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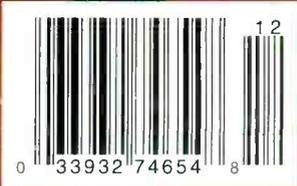


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Times**

Tropical Band DXing



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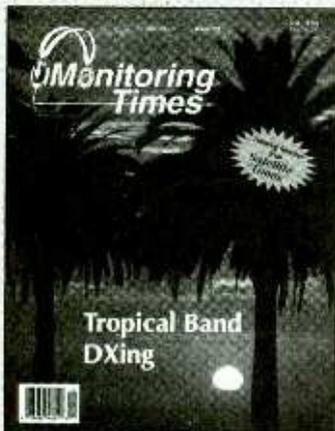
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Cover Story

Tropical Band DXing

By Don Moore

To most people, the phrase “tropical bands” brings a pretty clear picture to mind — a bunch of shirtless guys playing calypso music. But, to the hobbyists who delight in catching the most distant or elusive signals (DXers), those two little words express the most challenging and enjoyable part of the radio hobby. If you haven’t DXed the bands between 2000 to 5900 kHz yet, it’s time to join the fun!

DXpert Don Moore gives you the where, when, why, what and how to get started, beginning on page 8.

C O N T E N T S

Rádio Difusora de Poços de Caldas 12

By Valter Aguiar



Rádio Difusora fits the stereotype of a “tropical band” station, broadcasting Brazilian country music from its location in a lush, tropical paradise favored by Brazilian honeymooners. The station is also known to “roll out the red carpet” to listeners who visit their facilities.

Digital Alternatives in Satellite Television 16

By Ken Reitz



The transition of satellite broadcasters to digital modes is not all bad news for the C/Ku band viewer. For example, digital transmissions allow many North American viewers new access to Intelsat satellites whose signals are too weak for optimal analog reception.

Some domestic networks are also using digital modes as a way of offering the consumer cost-effective alternatives to major network programming via satellite and cable. (See sidebar on p.19, “PAXNet: A Wholesome Viewing Alternative” by Steven Handler.)

Challenges in IDing Trunked Radio Systems..... 20

By David Stark



Unless you have all the system frequencies programmed into your trunk-tracking scanner or software, you won’t follow all the conversation. Here are a variety of ways — from the elementary to the complex — to find and follow trunked communications.

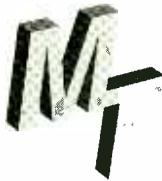
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Reviews:

Weather radios are a hot gift item these days, and we offer four quite different models for your consideration: Jock Elliott looks at two from Oregon Scientific and Midland (p. 87), Bob Grove elaborates on one made by Radio Shack (p. 101), and “What’s New” reports on the EAR system from MTS (p. 97).



MT also takes its first look at the AOR AR7000 on page 101. Kevin Carey reviews the book *Radioscience Observing* by Joe Carr (p. 78), and Ike Kerschner finds “More Neat Stuff” for the amateur’s stocking (p.86). “Magne Tests” is on hiatus this month.



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Address: P.O. Box 98, 7540
 Highway 64 West,
 Brasstown, NC 28902-
 0098
 Telephone: (828) 837-9200
 Fax: (828) 837-2216 (24 hours)
 Internet Address: web: www.grove-ent.com
 or e-mail: mt@grove-ent.com
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Owners

Bob and Judy Grove
 judy@grove-ent.com

Publisher

Bob Grove, W8JHD
 bgrove@grove-ent.com

Managing Editor

Rachel Baughn, KE4OPD
 mteditor@grove-ent.com

Assistant Editor

Larry Van Horn, N5FPW

Art Director

Belinda McDonald

Advertising Svcs.

Beth Leinbach
 (828) 389-4007
 beth@grove-ent.com

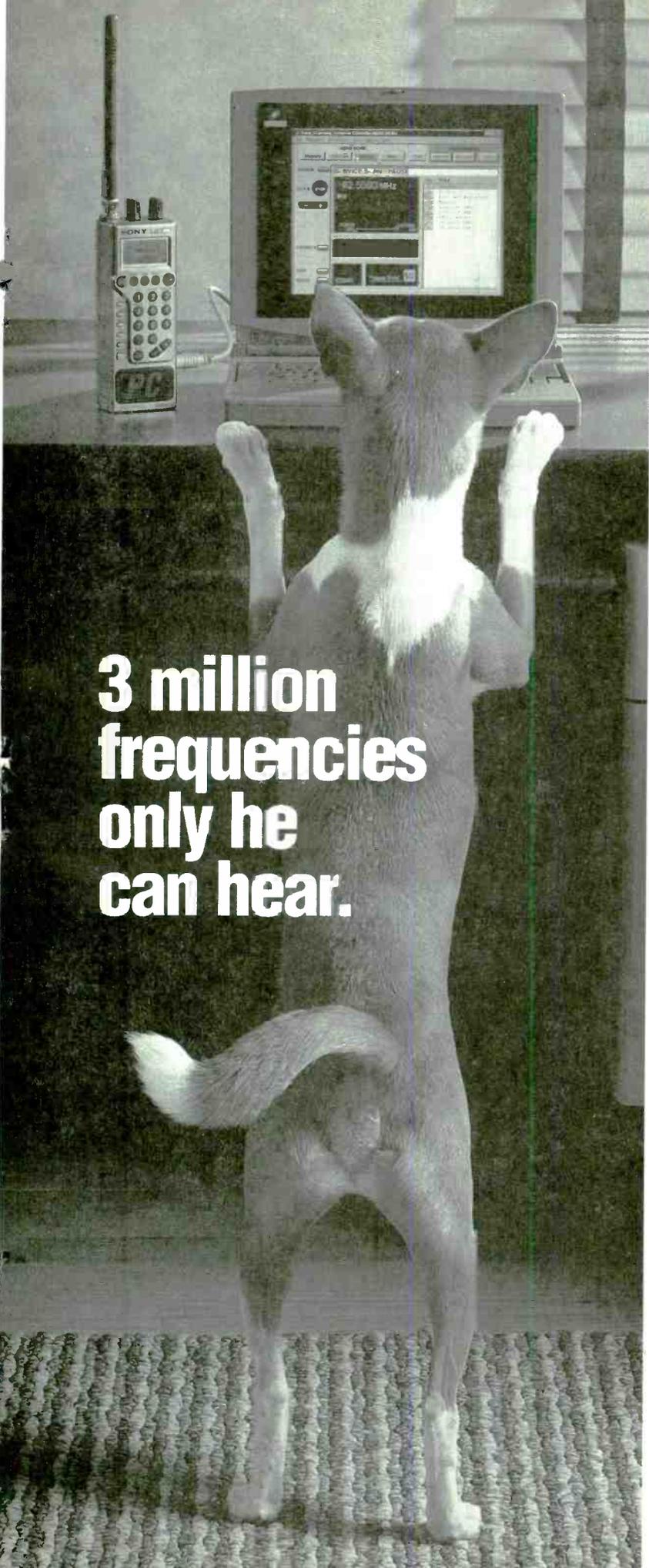
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EDITORIAL STAFF

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

Frequency Manager	Gayle Van Horn	gayle@grove.net
Frequency Monitors	David Datko, Mark J. Fine	
Program Manager	Jim Frimmel	frimmel@star-telegram.com
American Bandscan	Doug Smith, W9WI	w9wi@bellsouth.net
And More!	Jack Elliott KB2GOM	lightkeeper@sprintmail.com
Antenna Topics	W. Clem Small, KR6A	clemsmal@bitterroot.net
Beginner's Corner	T.J. Arey, WB2GHA	tjarey@home.com
Below 500 kHz	Kevin Carey, WB2QMY	lowband@gateway.net
Computers and Radio	John Catalano	j_catalano@conknet.com
Digital Digest	Bob Evans	reevans@interlog.com
Experimenter's Wkshp	Bill Cheek	bcheek@cts.com
Federal File	Larry Van Horn, N5FPW	larry@grove-ent.com
K.I.S. Radio	Richard Arland, K7SZ	k7sz@juno.net
Magne Tests	Lawrence Magne	
Milcom	Larry Van Horn N5FPW	larry@grove-ent.com
On the Ham Bands	Ike Kerschner, N3IK	
Outer Limits	George Zeller	George.Zeller@acclink.com
PCS Front Line	Dan Veeneman	dan@decode.com
Plane Talk	Jean Baker, KIN9DD	
Programming Spotlight	John Figliozzi, KC2BPU	jfiglio1@nycap.rr.com
Propagation	Jacques d'Avignon	monitor@rac.ca
QSL Corner	Gayle Van Horn	gayle@grove.net
Satellite Radio Guide	Robert Smathers	roberts@nmia.com
Scanning Equipment	Bob Parnass, AJ9S	
Scanning Report	Richard Barnett	ScanMaster@aol.com
SW Broadcasting	Glenn Hauser	ghauser@hotmail.com
SW Broadcast Logs	Gayle Van Horn	gayle@grove.net
The Launching Pad	Ken Reitz, KS4ZR	ks4zr@compuserve.com
Utility World	Hugh Stegman, NV6H	driver8@netcom.com
View from Above	Lawrence Harris	lawrenceh@ndirect.co.uk
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SONY



By Fred Maia, W5YI
fmaia@cwixmail.com

• **In 1995, the FCC was completely restructured.** The Private Radio Bureau became the Wireless Telecommunications Bureau; the Field Office Bureau became the Compliance and Information Bureau ...and so forth. Now they are going to do it all over again!

The Telecom Act of 1996 permits various telecommunications companies to participate in other businesses. Now wireless carriers are competing with wireline. Cable companies will be offering telephone service. Microwave links will be used for video. And local phone calls might be made by satellite.

The objective is to consolidate tasks that are spread among several bureaus. The FCC believes the planned restructuring along functional lines will better allow the Commission to oversee converging markets and the emergence of new technologies. One of the first new offices to surface is a combined effort: a new enforcement division that will oversee all rule compliance.

• **One of the major complaints of ham operators is the lack of radio wave enforcement. This will be changing!** The Federal Communications Commission announced on September 28th a change in the handling of enforcement actions concerning the Amateur Radio Service. By internal arrangement between the FCC's Compliance and Information Bureau (CIB) and the FCC's Wireless Telecommunications Bureau (WTB) all investigation, evaluation and processing of radio amateur related enforcement matters have been transferred to the CIB. The main objective of this change is to facilitate the Commission's pursuit of compliance in the amateur service especially with regard to resolution of interference complaints.

The CIB staff now handles amateur radio enforcement matters from initiation to resolution, including, as appropriate, complaints, amateur testing issues, warnings, monetary penalties, revocation hearings or, in extreme cases, equipment seizure and prosecution through the Department of Justice. WTB continues to handle all processing and licensing matters including new applications and licensing renewal matters ...and all policy and rule making matters related to amateur radio.

All amateur enforcement questions and complaints should be sent to: FCC-Compliance and Information Bureau, Compliance Division, Attention: Amateur Complaints, 1919 M Street,

Mail Stop 1500E1, Washington, DC 20554.
Telephone calls should be directed to: (202) 418-1184.

• **The long disputed, long resisted and long delayed move by the FCC's Washington DC headquarters is underway.** It began on October 23rd and will be completed by March 1999. The objective is to consolidate several FCC offices scattered around the downtown area just north of the White House. The new headquarters will be located on the waterfront at the "Portals II" in southwest Washington, DC.

A major controversy erupted when it was discovered that the developer of the complex paid a \$1 million legal fee to President Clinton's 1996 campaign manager for work that included amending the FCC's lease. The annual lease will cost about one-third more than is currently being paid. Unless Congress can come up with an additional \$9 million in rent which is not in the FCC's budget, commission staffers could be furloughed.

• **Two-way high speed wireless Internet access from the home will eventually be a reality.** The FCC has cleared the way for wireless companies to provide high-speed Internet and other services to-and-from homes and businesses. Up until now, wireless technology could only be provided in one direction. Customers had to use slower telephone lines to move data from the home or business. The FCC's action means wireless companies will be able to offer speeds up to 100 times faster than the 128 kbs ISDN lines provided by telephone companies. To use the new service, people would need an outside antenna and a cable modem.

• **Do you understand all those line-item charges on your phone bill?** Well, you are not alone. The FCC has a new rulemaking proposal out that would make them easier to read and comprehend. The agency hopes it will put a stop to two growing problems — slamming and cramming (unauthorized switching of your long distance phone service and adding services you don't ask for). One of the controversial billing practices is the listing of government-ordered subsidies as separate line items on a phone bill. Phone companies do this so they won't be accused of raising rates.

• **But the FCC believes that phone compa-**

nies should not be passing on the cost of wiring the nation's schools and libraries to the Internet. The up to 90% reduction in the price they pay for Internet service is being tacked onto phone bills. The agency contends that the \$1.7 billion reduction in access charges that long distance companies pay more than offsets the cost of the "e-rate" (education rate) plan. Still, MCI, AT&T and Sprint are charging business customers an additional 4 - 5% "Universal Service" charge without explanation to pay for the Internet connections.

Congress says this "telephone tax" was enacted without their approval. The e-rate program is administered by the FCC-created "Schools and Library Corp." which has 13 employees and 84 independent contractors. Their CEO gets paid \$250,000 — more than any federal employee except the President.

A new plan to pay for the e-rate program is now being looked into. An existing 3% telephone excise tax (enacted in 1898 to pay for the Spanish American War) goes to the general fund. Congress wants to divert enough of this tax to pay for the e-rate program.

• **Strangely, Internet access is not the most desirable electronic addition to a classroom.** Teachers and principals ranked having cellular telephone access as the most useful, followed by computers and then the Internet. In most schools, telephone service is available only at one central location — the school office. According to a national survey, wireless phones are useful in emergencies, enhance parent-teacher and teacher-teacher communication, decrease the feeling of isolation, and saves time.

• **U.S. may need to regulate Internet access.** A new 129-page FCC report says they may have to reinterpret current laws and Congress may have to pass new ones to fit "...the new global communications medium known as the Internet."

• **Motorola has unveiled a new interactive broadcast radio service over the Internet.** Their two-way RadioWave.com service will enable listeners to send information back and forth to the radio station in real time. Motorola also has an investment in Broadcast.com, another Internet radio broadcaster. Several hundred AM/FM radio stations are already broadcasting to PCs over the Web.

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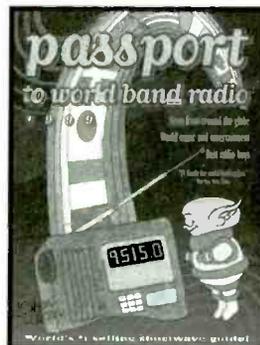
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Tropical Band Radio Declines

Tropical band — that part of the spectrum at the bottom of the shortwave bands — is on its way out, according to an article by Hans Johnson in *Radio World* which quoted extensively from DXers Don Moore and Harald Kuhl. The decline is largely due to the growth of FM networks. Shortwave was used by big stations to get their broadcast into the countryside. But, as shortwave broadcasters to Africa have discovered, when audiences are offered a choice they will generally choose the better fidelity of FM.

Moore also pointed out that in rural areas of Ecuador, radio also serves as a way to get personal messages to individuals in remote villages. As telephone service expands, this major source of station revenue also disappears.

The obstacles to building such infrastructure in remote sections of the Amazon and Andes, however, are so daunting that tropical band radio may be a force there until hi-tech satellite systems become cost-effective.

MDT Monitoring — is it legal?

A Houston, Texas, man was recently charged with illegal interception of mobile data terminals. Jose Morales is a computer programmer who was arrested for intercepting police MDT communications, converting the digital signal into text, and selling the information to tow truck drivers so they would be present when an officer called for a tow truck.

MT is attempting to discover more about the case. While federal law clearly prohibits use of intercepted communications for financial gain, it does allow interception of public safety agency communications "readily accessible to the general public." A number of parameters define the latter phrase, but case law has not yet determined whether MDTs fall within or without that definition.

According to the report in the *Houston Chronicle*, the charge of intercepting wire communications is a second-degree felony under Texas state law.

One Step Closer to Heaven

Angel Technologies Corporation is one step closer to their goal of encircling urban



areas with a HALO — a relay station in the sky called the High Altitude Long Operation (HALO™) Network. The Proteus aircraft that would provide this service is based upon Bart Rutan's *Voyager*, the first aircraft to fly non-stop around the globe without refueling. The new aircraft, designed by Rutan and built by Scaled Composites, was unveiled September 23 in a demonstration above the Mojave desert.

Angel hopes to be ready to deploy the first network 50,000 feet above a major urban area by the year 2000. The system will allow wireless broadband, multi-megabit per second transactions at greater strength and speed than satellite-delivered signals, but it casts a footprint (or a halo?) only 75 miles in diameter. (Sketch courtesy Scaled Composites)

Your lobbying dollars at work?

Remember those huge revenues that the FCC supposedly racked up with spectrum auctions about two years ago? The three highest bidders have defaulted on the debt and have filed for bankruptcy protection. A provision in the recent budget bill would have restored PCS licenses which end up in bankruptcy court to the pool of available frequencies. Not surprisingly, the three

businesses opposed losing their most valuable asset — and so did a number of Congressmen, including Rep. Billy Tauzin (R-La), Chairman of the sub-committee on Telecommunications, Trade and Consumer Protection. The measure was dropped from the spending bill.

The days of Mom and Pop are over

Early last year we reported a victory for Zebulon Lee, owner of WZLS in Asheville, NC, who has been fighting for 11 years for the right to broadcast on 96.5 FM. The victory was only temporary: The FCC has now decided the only fair way to settle the matter permanently is by an auction between the five contenders, to be held in a year or less.

Most of the parties seem to agree that it will be difficult for the winner to avoid becoming part of a chain or selling out to a major broadcaster in order to recoup the purchase price. "The days of mom and pop operators in markets like Asheville are over," said one attorney. According to the *Asheville Citizen*, a second attorney said the FCC decision is the government "just deciding that the public interest is just getting however much money (it) can get."

Zebulon Lee died in August at the age of 87. His son Brian Lee is program manager of WZLS, the area's only rock station.

Thanks to Inmarsat, still in school

After building their own 56,000-foot yacht, the Edington family is taking a 15,000



Saturday, Dec 5: Madison, WS

"Make plans to attend the 5th Annual Madison Area Get-Together for DXers and Radio Enthusiasts, on Saturday December 5th at 2pm." For more information please contact Joe Olig, 608-231-2446, utedxer@webtv.net

Monthly DXpeditions:

Over the winter a group of DX aficionados will be conducting a DXpedition

every month. A web page is now available where the results of these DXpeditions will be posted. Photos and probably sound files will also be available from this site. Ken Alexander from Ontario DX Association is the main engine behind these expeditions and page. Ken would welcome reports from other DXpeditions and they will posted on this site: www.interlog.com/~auroradx/coehome.html (via Jacques d'Avignon)

mile. 14 month journey around the globe. However, the Edington's two teen-aged daughters won't be missing any school. They will be continuing their schooling as part of a project of the Cranford Community School in Hounslow, West London — made possible using an Inmarsat-C messaging terminal integrated with GPS (Global Positioning System) and an Inmarsat mini-M satellite phone.

The adventure began in August in Plymouth and will end—if all goes well—in New South Wales, Australia. Along the way the family is delivering more than 200 artificial lenses to eye surgery camps and learning toys to a blind children's school in The Gambia. Then their path takes them to the Caribbean, through the Panama Canal, and on to the South Pacific to deliver aid for islands in that region as well.

SOHO nears recovery

The Solar and Heliospheric Observatory (SOHO) satellite has revolutionized our understanding of the Sun since it was launched in 1995. In April 1998, SOHO's scientists were justifiably proud when they got the go-ahead to extend the mission to 2003. Two months later, on June 24, human error caused the loss of radio contact (and therefore loss of control) with the satellite.

It took the huge radio telescope at Arecibo, Puerto Rico, and a 70-meter dish of the NASA Deep Space Network to locate the satellite and reestablish the radio link. (*MT* will publish an account of the dramatic story later next year.) Once found, scientists have been slowly bringing the instruments back into operation for an almost full recovery — just in time for sunspot maximum in the year 2000!

Unsolved Mysteries

"We've been getting UFO (unidentified flying objects) reports worldwide for about 50 years that we've been ignoring," says Peter Sturrock, professor of applied physics at Stanford University, "Let's not ignore them for the next 50 years."

Professor Sturrock was head of a panel of scientists which submitted a 50-page report to the *Journal of Scientific Exploration*, calling for modest funding to enable the scientific examination of unexplained phenomena.

The last such study was done 30 years

ago and was backed by the US Air Force and Central Intelligence Agency, which concluded that further study was not justified. However, the panel contends that, given improvements in technology and recent discoveries that suggest the potential for life elsewhere in the universe, some cases may warrant another look. Sturrock says, "Forget the theories about what caused the evidence. Look at the evidence and see what it has to tell us."



"Communications" is compiled by Rachel Baughn, from news sent in by *MT* readers. Thanks to this month's reporters: Anonymous, NY; David Alpert, NJ; Kenneth Dupuis, NY; Ken Hydeman, OH; Jeffrey Jones, CA; Steve Kaatz, MI; Maryanne Kehoe, GA; Kevin Klein, WI; Roy Lavender, CA; Michael Lawrence, GA; Edward Lentz, TX; Charles McCallister, TX; William McConnell, SC; Brian Rogers, MI; Ed Schwartz, IL; Walter Szczepaniak, PA; Richard Sklar, WA; Richard Sobon, NY; Ronald Tull, Yukon, Canada; Larry and Gayle Van Horn, NC; Jim Wade, CA.

