0μV</td>
<td>0.9μV</td>
<td>1.0μV</td>
<td>-</td>
</tr>
<tr>
<td>1.0 - 3MHz</td>
<td>1.0μV</td>
<td>0.3μV</td>
<td>0.5μV</td>
<td>-</td>
</tr>
<tr>
<td>30 - 1000MHz</td>
<td>1.5μV</td>
<td>0.3μV</td>
<td>0.35μV</td>
<td>1.8μV</td>
</tr>
<tr>
<td>1.0 - 1.5GHz</td>
<td>1.9μV</td>
<td>0.35μV</td>
<td>0.4μV</td>
<td>3.5μV</td>
</tr>
</tbody>
</table>

### Typical Sensitivity for WR-3100i-DSP/WR-3100e receivers

<table>
<thead>
<tr>
<th>Frequency Range</th>
<th>AM (1)</th>
<th>CW/SSB (1)</th>
<th>FM-N (2)</th>
<th>FM-W (3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.15 - 0.499MHz</td>
<td>(3)</td>
<td>(3)</td>
<td>(3)</td>
<td>-</td>
</tr>
<tr>
<td>0.5 - 1.7999MHz</td>
<td>5.0μV</td>
<td>0.9μV</td>
<td>0.9μV</td>
<td>-</td>
</tr>
<tr>
<td>1.0 - 2.9999MHz</td>
<td>1.0μV</td>
<td>0.3μV</td>
<td>0.35μV</td>
<td>-</td>
</tr>
<tr>
<td>30 - 999.9999MHz</td>
<td>1.0μV</td>
<td>0.3μV</td>
<td>0.35μV</td>
<td>1.0μV</td>
</tr>
<tr>
<td>1.0 - 1.5GHz</td>
<td>1.5μV</td>
<td>0.35μV</td>
<td>0.4μV</td>
<td>2.0μV</td>
</tr>
</tbody>
</table>

| Power supply    | internal (PC supplied) | 12V DC +/- 15% |
| Dimensions      | 114x290x18mm (4.5x11.4x0.7in) | 122x216x48mm (4.8x8.5x1.8in) |
| In-built speaker | - | 8 ohm 0.1W |

### Ordering codes

- WR-1000i WiNRADIO WR-1000i receiver (internal)
- WR-1000e WiNRADIO WR-1000e receiver (external)
- WR-1500i WiNRADIO WR-1500i receiver (internal)
- WR-1500e WiNRADIO WR-1500e receiver (external)
- WR-3100i DSP WiNRADIO WR-3100i-DSP (internal)
- WR-3100e WiNRADIO WR-3100e (external)
- WR-DBM WiNRADIO Database Manager Option
- WR-DS WiNRADIO Digital Suite Option
- WR-PCA WiNRADIO PC Card Adaptor Option
- WR-PPS WiNRADIO Portable Power Source
- MS-8003 Multichannel Monitoring System (3 channel)
- MS-8006 Multichannel Monitoring System (6 channel)

**Authorized Distributor:**

**Advanced Digital Systems**

of Saint Louis, Inc.

Communications & Security Division
Where Technology & Ingenuity Meet

Visit us on the Internet for more information and free software!

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or email us at winradio@advdig.com

Dealer inquiries invited.

Phone: (314) 791-1206  Fax: (314) 458-1597

1374 Clarkson/Clayton Center, St. Louis, MO 63011 USA

WiNRADIO is a trademark of WiNRADIO Communications.
All other trademarks are the property of their respective owners.
Technical specifications are subject to change without notice.
Patents pending.

[www.winradio.com](http://www.winradio.com)
© 1999 WINRADIO Communications
At the other extreme, my antenna, lately, including my mission. From the signals, my near 476 MHz. When searching for NFM while I mostly free from images and intermod, though it doesn't available BC200XLT, actually sounds IC -R2 VHF and UHF reception. Though the radio is quite sensitive, though IC -R2 NFM reception is quite sensitive, due to the supplied (***) hear S/N 01385, 1 -30 MHz, is insensitive. That's because the radio is insensitive. This is supposed to be a scanner equipment column, but readers may enjoy learning about an older, exotic shortwave / longwave receiver which I recently acquired — an ITT Mackay Marine model 3031A. Made in USA, the 3031A is a 1980s vintage dual conversion solid state model used aboard ships and in coastal stations. It tunes 15 kHz - 30 MHz in 10 Hz, 100 Hz, or 100 kHz steps. Frequencies are boldly displayed down to 10 Hz resolution on a large red LED readout. Velvet smooth tuning is accomplished using a fly-wheel weighted optical chopper.