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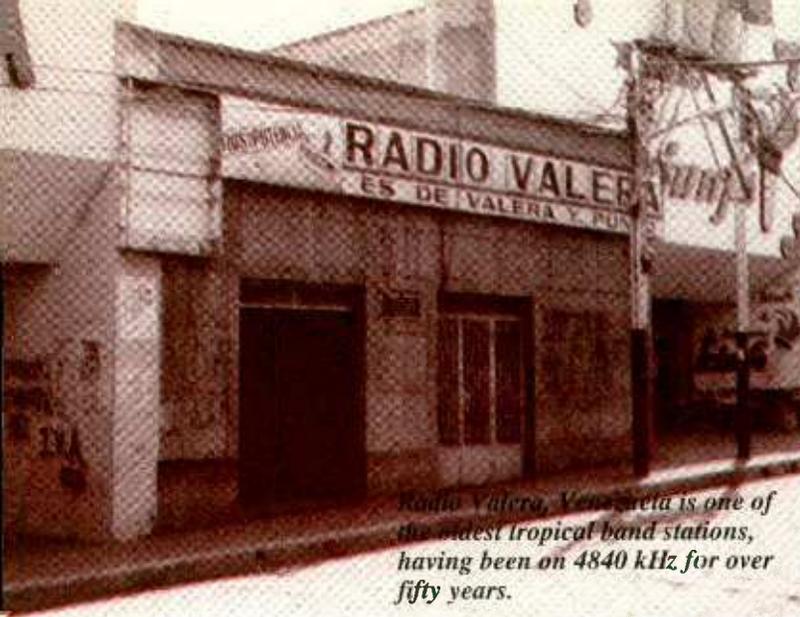
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Tropical Band DXing

Where, When, Why, What, and How

By Don Moore

To most people, the phrase “tropical bands” brings a pretty clear picture to mind — a bunch of shirtless guys playing calypso music. But, to experienced shortwave DXers, those two little words express the most challenging and enjoyable part of the radio hobby. The phrase kindles memories of a DXer’s best catches and favorite QSLs, of exotic music, and of early morning listening sessions. For many DXers, the tropical bands are what this hobby is all about. And, if you haven’t DXed the tropical bands yet, it’s time to join the fun!

WHERE ...

...are the tropical bands? According to the rules, there are three distinct ranges: 2300 - 2495, 3200 - 3400, and 4750 - 5060 kilohertz. Long-standing international agreements have set aside these frequencies for broadcasting stations located between the Tropics of Capricorn and Cancer. Most, but not all, countries strictly adhere to these guidelines.

The most common exception is “out of band” broadcasting where stations use adjacent frequencies allocated to other types of radio services. For example, there are several dozen tropical band stations in the 5200-5700 kHz range. In some countries, such as Vietnam and Indonesia, these are official government stations. In others, Peru and Bolivia especially, private broadcasters in remote areas simply ignore the regulations and the government does not have the manpower, funding, or interest to stop them.

Thus, for all practical purposes, the tropical bands may be thought of as anything between 2000 to 5900 kHz. Furthermore, there are many smaller stations through 7500 kHz that can just as well be considered tropical band broadcasters.

The second exception is that not all tropical band stations are in the tropics. For decades, China and Russia have had numerous stations in the tropical bands. One old Soviet tropical band station was actually located in Murmansk, north of the Arctic Circle! More recently, some US-based shortwave broadcasters have used loopholes to get FCC permission to broadcast in or just outside the tropical bands. So, tropical band stations are not necessarily tropical.

WHEN ...

... can the tropical bands be DXed? The key word here is **darkness**.

The lower shortwave frequencies only propagate long distances when most or all of the reception path is in darkness. For the listener, that means from about two hours before local sunset to about two hours after local sunrise. (The station heard must also be in or near darkness.)

Right now, in mid-winter, there are fewer hours of daylight than at any time of year, which means more hours when tropical band DX can be heard. Conversely, June provides the fewest hours of listening. Nicely enough, static levels are also at their lowest in mid-winter (and highest in June), which means we are at the beginning of the best tropical band DX time of the year.

Because of the need for darkness, there are particular time periods, or windows, each day to listen to tropical banders from different regions. Because Latin America is south of North America, it is the simplest. Any time it is dark or near dark at your location you can probably hear some Latin American stations. However, most stations sign off by 0400 UTC and few sign-ons begin before 0900, so there isn’t much to be heard in the middle of the night.

There are two windows for hearing African stations. The first begins an hour or two before sunset at the DXer’s North American location and lasts until about 2400 UTC, at which point almost all



Manager Carlos Rumbos (right) and other staff in the Radio Valera studio.



Modesto Marchena, owner/manager of Venezuela's Radio Frontera on 4760 kHz.

African stations have signed off for the night. (Eastern Africans begin the sign-off parade about 2000 UTC.) The further west the listener is located, the shorter and later this window is. On the West Coast, there is no first window at all.

The second window starts at 0300 when the East Africans begin to come back on and it lasts until sunrise at the transmitter site. As morning moves across Africa from east to west, more stations sign on. They may be heard for an hour or so until their local dawn catches up with them. The last stations, in West Africa, fade out around 0700 to 0800, depending on the time of year. While this second window is open to all North America, signals are usually weaker as one moves towards the West Coast.

The third main target area is East and South Asia and the Pacific, for which there is one main window in the morning. After darkness covers the West Coast, it gradually moves across the Pacific, creating darkness reception paths as it goes. This target area extends from Australia to Mongolia, and from Pakistan to Vanuatu, so there is a lot of variation both geographically and seasonally. But generally speaking, some part of the region is within the darkness path to North America between 0800 to 1500 UTC.

Of course, because of the North American sunrise, East Coasters have the shortest window, ending about 1200 UTC, and West Coasters have the longest (and strongest signals). During the winter months, however, East Coasters (and, to a lesser extent, Midwesterners) do get the benefit of a late afternoon window to parts of East and South Asia at around 2100 to 2200 UTC.

Of course, nothing is quite that simple as just listening during those windows. Tropical band reception

tends to be best during grayline enhancement.

What's that? Just a fancy word for sunrise or sunset. We'll skip the technical background, but the ionosphere gets extra-excited when it is changing from light to dark or vice-versa. If either the listener or the station is at sunset or sunrise, reception is enhanced. If both the listener and the station are on the grayline at the same time, WOW!

However, between any two specific points, grayline enhancement does not happen very often. For example, Iowa and Bolivia are both on the grayline at about 1100 UTC in mid-June and about 2230 UTC in mid-December. The *when* and *where* of graylining can be determined through software such as **GEOCLOCK**¹, paper maps which some DX clubs sell, or other tools such as the slide-rule-like **DX Edge**².

WHY ...

... do DXers go after stations on the tropical bands? The biggest reason is the challenge. Because most tropical band stations are broadcasting just for listeners in their own country, transmitter powers are usually low. Few are over ten kilowatts — many running under one kilowatt. International broadcasters with 500 kW just don't present that kind of challenge!

And, unlike the big guys, few tropical band stations have antennas that maximize low angle distant propagation. Antennas are either designed for high-angle, relatively local coverage or are haphazardly put up without any plan at all. Many small Andean stations just string a wire between two trees and don't even bother to match it to the transmitter! Throw in some static and fading, and you have the biggest DX challenge the shortwave broadcast bands have to offer.

The other reason to DX the tropical bands

is who can be heard. For a variety of reasons, the tropical bands are not the best place for long-distance propagation of radio signals. That's not to say you can't hear distant stations on the tropical bands — far from it! But, if you are a major international broadcaster and you want to get a good solid consistent signal into your target area every day, the higher frequencies work better. So there is very little international broadcasting in the tropical bands.



Radio Luz y Vida, 3250 kHz, from Honduras is one of the more regular stations in the 90 meter band.

Most of the world's countries do not have an international broadcasting voice with English programs for overseas listeners. However, most do have some sort of domestic broadcasting on shortwave, usually in the tropical bands. It is impossible to log more than about seventy or eighty countries without DXing tropical band stations. Adding the tropical bands, however, many DXers have heard over 200 countries and over 1000 stations.

Finally, there is the programming, which is a lot different from international broadcasters. Because most tropical band stations broadcast to their own country, this is a chance to hear real local radio from around the world. It may not always be professional, but it has an authentic quality that has disappeared from much of the homogenized US radio dial.

Of course, most broadcasts will be in a language other than English. If you know a little Spanish or French, that will be help. However, many things to be heard on the tropical bands transcend the language barrier. For example, there's nothing like the excitement of a Brazilian *futbol* (soccer) announcer — it's easy to feel the atmosphere even without



Costa Rica's Faro del Caribe can be heard on 5055 kHz.



La Voz del Rio Tarqui, 3285 kHz, is one of Ecuador's many irregular tropical band stations.

knowing a word of Portuguese. (And wait till you hear your first "go-o—insert one thousand o's here — oal" scored!)

Of course, music overcomes any language difference, and for good international music the tropical bands can't be beat.

WHAT ...

... equipment is needed? Any receiver that includes the tropical frequency range will

pick up at least a few stations if conditions are right. A few years ago, I picked up several Latin American stations on a cheap three-band portable costing less than \$30.

But real DXing does take a better receiver. The minimum is a good portable, like the Sony ICF-2010 or Sangean ATS-909; a good tabletop receiver like the Drake R-8 series or the AOR AR-7030 is even better.

The keys to receiver choice are sensitivity and selectivity. The receiver must be sensitive enough to make usable audio out of signals that are sometimes very weak.

Selectivity — the ability to cut out nearby interfering signals, or QRM — is just as important. Like the international bands, the tropical bands can also be congested at times. On the international bands, at least the interference is almost always 5 kHz away, since stations are on frequency. But, some tropical band stations drift in frequency, so the QRM may only be two or three kilohertz away! And, besides QRM from other broadcasting stations, digital utility stations (RTTY, Morse code, FAX, etc.) also use some of the tropical spectrum.

Good selectivity is just the first tool that DXers can use in cutting down interference on the tropical bands. Many DXers do much of their tropical band DXing in single sideband (SSB) mode, even though the signals are AM, not SSB. The reason is simple. If you are listening in upper sideband (USB) mode, you hear only what is above, not below, the frequency you are tuned to, which eliminates or at least reduces QRM from a lower frequency. Use lower sideband (LSB) mode to reduce

QRM on a higher frequency.

Either way, with SSB you have to tune in the station *precisely*. If you are off by even a hundred Hertz, the signal will be distorted and there will be a sharp tone. This type of tuning takes practice, but it's well worth it. Try it on some strong signals first, to develop your touch for the weak ones.

Other tricks include use of receiver features such as the tone control, notch filters, synchronous detection, and passband tuning, if your receiver has them. Controls which are not often needed for the big broadcasters come in very handy on the tropical bands.

Of course, a receiver is no better than the antenna it is attached to. An outdoor wire antenna is a near-must for tropical band DXing. Beverage antennas — several hundred feet of wire strung in a straight line about eight feet above the ground — are DX "nirvana," but for most people they are impractical except on DXpeditions. However, small active antennas and indoor loops can be almost as good, if they are located in a quiet environment. I continue to have very good results with my twenty-year-old ferrite bar loop, which easily sits on top of my desk.

Indepth information about buying receivers and using specific antennas is beyond the scope of this article. For more specific facts about receivers, check Larry Magne's reviews in *MT* and *Passport to World Band Radio*³. There are several good antenna books on the market; I especially like the ones by Ed Noll and by Joe Carr⁴.

And remember, while equipment is great, plopping down \$1000 for a fancy tabletop

Decal from RRI Bengkulu in Indonesia.

receiver doesn't make anyone a good tropical band DXer. An experienced DXer with a ICF-2010 will outhear a novice with an R-8B any day.

HOW ...

... can you become a good tropical band DXer? Learn the bands. That's why an experienced DXer with minimum equipment will outhear a novice with the best.

The experienced DXer knows what is usual and what is unusual. When tuning the bands, he will stop for a few seconds with each station found. Based on the frequency, language, programming, signal quality, and time of day he will know who most stations are — the usuals. If something is different, that will stick out to one familiar with the band.

Perhaps there is a new or rare station on a usually empty frequency. Maybe Spanish language and Guatemalan music is heard on a frequency that had been occupied by a Brazilian broadcaster. Maybe a usually weak but regular African station is booming in, indicating enhanced conditions to that region and a chance to go after less common stations.

There is no magic to successful tropical band DXing. The longer one pursues the hobby, the more experience is gained and the better the DXer becomes. Gradually, the DXer learns to recognize major DX languages such as Spanish, Portuguese, Indonesian, Russian, and French. Then he learns typical phrases that are used with station IDs, time checks, and other important announcements.

Recognizing music types is just as important. Few stations outside Indonesia play *gamelan* music. To the novice, African rhythms and Latin American tropical music may sound much the same, as might Chinese and Andean music. Yet, each are very distinct-



Staff members at Radio Popular in Ecuador. The station's 4800 kHz shortwave transmitter has been inactive for several years while waiting a replacement tube.

Best Bet Tropical Band Stations		
Twenty-Five Best-Heard Countries in North America		
2325	Australia	VL8T Tennant Creek
3290	Namibia	Namibian Broadcasting Corporation
4725	Myanmar	Radio Myanmar
4753	Indonesia	RRI Ujung Pandang
4755	Brazil	Radio Educacao Rural
4770	Nigeria	Radio Nigeria, Kaduna
4777	Gabon	RTV Gabonnaise
4835	Guatemala	Radio Tezulutlan
4835	Mali	Radio Television Malienne
4890	Papua New Guinea	National Broadcasting Commission
4910	Zambia	N.B.C.
4915	Peru	Radio Cora
4915	Ghana	Radio Ghana
4920	Ecuador	Radio Quito
4926	Bolivia	Radio San Miguel
4930	Honduras	Radio International
4980	Venezuela	Ecos del Torbes
4990	India	All India Radio
5020	Solomon Islands	S.I.B.C.
5025	Cuba	Radio Rebelde
5030	Costa Rica	Radio Lira
5047	Togo	Radiodiffusion Togolaise
5077	Colombia	CARACOL
5125	China	China National Radio
5500	Ethiopia	Voice of the Tigrey Revolution

ive. With experience, DXers learn to recognize different types of African music and even the difference between northern and southern Peruvian *huaynos*.

Just as important is the DXer's general background knowledge of the DX target area. Knowing the names of countries, cities, rivers, and other geographic features may help. Some DXers can list from memory the names of many of the internal states or departments of Peru, Bolivia, and Brazil. Other important clues include the names of the local currency, the president and prominent leaders, and major consumer products. (Beer and banks are two of the most widely advertised products on Latin American radio. The company name can narrow down which country is being heard.) All this is learned over time.

One part of the road to experience is simply putting in the time at the dials. The other is using references and resources. Regularly reading DX bulletins and radio websites is a must, as is having a good atlas. Borrowing library books and videos on a favorite DX target area can not only be interesting, but can help the DXer learn helpful background knowledge. Many libraries have CDs of international music as well. Also, try finding soundclips from world music vendors on the Internet. In the end what the DXer knows or knows where to find is what counts.

So, isn't it time to begin your own tropical band memories of best catches, favorite QSLs, and early morning listening sessions? And, who knows. You might even hear some calypso music!

Footnotes:

- 1 - GeoClock shareware can be downloaded from <http://www.clarknet/pub/bblake/geoclock/>
- 2 - DX Edge, developed by Xantec, Inc., P.O. Box 834, Madison Square Station, New York, NY 10159.
- 3 - *Passport to World Band Radio* is published by International Broadcasting Services, Ltd., and is available from Grove Enterprises. Call 1-800-438-8155 to request information or a catalog.
- 4 - *Joe Carr's Receiving Antenna Handbook*, 1993, is published by Hightext. Ed Noll's book, *Easy-Up Antennas*, was published by Howard W. Sams in 1988, but is now out of print.

.....
Don Moore has been DXing for over 25 years and has lived and traveled extensively in Latin America. He was selected as the 1995 North American Radio Clubs DXer of the Year.

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Rádio Difusora de Poços de Caldas

An international voice from the honeymoon paradise

The Bridal Veil waterfall

By Valter Aguiar

"Eta trem bão, sô!" What does this mean? Well, if you translate it literally from Portuguese (forgetting the grammatical errors), the result will be "oh, what a good train sir!" But "trem" here does not mean "train." It can mean everything you are talking about. A "trem bão" could then be better translated as... "a nice thing."

Too complicated? Perhaps, but you should get used to it if you ever visit Minas Gerais, a very important state in the countryside of Brazil. Historically, most gold and precious stone mines were located in the state and explored when Brazil was a Portuguese colony. Today, Minas Gerais is well known for its agriculture, milk and cheese production, historical places, lovely people and very beautiful towns to visit.

Minas Gerais' capital is Belo Horizonte, a city located in the middle of the state. If you go towards the south (near the border with São Paulo), you will find a very beautiful and important town with 150,000 inhabitants. In fact, it is so important in the region that it is called "the capital of southern Minas Gerais." We are talking of Poços de Caldas (the accent under the c gives it the pronunciation of an "s" as in superb)!

And it is indeed a superb town! Besides its metal production and mineral water springs, Poços de Caldas is a very well-known tourist city, traditionally chosen by Brazilian couples for honeymooning. There you can find lovely places to visit, such as the Flower Clock, the

giant Chess, the Bridal Veil waterfall, and the Lovers' Fountain. The tropical band DXer, though, might want to put Rádio Difusora de Poços de Caldas on his list of stops! Rádio Difusora is a very interesting tropical wave station in the heart of Brazilian countryside.

Being such an important town in its region, Poços de Caldas has a number of radio broadcasters on both mediumwave and FM. There are also relays of the national TV networks and a local TV station. Rádio Difusora is, however, of special interest due to the fact that

its daily MW programs are also relayed by a 1 kW shortwave transmitter.

■ Listeners Abroad Encouraged

Rádio Difusora de Poços de Caldas started its broadcasts on January 1, 1964, broadcasting on medium wave (1250 kHz), tropical wave (4945 kHz) and FM (104.1 MHz). Only three other broadcasters in Minas Gerais currently broadcast on three bands. Rádio Difusora's tropical wave broadcasts can be heard nearly worldwide. About 100 letters come each year from listeners abroad, many of them with interesting stories.

In Norway, a Brazilian citizen has become a loyal listener to Rádio Difusora since he moved to that country a few years ago. Reports from another Brazilian citizen, who lives in Finland with her Finnish husband, are a regular presence among the letters received by the station. Members of the Radio Nuevo Mundo club in Japan also regularly send their reception reports, along with shortwave listeners all over Brazil.

All letters from outside Poços de Caldas are replied to by the station. In fact, they are of special interest to Rádio Difusora, who (like most stations in the Brazilian countryside) use them for advertising purposes. When a major Minas Gerais retailer network opened a store in Poços de Caldas last year, the station's commercial management delivered a number of letters from distant places with their advertisement offer — and even a copy of *Monitoring Times*' March 1995 issue, in which a photo of the old (rented) building of Rádio Difusora was published. The station won the advertising contract!



The new building of Rádio Difusora, right in the center of Poços de Caldas.

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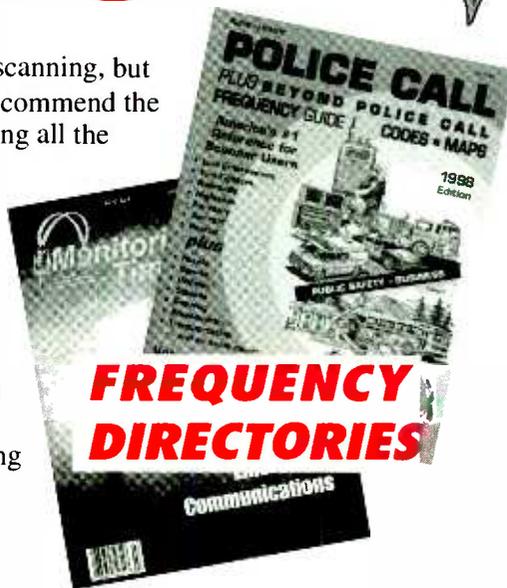


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Rádio Difusora's AM studio.

■ **A variety of domestic programming**

Programs broadcast on medium and tropical wave have a popular appeal. Music played is from all genres (their 1996 Christmas message, for instance, was taken from the Carpenters' beautiful "Christmas Portrait" album). Brazilian county music, though, receives special attention.

FM broadcasts are mainly Brazilian country music. This is quite unusual even in rural



Rádio Difusora's mediumwave antenna is the highest in southern Minas Gerais.

Brazil. The station owner, Mr. Orlando Cioffi, is a former country music singer. He had a duo with his brother under the name "Riachão (Big River) and Riachinho" (Small River). He was the Small River. Under Mr. Cioffi's administration, the station decided to broadcast 100 percent country music on FM, and audience reaction has shown that this decision was the right one.

News coverage is another important part of Rádio Difusora's broadcasts. The main focus is on regional news. The station has a car of its own, with equipment to broadcast live from any part of the town. Poços de Caldas is quite an active city, and this facility allows the station to report what is happening in the town over its daily programs.

Poços de Caldas naturally has its local soccer team, called Caldense. On weekends, Rádio Difusora broadcasts live all the Caldense's matches for the soccer championship of the state of Minas Gerais.

"With Caldense, wherever it may be," says Rádio Difusora's sports staff.

In Latin America, radio stations provide a real public service. Every day, listeners visit Rádio Difusora to make personal announcements. These may range from documents lost or stolen and pets who left home to people looking for relatives! Documents found are daily delivered to the station, which makes the announcements over its AM broadcasts — at no charge, of course.

Rádio Difusora's staff have no trouble recalling many interesting stories. If you stay at the reception desk for a few hours, you may meet a woman checking to see if her son's

identification documents were found and delivered to the station. He had lost them on his way from home to work, and Rádio Difusora is helping to discover if anyone found his documents.

There is also the story of the man who lived in Belo Horizonte with his wife, until she left home with his two children. About a year later, he discovered she had moved to Poços de Caldas. He then visited Rádio Difusora for an on-air announcement, which the station did. Did he find his family? No one at the station knows...

■ **Communication is a two-way street**

Rádio Difusora has its own offices and studios at the very center of Poços de Caldas. These are literally open for all listeners in Brazil and abroad. The station staff will roll out the red carpet to every listener who visits its facilities. A heartfelt welcome is characteristic of most regional stations in the Brazilian countryside.

In a time when major international broadcasters turn more and more to satellites to reach their foreign audiences, local stations such as Rádio Difusora find shortwave to be a unique way to transmit their messages outside their state and national borders. More than a commercial radio station, Rádio Difusora is an authentic voice on behalf of the beautiful town, state and country where it is located.

Throughout the world there are many small stations on shortwave like this one; we must give them an incentive to keep their important work in the years to come. After all, listening to regional stations worldwide has given hours and hours of healthy enjoyment to millions of people — this is indeed a "trem bão," sir!

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Valter Aguiar (aguiar@carrier.com.br) is a Brazilian journalist, freelance writer and translator for the import/export trade during the day, but has been a shortwave hobbyist since his teens. He also writes a regular column on shortwave and the Internet for the Brazilian magazine Antenna-Eletronica Popular.

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Digital Alternatives in Satellite Television

By Ken Reitz KS4ZR

The digital age hit the satellite TV industry in 1994 like an iceberg in the chilly waters of the Atlantic. Though damage was extensive, the "S.S. C-band" was able to limp back into port for repairs. Since then nearly half of the analog satellite TV customers jumped ship and signed on with the more attractively packaged small dish entities Primestar, DirecTV, and DISH. Conventional wisdom had the big dish industry dying a quick and agonizing death. It didn't. Instead the C-band universe has hung stubbornly around the 2 million subscriber count for over a year.

Exact data is not easy to come by, but one figure which is tracked month by month is the number of "authorizations," or the activation of decoder modules used for C-band subscriptions. This figure declines by about 10,000 units per month and, as of this past August had dipped to just below the 2 million count. This compares with 2.1 million Primestar customers; 1.5 million DISH viewers and 3.9 million subscribing to DirecTV. The total satellite universe includes nearly 10 million paying customers, which makes it a \$300 million a month industry.

What the authorizations number can't tell us is the number of C-band satellite viewers who choose not to subscribe, but instead, watch all the programming which remains in the clear and listen to the dozens of satellite audio services which are also free. It's estimated by one industry source that as many as two million non-subscribing C-band viewers could be uncoupled in the whole satellite picture.

C-BAND'S DIGITAL SOLUTION

The General Instrument Corporation (G.I.), makers of the C-band industry standard VideoCipher II (VCII) encryption system, feared the worst, but was slow to react to the digital challenge. It took nearly two years for G.I. to counter with a digital system of its own, known as DigiCipher II (DCII). Following an initially lackluster promotional campaign and meeting cantankerous opposition from a substantial portion of retail satellite dealers who are not pleased with anything G.I. does, G.I.'s DCII equipped 4DTV receivers finally started making sales headway this year.

4DTV is without question the premier satellite receiver available anywhere. Using an extensive on-screen menu in the same style as the small dish systems, the click and tune capabilities of this receiver make it the most user friendly of any make or model. It has the capability to tune old-fashioned analog channels as well as VCII encrypted channels. The 4DTV also tunes DCII encrypted and unencrypted channels, depending on your subscription desires.

DigiCipher II signals are based on the MPEGII (Motion Picture Experts Group) standard. This standard came about as a way to establish the same video quality throughout the international broadcast industry, particularly through satellite delivery. It was a lesson learned from the early days of TV which left the U.S. with the NTSC standard; the U.K. and other countries with the PAL standard; and France and still other countries with the SECAM standard.

The whole point to the introduction of any digital standard is to save transponder space by uplinking five or ten digital channels on a transponder which previously could carry only one analog channel. This brings down the cost of transponder space and enables niche broadcasting, the transmission of programming of interest to a narrow audience.

Eventually G.I. hopes to switch all current VCII channels to DCII, but they realize this is a long term project. Meanwhile, folks with 4DTVs are enjoying an ever widening viewing universe, much of it unencrypted and free for the viewing.

DVB AND THE ETHNIC CONNECTION

Satellite broadcasting is a highly competitive world. And, it turns out, G.I.'s DCII MPEGII standard is not the only player in town. A good portion of the world uses what's referred to as the Digital Video Broadcast (DVB) standard. DVB, which is also based on the MPEGII standard, has done exceedingly well in Europe and, in the last two years, has enjoyed a surge of popularity with satellite programmers in the western hemisphere.

One area experiencing the most growth in use of the DVB system is ethnic programming. The U.S. in particular has a large (and grow-



G.I.'s 4DTV digital/analog receiver. The premier home satellite receiver does it all. (Courtesy General Instrument Corp.)

ing), ethnically diverse immigrant population. Like the rest of us, they like to get news from back home, and nothing delivers it like satellite TV. As we've already discovered, digital delivery cuts the costs of broadcasting and makes this type of niche programming financially feasible.

Another big advantage is that DVB satellite receivers tend to be considerably cheaper than their DCII-equipped competition. This is because DVB receivers can tune only DVB digital signals, are not compatible with DCII, and cannot tune analog signals. In fact, most DVB receivers have no provisions, memory, or voltage output for moving a dish and must be used in a "slave" configuration (see diagram on p. 18).

The result of all this cost cutting is the introduction of relatively inexpensive satellite systems designed to receive a particular niche programming service. Satellite dealers across the U.S. are beginning to realize the importance of this large and nearly untapped source of income. DVB receiver manufacturers have seen record sales in the past 12 months. Sales in this segment of the satellite TV industry is estimated to be several thousand units per month and growing.

The largest sales currently are to the Thai community which itself buys over a thousand such systems a month nationwide. The reason for all this action is the existence of the national network known as Thai TV-5 (transmitted on Telstar-5 Ku-band). Second, and probably catching up fast, is the Chinese community which has more than a dozen channels to choose from. There are numerous Arabic channels as well as individual channels from Germany, the UK, Italy, Spain, France, and Latin America.

Many other channels have signed up with the DVB delivery system, again mostly for the low cost of receivers and simplicity of recep-



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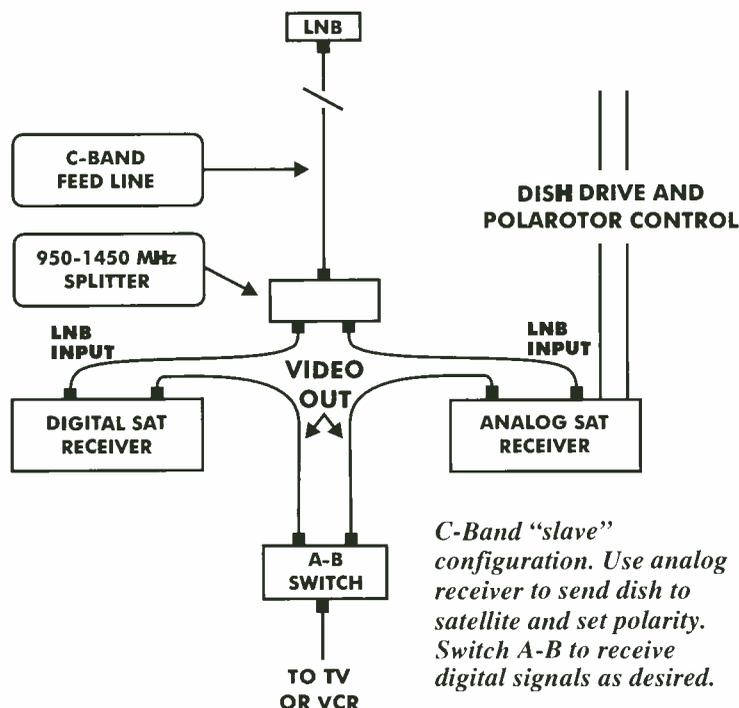
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tion. Typical in this regard is PaxNet (see sidebar) which aims its Christian-oriented family programming at American cable-TV systems. Canada's non-government subsidized commercial network CTV uses DVB to transmit its programming to Canadian cable systems. There are dozens more.

BRIDGING THE ATLANTIC

Before the advent of digital transmissions it was quite a trick to hop the Atlantic. Because of the relatively low power of the Intelsat satellites which are lined up across the Atlantic, reception required some pretty big dishes to get enough analog signal to make a noise-free picture. With DCII and DVB this is no longer the case. Normal C-band dishes (10 ft. in diameter), with a relatively clear view to the southeast, can receive artifact-free digital pictures with modest equipment.

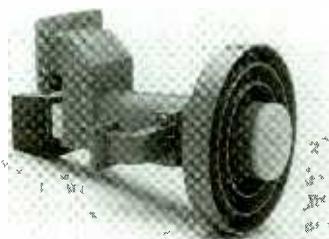
The Intelsat satellites differ from our domestic satellites in one crucial aspect: their polarization is circular as opposed to our linear polarization. Using a linear polarity feed horn on a circularly polarized signal results in too much signal loss. The cheapest way to correct this is to use a dielectric insert (a small block of Teflon measuring about 2.5 x 1.5 x 1/4 inches), which is inserted in the throat of the feed horn so that it sits between the 90° axis of the rotating probe. This serves to change the polarity of the signal from circular to linear.

The insert costs less than \$20, but has a couple of drawbacks. It's not 100% efficient and is not designed to fit into the throats of modern C/Ku-band feed horns. The insert must be cut to fit in the throat and around the Ku-

band probe, resulting in even more efficiency loss.

The best way to receive Intelsat signals is with an Intelsat feed horn which is specifically designed for such reception. ADL (see photo) manufactures such a feed horn and the results are nothing short of amazing. Without the feed, digital signals which were marginal come in with excellent signal strength, and digital signals which appeared to be non-existent come in with more than enough signal to have artifact-free viewing. The ADL feed horn not only does Intelsat circular polarity, but it also does linear polarity on both the C and Ku-bands. It's the only feed horn for serious TVRO enthusiasts for digital/analog, C/Ku/International, horizon-to-horizon viewing.

Changing from your current feed horn to the ADL feed horn takes less than half an hour. With the adjustable scalar ring, it's a snap to set it up for your dish size and fine tune the polarity. If you don't already have Ku-band capability



ADL's RP3-CKU International feed horn lets you tune into dozens of channels of international video and audio programming on the Intelsat birds over the Atlantic. (Courtesy ADL)

and are considering replacing your C-band-only feed, you should consider the ADL Intelsat feed and start doing some "bird" watching over the Atlantic.

THE 500 CHANNEL REALITY

Several years ago the Cable-TV industry was promising a "500 channel universe." Most cable systems have fallen some 450 channels short of the goal. The small dish services have to add all of their audio services to get up to the 100 channel count. On the big dish there are about 150 full-time analog video channels; over 100 analog audio services; over 100 digital audio services; over 150 digital video services; and there are dozens more audio and video services on the Intelsat satellites. This is what makes satellite television the best entertainment alternative.

If you already have a satellite TV system, adding a 4DTV or DVB receiver is like doubling the channel capacity in your home. While your neighbors on cable-TV or with the small dish systems complain about rising monthly costs, poor service, or both, you'll be tuning in channels for which they may have to wait years to watch.

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PAX Net: A Wholesome Viewing Alternative

By Steven Handler

Looking for shows that your whole family can watch together? A new nationwide television network, Paxson Communications Corporation of West Palm Beach Florida, launched their new 24 hour a day network, PAX Net, this past August.

Using GE-1's C-Band channel on transponder 7, PAX Net relays its programming to Paxson-owned TV stations and their affiliated stations around the country, as well as to cable systems. GE-1 is one of the newer geostationary satellites located above North America. It is one of 11 satellites operated by GE American Communications (GE Americom), a wholly-owned subsidiary of General Electric Company's GE Capital Services, based in Stamford, Connecticut.

By using a C-Band satellite, they would have made their programming also available to more than 2 million large dish owners, if it weren't digitally encoded using MPEGII. Even so, using a DVB or GI 4DTV receiver (see accompanying article), PAX Net's programming can provide an accessible alternative.

PAX Net, billed by Paxson as the nation's seventh broadcast television network, will air a line-up of day-time and prime-time network programming seven days per week. They appear to have selected programming that should appeal to viewers looking for quality shows that you wouldn't hesitate to watch with your children.

"All of our major programs are wholesome and focus on values," said Dean Goodman, President of PAX Net. Further commenting, Goodman said, "We have observed the strength of some of the best first-run series on television today and have invested carefully in programs that have developed a significant and loyal audience and also reflect our high network standards."

PAX Net is offering viewers a choice. Programming includes off-network runs of the hit series *Touched By An Angel*, *Promised Land* and *Dr. Quinn, Medicine Woman*. Other quality shows include *I'll Fly Away*, *Christy*, *New Land*, *Road Home*, *Neon Rider* and *Dave's World*.

Daytime programming will include *Lunch with Lucy*, two back-to-back *Here's Lucy* half hour programs, as well as *Love Boat*, *The Hogan Family*, *Dave's World*, *Eight is Enough*, *Highway To Heaven* and *Life Goes On*.

For mystery buffs, one of my all-time favorite programs, *Diagnosis Murder*, airs at 10:00 p.m.

■ Movie Fare

In addition, programming is also slated to include theatrical and made-for-television movies. Almost all programming will be off-network, exclusive to PAX Net. In addition to airing old favorites, PAX Net announced its plans for at least two original shows, *Live Link*, hosted by Dan Stuecher, and *Heart of Gold*.

Those looking for quality feature movies will

find a haven on Sunday evenings.

From 7:00 p.m. to 9:00 p.m., movies with strong, emotional content, such as *Terms of Endearment*, *Heaven Can Wait*, *Cross Creek*, *Almost An Angel*, *The Butcher's Wife* and *On A Clear Day You Can See Forever* will air.

According to Jeff Sagansky, president and chief executive officer of Paxson Communications, "This schedule embodies the elements that will make the network a success — a line up of high quality entertainment that inspires and touches, that speaks to the values of the community, friendship and giving back. PAX Net will be a safe haven for family viewing."

■ "I heard about it on the radio"

Paxson is no small time operator. They have assembled a formidable cadre of stations carrying their programming. PAX Net's debut onto the television network scene is nothing less than the launching of a new powerhouse. In addition to their C-Band broadcasts, there are 71 full power and six low power over-the-air broadcast television stations



carrying their programming. These include stations in all 20 of the top 20 domestic markets and stations in 43 of the top 50 markets.

How will PAX Net get the word out about their new network? In part, they will rely on radio advertising. They announced plans to become one of the largest users of radio advertising time in the US. Not surprisingly, they indicated their marketing and advertising plan will focus on

radio formats targeted to a female demographic in each market where they have a station or affiliate.

Paxson doesn't appear to be resting on their laurels. According to Jay Hoker, President of Paxson Television Station Group, "The acquisition program is not over. Before PAX Net is launched, more stations will be acquired. Paxson Communications plans the largest group of network owned or controlled, full power broadcast television stations ever amassed by one company in the history of broadcast television."

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Challenges in Identifying Trunked Radio Systems

By David T. Stark

Much information and advice has been written about figuring out subfleet or talkgroup identifications on Motorola-type trunked radio systems. There has not been much guidance offered lately about finding the actual frequencies on which those systems operate.

It is not possible to track or identify users of a trunked system unless the listener has *all* of the system's frequencies available. Finding trunked frequencies is not as simple as locating an agency's single- or multiple-channel conventional radio system.

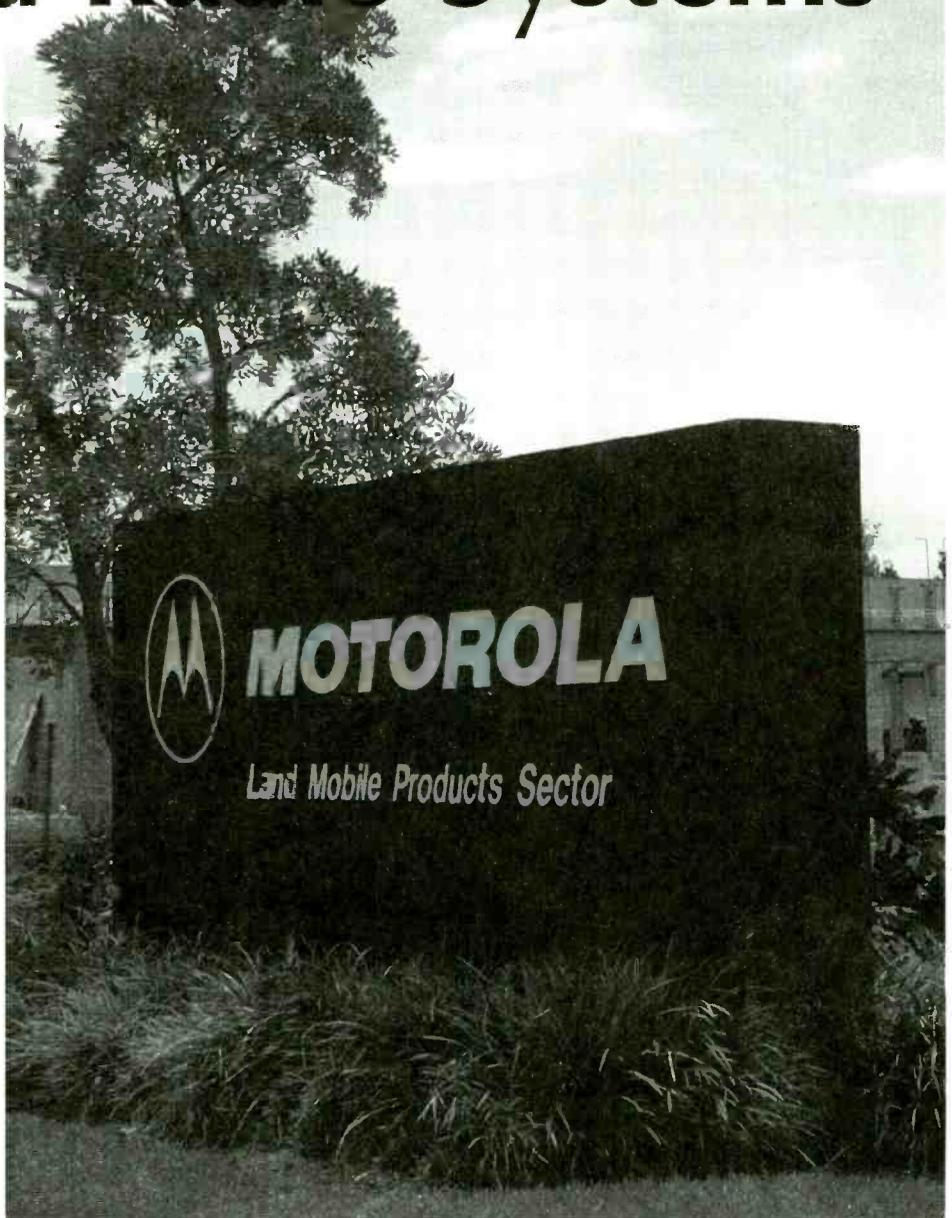
SMR (Specialized Mobile Radio) is the FCC's designation for most trunked systems. Some workers in the radio business pronounce SMR as "smur." This designation should also be recognizable in other countries.

There are several methods available to the erstwhile SMR researcher. Some are tried-and-true methods that have served us well when dealing with conventional (non-trunked) radio networks. Others have become available only recently. We will discuss them generally in order of increasing effectiveness with respect to finding trunked frequencies.

Method #1: Ask Someone

Just about anyone can simply ask someone what frequencies are in use by a particular service or agency. This requires no special tools or access. Asking may yield an exact listing and all sorts of details, or nothing at all.

End users of most radio systems, especially technically complicated networks, generally know next to nothing about the equipment they have. They can give all sorts of bizarre answers to the question, "What frequency are you using?" Users who have been exposed to system sales representatives can give very silly answers indeed. The following are some examples of what you might hear from an end user, along with a more accurate translation.



"We're on Channel 1."

User has no idea what sort of radio is being used.

"Our radios can't be monitored."

User has been talking to a sales rep. It is still very rare for a two-way radio system to be truly unmonitorable. Digital systems are currently scanner-proof, but that situation is likely to change. Also, people are sometimes told that a system is "digital" when it is only computer-controlled or has some digital fea-

tures, such as mobile data terminals or alphanumeric paging. The voice traffic can still be analog in some cases.

"It's not a radio, it's a telephone."

Thank you, CTIA (Cellular Telecommunications Industry Association). If it doesn't have wires, it's a radio. Trust me.

"It's illegal to monitor our radios."

Unless the radio is actually a mobile or portable telephone, this is probably untrue. There are other services that are illegal to



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monitor, but since we are mainly concerned with finding trunked frequencies here, that point is not relevant to our discussion.

There is a common misconception that it is illegal to monitor digital radio systems. The truth is, under United States law, it is only illegal to monitor digital cellular, cordless, and PCS (personal communications service) phones. Anything else digital is legal unless it is encrypted or scrambled (18 USC 2510 (16) and 2511 (2)). In Canada, though, one must have a special permit to possess a digital scanner receiver (RSS-135).

"Our frequencies are proprietary."

This response may come from a radio technician or sales person. Radio systems have to be licensed, and if the FCC or Industry Canada is the licensing body, the frequencies and callsigns are a matter of public record. However, arguing the point with the tech or sales rep will probably get you nowhere. You might as well move on to Method #2 or #3.

Method #2: Search and Scan

Another time honored research tactic is to use the **Search** feature of your scanner. In time, you will accumulate a list of active frequencies in your listening area. The catch is, there may be multiple trunked systems in use around you.

Your next task will be to extensively monitor those frequencies and try to associate frequencies that are part of the same system. This is done by following particular users from channel to channel and requires a good ear for voices and a fast finger on the **Scan** button.

Method #3: Look it Up

The next step up is to check the FCC database (or that of the radio licensing body in your country). Many published scanner frequency guides are based on license data. This includes the booklet that is distributed with the Uniden® line of TrunkTracker™ scan-



Fifty state patrol cars are getting new radios. Chances are they'll be trunked. (Photo by Mark Swarbrick)



Multi-agency trunked systems present a challenge for the monitor. (Photo by Haskell Moore)

ners. Unfortunately, license information is just raw data to the scanner user. The fact that someone has been issued a license does not definitely indicate that the actual transmitter is on the air yet.

A county or large city might have licenses on many more frequencies than can possibly be included in a single SMR. Motorola systems can have no more than 30 repeater frequencies. The mobile frequencies (repeater inputs) may also be listed, but you don't need those in your receiver to follow trunked communications. In the 800 MHz band, input frequencies are exactly 45 MHz lower in frequency than the repeater output. If you encounter a list that contains frequency pairs that are 45 MHz apart, you should always disregard the lower set.

What if you find a list of more than 30 repeater outputs licensed to the same entity? There is a way to include several separate systems into a sort of meta-SMR. This is called SmartZone™. Users on this system may "roam" or migrate among a group of networked SMRs, each different system having its own control channel and System ID. Tracking a system like this may require the use of an actual brand-name trunking radio with the correct system information programmed in by the radio shop.

Once you have a list of licensed frequencies, you can go back to manually tracking users in conventional mode, or advance to one of the newer methods.

Method #4: Use a Trunk Tracking Scanner

A scanner that is capable of tracking SMR traffic is a very effective way of finding and verifying trunked frequencies. The available models have operating modes that can show you which programmed frequencies are being used at any given time. This allows you to determine whether or not licensed channels are actually in use, but will not reveal any new or missing frequencies. Your best indication of missing channels is the occasional loss of communication while tracking a group that is sent to a frequency not programmed into your scanner. The scanner can't tell you where they went, so all you know is that a frequency is missing.

The current generation of trunk tracking scanners are only able to track Motorola SMRs that operate on the 800 MHz band. Only the Optoelectronics' OptoCom "black box" is currently capable of tracking 400 MHz trunking (common in the U.S. military and in Canada) and 900 MHz trunking (used mainly by businesses).

A trunk tracking scanner will follow the individual SMRs that are part of a SmartZone network, but such radios are not yet capable of automatically monitoring traffic across the entire network. The user of a trunk tracking scanner may not always be able to tell that a SmartZone system is in use.