Intended for maritime use and 19-inch rack mounting, the Mackay is built like a tank and has 1 PPM (part per million) stability, too. The front panel is an aluminum rack panel — no sculpted plastic here! The IF bandwidths are 8, 2, 1, and 0.4 kHz.

An internal 9-band preselector permits honest VLF reception without interference from strong broadcast band stations, but the preselector can be bypassed. The 3031A contains no memory channels or noise blanker, though an internal NiCd battery remembers the VFO frequency when the power is off. Like other marine and military receivers, there's a fixed level, 600 ohm audio output connection on the rear panel in addition to a 3.2 ohm speaker port. The front mounted speaker employs a huge magnet and produces better audio than my fancier imported radios.

Mackay Radio Systems, Inc., now a part of Thomson-CSF, is still making radio communication gear. They are located at 2721 Discovery Dr., Raleigh, NC 27616.

**Go for It**

At a street price of about $220, the IC-R2 is a great value and an impressive performer in a tiny package. For me, it was love at first sight. The affair will continue 'til the day that I am forced to return this loved IC-R2 to Icom.

**ITT Mackay Marine 3031A Receiver**

This is supposed to be a scanner equipment column, but readers may enjoy learning about an older, exotic shortwave / longwave receiver which I recently acquired — an ITT Mackay Marine model 3031A. Made in USA, the 3031A is a 1980s vintage dual conversion solid state model used aboard ships and in coastal stations. It tunes 15 kHz - 30 MHz in 10 Hz, 100 Hz, or 100 kHz steps. Frequencies are boldly displayed down to 10 Hz resolution on a large red LED readout. Velvet smooth tuning is accomplished using a fly-wheel weighted optical chopper.

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More on Digital Shortwave

In our February issue, I mentioned that several digital techniques had been tried on shortwave, but without much success. WWCR’s George McClintock adds that the experiments showed that 60 kHz of composite bandwidth would be required to handle the digitized signal, and shortwave assignments are 10 kHz wide.

And how about single sideband? Informally, says George, the global broadcasters have affirmed that they will never go to single sideband (SSB) because of incompatibility with the vast majority of shortwave radios spread among world listeners.

Don’t throw away that AM-only radio; it looks as if AM shortwave will be with us for some time to come!

Q. I gave myself a Christmas gift of the Grundig Deco table radio primarily to listen to the AM band and get that “way it should be” feeling from the lighted dial, wooden cabinet and big tuning knobs. Tuning around the top end of the AM dial, around 1700, I was quite surprised to hear John Peel on the BBC. I also receive Deutsche Welle and some Spanish-language stations at this end of the dial. Why do I get this bonus, when I don’t on other radios like my GE Super Radio? (Dale Hazelton, New Hampton, NY)

A. This “bonus” is actually a deficiency in design. You are hearing shortwave “images” from higher frequencies, a result of inadequate filtering in the front-end tuner of the radio. The GE Super Radio is known for its superior filtering and doesn’t suffer from (or, in your case, benefit from!) this image response. But if you like hearing them, and they aren’t interfering with signals you want to hear in that part of the spectrum, then it is a bonus for you.

Q. Is there any way to recognize when the signals from the US Navy’s High Frequency Active Auroral Research Program (HAARP) in Alaska are on the air? (Angus Ashdown, Lexington, MO)

A. Not that we’ve been able to determine. The program conducts experimental transmissions on an assortment of frequencies, but since the radiation pattern is straight up, very little effect is noticed at lower latitudes.

Edward Kennedy, who recently contacted us on behalf of HAARP about a different kind of listening test (see p. 6, March MT), affirmed that the only noticeable effect would be on signals whose propagation path passes over the facility. He says, “The HF transmissions

Bob’s Tip of the Month

**Synchronous Detection** - A recent discussion with *MT*’s Scanner Equipment columnist, Bob Parnass, got us thinking. Many good communications receivers and amateur transceivers don’t have synchronous detection. The addition of the time-honored Sherwood SE-3 accessory would add some $500; are there less expensive options?