Method #5: Computer-Assisted Scanning

The most effective trunking research tool is a computer that is connected to a scanner and running suitable software. This is where a program like **Trunker** comes in. Trunker grew out of the independent research of a few experimenters who began posting protocols and source code in Usenet newsgroups. The development "team" eventually came up with a shareware platform over which programs can be run that can analyze and track Motorola and GE/Ericsson trunking systems and decode mobile data terminals using the Motorola MDC-4800 protocol.

Trunker is the only method that automatically informs the scannist of the System ID being used. It can also track Motorola trunking on other bands beside 800 MHz.

While this suite of programs is probably the most effective and inexpensive way to have tracking capabilities on all of the systems it covers, it is limited by the fact that it uses the computer's serial port (the same type of port used by a modem) to process the data



Trunked activity log using Trunker

coming from the scanner. Serial communications under the current flavors of Windows do not have enough system priority to allow real-time decoding of a datastream. So these programs must be run after the computer is booted up in DOS mode. This eliminates multitasking while trunk-tracking.

Another obstacle for some hobbyists is the need for a hardware interface to the scanner. Such an interface can be built from plans that can be found in many places on the Internet,

including within the Trunker documentation. The scannist must also locate and tap into the discriminator output of the scanner for baseband audio. Using a speaker or recording jack does not work because by the time the signal reaches the audio amplifier, the part that carries the digital information has been filtered out.

If you wish to use the program to actually monitor trunked communications, you need a supported second scanner and the hardware control interface, too.

With these caveats in mind, it is well worth the effort to acquire and install a computer interface to your scanner. The Trunker program can even indicate the presence of a SmartZone network of trunked systems. The following is a relatively simple example of the strengths and weaknesses of the aforementioned research methods.

An Example

Here in Rochester, New York, there is a 12-channel single-site Motorola Type ISMR that used to be operated by Flower City Communications. Like all other Motorola systems in the country, it now belongs to NexTel® — (a

whole feature topic in itself if someone wants to write it). The SysID is 1812 and the frequency list, based on Trunker's output and the FCC database, is this:

c	v	852.7875	WNCE-581	Motorola, Inc.
	v	853.2375	WNCE-581	Motorola, Inc.
	v	863.9375	WNMD-357	ESMR, Inc.
	v	864.0375	WNCE-581	Motorola, Inc.
	v	864.3875	WNMD-357	ESMR, Inc.
d	v	864.4875	WNCE-581	Motorola, Inc.
	v	864.8375	WNMD-357	ESMR, Inc.
	v	864.9375	WNCE-581	Motorola, Inc.
	v	865.2875	WNMD-357	ESMR, Inc.
d	v	865.3875	WNCE-581	Motorola, Inc.
	v	865.7375	WNMD-357	ESMR, Inc.
d	v	865.8375	WNCE-581	Motorola, Inc.

For those unfamiliar with Trunker, the small letters before the frequencies indicate channel usage observed by the program over time. A "c" indicates that a Morse callsign identification is sent on this channel. In the case of the system illustrated here, the callsign that is broadcast is WNCE-581, matching the license information for Motorola, Inc. When listening in conventional mode, the scannist will never hear the other callsign.

The "d" shows a channel that has carried digital information, normally the system con-

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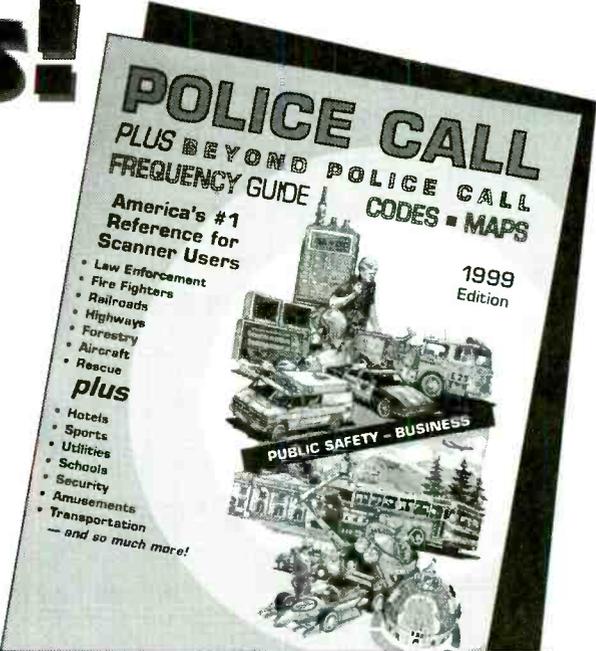
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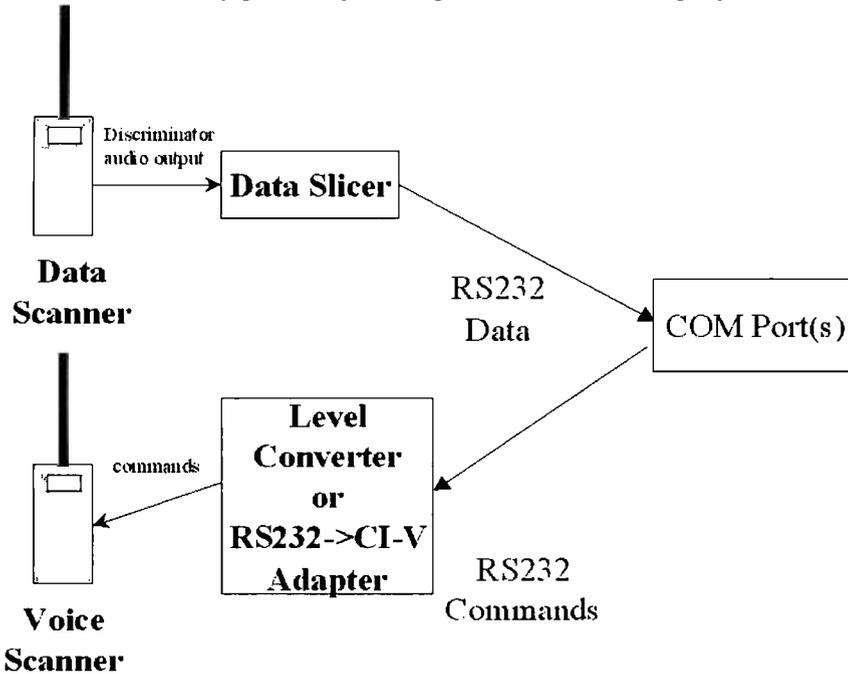
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Hardware configuration for using the Trunker tracking software.



trol channel. As you can see, control rotates among three of the system's frequencies. You might also notice that only the Motorola-licensed frequencies have been control channels. If the scannist were to program a trunk tracking scanner with just the ESMR, Inc., frequencies and assume they were a separate system, the scanner would never track anything because none of these frequencies ever carry the control signal.

Finally, the letter "v" indicates that this channel has carried voice traffic. In this particular SMR, all 12 channels can be voice channels. That is not always the case, and it is impossible to associate a control signal with the correct network while scanning or searching in conventional mode without a decoder.

It takes a little time to generate a complete list. The system has to be busy enough to fully "load up" without announcing any more frequencies before you can be sure that you have them all. Some licensed frequencies may not be announced by the controller. They may be intended for future expansion. If that is the case, Trunker will automatically add them to the list when the controller announces that they are in use.

To recap, Trunker has generated a complete list of all of the channels that are included in this trunked system. The FCC database shows what would appear to be two separate systems because they are licensed to different entities. Conventional searching and scanning is not likely to reveal that all of these frequencies are associated with each other.

A trunk tracking scanner cannot tell you what frequencies are missing when it is unable to follow a user to a channel that is not programmed. It can tell you when you have frequencies programmed that are not part of the system, but only if you carefully watch the display indicators for a period of time.

The Next Step

Any listings for trunked radio system frequencies that have not been validated by direct monitoring, preferably with a trunk tracking scanner (at least) or a computerized analysis program like Trunker, should be treated as suspect. It is very easy to inadvertently list invalid frequencies or to omit channels that are part of a large system.

Once the scannist has collected *all* of the correct frequencies included in the Motorola SMR to be monitored, he or she is ready to begin the process of differentiating between Type I, Type III, Type II, and Hybrid systems. This requires extensive monitoring and tracking and possibly a little hexadecimal math. The process is beyond the scope of this article. Trunker will spot a Type II system automatically, but you still have to do the bulk of the work to figure out the correct fleetmap settings for the other types.

Where to Find More Information

At the present time there are few, if any, printed books that cover trunk tracking in any

detail. Most of the research is being conducted and documented via the Internet. Each of the five research methods described in this article can be facilitated if you have access to the Internet.

- You can ask for help via the *rec.radio.scanner* Usenet newsgroup. Most of the basic trunking questions have already been asked and answered at least once, so I recommend going to DejaNews (www.dejanews.com) and searching the database of Usenet postings for trunking related articles.

- Another good way to converse with other trunking enthusiasts is via the TRUNKCOM mailing list. You can join TRUNKCOM by sending an e-mail message to *majordomo@qth.net* with the words "subscribe trunkcom" (no quotation marks) in the text.

- Naturally, there are several excellent websites that contain trunking information. Frequencies for many SMRs around the country, including non-Motorola systems, have been collected by many scannists and submitted to Warren Whitby's "Trunked Radio System User List" (members.aol.com/whitby2/trs.html).

General information about trunking and trunking-capable scanners is available from: Trunktracker.com (www.trunktracker.com) Motorola (www.mot.com/LMPS/RNSG/trunking/alt.htm) Lindsay Blanton's website (web2.airmail.net/lblant1/trunked.htm)

- You can download the latest version of Trunker from:

web2.airmail.net/lblant1/dfw/digital.htm

and read detailed documentation at:

www.geocities.com/CapeCanaveral/Lab/1060/beta.htm.

- I also invite you to visit my own website. The NF2G Scannist Pages contain frequencies, codes, unit numbers, CTCSS/DCS information, trunking details, laws and regulations pertaining to Upstate New York, Western Vermont, and southern Ontario Province. It is also the home of NYSING - New York State-wide Incident Notification Group. The address is www.nf2g.com.

.....

David Stark, NF2G, NYSING-01, got his first tunable receiver in 1972 and his ham radio license in 1981, and has about 20 years' experience in various aspects of public safety. He has nearly completed a Bachelor of Science in Criminal Justice and Sociology.

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Statewide Systems

One of the hottest trends in public safety communications and operations is centralized dispatch/centralized 9-1-1 PSAPs (public safety answering points). County and local police departments, county and local fire and EMS departments, or an amalgam of all the public safety services (and at times non-public safety services) are centralizing their call taking and dispatching. In many states, counties will oversee the dispatching for the sheriff as well as the local communities.

Here in Massachusetts, the State Police operate call taking and dispatch operations for not only their own units, but also for groups of small towns in the central and western portions of the Commonwealth. Some agencies maintain a very efficient communications structure to conduct operations among a variety of departments. A good example of this is the single trunked system with separate talkgroups for local communities as well as for the county services, as found in San Bernardino County, California.

Others, such as the Massachusetts State Police center in New Braintree, control distinct VHF-low band, high-band, UHF and 800 MHz systems in order to dispatch their own units as well as the local towns. It's cumbersome and costly, but it still provides for an effective dispatch operation.

Massachusetts, like other states, would prefer that the small towns migrate to their statewide trunking system. The price of radios, however, can be almost as much as the school budget for some of these tiny communities. Do remember, however, that if a small town suddenly disappears from the air, one should check the county or statewide system first, then look for the creation of a regional dispatch amongst a number of small communities.

Efforts to construct statewide systems that can be utilized by state, county, local and federal officials have sprung up over the last decade. Some systems, such as Michigan's digital trunked network, are partially operational and still under construction. Others have not really gotten off the ground.

Here's a partial description of two statewide systems that were on the drawing board

for some time. One is on-the-air and the other...? We're not sure what its status is, if there's any status at all. The full text can be found on the web at http://www.ntia.doc.gov/osmhome/reports/slye_rpt/appendix.html.

■ State of Michigan

The State of Michigan is building a statewide digital trunked radio system based on Motorola Astro technology. The system will include 168 sites, including upper and lower peninsulas, with an estimated cost of \$187 million. This will provide mobile coverage for 97% of the area of the state. Operation of the system was scheduled for October 1996.

A total of 66 frequency pairs in the 821-824 MHz and 866-869 MHz band will be used in the system. The first implementation was to include 1500 radios for state functions and 3000 radios for local government functions.

Users on this system include State Police, 911, and all other state public safety functions. Municipal governments are being invited to join. The City of Lansing (the State capitol) will be part of the system.

Radio users must buy their own radio, pay a \$250 entrance fee, and pay \$300 per year for service. Some federal law enforcement agencies have asked for some access to the system, though this is currently not intended to replace any existing federal networks.

■ State of Colorado

The State of Colorado is planning a statewide digital trunked radio system (DTRS), based on APCO-25 standards. Planning began in 1991 within the Division of Telecommunications, studying advanced designs for an improved statewide system for the State Patrol. Eventually, components of the Highway Maintenance and Natural Resources Departments were included.

Beginning in 1992, an extended series of informational meetings were undertaken to gather public support of this system. A six-phase schedule of implementation has been proposed for DTRS, beginning with the Den-

ver Metropolitan area in 1996. The state legislature would be expected to provide much of the funding, with some expenses recovered from monthly fees and some reimbursed construction costs. The system is expected to cost somewhere near \$120 million, not counting the microwave backbone which is already mostly in place. It is anticipated that the system will be built using the 800 MHz public safety bands.

The Division of Telecommunications will own and operate DTRS, but local governments and federal agencies have been invited to participate. A strong user's group is expected to be set up to help govern the system. Several municipalities are in conversation with the Division of Telecommunications regarding coordination of their municipal radio improvement plans with the DTRS.

Other statewide systems have been announced, but will their future be like that of Michigan or that of Colorado? We'll just have to wait and see. The state of Ohio announced their Multi-Agency Radio Communication System (MARCS) system many years ago, but the latest we've heard is that the final price tag just came in too high. Pennsylvania and New York both recently announced statewide systems, but they have a long way to go before you'll ever hear units transmitting from one end of those states to the other.

While skyrocketing costs have stopped more than a few grandiose plans in their tracks, the fact that thousands of cellular, PCS, Nextel and other towers are sprouting in every state means that infrastructure and coverage are no longer overwhelming obstacles. Public safety agencies are leasing space from the commercial providers or they are granting tower rights on state lands in exchange for tower space.

(By the way, while this editor loves towers as much as the next radio nut, it's becoming rather disconcerting watching the number of these behemoths going up across the country. There are seemingly few vistas left anymore that don't have the intrusive sights of Rohn, poles, yagis, collinears and microwave dishes. Some parts of Florida, for ex-

ample, look like a porcupine from the air and just plain ugly from the ground. And, don't forget the RF and intermod that these towers spew.)

Statewide systems do not have to be viewed with *angst* if they operate analog or even if they are now digital but without encryption. One day we hope to see an APCO-25 capable scanner (call your scanner manufacturer and ask him to build one!). There are some systems, however, such as the Southern Linc network (that is akin to NEXTEL), which utilize a commercial digital scheme and thus cannot be easily or legally monitored. It has been reported that the Georgia State Patrol, at least in the Atlanta area, is running Southern Linc radios for their communications. This trend is certainly troublesome to the scanner hobbyist.

If you know of other statewide efforts in your area, or if you know of other public safety agencies operating on commercial radio systems, please write and tell us about it at the Grove HQ address or send e-mail to scanmaster@aol.com.

■ The Gotcha Department

John Griffin, KB2SGJ, sent us the following email recently: "Rich: Regarding your pet peeve comments in the October column, did you know that there *IS* a radio which can scan *AND* search at the same time? The Icom R7100 has a window scan feature which allows the user to alternate between scanning memory channels and programmed search ranges. The duty cycle between the two windows is adjustable. Too bad this feature is found only on a receiver that comes at such hefty price which is beyond the budget of most monitoring hobbyists."

Thanks for catching me on that one, John. Having owned an R-7100 for many years, I should've known. The problem this editor has with the radio is that, unless you use it all the time as your primary receiver, there's no way to remember how to operate the product beyond its most basic functions. That's the problem with a lot of high-end gear. You have to have that owner's manual always at the ready.

The radio also scans painfully slowly, but on the other hand, it has excellent sensitivity and selectivity (in particular) and can, according to John, scan and search at the same time.

Rich Carlson, our good friend from the very popular Chicago Area Radio Monitors Association (CARMA), took issue with us on another recent point:

"I think you made an error in your Octo-

ber column. As far as I know there is no law against monitoring MDT's or other data service as long as it is not encrypted. When the MDT program first came out and after I tried it on our MDTs (it worked), I contacted our MDT Service provider which is an agency of the State of Illinois (Illinois Criminal Justice Information Authority). They were made aware of the program, and they said they knew it was available, but that they were unable to do anything about it, as it was legal to monitor unencrypted data signals.

"It is illegal to monitor encrypted communications, voice or data, as well as the services specified in ECPA. It is illegal to divulge content or even the existence of a communication that you are not a party to in most services (CB, Ham, GMRS, broadcast, and messages intended for the general public are excepted)."

Thanks, Rich, but don't forget that if you disseminate or in any way make use of what you hear (or read) off the airwaves you might be in for some serious trouble. Take the case of the notification service in New Jersey which was caught reading the pager messages of officials with the city of New York and allegedly alerting the news media to what they had read. They were in for some serious headaches and legal bills.

MDT programs are available on the net, but I would only trust a court to say for certain that it is legal to monitor these non-encrypted transmissions. Encrypted MDT transmissions are too difficult to decrypt to even worry about.

■ Frequency File

We wish to present a greater number of frequency and trunking talkgroup/subfleet information in the coming months. This month we'll present new channels and tone codes for Massachusetts agencies and inter-

esting businesses (to be completed in a later column). We urge our readers to send similar detailed information for their local area whenever they can. It's a benefit to all *MT* subscribers. If possible, please email any such data to me at scanmaster@aol.com.

Massachusetts Monitoring

Freq (MHz)	Service	Tone (Hz)
Action		
453.175	Fire	D-074*
Adams		
155.220	Town Ambulance	107.2
Agawam		
151.055R	Fire-Repeater	100.0
154.235	Fire-Fireground	
Amherst		
461.175	UMass Security	
461.675	UMass Security	
462.125	UMass Operations	
463.450	UMass Operations	
Andover		
482.425	Police-Future use	
159.0975	Police-MDT's	CSQ**
464.475	Andover Marriott	110.9
Ashland		
472.975	Police-MDT's	CSQ
Athol		
158.775	Highway Department	127.3
464.375	Athol Memorial Hosp	
Attleboro		
151.445R	Police-Dispatch	218.1
156.015	Police-Repeater input	218.1
159.885	Highway Department-F2	
464.575	Sturdy Memorial Hospital	
Auburn		
153.770	Fire-Future repeater input	
453.8875	Housing Authority	
Avon		
482.750	Fire	203.5
Ayer		
471.725	Police	
453.275	Devens Security	118.8
453.6375	Devens Security	
453.025	Devens Fire	118.8
Barnstable		
154.355	Fire-Centerville Pagers	114.8
151.355	Woods Hole Steamship	D-465
151.835	Sheraton Tara	110.9
463.375	School Department	D-411
463.850	School Department	
Barre		
154.830	Police-future use	
43.80	Elder Vans	79.7
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451.850	Renaissance Hotel	
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453.125	Fire-Future use				
Boston					
453.350	Housing Authority Police	D-351			
453.775	Boston EMS-TAC 16 Info Svcs.	156.7			
460.525	Boston EMS	192.8			
460.550	Boston EMS	192.8			
130.575	Boston Medflight	CSQ			
460.800R	Boston Medflight	74.4			
464.550	Roxbury Community College	D-114			
453.425	Mass College of Art				
453.400	UMass Boston				
464.725	Sheraton Boston	172.8			
Bourne					
151.295	Recreation Department				
150.995R	Highway Department				
460.6625	Maritime Academy	CSQ			
154.570	Factory Outlet Mall	CSQ			
Braintree					
158.880	Highway Department	CSQ			
467.850	Braintree Hospital Security				
Brewster					
453.075	Fire-Future use				
Bridgewater					
460.525	Fire	107.2			
Brockton					
154.310R	Fire-Dispatch	203.5			
151.160	Fire-Repeater input	203.5			
153.830	Fire-Fireground	203.5			
464.675	Brockton Hospital				
464.3125R	Massasoit Community College	203.5			
Burlington					
482.875	Police-Future use				
Cambridge					
484.0875	Harvard University-F10				
Charlton					
471.725	Police-Future use				
33.58	Fire-Future use				
155.835	Municipal Services				
Chelmsford					
482.975	Police-Future use				
484.425	Police-Future Regional				
33.76	Fire-F1	186.2			
33.66	Fire-F2	CSQ			
Chester					
160.065R	Police-Dispatch	167.9			
153.775	Police-Repeater input	167.9			
155.220R	Huntington Ambulance	203.5			
150.790	Hunt Amb-Repeater input	203.5			
Chesterfield					
154.115	Police-F2/Highway Dept.	127.3			
Chicopee					
853.5625	Police-MDTs	CSQ			
158.805	Emerg Mgt/Aux PD/Traffic	141.3			
Clinton					
33.94	Fire-Fireground Portable	131.8			
153.830	Fire-Repeater for 33.94	131.8			
Colrain					
33.92	Fire-Future use				
Concord					
482.550	Police-Future use				
Dalton					
153.815	Fire/Amb/Municipal Svcs	107.2			
150.905	Regional School District (& 158.145, 158.175)				
Dartmouth					
155.250R	Police	127.3			
155.595	Police-Repeater input	127.3			
155.025	Police-F2	127.3			
159.675	Police-MDTs				
155.025	Fire-Administration				
453.35R	UMass Security	D-143			
451.700	UMass				
Dedham					
471.375	Police-Future use				
Deerfield					
33.70	Fire-Greenfield tie	123.0			
151.925	Deerfield Academy				
462.300R	Yankee Candle Security	131.8			
462.350	Yankee Candle Parking	114.8			
461.1875	Yankee Candle Maintenance	186.2			
469.550	Yankee Candle Retail Ops	114.8			
466.1875	Yankee Candle Retail Ops	131.8			
467.400	Yankee Candle Simplex	114.8			
464.975	Historic Deerfield				
Dighton					
453.3125R	Fire-Operations (also: 453.6375, 453.8875, 458.8875 FG)				
Dracut					
483.750	Police-Future use				
465.6375	Fire-Link for 154.400	186.2			
Dudley					
464.525	School District F1-Maintenance				
464.675	School District F2-Security				
453.575	Courthouse Security	123.0			
Duxbury					
33.48	Fire-Tone Alert/Mobiles	203.5			
460.575	Fire-FD Base/Portables	203.5			
155.385	Fire-Ambulance to FD	131.8			
East Bridgewater					
471.775	Police	203.5			
483.6875	Fire	192.8			
Easton					
471.175	Fire-Future use				
151.715	SE Regional High School	192.8			
Essex					
461.150	Whittier Regional High School				
462.150	Whittier Regional High School				
Everett					
154.310	Fire	186.2			
464.325	School Department				
Fairhaven					
452.325	Highway Dept/Emerg Mgt.	203.5			
Fall River					
867.7375	Fire-Future use				
Falmouth					
37.94	Highway Department	CSQ			
462.075	Falmouth Hospital	D-754			
Fitchburg					
155.355	Fire-EMS Dispatch	192.8			
453.0125R	Airport Operations	136.5			
464.675	Montachusett Opportunity Council	74.4			
Foxboro					
154.600	Sullivan Stadium-Parking Ops	186.2			
462.550R	Sullivan Stadium	225.7			
464.100	Sullivan Stadium-Operations	203.5			
464.325R	Sullivan Stadium-Security	210.7			
464.450R	Sullivan Stadium-Operations	210.7			
464.625R	Sullivan Stadium-Operations	203.5			
464.950R	Sullivan Stadium	D-132			
Framingham					
159.420	Police-MDTs	CSQ			
464.600	School Dept.Bldgs. & Grounds (& 467.900)				
471.5125	Framingham State College-Future use				
Franklin					
465.4875	Police-Mobile Rptr (& 465.5375)				
482.650	Police-Future use				
472.700	Fire-Future use				
Gardner					
154.055	Housing Authority	118.8			
453.850	MART Transit Buses	100.0			
453.850	MART School Buses	110.9			
Georgetown					
154.010	Fire	131.8			
Gloucester					
154.160	Fire	91.5			
472.7625	Cape Ann Transit Authority	146.2			
Grafton					
465.1875	Police-Mobile repeater	167.9			
Granby					
155.250	Police				
155.250R	Police-Future Repeater	100.0			
153.815	Police-Future Repeater input				
155.040R	Fire/Police/Highway				
151.040R	Highway Dept-Future Repeater				
Granville					
33.52	Fire-F1	114.8			
Greenfield					
155.520	Police-Future Repeater				
158.940	Police-Future Repeater input				
151.115	Franklin Cty Medical Center	114.8			
155.340	Franklin Cty Medical Center	218.1			
458.5875	County House of Corrections	D-134			
Groton					
483.150	Police-Future use				
151.685	Groton-Dunstable School District				
Graveland					
483.5125	Police	146.2			
Hadley					
155.460	Police-CH2				
154.100	Highway/Water Departments	127.3			
Hampden					
33.46	Fire-F2 Primary	CSQ			
Hanover					
484.7625	Police	203.5			
483.3875	Police				
483.625	Police-Future use				
484.400	Fire-Future use				
Harvard					
151.010	Highway Department	123.0			
Harwich					
460.550R	Fire-F3	118.8			
460.550S	Fire-F4 Simplex	118.8			
460.5125	Fire-Mobile Repeater				
451.475	Water Department				
Haverhill					
159.0225	Police-Future use				
154.010	Fire	167.9			
153.860	School Department	127.3			
155.760	Water Department				
154.515	Elder Vans				
461.475	Whittier Reg Voc School	167.9			
158.760	North Essex Comm College	CSQ			
158.145	Bay State Gas-Repeater Input	100.0			
Heath					
453.9625	Fire-Mobile Repeater				
Holbrook					
155.040	Highway Department	CSQ			
Holden					
159.675	Police-MDT's				
45.08	Highway Dept/Electric Light	CSQ			
Holland					
33.46	Fire/Ambulance Primary	131.8			
Holliston					
465.5625	Fire-Mobile Repeater	100.0			
Holyoke					
159.795	Fire-Fireground	74.4			
460.7375	Holyoke Hospital	110.9			
173.7125	Holyoke Soldiers Home	CSQ			
Hopedale					
460.5125	Fire-Mobile repeater				
Hopkinton					
465.5375	Fire-Mobile repeater	136.5			
Hubbardston					
159.150R	Police-Operations	156.7			
155.790	Police-Repeater input	156.7			
155.730	Police-Secondary/Area tie	192.8			
156.225	Highway Department	151.4			
Hudson					