Couldn’t an inexpensive, new or used, synchronous-detector-equipped receiver like a Drake SW2, or Sony ICF2010 or ICF7600G be used instead? The inexpensive radio would be connected via coax between its external antenna jack and the host receiver’s intermediate frequency (IF) output jack, and adjusted to the correct IF frequency. If the host receiver is not equipped with an IF output jack, the technically competent experimenter could install a jack, shielded jumper, and direct current (dc) blocking capacitor to the IF output stage of the host receiver.

The advantage of such a scheme would be that the add-on radio could be set to the intermediate frequency of the host receiver (455 kHz, 5 MHz, 9 MHz, etc.), while a dedicated synchronous detector like the Sherwood is set at 455 kHz, and it’s another $150 for a converter. The secondary receiver can still be used as a backup receiver.

**Digital RF Signal Generator** - Scanner listeners using multiple radios often complain about oscillator radiation from one scanner being heard on another scanner, blocking reception on certain frequencies. While this is a detriment to listening, it “signals” another use.

Radio experimenters looking for a stable, reliable signal source for testing receivers can use a keyboard scanner as a signal generator. Less expensive double-conversion units are best because the math is simpler!

If the scanner has a 10.8 MHz IF stage (typical Bearcats and Uniden-manufactured Radio Shack scanners; occasionally 10.7 MHz on other models), you would either add or subtract 10.8 MHz from the dial reading (depending upon which band you are on) to determine the oscillator frequency radiating from the unit.

For example, the oscillator of a PRO-51 set to 130.000 MHz on the aircraft band will be heard on 140.800 MHz on a nearby scanner, while the same PRO-51 radiates on 160.000 MHz when set at 170.800 MHz.

Using this basic equation:

\[ \text{Signal Frequency} = \text{Dial Frequency} +/ - 10.8 \text{ MHz} \]

you can make a chart, or write the equation, enabling the use of virtually any keyboard scanner as a radio frequency (RF) signal generator. Of course, you will need a second radio to confirm the conversion frequencies for your model scanner.

Unusual Solutions for the Technically Adept

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M0U? Are you concerned that hams will disapprove? Do you think the FCC will eventually approve of the unlicensed usage? (Bob Schultz, St. Louis Park, MN)

A. There really isn’t much to say about this embarrassing part of the spectrum that hasn’t already been covered in past issues — it doesn’t change. And it isn’t a ham band, so we aren’t concerned for hams’ approval or disapproval.

The Federal Communications Commission threw up their hands and deregulated the CB service (officially 26.965-27.405 MHz) years ago and, due to budget and personnel restraints, no longer enforces infractions such as out of band operation, high power, abusive language, international communications, unapproved equipment, improper modes, noise makers, and other artifacts of a communications medium run amok.

Because of the worldwide phenomenon of billions of people talking all at once (often with no one listening!), legitimate radio services globally have abandoned 26-28 MHz for serious use.

If there is interest in our doing another freeband article, or an update on the CB radio service, we will be happy to do so. So far, most reader sentiment has seemed against it.
AVCOM SDM42A Spectrum Display Unit

By Bob Grove

It has been some time since low-cost spectrum display units (SDUs) have been available to consumer radio monitors. Those serious listeners who are fortunate enough to have one agree that they are indispensable, and having a tunable VHF/UHF receiver without one is like listening to TV with your eyes closed.

An SDU with a wide-frequency-coverage receiver is the virtual equivalent of a spectrum analyzer, and audio detection is even better than a spectrum analyzer. Applications include locating and identifying unknown signals, sweeping for illicit transmitters, antenna adjustment, receiver and transmitter alignment, filter design and testing, interference tracking, and more.

Most signal sleuths without the benefit of such a marvelous device are limited to tuning up and down the dial manually, hoping to hear a signal transmitting just at the time they tune across its frequency, or they must allow a scanner to laboriously search slowly across the band hoping for the same coincidence. But with an SDU, you are instantly alerted to the presence of a new signal; a quick turn of the tuning dial snaps it for identification.

Currently, with the Grove SDU-100 discontinued, only the AOR SDU5500 is readily available, and it is primarily suited to match the AR5000 and AR5000 Plus receivers.

AVCOM, a leading manufacturer of cost-effective test equipment, has a universal alternative: the SDM42A, a lightweight (8 lb.), small profile (8-1/4" x 5" panel), 5-inch diagonal cathode ray tube (CRT) 'scope available for any receiver with an intermediate frequency (IF) output of 10.7, 21.4, 45, or 70 MHz. A BNC interconnect cable is included, and the SDU is powered by 120 Vac (a minor limitation for mobile applications).