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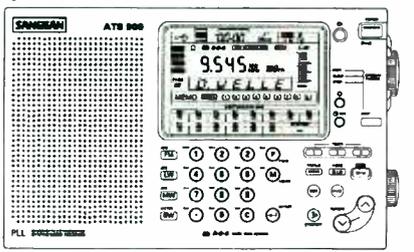
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Hugh Stegman, NV6H
driver8@netcom.com



Is There Life in MARS?

Last month, we described evolutionary changes to the United States government's SHARES, an emergency radio system whose highly descriptive acronym means "Shared Resources." In passing, we also mentioned the Military Affiliate Radio System, MARS (said all in one word like the planet or the ancient god of war).

MARS, with almost 9000 volunteer radio operators, all of them FCC-licensed hams, accounts for the vast majority of SHARES check-ins. In fact, when someone in the National Communications System recently became worried that it was taking over altogether, MARS was limited to forty per cent of SHARES—still around 400 stations.

We've had years of rumors that MARS cannot sustain life. As military use of HF (our shortwave spectrum between 3 and 30 megahertz) declined—especially for "morale" phone patches and troop "MARSgrams"—many assumed that MARS would be expendable at budget time. Instead, we've been reminded by everyone from the Secretary of Defense on down that the system's primary mission remains emergency readiness, which it's doing very well at a minimum cost.

While MARS is changing a bit, I really don't think it's going away any time soon.

■ MARS Evolution

Instead, MARS is about to go digital in a big way. Already the Air Force requires that stations have Packet, Amtor, Pactor, or G-TOR. "Packet" lets your computer do a few of the same things over a radio that it already does on a phone modem. Amtor is "Amateur Teleprinting Over Radio," an adaptation of the system used for maritime teleprinting. Pactor is sort of a combination of packet and Amtor, and it's the mode used by SHARES for its bulletin board system on 6800 and 13242 kilohertz (kHz). Finally, G-TOR refers to "Golay Teleprinting Over Radio," using a digital mode better known from certain message paging systems. I would guess that we'll start seeing CLOVER, a robust mode designed for HF, as well.

Some MARS stations will probably also be interfacing with the Automated Link Establishment (ALE) capability that is taking over

military HF. Since digital modes are recommended on SHARES ALE channels, the result is likely to be a super data system, allowing MARS to transfer pictures or long, logistical documents just as easily as straight packet handles messages.

■ MARS Operations

Traditionally, MARS used frequencies just outside the amateur bands using slightly modified ham gear. However, many stations now have full capability from 3 to 30 MHz. Some stations are attached to military units, while others are plain old ham radios operated "out-of-band" by individuals using special call signs.

These "funny" calls are distinctive. Ask anyone who's had to draw a mouthful such as, "November November November Zero Uniform Sierra Alpha (NNN0USA)," a few hundred times a day. However, there are still a few of the "old-time" call letters left, such as WAR (Army MARS headquarters) and AIR (Air Force). I've listed most of these special stations in Table 1. They conduct a great exercise every Armed Forces Day (as seen in the *Utility Loggings*), with several certificates and verifications available for some really unique "wall-paper."

The MARS network structure is far too complicated to cover in one column, and in fact it fills several operating manuals with national, state, local, and gateway routings. We can all learn a lot about good radio operating by listening in on all these well-drilled nets.

You'll often see MARS frequencies listed as "Window," "Dial," or "Assigned." This causes great confusion. "Window" and "Dial" are where most radios will tune to receive a utility signal, while "Assigned" is the standard "carrier" frequency shown by international allocations. All you need to remember for voice is that the USB "Window" is 1.5 kHz below the "Assigned," and LSB is 1.5 kHz higher.

Table 2 lists a few emergency frequencies that have been heard recently.

■ The Twilight Zone

Hurricane Georges showed some new players in the SHARES Coordinating Net.

AAR1DD, Army MARS, is now SHARES Coordinating Station, East. AFA3HY, Air Force MARS, is the central US station.

Our September log had a comment I made which identified US Air Force "Razor 85" as, "An FB-111 out of Pease Air Force Base." I am still not sure why I would ever say such a thing: Even I know that the Razor callword's current owners are the E-8C, "Joint STARS," observation planes. The acronym means Joint Surveillance and Tactical Radar System.

Well, no matter. We'll fly again next month.

Table 1: MARS Headquarters Stations

Station	Location
AAE	US Army, Ft. Sam Houston, TX
AAH	US Army, Ft. Lewis, WA
AAZ	US Army Signal Command, Ft. Huachuca, AZ
AEMI	US Army Corps of Engineers, TN
AIR	US Air Force, Andrews AFB, DC
AIR-2	US Air Force, Las Angeles AFB, CA
MCL	Navy/Marine Corps, Camp Lejeune, NC
MCU	Navy/Marine Corps, Quantico, VA
NAV	Navy/Marine Corps MARS Headquarters, DC
NAV-1	Navy/Marine Corps Region 1, CT
NAV-2	Navy/Marine Corps Region 2, SC
NAV-3	Navy/Marine Corps Region 3, TX
NAV-4	Navy/Marine Corps Region 4, IL
NAV-5	Navy/Marine Corps Region 5, CA
NAV-7	Navy/Marine Corps Region 7, WA
NAV-8	Navy/Marine Corps Region 8, HI
NMH	USCG Telecommunication, Alexandria, VA
WAR	US Army, Ft. Detrick, MD

Table 2: MARS Emergency Frequencies (USB unless noted)

Window (kHz)	Use	Comments
3311.0	Air Force Calling	Pooled with SHARES
4041.0	Navy Common Emerg.	
4590.0	Air Force Calling	Pooled with SHARES
5211.0	NECN Night Primary	Liaison with FEMA
5236.0	SHARES Coordination	With NCS/NCC
6826.0	Army MARS	
6999.0	Army Emerg. Guard	6997.5 Assigned (LSB); pooled with SHARES
7317.0	Army Inter-Regional (LSB)	7315.5 Assigned
7381.0	Navy/Marine common	7382.5 Assigned; pooled with SHARES
7498.5	Navy/Marine Corps	Pooled with SHARES
7540.0	Air Force MARS	Pooled with SHARES
10493.0	NECN Day Primary	Liaison with FEMA
13506.5	Army Inter-Regional	13508.0 Assigned
13910.5	Army Emergency	
13993.0	Air Force Calling	Pooled with SHARES
13996.0	Army/ Joint Guard	13997.5 Assigned; pooled with SHARES
14383.5	Navy Calling/Emerg.	Pooled with SHARES.
14389.0	Air Force MARS	
14390.5	Army MARS	
14396.5	SHARES Coordination	With NCS/NCC

Abbreviations used in this column

AB	Air Base	LSB	Lower Sideband
AFB	Air Force Base	MARS	Military Affiliate Radio System, US
AM	Amplitude Modulation	METAR	Meteorological Aviation Routine report
AMTOR	Amateur Teleprinting Over Radio	Meteo	Meteorological; weather stations
ARQ	Synchronous transmission and automatic repetition teleprinter system	MFA	Ministry of Foreign Affairs
ARQ-E3	Single channel ARQ teleprinter system	MI6	Military Intelligence, group 6, UK spy agency
ARQ6-90	6-character-block simplex ARQ teleprinter system	Minrex	MFA, Cuba
ASECNA	Aeronautical Safety Agency for Africa and Madagascar (loose, from French)	Navrad	Naval Radio
Coq-8	8-tone multi-frequency teleprinter system	NCC	National Coordinating Center
CP	Command Post	NCS	National Communications System
CW	Morse code telegraphy ("Continuous Wave")	NECN	National Emergency Coordination Network
DSN	Defense Switching Network	PETRA	Jordan News Agency
Dup-ARQ	Hungarian diplomatic simplex ARQ teleprinter system	Pol-ARQ	Polish ARQ teleprinting system
EAM	Emergency Action Message	RSA	Republic of South Africa
FAPSI	Federal Agency for Communications and Intelligence, Russia	RTTY	Radio Teletype
FEC	Forward Error Correcting teleprinter system	SAM	Special Air Mission, US Air Force VIP flight
FEC-A	One-way traffic FEC teleprinter system	SAN	South African Navy
FEMA	US Federal Emergency Management Agency	SCOPE	System Capable Of Planned Expansion, US Air Force
GHFS	US Air Force Global High Frequency System	Selcal	Selective Calling tones
GMDSS	Global Maritime Distress and Safety System	SHARES	Shared Resources, US government traffic network
HF	High Frequency (3-30 MHz)	Stratcom	US Strategic Command
ID	Identification	Swed-ARQ	Swedish diplomatic ARQ teleprinter system
		UK	United Kingdom
		Unid	Unidentified
		US	United States
		USCG	United States Coast Guard
		VIP	Very Important Person

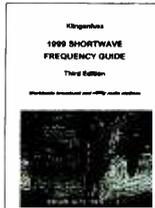
All transmissions are USB (upper sideband unless otherwise indicated). All frequencies are in kHz (kilohertz) and all times are UTC (Coordinated Universal Time).

- 4025.0 Unid-CW numbers in 5-letter groups, at 2209. (Ary Boender-Netherlands)
- 4041.0 Unid-Repeated CW message "TETINSITEAEMNL" for 3 minutes, at 1940. (Boender-Netherlands)
- 4214.0 ZSC-Cape Town Radio, RSA, with marine weather in FEC at 1713. (Bob Hall-RSA)
- 5002.0 Unid-Ticking Station, just sends groups of ticks, mode unknown, at 1947. (Boender-Netherlands)
- 5178.0 Unid-Backward music station, with weird, whale-like groans and noises, not parallel with others, at 2149. (Boender-Netherlands)
- 5211.0 WGY 912-FEMA Special Facility, VA, working KGA 93, FCC, Washington, DC, at 0614. (Jeff Haverlah-TX)
- 5472.0 Unid-CW numbers in 5-figure groups, at 1703. (Boender-Netherlands)
- 5680.0 Kinloss Rescue-Germany, working Alpha 91 at 0703. (Boender-Netherlands)
- 5711.0 Moffett Rescue-US Air Force Aerospace Rescue and Recovery Command, telling unheard aircraft that "Jolly 18 has a survivor," at 0335. (Hugh Stegman-CA)
- 5800.0 Syndrome working Nightwatch 01 (E-4B, US joint airborne CP) at 0035. Moustache, told by Nightwatch that Z150 (5800 kHz) was the primary frequency, at 0253. (Haverlah-TX)
- 6342.2 WLO-Mobile Radio, AL, with high seas traffic rates, GMDSS operator course announcement, tropical advisory for hurricane Bonnie, then traffic list, all in FEC, at 0436. (Sue Wilden-IN)
- 6494.7 Unid-METAR weather observation codes in RTTY, at 0449. (Wilden-IN)
- 6495.0 SAN-Silvermine, RSA, with RTTY news in Afrikaans at 1800. (Hall-RSA)
- 6695.0 Unid-Backward music station, with weird, whale-like groans and noises, not parallel with others, at 2149. (Boender-Netherlands)
- 6753.0 Unid-Backward music station, with weird, whale-like groans and

- 6757.0 noises, not parallel with others, at 2149. (Boender-Netherlands)
- 6757.0 Nightwatch 01-US Air Force, checking Jury Mast into a net with Trillion, also using Z190 (10204 kHz) and Z165 (6757 kHz), at 0140. (Haverlah-TX)
- 6797.0 Unid-Cuban 'Atención' numbers, loud carrier started at 04445, two beeps at 0449, then late start of AM callup and 5-number Spanish groups at 0510. (Stegman-CA)
- 6830.0 PETRA-Jordanian News Agency, Amman, with Arabic news in RTTY at 1638. PETRA-English news in RTTY at 1704 and 1707. (Hall-RSA)
- 6830.0 PETRA Amman-English language news in RTTY, at 1712. (Hall-RSA)
- 6959.0 Lincolnshire Poacher, British MI6, tune and numbers at 2200. (Boender-Netherlands)
- 6980.0 Unid-Cuban 'Atención' Spanish numbers in AM, at 0200. (Camillo Castillo-Panama)
- 6988.0 AAH-US Army MARS, WA, with Secretary of Defense's Armed Forces Day message, in AMTOR at 0140. (Paul Bunyan-MO)
- 7529.0 The Russian Man-Russian intelligence, weird voice with 5-figure numbers in AM, at 0500. (Boender-Netherlands)
- 8010.0 Unid-Cuban 'Atención' Spanish AM numbers, in progress at 0228. (Castillo-Panama)
- 8167.0 The Russian Man-Russian intelligence, weird voice with 5-figure numbers in AM, at 0500. (Boender-Netherlands)
- 8167.0 The Russian Man-Russian intelligence, weird voice with 5-figure numbers in AM, repeated 0500 transmission at 0520. (Boender-Netherlands)
- 8303.0 LOR-Argentine Navy, Puerto Belgrano, with 5-letter code groups in RTTY at 0541. (Hall-RSA)
- 9016.0 WAR 46-US Joint Alternate CP, PA, working Nightwatch 01 (US joint airborne CP, an E-4B), with signal checks, at 0306. Repudiate working Nightwatch 01 at 1249. Offutt-US Air Force, NE, calling WAR 46 and Auxiliary, then WAR 46 moved Nightwatch 01 to Z211 (12070 kHz), at 1534. Net with Splendid, Residence, Unwanted,