With its 10 kHz resolution bandwidth filter, the signal spikes are sharp and clean, but limited to 65 dB dynamic range, according to the specs (we measured 55 dB on the scale); above that, intermodulation generates phantom spikes ("spurs"). Reducing the gain helps, but eliminates weak signal spikes. Perhaps better gain distribution could have prevented this limitation which makes it difficult to resolve weak signals in a strong-signal field.

A continuously variable span allows a view of the spectrum from 0-10 MHz wide, conforming to compatible receivers like those from ICOM, AOR, and government/military vendors. At 0 span, the scope displays time domain, revealing modulation waveform for visual analysis.

Initial adjustment couldn’t be simpler: With a signal tuned in, the input sensitivity control is adjusted for desired vertical amplitude (10 dB/division sensitivity), the fine tuning control centers the spike, and the span control selects the desired spectrum width. That’s it.

A few trimpots are accessible from the front panel for tweaking if necessary; these include intensity, vertical and horizontal centering, center frequency spike adjustment, and sweep rate. A five-segment LED bargraph gives a coarse visual indication of the selected span up to 2 MHz wide. While that is nice, having it continuously adjustable up to the full 10 MHz span would make more sense.

After a few minutes’ warmup, the trace is quite stable, far more stable than the more expensive PSA65C spectrum analyzer which drifts continuously. An occasional touch of the SDU’s fine tuning control every few minutes keeps the signal spikes dead on center.

It’s hard to fault a piece of equipment that works so darned well, but an edge light on the graticule, or even imprinting, would make the scaling far more legible; a coarse calibration of the span control would let the user know approximately how much spectrum he is watching; and a switch to reverse the sweep direction would allow the user to choose whether the span goes from low to high, or high to low, frequency. Most important, a 12 volt power capability would dramatically improve the SDU’s desirability in mobile applications.

But just as it is, owners of receivers with IF outputs are hard-changing themselves without such a useful accessory.

The AVCOM SDM42A is available for $999.95 plus shipping from Grove Enterprises, PO Box 98, Brasstown, NC 28902 (800-438-8155 or visit www.grove-ent.com).
Bearcat Bonanza!

Grove Enterprises has acquired a large stock of factory-tested handheld Uniden scanners and is selling them at rock-bottom prices—as much as a hundred dollars off retail. These units are in-as-new condition and come with a 90-day warranty.

The 200-memory-channel BC220-XLT, with preprogrammed service and weather radio search, covers 29-54, 118-174, 406-512, and 806-956 MHz, and boasts 10 priority channels, data skip, and 100 channel per second scan speed—priced at $149.95. The popular SC150 Sportcat handheld scanner covers the same frequency range as the BC220XLT, has 100 memory and 10 priority channels, with preprogrammed band search capability and weather radio—all for $99.95.

The Uniden BC100-XLT excludes the 800 MHz range, but contains 100 memory channels, 10 priority channels, and weather search for the price of $69.95. The Bearcat 60-XLT covers neither the 800 MHz nor 118-174 MHz ranges, but it does have 10 memory channels and weather scan for the low price of $49.95. Both these hand helds scan more slowly (10-15 chan/sec) than the more sophisticated units. For information and availability call Grove Enterprises at 800-438-8155 or check Bob’s Bargain Bin off the Grove website at www.grove-ent.com.

HF Communications Receiver from Icom

Details are beginning to emerge on Icom’s upcoming all-mode shortwave communications receiver, the IC-R75, touted as the successor to the Icom IC-R72. The wide-range receiver is designed for optimum reception on HF (0.03-30 MHz) and at 50-54 MHz (the 6 meter band).

The receiver is tuned via program scan (two sets of limits may be saved in memory), memory channel scan (99 channels), or priority scan (scan of main frequency plus selected memory channels), or by direct frequency or memory channel input from the keypad. An option to be available in the future is computer control using a standard serial cable and RS-R75 remote control software.

Watch for more news on this long-awaited offering from Icom, slated for an April or May appearance.

NEW!
FREE-POWER RADIO FROM SONY!

The new ICF-B200 provides not only quality AM/FM reception in a tiny (6"x3") case, but also never-lights batteries or sunlight to operate! That's lightweight and easy to use. The ICF-B200 provides all the power needed for this radio—one minute’s spin gives you full half-hour of play time! And you can even install two AA alkaline batteries for many hours of untended operation. An LED status indicator alerts you to charge conditions.

Need emergency lighting? The B200 has a built-in emergency light. Its display is illuminated as well. A headphone jack allows private listening, or you can call for help with the audible alarm. Be ready for power outages—don’t be caught without a source of emergency information! Call now to order your lifetime to the community!

Order RCV-12.

ONLY $79.95 plus $5.50 shipping

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e-mail: order@grove-ent.com
www.grove-ent.com

April 1999 MONITORING TIMES 97
Have Station, Will Travel

For the amateur or the monitor on the go, Cutting Edge Enterprises has added to its line of portable power supplies. Their new HAM-Pack will let you carry your 110 Watt station on your back or in your car. A lower compartment holds a rechargeable power supply, and a pocket on the side holds your mobile antenna. The lid contains a pocket for microphone storage.

The backpack is constructed of laminated heavy duty black nylon with 1/4-inch foam padding. An adjustable radio sling holds the radio securely in the top compartment, but allows it to be raised for easy operation. Power cords pass through openings into the lower power compartment.

The pack can be toed by a handle at the top when not worn as a backpack. The company claims it’s “small enough to qualify as airline carry-on luggage, is complete enough to serve as an entire station, and is comfortable enough to carry for miles.”

Cutting Edge offers a special introductory price of $47.95 for the HAM pack. If you don’t have a power supply, you can purchase CEE’s kit for $63.95. To order, call 800-206-0115, email cees@cenzi.com, or write Cutting Edge Enterprises at 1803 Mission Street, Suite #546, Santa Cruz, CA 95060.

RuffRider Mobile Antennas

MFJ Enterprises has an entire line of mobile antennas for the ham which they have dubbed RuffRider™ for their ability to “battle the elements, handle rugged rides and day-to-day highway abuse.” All are dual band 144/440 MHz antennas with stacked elements and high-Q phasing coils housed in weatherproof plastic insulation attached to stainless steel radiators. The heavy duty buses are super rigid. The sturdy antenna mounts have an SO-239 base, with a free NMO adapter included, plus Allen wrenches, locking screws and protection caps.

Antenna lengths vary from 16-1/2 inch to 62-1/2 inch, with a variety of mounts; prices range from $34.95 to $69.95. Call MFJ at 800-647-1800 for your nearest dealer, or email mfj@mfjenterprises.com.

Clear Speech Speaker

Algorithms are hot these days: They produced MF1’s eye-popping cover this month, they are producing record-breaking reception when used for antenna design, and they are also being used to cancel irritating noise and static in radio reception.
Noise Cancellation Technologies, Inc. (NCT) has announced their new ClearSpeech-Speaker™ specially designed for the spoken word. NCT claims that up to 95% of stationary or constant noise can be removed from a signal containing noise and speech. And, as the noise changes, the algorithm adapts.

“ClearSpeech-Speaker is great for use with mobile radios, fleet communications systems, marine and ham radios and many other communications systems,” says Michael J. Parrella, President of the Stamford, Connecticut, company. “It’s perfect in situations where communication is critical and noise hampers intelligibility.”

For more information call 800-278-3526 or visit www.nctactive.com.

**Computer-Modem Surge Protection**

If your household is like ours, it’s plugged into the outside world via phone lines, cable connections, electrical connections, and even satellite television. These circuits can also provide a conduit for damaging electrical surges, brownouts, and lightning strikes.

TrippLite’s Super 10 Surge Protector provides protection for two phone connections and ten electrical outlets (two of which remain on, even when the unit is switched off, to provide power to clocks, fax and answering machines, etc.). Three LEDs indicate power line problems; the Deluxe model also indicates damaging low voltage conditions.

DBS model also features gold-plated coaxial F connectors and R111 jacks for home theater and satellite system equipment.

Super 10 and Super 10 DBS models retail for $79.95. The Deluxe model goes for $99.95. For the dealer nearest you call 773-896-1234 or visit www.tripplite.com.

**Weather software from Timestep**

Another way to protect equipment is to monitor the weather. “PROsat for Windows™ is the latest weather satellite reception interface and software available from Timestep, manufacturer of weather satellite equipment. The "7" products are new versions of Timestep's Windows interface and 32 bit software and contain every conceivable feature to provide totally stunning live weather fax images.