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- Brushwood and Nightwatch, also using Z175 (9016 kHz), Z205 (11494 kHz), and Z211, at 1611. Windpipe working Nightwatch 01 regarding comms with Cotter Pin, who Nightwatch could not hear. Went to Z190 (10204 kHz) at 1922. (Haverlah-TX)
- 9017.0 SPAR 06-US Air Force VIP, with DSN patch to Mildenhall through Andrews, at 0433 (Haverlah-TX)
- 9429.0 The Russian Man-Russian intelligence, weird voice with 5-figure numbers in AM, at 0520. (Boender-Netherlands)
- 10132.4 TNL-ASECNA, Brazzaville, with aero weather in RTTY at 1625. (Hall-RSA)
- 10160.4 DOR-MFA, Sofia, Bulgaria, with traffic, either encrypted or in Bulgarian, RTTY at 1652. (Hall-RSA)
- 10204.0 Abrupton telling Nightwatch 01 that he had no traffic and that WAR 46 was in the net, something they don't usually talk about, at 0001. Red Fern telling Nightwatch 01 that he was going monitor only. Royal Gem with EAM at 0037. Mover Van calling Nightwatch, no joy, at 0516. Deer Meat working Nightwatch 01 at 1439. Nightwatch moving Ruthless to Z211 (12070 kHz) where they were weak-readable, at 1612. Fire Ship with net check-in for Nightwatch 01 at 1615, then several 26-character EAMs, asking Nightwatch for acknowledgment each time, starting at 1732. WAR 46-US Joint Alternate CP, PA, testing "secondary antenna" with Nightwatch 01, at 1852. King Pin working Nightwatch 01 with net check-in, at 1955. Nightwatch 01 calling Nightwatch 02, no joy, at 2325. (Jeff Haverlah-TX)
- 10299.4 SW62-Bangkok Meteorological, RTTY synoptic charts at 1450. (Hall - RSA)
- 10929.0 The Russian Man-Russian intelligence, weird voice with 5-figure numbers in AM, at 0540. (Boender-Netherlands)
- 11167.0 The Russian Man-Russian intelligence, weird voice with 5-figure numbers in AM, at 0540. (Boender-Netherlands)
- 11175.0 Loft Hay, given Nightwatch 01 (airborne command post) frequencies Z190 primary and Z175 secondary, by Thule AB at 0002. M4N-US military unit, with patch via Hickam to W8R, handling "Exercise Beard Iron" message traffic, at 0532. Tempo 83-US Air Force, calling any station, no joy. Road Race in patch through Andrews, then "Sky King" EAM. Andrews-US Air Force GHFS, Andrews AFB control station, keying multiple sites for EAM, also making a loud carrier on 11176 kHz, at 1417. McClellan has also caused spurious carriers on 6739 and 11245, possibly a current technical fault in GHFS/SCOPE Command. (Haverlah-TX) SAM 201-US Air Force VIP flight, general call, at 1740. (Wilden-IN) Teal 39-US Air Force Reserve, WC-130 "Hurricane Hunter," in patch via Andrews to "Channel 6" for live news interview from eye of Georges, at 2242. (Stegman-CA)
- 11181.0 Nightwatch 01-US Air Force, radio check with WAR 46 at 1540. Nightwatch 01, in net with Rain Cell and Landfall [During hurricane Georges, for whatever that's worth -Hugh], also using Z211 and Z200 (11181 kHz), at 1631. Rain Cell tried comm with Nightwatch on 12070 kHz at 1632, and 10204 at 1635. (Haverlah-TX)
- 11244.0 Playtime with EAM, simulcast on 8992 and 10204 kHz, at 1749. (Haverlah-TX)
- 11252.0 J2H-US Navy, with several EAM broadcasts at 0342 (Haverlah-TX)
- 11291.7 MFA, Cairo, with selcals for QQT(X) (Prague) and XBVG (Paris), at 1634. (Hall-RSA)
- 11452.8 IMB3-Rome Meteorological, Italy, RTTY weather at 1650. (Hall-RSA)
- 11453.5 IMB3-Rome Meteorological, Italy, coded weather in RTTY at 1758. (Hall-RSA)
- 12070.0 Nightwatch 01-US Air Force, working Ruthless at 1612. (Haverlah-TX)
- 12183.0 Unid-FAPSI, Russia, with 5-letter code groups in RTTY at 1641. (Hall-RSA)
- 12190.2 FVI-French Forces, Le Port, idling arq-e3 at 1650. (Hall-RSA)
- 12211.7 PWX33-Possible callsign, Brasil Navrad, with number groups for "HINAVE" from "POTRIN," in RTTY at 1649. (Hall-RSA)
- 12577.0 GMDSS Digital Selective Calling channel, with 27 data messages (18 routine, 2 safety, 6 errors, and 1 test) filed in 6.5 hour period starting at 1100. (Hall-RSA)
- 12610.5 Copenhagen Radio, with Danish news and weather, not listed and new this frequency, at 1637. (Hall-RSA)
- 12689.5 American Forces Network-US Navy downlink feed via HF transmitter in Key West, FL, with news broadcast at 0621. (Boender-Netherlands)
- 13446.7 MFA, Islamabad, with 5-letter code groups in ARQ at 1630. (Hall-RSA)
- 13542.0 ZRO3-Pretoria Meteorological, RSA, with forecast and warning relay for "TEMPETE," in RTTY at 0910. (Hall-RSA)
- 13551.8 RFGW-MFA, Paris, France, with many pages of 5-letter code groups for embassies, in FEC at 1726. (Hall-RSA)
- 14111.0 Russian Navy- cannot decode RTTY, but signal present nearly every day, at 1656. (Hall-RSA)
- 14325.0 N4QBF-Amateur in Puerto Rico, telling WC2OEM (New York state Office of Emergency Management) that he was in the eye of hurricane Georges, had recently measured a 113 mile-per-hour gust, but could not do damage assessment because nobody wanted to go outside yet, at 2349. (Stegman-CA)
- 14396.5 WGY-910-FEMA Region 10 Control Station, WA, calling WGY 9901, Puerto Rico Red Cross headquarters, in hurricane Georges, but no joy, at 1625. KGD 34-SHARES Master Control Station, Arlington, VA, taking Georges checkins for 2300 UTC "window," many stations heard. (Stegman-CA)
- 14481.0 Unid-Russian Navy, very strong RTTY at 1701. (Hall - RSA)
- 14486.0 RFGW-MFA, Paris, France, with coded circular to embassies in fec-a at 0530. (Hall-RSA)
- 14996.0 RWM-Moscow, Russia, with CW time signals and ID at 0743. (Boender-Netherlands)
- 16235.8 FAPSI numbers in RTTY at 0743. (Hall - RSA)
- 16235.8 FAPSI station with text, sounded like operator training, in RTTY at 0800. (Hall - RSA)
- 16317.0 Polish Embassy, Kinshasa, Zaire, testing in Pol-ARQ with MFA, Warsaw, Poland at 0950. (Hall-RSA)
- 16317.0 Polish Embassy, Kinshasa, calling SNN 299 (MFA, Warsaw), in Pol-ARQ at 1030. (Hall-RSA)
- 16357.0 LZ-MFA, Prague, Czech Republic, with news in RTTY at 0751. (Hall - RSA)
- 16386.7 Possibly MFA Islamabad, calling MBKC in ARQ, no joy at 1501. (Hall - RSA)
- 16453.5 HGX 21-MFA, Budapest, Hungary, idling in Dup-ARQ at 1613. (Hall-RSA)
- 16804.5 UHLW-Russian vessel *Leonid Novopassiki* (MB-0015) with weather observations for UDK2, Murmansk, in RTTY at 1015. (Hall-RSA)
- 16814.5 HEC17-Berne Radio, Switzerland, with administrative messages and traffic list in FEC at 1630. (Hall-RSA)
- 16816.0 ZSC-Cape Town Radio, with weather warnings, now including Meteo France/Reunion for area ACK (Amsterdam, Crozet, Kerguelen), in FEC at 1005. (Hall-RSA)
- 17430.0 Unid-Russian FAPSI RTTY with 5-letter groups at 0544. (Hall-RSA)
- 17461.5 Minrex-Cuban MFA, Havana, with Spanish news in RTTY, not listed and new this frequency, at 0901. (Hall-RSA)
- 18064.0 MFA, Warsaw, with news in Polish, Pol-ARQ at 1652. (Hall - RSA)
- 18064.0 MFA, Warsaw, Poland, with news in Pol-ARQ at 1704. (Hall-RSA)
- 18183.5 Ambalg Rabat-Algerian embassy, with Arabic traffic for MFA, Algiers, copies to other Arab embassies, in Coq-8 at 0912. (Hall-RSA)
- 18183.5 MFA, Algiers, with French traffic to Ambalg Lagos in Coq-8 at 0845. (Hall-RSA)
- 18183.5 MFA, Algiers, with French language traffic to and from Riyadh, Yaounde, N'Djamena, Addis, and Dakar, at 0810. (Hall-RSA)
- 18211.0 AAH-US Army MARS, WA, listening for Armed Forces Day ham contacts on 18155 kHz, at 1745. (Bunyan-MO)
- 18242.0 ZRO4-Pretoria Meteorological, high seas weather for Area VII in RTTY at 0905. (Hall-RSA)
- 18308.5 P6Z-MFA, Paris, calling Y9L, Pretoria in FEC-A, no joy at 1529. (Hall-RSA)
- 18597.5 MFA, Madrid, with encrypted Spanish, possibly for Kinshasa, in ARQ at 0841. (Hall-RSA)
- 18669.0 Kdakar-MFA, Cairo, Egypt, with Arabic language traffic to Madrid, Spain, in ARQ, at 1623. (Hall-RSA)
- 18760.0 P6Z-MFA, Paris, calling Y9L in Pretoria, FEC-A at 1815. (Hall-RSA)
- 19724.5 UIW-Kaliningrad Radio, Russia, with RTTY messages for remote stations, at 1643. (Hall-RSA)
- 19730.5 P6Z-MFA, Paris, calling N2G in Damascus, FEC-A at 0730. (Hall-RSA)
- 20556.5 RFGW-MFA, Paris, France, with 5-letter code groups in RTTY for TJN, Beijing, L4N, Sofia, J5W, Rabat, and K4X, Tunis at 1315. (Hall-RSA)
- 20925.0 NDJX-French Embassy, N'Djamena, 5-letter code groups for MFA, Paris, changed callsign to NDJA, then back again, in ARQ6-90 at 0938. (Hall-RSA)
- 23053.7 Portuguese embassy, Kinshasa, Zaire, working station that was probably MFA, Lisbon, Portugal, in ARQ at 1105. Portuguese embassy, Luanda, with urgent coded message for MFA, Lisbon, in ARQ at 1116. (Hall-RSA)



Bob Evans

reevans@interlog.com

http://www.interlog.com/~reevans

Digital Reflections

As the year 1998 rapidly winds down to a close, we find ourselves poised with little preparation time for the Year 2000, some 365 days hence. The New Year has also typically been a time to take stock of the past year's events and plan for the future.

In keeping with this theme, this month we'll reflect on what has gone before, on what we have lost and what we have gained, and I shall offer a few personal prognostications on what the future has in store regarding monitoring the digital signal spectrum.

But first, let us consider a few basic facts.

FACT 1: There are fewer digital stations on the bands than there were five years ago.

FACT 2: More digital stations now use some form of encryption.

FACT 3: Propagation conditions over the past few years have not been as favorable as they were 10 or 20 years ago.

FACT 4: The plethora of digital modes has grown exponentially in the past decade.

FACT 5: There is more man-made noise on the HF bands than ever before.

FACT 6: We have witnessed a transformation from a "wireless" society (via radio waves) to a "wired" one.

With almost instant access and 100% readability, the Internet and the World Wide Web have replaced many radio receivers and transceivers. No longer are we dependent on propagation conditions to get our message out or receive our transmissions. Thanks to programs like RealAudio we can actually listen to foreign shortwave broadcasters' transmissions on their Web sites.

FACT 7: Politicians and law makers are becoming more paranoid regarding third party eavesdropping on private communications.

■ A Digital Transformation

During the past decade, several major changes have taken place on the digital airwaves.

Overall, press stations have declined. Gone are the giants, Voice of America and TASS. Only a smattering of third world press agencies remain. Similarly, Associated Press news photos broadcast from Buenos Aires have also disappeared. Less and less Japanese and North Korean FAX is now being transmitted in the HF spectrum.

Morse Code (CW), once the stalwart of the

maritime community, has been phased out for commercial use. Digital Selective Call Paging (DSC) has replaced this outdated code, and a more sophisticated version has been implemented for the Global Maritime Distress System (GMDS).

The French military continues to dominate the bands. Originally broadcasting in ARQ M-2, they shifted to ARQ-E and ARQ-E3 several years ago. During the past few years they have generally increased their baud rates to 192 and 200 for many of their signals. Traffic monitored from New Caledonia and Tahiti has decreased dramatically and a number of French bases in Africa are in the process of being closed.

The plethora of United Nations naval stations transmitting FAX has declined. With the American base closures in the Philippines, Subic Bay and others are now silent on the bands.

Amateur radio transmissions utilizing RTTY and SITOR are on the decline. PACTOR is fast becoming the preferred code of the ham community.

The demise of the Soviet Union has brought about a dramatic decrease in Soviet Maritime ship/shore fleet traffic.

On the other hand, the world of VHF digital modes has grown and equipment is now available at reasonable prices to monitor this facet of the hobby. ACARS (Aircraft Communications Addressing and Reporting System) is now utilized worldwide, and much of the old aeroband voice traffic transmissions now utilize this new digital mode. Pagers and cellular phones have likewise gone digital as well. You can now use your phoneset to make a voice call, or you can use it to send and receive email messages via satellite.

Dependable and economical satellite communications have encouraged many facilities to desert the HF bands: From press to military to transoceanic airliners — they have all found new homes in the Clarke Belt.

■ Into the Future

What then, does the future hold in store for digital communications as far as the HF/VHF spectrum is concerned? Will there be any traffic to monitor in the years to come?

The answer, of course, is that, yes, there still will be signals out there to decode. However, we must learn to adapt by changing our

listening habits, just as we did when RTTY first emerged. Facilities in third world countries will continue to be unable to afford satellite communications technology. Maritime shipping is a thriving industry — perhaps it's time you explored this facet of the hobby.

■ Personal Changes

On a more personal note, 1999 also has several changes in store for myself — not the least of which is my retirement from the MT family as your "Digital Digest" editor. This will be my last column, so I would like to thank Bob Grove and Rachel Baughn for the opportunity to share my interests and insights with you through this magazine. Their encouragement and professionalism were very much appreciated. Participation in the MT Annual Conventions was always one of the highlights of each year for me.

I would especially like to thank you, the MT Readers, for your interest in and feedback to the "Digital Digest" column over the years that I have been privileged to serve as your editor. Robert E. (Bob) Evans

Editor's Note: Bob Evans has been keeping MT readers apprised of the world of digital communications for the past five years. It is with deep regret we see him move on to other things, but we wish him good health and happiness in his "retirement." In the meantime, MT will continue its coverage of all modes—including digital.

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Norway Cancels English

NRK (*Norsk Rikskring Kasting*) is planning to pull the plug on the once-a-week English half-hour from RNI (Radio Norway International). Norwegian would also be largely replaced with relays from the domestic service (*Radiotidningen* via *Sweden Calling DXers/MediaScan*)

And so they did, with the final English broadcast Sept 27 (gh) RNI's five English broadcasters got little notice; had been on the air since 1952, costing about \$66,000 a year. NRK management decided that Norwegian TV license-payers should not have to support an international English radio service (Kim Andrew Elliott, *VOA Communications World*)

NRK says it is the responsibility of the Foreign Ministry to provide funding. Seems to have been an abrupt decision with little chance of reversal. I will be sad to see *Norway Now* go because it gave news you could find nowhere else (Martin Gallas, IL)

It's a shame that the government doesn't see the value of this service and that nobody wants to take the responsibility. Some of us will try to figure out some alternatives in order to rescue the English service (Grete Breie, RNI via Chris Brand, British DX Club)

Thanks to a three-way call arranged by Joe Hanlon, we had a

chance to speak with Olav Mo Grimdalen, the frequency manager for NRK. He asked us to publicize his need for more technical monitors along the West Coast, such as Seattle, San Francisco, San Diego, and also in Southeast Asia, who can communicate with him by E-mail for quick feedback on frequency monitoring at *Olav.Grimdalen@npt.no*. He feels as we do that it is a terrible mistake to terminate English. Nothing definite had been arranged yet, but there was talk of producing an English program at P4, a national domestic network, instead of NRK, and then presumably broadcasting it on the same SW facilities. He plans to use more 21 MHz frequencies next summer, and even 25 MHz (gh)

Among NRK's B-98 frequency usage plans: 18950 kHz from Sveio expanded for the Americas, all in Norwegian now: 1000 and 1100 UTC 235 degrees, 1200 280°, 1300 and 1400 300°, 1700 280°, 1800 300°; also 18950 kHz at 0700 UTC 180° to Eu/SAf. Other NAM freqs: 1500 UTC on 13790 kHz; 1600 UTC on 15705, both 315° to WNA; 2300, 0000, 0100, 0200 UTC all 9945 kHz 280°; 0100 and 0200 UTC 7465 kHz 300°; 0300 UTC on 9945 kHz and 0400 UTC on 7560 kHz 315°; per info from Olav Mo Grimdalen (Joe Hanlon, PA)

AFRICA [non] Radio Democracy for Africa (RDA), a Voice of America project to create a surrogate radio operation throughout Africa to promote democracy and human rights, will hit the air within two to six months. U.S. government sources have told *Clandestine Radio Watch* (CRW).

House Resolution 415, written by representatives Ed Royce (D-CA) and Robert Menendez (D-NJ) was passed unanimously on September 14. The service's final obstacle remains its budget, which will be passed for the FY99 - that is, next year. "Congress is very enthusiastic about RDA," CRW was told "so there won't be a problem if we move funds around after October first."

U.S. Information Agency (USIA) spokeswoman Mary Ellen Glynn says that the personnel and resources are already in place for Hausa and French-language broadcasts. She also noted that the VOA has stepped up its transmissions to Africa, now in 10 languages over 87.5 hours a week. Radio Democracy for Africa, if funding is indeed moved around, should therefore begin broadcasting by the end of the year (Nick Grace, *Clandestine Radio Watch*)

ANGUILLA Has one windbag silenced another? Since Hurricane Georges blew through on Sept 21, Caribbean Beacon missing from 11775, 6090 kHz (gh)

BELGIUM RVI's new relay via RN Bonaire in English to North America at 2230-2300 is on 13670 kHz (RVI via Alex Draper, Edwin Southwell)

BRAZIL RadioBras, 15265 at 1630-2050 in Portuguese, English and German to Europe accompanied by FM-like spurs every 82.5 kHz, on 15017.5, 15100, 15182.5, 15347.5, 15430, 15512.5 kHz (Wolfgang Büschel, Germany, *BC-DX*)

R. Transmundial, Santa Maria, RGS, has a new DX program, *Amigos do Radio* from the DX Clube Paulista, Sat 1445 and 2345, Wed 1445, Thu 0145 on 5965, 9530, 11705 kHz (Carlos Felipe da Silva, host) We heard it at 2345, fair signal but undermodulated (gh)

BURMA [non] Democratic Voice of Burma tested via KHBN, Palau, 1300-1400 on 15725 or 13840 (Ludo Maes, Belgium)

CANADA RCI started a new program in late September *First Edition*, morning show for Europe, Africa, Mideast, weekdays 0500-0530. For those of you with access to the WWW, the RCI website has a button for the latest program, so you can listen to us any time, day or night: <http://www.rcinet.ca/en/program/emission/first.htm> (Wojtek Gwiazda, Host and Producer) Winter timing: 0600-0629 M-F on 6090 9750.

[non] R. Asia Canada, B-98 via DTK (Deutsche Telekom) Germany: Daily 1400-1600 UTC 15370

kHz; 1600-1630 on 11910; 2100-2130 on 9800; 2100-2259 on 9510; 2300-2459 on 5905; 0100-0259 on 9585; 0300-0459 on 6125. Sat and Sun also 0500-0559 6175; 1900-2059 11835 13855 (DTK via Andreas Volk, *BC-DX*)

But this schedule may never go into effect: Radio Asia Canada has disappeared; this should be satisfying to our reporter Ernie Behr, who first exposed their connections to the Liberation Tigers of Tamil Eelam, considered a terrorist organization in Sri Lanka. In UADX via BC-DX, Victor Goonetilleke, a Sinhalese, says "Finally the LTTE showed its head in their program. We were about to expose them to the German government." Harold Sellers, Toronto, hard-core-dx, also notes their "frequencies empty, website not connecting, telephone number unanswered." Via hard-core-dx, Paul Ormandy, NZ, says RAC was last heard on 15245 around the end of September.

CENTRAL AFRICAN REPUBLIC After some delays, Radio Minurca was expected on the air in October, using 9900 kHz — yes, I told them it was a bad frequency. The election prompting it was scheduled for late November (Stig Hartvig Nielsen, Denmark)

CHINA I'm 99.44% sure that the voice heard on China Radio International's new opening announcement is that of Mindy Ratner, who got a big send-off by Minnesota Public Radio for a one-year exchange program (Max Swanson, MN, *Review Of International Broadcasting*)

COSTA RICA Visit to the Limón transmitter site of R. Casino found the 5955 TIQ SW transmitter to have been off the air for two years, and no plans to return (Adrian Peterson, Costa Rica, *TIAWR Wavescan*)

Within the next few months, exact date not set, AWR will discontinue SW from Cahuita, and move all SWBC to the DOMINICAN REPUBLIC. Will continue producing programs at Alajuela for their satellite network (Allen Graham, *HCBJ DX Partyline* after a visit to CR in late September)

CUBA Radio Havana is audible "down under" on what is assumed to be the third harmonic of 9550 = 28650 at 2345 and 0000. Weak but clear signal, apart from occasional CW beacon. (Bryan Clark, New Zealand, *Cumbre DX*) This was an off-heard RHC harmonic during the last sunspot peak. Despite his enthusiasm for HF openings, 10-meter DX, etc., I don't think Arnie Coro ever acknowledged on *DXers Unlimited* that RHC SWBC harmonics can be heard worldwide, or anywhere. Tsk tsk (gh)

For reasons beyond my will, and very much in spite of me, I will be away from the microphones and the programs I customarily present for an indefinite time. I shall continue answering corre-

All times UTC; All frequencies kHz; * before hr = sign on, * after hr = sign off; // = parallel programming; + = continuing but not monitored; 2 x freq = 2nd harmonic; J-98=May-Sept; Z-98=Summer season; W-98=Winter season; [non] = Broadcast to or for the listed country, but not necessarily originating there.

spondence as best I can. Best wishes, and 73 (Manolo de la Rosa, Radio Habana Cuba, via Ruben Guillermo Margenet)

[non] Two new clandestines for Cuba via WRMI: "La Voz de los Plantados," produced by Plantados Until Freedom and Democracy in Cuba, and "La Voz de la Disidencia," produced by Grupo de Apoyo a la Disidencia (GAD) (Armando F. Mastrapa, *Clandestine Radio Watch*)

The President's Advisory Board for Cuba Broadcasting demanded the ouster of Herminio San Roman, director of the Office of Cuba Broadcasting, charging him with "multiple management failures, refusing to cooperate" at Radio Marti. The station's audience was reported to have dropped sharply after it started carrying Miami talkshow hosts, losing credibility (Miami *Herald* via Mike Cooper)

CZECH REPUBLIC R. Prague announced some changes to the format after taking into account listeners' comments. Features will be seven minutes long, and current affairs extended to 20 minutes with more interviews. Bill Bathurst will feature some literature. Deleted from the schedules are *I'd Like You To Meet* and *Media Czech* (Edwin Southwell, *World DX Club Contact*)

[non] After lengthy negotiations, WRMI is relaying R. Prague on its new NAM antenna experimentally from Oct 25 daily in English at 0400-0430 on 9955, 317 degrees, and stays on this beam until sign-off, including *Viva Miami* in English UT Fri and Sun 0430, *Wavescan* UT Sat 0430, and Frank Zappa Show, Sun 0500-0600 (WRMI)

DOECANESE ISLANDS The SW portion of the US International Broadcasting Bureau's (IBB) relay station on Rhodes, Greece, ceased to operate in August. It had opened in 1964 and ended with two 50 kW transmitters. Two relocated 250 kW are being installed at Kavala to replace Rhodes. A new 600 kW MW on Rhodes is replacing the 500 kW on 1260, to be automatically controlled from Kavala. The portion of the Rhodes site being vacated will be returned to the Greek Government (VOA *Guide* via Dr. Jürgen Kubiak, *Electronic DX Press*)

DOMINICAN REPUBLIC 2700.09, Ondas del Yuna, Bona, not heard September 23-26 after Hurricane Georges' visit. R. Cima, 4890 1 and R. Cristal, 5014v also noted missing (Jay Novello, NC)

ECUADOR Quito has been under white alert for a long time, the lowest level, due to the proximity of Pichincha volcano. Now the alert status has gone up a step to yellow, and HCJB has been working on a contingency plan if it goes further up to orange, with a possible eruption. Shortwave site at Pifo is far enough away not to be in danger. But studios and offices in Quito would get ash. Worst case scenario: shut down Quito operation, put announcers at Pifo transmitter site. If phone lines to transmitter lost, could use HF feed; heavy ash could disrupt VHF links.

Language/service priorities to get back on the air: 1) AM 690 in Spanish, but may also add English, German, Quechua; 2) Local Quechua service; 3) International English; 4) International Spanish; 5) Everything else (John Beck, HCJB *DX Partyline*)

[non] HCJB relays via UKoGBaNI for B-98: 1700-1800 Russian and Central Asian languages on 9870 kHz; 1800-1900 Russian, Ukrainian, Georgian, Tatar on 7265; 2100-2200 Arabic to NAI on 6085 (HCJB via *BC-DX*)

FINLAND As of October 25th, YLE Radio Finland returns to morning broadcasts also during the week. YLE will air daily at 1330 UTC on 15400 and 17660 kHz (Juhani Niinisto, YLE, *rec.radio.shortwave*)

IRAN 7180 kHz: Voice of Islamic Republic of Iran (VOIRI) from Mashhad, capital city of Khorasan province in north east of Iran. It covers Central Asia and its goal is to spread the Iranian government's views. Their production is local with direction from Tehran. Recently this station has been more active because of the conflict between Iran and Taleban of Afghanistan. They have programs in Dari, Tajik, Uzbek, Pashtu and other languages in Central Asia. I can hear this station pretty well between 1000-1600 UTC (Mehrdad Sahba, Sweden, *Cumbre DX*) In Dari, Uzbek, Tajik, Urdu, Pashto, 0100-0500, 1230-1730 on 7180 kHz (BBC Monitoring)

9022 kHz: VOIRI has been putting a great signal with its English service at 0030. Koran, first in Arabic and then translated into English. I usually tune in about 0038 when the news starts, read by a man and woman, both easy to understand. There has been good coverage of the row between Afghanistan and Iran (Hans Johnson, Florida, *Review Of International Broadcasting*) Agreed, except at 0030 also on 7260 kHz; 2130 on 6025 kHz, not 6165 (BBC Monitoring)

VOIRI's English schedule as monitored in early October: 0030-0130 on 6055 9022 9685 kHz; 1100-1230 on 9585 11830 11875 13605 15260v kHz; 1530-1630 on 11775 13605 15130 kHz; 1930-2030 on 7160 7260 9022 kHz; 2130-2230 on 6165 6175 kHz (Mikhail Timofeyev, Russia)

[non] Voice of Mojahed is heard between 1400-1800 on a number of frequencies including: 6850, 7050, 6650, and 5110. This is an anti-Iranian government station and belongs to a guerrilla group with Islamic ideology based in Iraq. You can listen to their radio on the Internet at: <http://www.iran.mojahedin.org> (Mehrdad Sahba, Sweden, *Cumbre DX*)

IRAQ "Republic of Iraq Radio" (Arabic: *idha'at jumhuriyat al-iraq min Baghdad*). Voice of the Masses: (*sawt al jamahir*). (All programs one hour later in winter time in Iraq. All frequency use subject to variation.) Main Program in Arabic: 0155-2315 on 9715v and 7160v, both irregular; includes daily *Quotes from Saddam's Thoughts* at 2015-2045.