The new interface, which connects to the computer serial port and can be used with a notebook or desktop, can take up to three different receivers. All switching is computer controlled; system monitoring and status are shown by 11 LEDs on the front panel.

New features include: multi-spectral color NOAA APT images, zoom in and out while receiving, multiple windows for the same image (e.g. to view NOAA IR/visible simultaneously), continuous polar auto-save scheduled to receive all passes with no user intervention, and color animation.

The new PROsat for Windows interfaces and software are priced from €120.00, $180.00 - upgrade for existing Timestep.
PROsat for Windows users start at about £50.

For more information on all Timestep weather satellite equipment and current prices, you may contact (in the US) Swagur Enterprises at 608-592-7409 phone/fax, email swagur@execpc.com or visit http://swagur.com; or you may write to Timestep at PO Box 2001, Newmarket, CB8 8XB England, or e-mail Sales@Timestep.com www.Time-step.com

Own Your Own Cellular Site

In author John S. Hollar, Jr.'s own words, "After working many years in commercial antenna site development, I was appalled at how little information is available to the electronic hobbyist, land owner, or real estate community when it comes to the money that can be made from land or buildings which can be offered to the exploding telecommunications industry. So much so, I wrote a book about it."

Do you have a building to support an antenna? Some vacant land? Know where you can find some? Antenna Site Operating Guide is a 300+ page book crammed with ideas and information, from using steeples and apartments to marketing and promotional concepts. Also included are lists of equipment needed, along with some good background information on services which would be interested.

Antenna Site Operating Guide is available for $18.95 plus $3.05 shipping from publisher Hollar Communications, 5201 South Torrey Pines Dr., Suite 1255, Las Vegas, NV 89118-0608; call toll-free 877-877-0040 or email Jrhollar@aol.com, or visit http://members.aol.com/antennas99

Shortwave Guide to Southeast Asia

The 36-page Shortwave Guide to Southeast Asia is intended to be a single-volume, timely reference for monitoring hobbyists needing accurate and up-to-date information, frequency planners, professional monitoring organizations, media producers, and anyone interested in learning about the impact of shortwave broadcasting on the region. When published in May, it will bring together information unavailable anywhere else.

The Guide includes the latest observed domestic shortwave schedules, last year's comprehensive international broadcast schedules, description of past and current broadcasting operations, geographic and cultural background on the area, QSL policies, and addresses.

The editorial team is comprised of four Australians: Bob Padula, Mick Ogrizek, Craig Tyson, and Matt Francis. The Guide may be ordered for US$10 or 8 International Reply Coupons outside Australia, or AU$10 to Australian addresses. Order before April 30th and receive a special prepublication voucher. Send payment to Bob Padula (Padula Books), 404 Mont Albert Road, Surry Hills, Victoria 3127, Australia; tel/fax +61 3 898 2906; bpadula@compuserve.com.

New Shortwave References for 1999

The name Joerg Klingenhuss has become synonymous with comprehensive shortwave directories. His new, expanded edition is certainly no exception.

Let's take a tour of each of these:

Shortwave Frequency Guide: Now including both broadcasting and two-way utilities, this massive, 570 page directory lists more than 22,000 worldwide users of the 1.7-30 MHz high frequency spectrum, complete with frequency, identification, location, callsign, mode, and pertinent comments. Glossaries and appendices detail frequently encountered abbreviations, listening tips, modulation types, and user profiles. (Available for $39.95 plus shipping from Grove Enterprises.)

Guide to Utility Radio Stations: The two-way signals of the shortwave spectrum are particularly tantalizing, and Klingenhuss details over 11,000 current frequencies and their 1900 users. All modes of transmissions are covered from 50 kHz-30 MHz, along with identifications, locations, callsigns, and network details. Extensive chapters identify callsigns, match users with frequencies, list Q and Z codes, discuss data decoders, and more. ($49.95 plus shipping from Grove Enterprises.)

Radiotelex Messages: "Reading the mail" has always been a popular pastime for those shortwave-listening enthusiasts who have demodulators, printers, or computers with appropriate decoding software. Radiotelex Messages shows over 1000 messages from historical teletype stations of the past 25 years, as well as current digital communicators to be heard on the global HF spectrum. Arranged alphabetically by country of origin, and including commonly encountered Z and Q codes. ($49.95 plus shipping from Grove Enterprises.)