Broadcasts by Radio Iraq International (Arabic: *idha'at al-'Iraq al-duwailiyah min Baghdad*) have been highly erratic for several years. By recent monitoring observa-

tions (all times variable; all broadcasts one hour later in winter): 11785v is the only frequency: 0100-0200 Arabic, 0200-0230 German, 0230-0300 French, 0300-0400 English (repeat of 2100); 1900-2000 Arabic, 2000-2030 German, 2030-2100 French, 2100-2200 English. Address: 8th February Post Office, PO Box 8145, Baghdad 12222, Iraq. (BBC Monitoring)

[non] R. Free Iraq was the subject of much controversy in Prague, due to fears it would draw terrorist attacks to the Czech capital. It was given the go-ahead if it would operate from a remote location away from schools, suburbs (AP via Dave Alpert, Mike Cooper) V. of the Islamic Revolution in Iraq, in Arabic and Kurdish on frequencies which at other times carry Iran's external service in Arabic: 0330-0530 on 9610, 7295, 7115, 6195; unconfirmed at 1430-1630 on 9670, 7115 (BBC Monitoring)

KUWAIT R. Kuwait heard with new English broadcast at 0600 on 15110, excellent signal, news and music (Alok Das Gupta, India, *Cumbre DX*) Starts at 0500, target seems Australasia, very good and strong (John Keckes, Australia, *DSWCI DX Window*)

LEBANON High Adventure Ministries - I just signed a contract for the delivery of a new 10 kW dual-frequency shortwave transmitter. Will be installed in January to replace the unit that burned out in June 1997 (Ludo Maes, *Cumbre DX*)

LIBERIA Star Radio, 5880, was hit by lightning which reduced transmitter power from 10 kW to 3 (or 1.3), at 0500-0800, 1700-2100 (George Bennet, Star Radio, and Philippe Neyround, Hirondele Foundation, via Tarmo Kontro, Finland, *hard-core-dx*)

MONGOLIA 4790 ? I asked Ludo Maes about the transmitter that he had sold to this country. Here is his reply. (Johnson)

Unfortunately, we didn't hear anything yet from the people in Mongolia who bought the shortwave transmitter last year. We contacted them several times, but never got a reply. We didn't get any complaints either so we are not even sure the transmitter has been installed yet. It's a pity because it would have been a real challenge to log it here in Europe (Ludo Maes, *Cumbre DX*)

During my travels in Asia, no listed Mongolian SW home service frequencies were heard morning or evening (Bob Padula, *Electronic DX Press*)

4850, Radiostation Khekh Tangar, 0107-0145, is on the air again, noted with non-stop western pop and rock music, advertising at 0140-0145 followed by jingle with ID in Mongolian and English ("Blue Sky") and more music. 4850 is only SW freq. for Mongolia - Radiostation Khekh Tangar (Blue Sky), 2200-1500, broadcasting here since April 15, 1994, in Mongolian. I have QSL letter from this station, v/s Director, A. Buidakhmet. But at 1350-1455* there was domestic service -Raadio Ulaanbaatar with clear ID at 1400, //LW 227 kHz. Cochannel QRM due to Uzbek R. and CNR (Feodor Brazhnikov, Russia, *DSWCI DX Window*)

NEW ZEALAND RNZI aired a 50th-anniversary special Sept 25 and Oct 2. Rudi Hill is very ill, having been diagnosed with cancer shortly after his programs ended in the latest cutoff.

Real Audio stream on <http://www.rnzi.com> carries the 5 hr per day of RNZI programs only, since RNZ domestic is already streamed elsewhere. Any chance of getting the funding cut restored? Yes, RNZI has challenged this and an audit is under way; hope to get back to previous level at least, but this would not be until next year, maybe (Adrian Sainsbury, RNZI)

RNZI B-98: M-F 1650-1751 6145; Sun-Thu 1752-1951 and Fri-Sat 1752-1958 11675; Sun-Thu 1952-0705 and Fri-Sat 1959-0705 17675; daily 0706-1015 9700; occasional for sports: 1015-1205 9700, 1205-1650 6105 (RNZI)

NIGERIA [non] 15460, Ogene Ndigbo. Ben Akpa tells *Cumbre DX* that they are not being well heard in Nigeria via WHRA and that they are looking for another transmitter site (Hans Johnson, *Cumbre DX*)

SNBS R.I.P.: After hearing WGTG announce for the third week that SNBS wasn't on, I think it is time to write the obituary on this one. SNBS, the product of Maureen Gold's Nigerian Advocacy Group for Democracy Human Rights (NAGDHR), was even more short-lived than her previous effort, Radio New Nigeria; it didn't even last three months. Gold was once the US representative of NALICON (then behind Radio Kudirat). Radio New Nigeria and SNBS seem to have been unsuccessful attempts by Gold to compete with Radio Kudirat. Gold may yet revive SNBS or come back with

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another program, but any future effort will also be short-lived until NAGDHR obtains funding and some semblance of organization (Hans Johnson, *Cumbre DX*)

PALESTINE [non] V. of the Palestinian Islamic Revolution, on frequencies which at other times carry Iran's external service in Arabic: 0400-0500 on 9670, 6020; 1830-2030 on 9695, 7190, 6145, 6025 (BBC Monitoring)

PERÚ The station on 3172.7 is R. Municipal, Panao, Pachitea, Huanuco, not a harmonic but announcing 3173 and 95.5 FM, the brainchild of Panao mayor Oriol Atino Perez, heard at 0040-0130 (Rafael Rodriguez, Colombia)

QATAR QBS: During Ramadan the main Arabic service is on the air 24 hours a day. When a shortwave frequency change occurs, there may be a gap of up to 30 minutes before the station appears on the new frequency. SW frequency usage: 0245-0707 on 9570, 7210; 0707-1305 on 17895, 9570; 1305-1705 on 11750, 9570; 1705-2130 on 9570, 7210 or alternate 11750 (BBC Monitoring)

RUSSIA Letters from Voice of Russia replying to its listeners are not being sent because the station cannot afford the postage. The letters are accumulating until they can one day be sent, as Pancho Rodriguez explained as best he could on the Spanish program *Frecuencia RM* (Jorge Aloy, Argentina, *Mundo Radial*)

SA'UDI ARABIA BSKSA Holy Qur'an at 0300-0600 was observed on: 9553.6 9619.4 9715 9718.3 11785 (instead of 7150) 11870 17895 kHz (Mikhail Timofeyev, Russia, *BC-DX*)

TANNU TUVA 5550.4 - Radio Kyzyl, Respublika Tuva (Siberia) - new on shortwave and possibly a feeder, 2220-2359*, local program mostly in Tuvian but also in Russian till 2300 and between 2310 and 2359 and Radio Rossii news at 2300, ID and time in Russian at 2310, weather reports in Tuvian/Russian at 2255, 2311, 2355; 2359 closing "*Peredacha iz Kyzyla okonchena*" (Mikhail Timofeyev, Russia, *DSWC1 DX Window*) Also had R. Kyzyl 1010-1042* in Oct (Pavel Miroshnikov, Irkutsk, BC-DX)

U K o G B a N I 'Modernizers' Move In On World Service: BBC World Service is to be rebranded in line with Robin Cook's commitment as Foreign Secretary to promote the nation's "modern identity" abroad. Research has found that listeners believe its "bowler hat and umbrella" image to be an outdated "colonial irrelevance." Changes recommended to BBC executives by Panel 2000 — the Foreign Office's so-called committee for cool — include more popular music, modern jingles, livelier programmes and presenters with regional accents. (Joe Jenkins, *Electronic Telegraph* via Joel Rubin)

It appears as if the "modernized" sound of BBC would just be clanky, noisy, kitschy and pseudo-modern, while losing all the dignity, poise and perspective which we serious BBC listeners have always valued. Just when BBC becomes more accessible than ever, via internet, satellite, and rebroadcast, it will become less worth listening to (Tim Hendel, AL, *World Of Radio*)

Replacing Sam Younger as Chief Executive, BBC World Service by yearend is Mark Byford (BBC World Service via British DX Club) Byford had been director of regional broadcasting (Carol Midgley, *The Times* via Joel Rubin) Sam Younger, the man in charge of devising a survival strategy, was forced to quit by Sir John Birt, the director general. Mark Byford, his successor, has no experience in foreign broadcasting (Nicholas Hellen, *Sunday Times* via Joel Rubin)

BBC WS is considering going to a 24-hour all-news format starting next October; the present news block at 0430-0700 [to Europe], might expand to 2200-0730 from January 10 (*Radio Magazine* via Mike Terry, British DX Club *Communication*)

Merlin Network One was scheduled to go fulltime on satellite, SW, in mid-October, rather than a few hours a week (Eric Wiltsher, MNO) Merlin Network One has registered these frequencies from 25th October (Ian Saunders, Oct *WDXC Contact*):

0000-0300	9560
0600-0800	6110
0600-0900	13720
0700-1600	9915 17630
0700-1900	21550
0800-1200	13660
1200-1400	13645
1400-1600	13680
1600-1800	6185
1700-1900	3965
1800-2000	6125
2030-0600	3985
2200-2400	7170 9835
2300-0200	7325

Not specified here, but this will presumably become daily. Note some ex-BBC frequencies, or timeshared with BBC; and 21550 will be a big clash with Chile (gh)

UNITED NATIONS UN Radio, which once had an extensive broadcast schedule on VOA transmitters, and later a lesser one via Switzerland, registered a new Monday-Friday

broadcast schedule via DTK, Germany, to start Oct. 12; however, we did not immediately hear it. The subsequent schedule for B-98: 0400-0430 and 0500-0530 11795; 0600-0630 11675 5990; 1700-1730 13800; 1800-1830 11840; 1900-1930 11735 6025 5970 (DTK via Andreas Volk via Wolfgang Büschel) Languages not specified

USA On his WBCQ show *Al Weiner Worldwide*, Al said the station made it to air by some lucky breaks: getting a lot of used equipment, a new antenna design that worked even better than calculated, and money from personal loans. John Gorski, engineering consultant, explained that his company provided the antenna, and because of a problem in the isolation transformer the power was initially only 15 kW. He explained that on the 7 MHz band, 14.14 dBi gain amounts to an ERP of 1.3 megawatts. At 13 MHz (that must be the daytime band contemplated, not exactly harmonically related to 7), would be 1.6 MW. Al thanked John for turning him on to the antenna they are using, which is not labor-intensive, and looks good, in contrast to curtains. It has nice smooth bandpass and perfectly matches transmitter (gh)

From our part, we are proud to be a part of this project and introduce this new antenna to the SW community. This antenna with its low cost and superior performance should enable those that previously could not afford to build a shortwave station to now do so. We certainly are looking for a breath of fresh air on shortwave, which WBCQ seems certain to provide. For more info, contact us at (319) 472-5102 voice or fax (John L. Gorski and Associates Consultants, Vinton, IA)

The antenna is on a 60 foot tower, and the elements also extend 60 feet out. WBCQ broadcasts from a small mobile home on Britton Road in Monticello, previously used by WREM-AM 710 (Wayne Brown, *Bangor Daily News* via Anita McCormick)

WBCQ cancelled *American Dissident Voices* after two broadcasts, due to pressure from various sources not happy about the anti-Semitic content (George Thurman, TX) *ADV* could have violated hate-speech laws in Canada, a target of WBCQ (Al Weiner, WBCQ) Al Weiner also told *Cumbre DX* that they were trying to get programs from the Left, but the Left doesn't have much money. They had tried to carry *Pacifica News*, but *Pacifica* insisted on being paid \$2,500 a year for carrying their news (Hans Johnson, *Cumbre DX*) For latest WBCQ program schedule see <http://theplanet.wbcq.net>(gh) We assume WBCQ program times shifted one UT hour later for winter (gh)

I spoke with Charles Josey and learned the following: WWBS, Macon, GA, is causing interference to a nearby studio and they are working together to solve the problem. For this reason and other interference concerns, Josey has gotten permission from Tom Polzin of the FCC to operate USB + carrier, power 12.5 kW with 50 kW peaks. Broadcasts were expected to start at the end of October, 2300-0000 on 11910, then 0000-0400 on 11905. He will be using a 4-element Yagi mounted 137 ft in the air; it's on top of the building, and aimed at 330 degrees. WWBS already has 30 hours of Christian program tapes from Canada and this seems to be their target as Canada does not allow such programming (Hans Johnson, *Cumbre DX*)

WGTG, Copper Hill, TN, was testing 9505 again on USB. Dave Frantz told me 9505 is only a test frequency, will not be used for regular programming, but instead 6890, and at night only. During two months of burn-in period, will operate 6890-USB // 5085-full AM with commercial programs. Religious programs Sat and Sun daytime will be on 9400-AM. Dave fed up with listeners using cheap unselective radios and plans to promote SSB by selling Sangeans 818 and 909; running SSB will also save 2/3 of the \$4000 power bill. However, we heard later that a buyer for WGTG had been found (gh)

WRNO - Informed sources who did not wish to identify themselves have this to say about the station: Look for things to really change at the station in about three months. The website is being updated and should be back soon. The saga with the transmitters also continues. When WRNO purchased their new transmitter a few years ago, they actually got two transmitters. Unfortunately, they are both lemons and it is hard to find parts for them. The manufacturer is in the process of declaring bankruptcy and is in no hurry to fix them. (The transmitter the station went on the air with in 1982 was sold at this time, fate unknown.) Because of the transmitter problems, WRNO often operates at lower powers estimated to be between 25 and 50 kW (Hans Johnson, *Cumbre DX*)

"Patriot" leader and WWCR talkshow host "Bo" Gritz shot himself in the chest, reportedly in despair over his pending divorce, but survived (*Enid News and Eagle*)

WRMI: see CZECH REPUBLIC
KIRO, Seattle WA, is the latest American station relayed on 25950 kHz, talk format and CBS news at 0000 (Bryan Clark, *New Zealand, Cumbre DX*) Since then we heard "94-7 NRK" from Portland, OR, also on 25950 in same time period; the two may not interfere on groundwave but could be confusing at a distance. KIRO has a talk format, KNKR music (gh)

Thanks to Bob Grove, VOA *Communications World* is now heard in one piece via WWCR, Sat 2300 on 5070, Sun 0630 on 3210, accompanied by *World of Radio* Sat 2330, Sun 0600, as timeshifted for winter. Other anticipated *World of Radio* times effective from December: Thu 2130 on 9475, Sun 0730, 1030 on 5070, Tue 1330 on 15685. For the latest see <http://www.angelfire.com/ok/worldofradio> WWCR added *Worldwide Punjabi Radio*, mostly music, which should now be Thu 2200-2240+ on 9475 (gh)

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

Gayle Van Horn

0000 UTC on 4777.8

BOLIVIA: Radio Andes. Spanish. Clear ID by male DJ, followed by short piece of instrumental music. Bolivians heard: **Radio Norte** noted at 0010 on 4939.2 in Spanish with commercials and ID. **Radio Santa Cruz de la Sierra** on 6135, 2245-2300. Spanish text on economics, station jingles and ID. (Michael Schnitzer, Hassfurt, Germany/*Hard Core DX*)

0003 UTC on 13690

UK: Rock Radio Network via Merlin Network One. Several IDs and promo, "the past, the present, the music." Station audible on 9560 at 0100-0200. **Radio Carolina** heard via MNO at 1641 on 13690, 2205 on 13690 with IDs, pop/rock music, heard on // 11985, 11915, 9780, 7170 kHz. **Radio London** via MNO on 13690 at 2220. (Enrique Alejandro Wembagher, Buenos Aires, Argentina)

0030 UTC on 9022

IRAN: VOIRI. Station sign-on at tune-in. Parallel noted on 9685. Signal noted better on 9022, while better on 9685 other days. (Lee Silvi, Mentor, OH)

0035 UTC on 17795

AUSTRALIA: Radio Australia. Sports report. Text on aboriginal land rights on 17795 at 0150; country music program on 15510 at 0610; program on PNG orchids on 9660 at 1230; ABC report on 9580 at 1230. (Eric Walton, Vancouver, BC Canada)

0045 UTC on 6055

SPAIN: Radio Exterior Espana. Mailbag program. (Bob Fraser, Cohasset, MA) Station noted on 11815 at 2339 with classical music and *Amigo to Amigo* program. (Sue Wilden, Indianapolis, IN; Walton, CAN)

0050 UTC on 6010

ITALY: RAI. Italy's foreign minister wants Russia's debts put on hold to help economy. (Fraser, MA)

0102 UTC on 5770

NICARAGUA: Radio Miskut. Spanish. Mostly English lite pop/rock from Elton John and Sweden's ABBA. Brief station break for "Radio Miskut" ID. (Harold Frodge, Midland, MI)

0103 UTC on 15410

NETHERLANDS ANTILLES: Deutsche Welle via Antigua. Germans newscast, English newscast on 6975 at 0352. (Wilden, IN)

0112 UTC on 4955

COLOMBIA: Radio Nacional. Long lite Spanish vocals. ID spots and station promos. (Frodge, MI)

0124 UTC on 9440

SLOVAKIA: Radio Slovakia Int'l. Newscast at tune-in to IDs, interval signal and sign-off, //7300, 5930. (David Ross, Hamilton, Ont, Canada/*The Four Winds*)

0130 UTC on 4779.7

ECUADOR: Radio Oriental. Tentative logging for station to 0150+. Lite Spanish vocals to commentary on Pope John Paul. (Frodge, MI)

0202 UTC on 4799.76

GUATEMALA: Radio Buenas Nuevas. Religious scriptures quote at tune-in to sermon text. Station ID break at 0230, 0232". (Gianni Serra, Rome, Italy, *TFW*)

0230 UTC on 9840

HUNGARY: Radio Budapest. Local news and current affairs. (Walton, CAN) English broadcast to Europe on 11700 at 2101-2128". (Silvi, OH; Frank Hillton, Charleston, SC)

0230 UTC on 9495

SWEDEN: Radio Sweden. Newscast and economic report. Station noted on 9475 at 0340; 15240 at 1330. (Walton, CAN)

0300 UTC on 6040

CYPRUS: (non) Radio Monte Carlo. Arabic. Saturday evening newscast with discussion on the Hamas and Israel, to update on Bill Clinton and his gal pal Monica. Abruptly left the air at 0320. (Marcia Head, Boston, MA)

0300 UTC on 9820

CUBA: Radio Havana. Evening newscast to *Making News in Cuba* program. Station audible past 0400. (Walton, CAN) Cuba's **Radio Rebelde** noted on 5025 at 0115. (Francesco Clemente, Udine, Italy/*TFW*)

0351 UTC on 6975

COSTA RICA: Radio for Peace Intl. *Making Contact* program discussing nuclear waste. (Wilden, IN)

0405 UTC on 9885

SWITZERLAND: Swiss Radio Int'l. evening newscast. (Wilden, IN) SRI audible on 9905 at 0400, 9575 at 1430 (Walton, CAN)

0500 UTC on 9721.70

PERU: Radio Victoria. Religious program to station ID. Music from Jean Michael Jarre with Oxygene. (Ruud Vos, Finland/*HCDX*)

0500 UTC on 4960

SAO TOME: VOA relay. English ID to newscast in Hausa covering item on Nigeria. (Klaus Elsebusch, Marienthal, Germany/*HCDX*)

0528 UTC on 9934.5

GREECE: ERT Thessaloniki. Greek phone-in program to ID, "*Radiophonikos Stathmos Makedonias*." Saloniki and Ellas mentioned during phone chats. (Elsebusch, Germany/*HCDX*)

0918 UTC on 6089.95

CHILE: Radio Esperanza. Long Spanish talk from male DJ with mentions about Fidel Castro. Several mentions of Christiano and address given followed by music at 0942. Choral music to 0959, mentions of "*esperanza Catolica*" and "*sintonia de Esperanza*." Fairly good and slowly fading. (Dave Valko, PA/*TFW/Weekly DX News*)

0947 UTC on 5927

BOLIVIA: Radio Difusora Minería (freq varies). Nothing heard while tuning, but Peruvian noted on 5926.83 at 0947 recheck while campo music popped up. Frequency then drifted to 5927.2 and drifted again while tuning. Brief canned ID at 0950, dead air noted 0952-0953 then more campo music at 0954. Very weak and lucky to catch the ID. (Valko, PA/*TFW/WDXN*)

1206 UTC on 17775

UZBEKISTAN: Radio Tashkent. Station ID from announcer duo as "this is Tashkent," to local music at 1216. ID repeat barely audible with deep fading. Slightly lesser but clearer signal found on // 15295. (Mark Fine, Remington, VA; Walton, CAN)

1230 UTC on 15545

BELGIUM: Radio Vlaanderen. English to North America with fair signal quality. (Silvi, OH)

1235 UTC on 13625

FRENCH GUINEA: Radio France Intl. *Club 9516* program, // 17575. (Fraser, MA)

1300 UTC on 6150

SINGAPORE: Radio Singapore Intl. National newscast and *Indonesia Today* feature. (Walton, CAN)

1915 UTC on 17735

ECUADOR: HCJB. *Studio 9* show on jungle hiking. (Fraser, MA)

1920 UTC on 17605

NETHERLANDS ANTILLES: Radio Netherlands Bonaire relay. Feature on diamond mining. (Fraser, MA)

2015 UTC on 9435

ISRAEL: Kol Israel. Report on the 5th anniversary of the Israeli-Palestinian agreement-the Oslo Accord. (Fraser, MA)

2042 UTC on 11960

BELARUS: Radio Minsk. Discussion alternating between man and woman to 2048, then music. Station ID at 2058 accompanied by frequency schedules and address. Signal very good and intelligible despite low modulation, QRM from 11965, and some fading. (Fine, VA)

2133 UTC on 9575

MOROCCO: Radio Mediterranean Intl. French. Fair signal due to 9580 interference. English rock music to French ID. Newscast at 2159 followed for editorials. (Frodge, MI)

2200 UTC on 6060.08

ARGENTINA: RAE. National program and ID as, "*Nacional la radio de todo el pais*," interference from Italy's **RAI** on frequency. (Vos, FNL/*HCDX*) Station noted on 11710 at 0240. (Walton, CAN)

2215 UTC on 9655

TURKEY: Voice of. *I Am Anatolia* program with interview of American tourist. (Fraser, MA) VOT noted 9655 at 0300. (Walton, CAN)

2304 UTC on 6811

PERU: Ondas del Rio Mayo. Spanish. Regional music, IDs, ads and evening comunicados. Peru's **Radio Quillabamba** audible 2304 on 5025. (Wembagher, ARG)

2315 UTC on 6155

BOLIVIA: Radio Fides. Spanish. Slow instrumentals to station jingles and ID. (Tom Banks, Dallas, TX) Station audible on 6024.9 at 0030. (Vos, NLD/*HCDX*)

2325 UTC on 6014.8

BOLIVIA: Radio El Mundo. Spanish. Music to ID at 2330. Signal very weak. Bolivians noted: **Radio Panamericana** 6105.5, 2335-2345; **Radio Illimani** on 6025 from 2345-0000. ID as, "*Radio Illimani del estado, la Voz de Bolivia*." (Schnitzer, Germany/*HCDX*)

2328 UTC on 4649

BOLIVIA: Radio Santa Ana. Station ID, sports report and time check in Spanish. (Wembagher, ARG)

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

Alaska Calling!