Super Frequency List on CD-ROM: Essentially a Windows 3.1/95/98 CD version of the Shortwave Frequency Guide described above, you can now search by frequency, country, station ID, and callsign for all records, and even by language and time for broadcasters. Includes abbreviations list and even a digital decoding software program! ($39.95 plus shipping from Grove Enterprises.)

Business News

• ComBox, Inc., a wideband internet systems technology company whose SatStream technology we covered in the January issue, now has a U.S. subsidiary located in Annandale, Virginia. To learn more about ComBox, visit their web page at www.combox-i.com, email Senior Vice President Ed Kay at edkay@combox-i.com, or call 703-333-3008.

• Several years ago, Doug DeMaw gave a rare testimonial in his construction column for CAIG DeoxIT spray for cleaning and deoxidizing electrical connections. The company recently notified us that they have moved. For a catalog of CAIG products, here's the contact info: CAIG Laboratories, 12200 Thatcher Court, Poway, CA 92064-6876; phone 800-CAIG-123; email caig123@aol.com or website www.caiig.com.

• If you're interested in antiques or collectibles, you'll soon be able to shop for them via satellite at Rarities-Exchange.com—a digitally-delivered satellite electronic retailer, television programming service, and internet website. Their corporate office, studio, and fulfillment center will be at 11221 Outlets Drive, Knoxville, Tennessee 37932.
MT Read in High Places

Reader John Maky sent a report to our utility column that an unidentified aircraft on 19131 kHz was heard asking Atlas for frequencies for the Voice of America. Atlas provided them and said the frequencies came out of Monitoring Times!

Who is Atlas? A radio operator retired from a related net clarified Atlas's true identity for us. Atlas is the callsign used by Communications Central, Rockwell-Collins, Cedar Rapids, Iowa, when it is in contact with the Drug Enforcement Administration (DEA), with which they are already on the books. John Breaux, a Democrat from Louisiana, has introduced legislation (HR 2364) that would prohibit the DEA from using radio communications to monitor private citizens. The DEA does not make the small enclosure larger, any more than a model airplane can carry a crew and passengers.

"Privacy" Bill, continued from page 3

A Call to Action: Write Now!

So what should you do? Do you have a favorite scanner or scanner-equipped public service volunteer, ham radio operators, firefighters, and private citizens. These volunteers, as well as many fire and police departments with low budgets, will be out of the loop if their county agencies move to a digital system. A digital scanner could make the difference, if Congress doesn't try to micromanage scanner technology and spectrum issues. It is already quite clear in the U.S. Code that most oral, wire, and electronic communications are off-limits to all but authorized users: it should be left to the spectrum managers and radio engineers to determine how such privacy may be accomplished.

WRITE NOW

If you don't know who the Senators from your state are, check your local telephone directory or your library. If you're on the Internet, just check www.senate.gov and click on your state. Be sure to send a copy to the Senators on the U.S. Senate Commerce, Science, and Transportation Committee:

Republicans
Spencer Abraham, MI; John Ashcroft, MO; Sam Brownback, KS; Conrad Burns, MT; William Frist, TN; Slade Gorton, WA; Kay Bailey Hutchison, TX; Trent Lott, MS; John McCain, AZ; Olympia Snowe, ME; and Ted Stevens, AK.

Democrats
John Breaux, LA; Richard Bryan, NV; Byron Dorgan, ND; Ernest Hollings, SC; Daniel Inouye, HI; John Kerry, MA; John Rockefeller, WV; and Ron Wyden, OR.
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Reactions from others

"The devil will be in the details of the proposal," said Pete Tridish of the Prometheus Radio Project located on the Internet at: http://home.earthlink.net/~prometheusrp. "We really want to see that spectrum scarcity be handled as much as possible through sharing and promoting access, as opposed to a very few lucky ones who win an auction or lottery."

"We could lose by winning," said Peter Franck of the National Lawyers Guild Committee on Democratic Communications, www.nlgcdo.org. "If the FCC moves to legalize micro radio, but then favors commercial applications and auctions of licenses, the thousands of community groups who have waited for access to the airwaves will lose miserably."

"If Low Power FM is proven to critically disable incumbent broadcasters' signals, it should not be implemented," according to Michael Bracy of the Low Power Radio Coalition, www.lowpowerradio.org. "We believe, however, that engineering studies will demonstrate that Low Power FM is a viable mechanism to serve the multitude of voices calling for increased access to broadcast radio."

But, as might be expected, the NAB argues otherwise. "This proposal to add as many as 4,000 lowpower stations to an already congested radio band threatens the transition to IBOC digital radio, will likely cause devastating interference to existing broadcasters, and will challenge the FCC as guardian of the spectrum."
"Excellent in all areas!"

This is just one of the things our readers say about DX Ontario, the ODXA's monthly magazine for radio listeners. Get a sample of our 40-page monthly magazine and see for yourself! Only $3.50. 1999 is our 25th Anniversary!

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Radio Waves and the Human Body: Two Interesting Views

A recent item in Time Digital (November 30, 1998), sent to me by Chuck Titus of Vancouver, Washington, caught my attention. An Israeli firm, Gen-Epics, claims to have implanted tiny chips in 43 people — perhaps movie stars, political figures, secret agents, or even ultra-wealthy individuals who could be kidnapped — so they can be tracked by satellite. The $5000 "Sky-Eye" ostensibly is powered by the host’s own "neuro-physiological energy."

A skeptic might ask: How much nerve power can be tapped from the human body without affecting normal activity? Is this voltage and current enough to reach the avalanche voltage of any active electrical device to sustain oscillation and amplification? What sort of (probably microwave) radiation pattern would be produced by a tiny chip, and how much signal attenuation would the skin produce?

Wouldn’t clothing reduce signal strength even further? And what if the individual is in a car, dense woods, a first-floor apartment, or even a cave? What happens to the signal when it rains? How large a satellite antenna is required to detect such a weak signal, and can it discriminate it from the attendant noise? How many satellites are necessary (and from which constellation) to simultaneously monitor 43 or more people worldwide? (Do we sound dubious?)

Perhaps one of our scientifically inclined readers would like to run the numbers.

It has been nine years since my article entitled, "Man: The Human Receiver" was published in MT (November, 1990). Meanwhile, research has been ongoing to determine the vulnerability of the human body to irradiation from electromagnetic (especially radio frequency) energy. Among these studies, effects of cellular telephone irradiation are quoted the most by the popular press.

Residents near Golden, Colorado’s, Lookout Mountain antenna site are alarmed by the perceived threat of over 400 transmitters in their back yards. Recent measurements show that the radiation is 250% over the maximum allowable federal guidelines.

A recent report published in the London Times (December 31, 1998) carried a large number of tantalizing accounts of apparent bodily damage caused by low level radio exposure; two of these follow:

Dr. Henry Lai, an expert in non-ionizing radiation and a professor at the School of Medicine and College of Engineering and the University of Washington, Seattle, announced that low-level microwave radiation can split DNA molecules in the brains of laboratory mice, an event often associated with Alzheimer’s and Parkinson’s Disease, as well as cancer. Subsequent findings substantiate these results.

But suspicions grow that the Wireless Technology Research grant, supported by the cellular telephone industry, have prevented Lai’s findings from being published. WTR, however, says that their refusal is based upon a lack of professionalism in the writing of the report, and that it is being re-written to bring it up to the level of peer review before publication.

In a parallel study funded by cellular giant Motorola, conducted by Professor Ross Adey, a radiation biologist, damage to animal tissue from microwave radiation was reportedly observed, but denied by Motorola. Motorola spokesman Norman Sandler says that Adey’s research showed no evidence that mobile phone operation posed a health risk.

In spite of vigorous denials by cellular industrialists, reports of brain tumors and other afflictions among cell phone users are beginning to accumulate worldwide. Many astute journalists are beginning to ask whether they are witnessing another massive cover-up as they recently witnessed with the tobacco industry.

In the Telecommunications Act of 1996, Congress declared that local communities may not refuse to grant cellular or PCS tower construction permits based upon the fear of health risks. To the contrary, Congress is pushing the industry toward a 2005 deadline for completion of two-thirds of needed infrastructure to accommodate hundreds of thousands of users.

Let’s hope what’s good for the economy won’t come back to haunt us. Congress may someday find itself plowing those profits back into research into the health effects of EMF. The issue is far from over.
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*Compatible Receivers:

**ICOM**
- 7000, 7100, 8500, 9000, R10
**AOR**
- 8000, 8000B, 8200
**Optoelectronics**
- Optocom, R11
- Radio Shack
  - Pro2005/6 with OS456/Lite
  - Pro 2035/42 with OS535

No modifications necessary. Interface cables required.

### Specifications

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