From Mike Osborne, English Service Host of KNLS, comes word of new developments at the station, of interest to the DX world of listeners.

KNLS is now offering free station pennants again. A small, white felt pennant with blue lettering is yours for the asking. *DX Tips for Beginners* and *Radio Propagation for Beginners* pamphlets are also available free of charge to any one requesting copies.

Mike also informs us that KNLS operates both a stamp and postcard exchange, with a maximum of ten stamps and or five postcards per mailing.

An interview with the director of Alaska's HAARP Project on audio cassette is still available free of charge, too. This interview about Alaska's "other" shortwave facility has proven popular with many hobbyists. (Additional info on HAARP can



be found in *Monitoring Times*, Oct. 1996, *Who's Playing Hell With HAARP*, by Wayne Mishler, and at the HAARP Home Page: <<http://server5550.itd.navy.mil/projects/haarp/haarpIndex.html>>

KNLS can now be visited anytime online at <<http://www.knls.org>> Email: <KNLS@aol.com> Visitors to the site can download program transcripts, peruse the free items the station offers, take a virtual tour of the facilities, listen to program samples, and browse the Alaskan photo gallery.

Mike and his staff can heard during the current English broadcasting schedule on 7365 kHz at 0800-0900 and 1300-1400 UTC.

Send your reports and return postage to International Radio Station KNLS, Anchor Point, AK 99556 USA. Tell Mike *MT* sent you!

BENIN

ORTB, 4870 kHz. Date only station logo QSL card unsigned. Received in 206 days for a French report, cassette tape and one U.S. dollar. Station address: Boite Postal 366, Cotonou, Republique de Benin. (Randy Stewart, Springfield, MO)

CANADA

CHNX Halifax, 6130 kHz. Full data letter on *Maritime Broadcasting System* letterhead, signed by Wayne S. Harvey-Chief Engineer, plus CHNS bumper sticker. Received in six months for an English report and two IRCs. Station address: Box 400, Halifax, NS Canada B3J 2R2. (Bill Wilkins, Springfield, MO)

ECUADOR

HD2IOA, 3810 kHz. Full data blue shield and sundial card unsigned. Enclosed station info sheet and letter signed by Jose Olmedo Moran-Director del Instituto Oceanografico. Station address: Instituto Oceanografico de la Armada, Casilla 5940, Guayaquil, Ecuador. (Wilkins, MO)

GEORGIA

Georgian Radio/Radio Tbilisi, 11805 kHz. *Transmitter Tower* card signed by Helen Aphkadze-Editor. Postcard and frequency schedule enclosed. Received in 52 days after third followup report sent as registered mail, plus one U.S. dollar. Station address: ul. M. Kostava 68, Tbilisi 380071, Republic of Georgia. (J.D. Stevens, Madison, AL/Cumbre DX)

IRAQ

Radio Iraq International, 11785 kHz. Full data verification written on oversized station certificate signed as, Jamila-Announcer. Received in three months for an English report. Station address: P.O. Box 8145, Baghdad, Iraq. (Donald Michael Choleva, Eastlake, OH)

MEDIUM WAVE

KAYK 1690 kHz AM. Partial data verification on station letterhead signed by Julia A. Newton-Administrative Assistant to General Manager. Received in six days for an AM report, two mint stamps and address label. Station address: 730 West Hampton Ave. # 300, Englewood, CO 80110. (Wilkins, MO)

KDSX 1700 kHz AM. Full data letter signed Hubert Beavers-Chief Operator KPLX/KLIF. Received in 90 days for a taped report. Station address: 3632 Blossom Tree, Plano, TX 75074. (Patrick Martin, Seaside, OR)

Talk Radio England 1089 kHz AM. Partial data station card signed as, Technical Manager-Engineering Dept. Received in nine months for an AM report and one U.S. dollar. Station address: 76 Oxford St., London, UK, W1N0TR. (Robert S. Ross, London, Ontario, Canada/AmFmTvDx)

WKSH 1640 kHz AM-Sussex, WI. Hand written verification note on yellow lined note paper, signed by Tod Naragon-Station Manager, plus program schedule. Received in seven days for an English AM report and an SASE (used for reply). Station address: 3251 Shady Lane, Pewaukee, WI 53072. (Harold Frodge, Midland, MI)

WMDM 1690 kHz AM. Full data letter signed by Stacy Reynolds-Program Director. Received for an English AM report. Station address: P.O. Box 600, Lexington Park, MD 20653. Website: <<http://www.977thebay.com>> (Stephens, AL/AmFmTvDx)

WPSL 1590 kHz AM. Full data letter signed by Greg Wyatt-General Manager. Received in 238 days for an English AM report. Station address: 8245 Business Park Dr., Lucie, FL 34952. (Martin, OR)

WTDY 1670 kHz AM. Partial data letter signed by Mark Grantin. Received in 55 days for an English AM report. Station address: P.O. Box 2058, Madison, WI 53701-2058. (Patrick M. Griffith, Federal Heights, CO)

WVNA 1590 kHz AM. Full data letter signed by Chuck Miller-Chief Engineer. Received in 245 days for an English AM report. Station address: 509 N. Main, Tusculumbia, AL 35674. (Martin, OR)

NAMIBIA

Radio Namibia/NBC, 3290 kHz. Full data satellite dish card signed by P. Schachtschneider and two schedules. Received in 126 days for an English report and one U.S. dollar. Station address: P.O. Box 321, Windhoek 9000, Namibia. (Martin Schoech, Germany/Cumbre DX)

PIRATE

Radio 510, 9955 kHz via WRMI. Full data *11th Annual Winter SWL Festival* card unsigned. Stickers and pamphlet enclosed. Received in 46 days for an English pirate report and two IRCs. QSL maildrop: P.O. Box 510, 4010 Basel, Switzerland. (Wilkins, MO) Website: <<http://www.radio510.org/>>

Radio Kenny, 6955 kHz. Full data QSL # 1 South Carolina Pirate card. Received in 108 days for an English pirate report and three mint stamps. QSL maildrop: P.O. Box 28413, Providence, RI 02908. (Frodge, MI) Pirate website: <<http://www.frn.net/stations/frontdoo.htm>>

WLIQ, 6955 kHz. Full data guitar sheet signed by Jimmy Hix. Received in 69 days for an English pirate report, three mint stamps and an address label. QSL maildrop: P.O. Box 109, Blue Ridge Summit, PA 17214. (Wilkin, MO)

With Glory to Gumby, 6955 kHz USB. Full data religious personages card signed by Steve Mann. Received in 35 days for an English pirate report, three mint stamps and an address label. QSL maildrop: Providence, RI. (Wilkins, MO)

SHIP TRAFFIC

Federal Vibeke-LACA4, 156.600 MHz (Bulk Carrier). Full data prepared QSL card signed by Aung Kyi-Radio Officer, stamped with ship's seal. Received in 31 days for an English report, one IRC, one U.S. dollar and mint stamps. Ship address: A/S Eidsiva, Vika, P.O. Box 1590, Oslo, Norway. (Russ Hill, Oak Park, MI)

Happy Holidays From QSL Report!

GET READY FOR WINTER DXing SEASON!

GREAT broadcast band antennas to fit ANY pocketbook.

KIWA Medium Wave Air-Core Loop Antenna

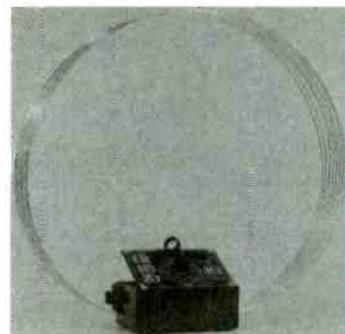
Are you looking for the ultimate indoor antenna for medium wave reception on your communications receiver? Then look no more—this unique 12-inch, circular air-core antenna provides improved weak signal reception of medium wave broadcast signals and its electronically balanced circuitry minimizes pickup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

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



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Exciting New KIWA Pocket-Loop Antenna



This highly efficient signal grabber is 12" across when deployed, yet collapses to a tiny pocket size for transport! Designed to receive and amplify signals from 530 kHz through 20 MHz in four bands, no antenna jack on your portable radio is needed; it space-couples to your radio's existing whip and internal ferrite rod!

ORDER ANT 32 only **\$119⁹⁵**
plus \$10 UPS 2nd Day Air shipping or US Priority Mail

Select-A-Tenna



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

No batteries, power, or connection required; simply set the Select-A-Tenna next to your radio, peak the tuning knob, and listen to AM broadcast signals soar out of the background noise!

This 11", high-Q loop antenna focuses its captive signals to your radio's internal ferrite loop without any physical connection! If your receiver requires an external antenna, a convenient 3.5 mm (1/8") jack and plug provided. Connect an outside wire to the Select-A-Tenna and receive medium wave signals like you've never heard before!

ORDER ANT 21 only **\$59⁹⁵** plus \$5.50 UPS 2nd Day Air shipping or US Priority Mail

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



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HOW TO USE THE SHORTWAVE GUIDE

1: Convert your time to UTC.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

HOT NEWS

COMPILED BY JIM FRIMMEL

SELECTED PROGRAMS.

The BBC is featured in our centerfold pages this month. All listings identify the BBC stream (AE=America/Europe, AF=Africa, AS=Asia) carrying the program. Also included are special Christmas/holiday programs for WEWN and Deutsche Welle.

TEEN-RUN RADIO STATION.

Internet-only radio station DAER is a professionally run, profitable station with an FM-quality sound using MS Media Player/Telos Systems. The station is on air full time (24/7) and is run by a 15 year old in Cleveland. (www.daer.com/)

RADIO WITH PICTURES.

Making its debut in October, FlashRadio marketers were calling it a new concept in radio. The Internet station presents five channels of different music themes with a continuous animation show tailored to the channel's mood.

(www.flashradio.com/)

However, according to Media Metrix in New York, only about 25% of all PC users are equipped with the hardware and software required to view web video.

CZECH RADIO VIA WRMI.

Radio Prague can now be heard on shortwave station WRMI in Miami daily at 0400-0430 UTC.

VOLCANO THREATENS

HCJB. Ecuador's Mount Pichincha began signs of erupting in October, causing the city of Quito to be on alert. If the eruption has not already occurred, it is said to be inevitable.

HAMS USING MACS.

About 850 Macintosh users who are also involved in amateur radio keep in touch with each other via "Macnet." Info about the informal, world-wide group can be found at <http://www.mv.com/ipusers/wd1v/Page2.html>.



ART BELL QUILTS RADIO?

The late night radio host of "Coast to Coast" and "Dreamland" abruptly announced "What you are listening to is my final broadcast" at the end of his show on October 13th. Art mysteriously cited complex family problems for his action. America's most popular overnight radio show was in reruns for a week. By October 19th, with the show being run by guest host Hilly

Rose. Art announced that his situation was improving and he would be back eventually.

WEB STATS. The latest study of Internet usage revealed that 70.5 million Americans, nearly 35% of the population, were online. Of the total, women were 43% and those over 50 were 17%. As for shopping online, 20 million had made online purchases. Canadians account for another 9.5 million net users. (Nielsen Media Research)

WEB THREATENS RADIO.

Arbitron NewMedia told attendees at the National Association of Broadcaster meeting in Seattle that the average listener who is not online listens to radio 22 hours and 45 minutes a week, while Internet users tune in to radio three fewer hours. A full 13% of those who are online report spending less time with radio due to Internet usage.

FREQUENCIES

0000-0100	Anguilla, Caribbean Beacon	6090am				0000-0030	Thailand, Radio	9680va			
0000-0100	Australia, Radio	9660pa	12080as	15240pa	17715pa	0000-0100	UK, BBC Asian Service	3915as	6195as	7110as	9410as
		17795pa						11945as	11955as	15280as	15310as
0000-0100 vl	Australia, VL8K Katherine	5025do				0000-0100	UK, BBC World Service	5970sa	5975am	6175na	9590am
0000-0100 vl	Australia, VL8T Tent Crk	4910do						9915sa	12095sa		
0000-0100	Bulgaria, Radio	7375na	9485na			0000-0100	UK, Merlin Network One	3985eu	7325eu	9560eu	
0000-0015	Cambodia, Natl Radio Of	11940as				0000-0100	USA, KAJI Dallas TX	5810va			
0000-0100	Canada, CBC N Quebec Svc	9625do				0000-0100	USA, KTBN Salt Lk City UT	7510am			
0000-0100	Canada, CFRX Toronto	6070do				0000-0100	USA, KWHR Naalehu HI	17510as			
0000-0100	Canada, CFVP Calgary	6030do				0000-0100	USA, Voice of America	7215as	9890as	11760as	15185as
0000-0100	Canada, CHNX Halifax	6130do						15290as	17735pa	17820as	
0000-0100	Canada, CKZN St John's	6160co				0000-0100	USA, WBCQ Monticello ME	7415na			
0000-0100	Canada, CKZU Vancouver	6160co				0000-0100	USA, WEWN Birmingham AL	5825na	13615na		
0000-0029 twhfa	Canada, R Canada Intl	6040am	9535am	11855am		0000-0100 stwhfa	USA, WGTG McCaysville GA	5085am	6890am		
0000-0059 smtwhf	Canada, R Canada Intl	5960am	9755am			0000-0100	USA, WHRA Greenbush ME	7395va			
0000-0100	Costa Rica, RF Peace Intl	6975am	15050am	21460am		0000-0100	USA, WHRI Noblesville IN	7315am			
0000-0027	Czech Rep, Radio Prague	5930na	7345na			0000-0100 twhf	USA, WHRI Noblesville IN	5745am			
0000-0100	Ecuador, HCJB	9745na	12015na	21455va		0000-0100 sm	USA, WHRI Noblesville IN	5755am			
0000-0030	Egypt, Radio Cairo	9900am				0000-0100	USA, WINB Red Lion PA	11950am			
0000 0100	Germany, Overcomer Ministr	11660as				0000-0100	USA, WJCR Upton KY	7490na	13595as		
0000 0015 vl	Ghana, Ghana Broadc Corp	3366do	4915do			0000-0100	USA, WRMI/R Miami Intl	9955ca			
0000-0045	India, All India Radio	7410as	9705as	9950as	11620as	0000-0100	USA, WRNO New Orleans LA	7355am			
0000-0100	Ireland, Unt Christian BC	6200do				0000-0100	USA, WSHB Cypress Crk SC	7535na	9430am		
0000-0015	Japan, Radio/NHK	6155eu	6180eu	9665af	11705na	0000-0100	USA, WWBS Macon GA	11910na			
		11815as	13650as			0000-0100	USA, WWCR Nashville TN	3215na	5070na	5935na	7435na
0000-0100	Liberia, LCN/R Liberia Int	5100do				0000-0100	USA, WYFR Okeechobee FL	5950na	6085na	9505na	
0000-0100	Lithuania, Radio Vilnius	6120na	9835na			010-0020	Kyrgyzstan, Kyrgyz Radio	4010do	4050do		
0000-0100	Malaysia, Radio	7295do				0015-0100	Japan, Radio/NHK	6155eu	6180eu	9665af	11705na
0000-0100	N Mariana Is, KHBI Saipan	15665as				0030-0100	Austria, R Austria Intl	7325na			
0000-0100 vl	Namibia, NBC	3270ai	3289af			0030-0100	Iran, VOIRI	6055eu	7260eu	9022eu	9685eu
0000-0030	Netherlands, Radio	6020na	6165na	9845na		0030-0100	Netherlands, Radio	6020na	6165na	9845na	9855as
0000-0100	New Zealand, R NZ Intl	17675pa						11655as	12090as		
0000-0100	North Korea, R Pyongyang	11845am	13650am	15230am		0030-0100	Sri Lanka, Sri Lanka BC	6005as	9730as	15425as	
0000-0100 vl	Papua New Guinea, NBC	9675do				0030-0100	Thailand, Radio	13695na			
0000-0100	Philippines, FEBC/R Intl	15450as				0030-0100	UK, BBC Asian Service	9410as	11955as		
0000-0002	Sierra Leone, SLBS	3316do				0030-0100 twhfa	USA, Voice of America	5995ca	6130ca	7405sa	9455ca
0000-0100	Singapore, R Corp Singapore	6150do						9775sa	11695ca	13740sa	
0000-0100	Spain, R Exterior Espana	6055am				0045-0100	Albania, R Tirana Intl	6115na	7160na		
						0050-0100	Italy, RAI Intl	6010na	9675na	11800na	

SELECTED PROGRAMS

Sundays

- 0000 BBC (AE/AS): Newdesk. World news and dispatches from overseas and UK correspondents.
- 0000 Canada, RCI Montreal: CBC Radio News. News, sports, and weather from the Canadian Broadcasting Corporation.
- 0000 USA, WBCQ Monticello ME: Worldwide Rock & Roll Party.
- 0007 Canada, RCI Montreal: Global Village. Vignettes about music in the little corners of the world.
- 0000 BBC (AE): Letter from America. Alistair Cooke, who celebrated his 90th birthday last month, shares his inimitable view of contemporary American life.
- 0000 BBC (AS): Write On. Air your views about World Service; write to PO Box 76, Bush House, Strand, London WC2B 4PH.
- 0000 USA, WBCQ Monticello ME: Chaos A.D.
- 0000 BBC (AS): Science View. A look at complex issues and the implications of the latest research findings.
- 0005 BBC (AE/AS): Britain Today. News about Britain.

Mondays

- 0000 BBC (AE): Chimes of Big Ben (7th). Hear the famous bells at this time on the first Monday of each month.
- 0000 BBC (AE/AS): Newdesk. See S 0000.
- 0000 Canada, RCI Montreal: CBC Radio News. See S 0000
- 0000 USA, WBCQ Monticello ME: Le Show.
- 0000 USA, WEWN Birmingham AL: Holiday Program (Advent Reflections) (7th). See F 0000.
- 0005 Canada, RCI Montreal: Roots and Wings. Philly Markowitz plays the rare, the beautiful and the unexpected music from the four corners of our world.
- 0000 BBC (AE): Westway Access. Explaining the soap opera as an English learning tool.
- 0000 BBC (AS): Variable Feature. See S 0130.
- 0000 UK, BBC London (AS): To Be Continued (7th, 14th). See A 0130.
- 0005 BBC (AE/AS): Britain Today. See S 0045.

Tuesdays

- 0000 BBC (AE/AS): Newdesk. See S 0000.
- 0000 Canada, RCI Montreal: As It Happens. See M 2330.
- 0000 Canada, RCI Montreal: The World at Six. See M 2300.
- 0000 USA, WBCQ Monticello ME: The Margo Sierra Show.

- 0030 BBC (AE): Westway. See M 0430.
- 0030 BBC (AS): Variable Feature. See S 0130.
- 0030 BBC (AS): Waveguide (22nd). See S 1515.
- 0045 BBC (AE/AS): Britain Today. See S 0045.

Wednesdays

- 0000 BBC (AE/AS): Newdesk. See S 0000.
- 0000 Canada, RCI Montreal: As It Happens. See M 2330.
- 0000 Canada, RCI Montreal: The World at Six. See M 2300.
- 0000 USA, WBCQ Monticello ME: The Margo Sierra Show.
- 0030 BBC (AE): Variable Feature. See S 0130.
- 0030 BBC (AS): Waveguide (23rd). See S 1515.
- 0030 BBC (AS): Variable Feature. See S 0130.
- 0030 UK, BBC London (AS): On Your Behalf. See S 0130.
- 0045 BBC (AE/AS): Britain Today. See S 0045.

Thursdays

- 0000 BBC (AE/AS): Newdesk. See S 0000.
- 0000 BBC (AS): Crimes of Big Ben (1). See M 0000.
- 0000 Canada, RCI Montreal: As It Happens. See M 2330.
- 0000 Canada, RCI Montreal: The World at Six. See M 2300.
- 0000 USA, WBCQ Monticello ME: The Margo Sierra Show.
- 0030 BBC (AE/AS): From Our Own Correspondent. See S 0330.
- 0045 BBC (AE/AS): Britain Today. See S 0045.

Fridays

- 0000 BBC (AE/AS): Newdesk. See S 0000.
- 0000 Canada, RCI Montreal: As It Happens. See M 2330.
- 0000 Canada, RCI Montreal: The World at Six. See M 2300.
- 0000 USA, WBCQ Monticello ME: The Margo Sierra Show.
- 0000 USA, WEWN Birmingham AL: Holiday Program (Advent Reflections) (11th). See F 0000.
- 0000 USA, WEWN Birmingham AL: Holiday Program (Advent Reflections) (4th). Special program for the Christmas season.
- 0030 BBC (AE): Westway. See M 0430.
- 0030 BBC (AS): Poems by Post. See S 1615.
- 0045 BBC (AE/AS): Britain Today. See S 0045.

Saturdays

- 0000 BBC (AE/AS): Newdesk. See S 0000.
- 0000 Canada, RCI Montreal: As It Happens. See M 2330.
- 0000 Canada, RCI Montreal: The World at Six. See M 2300.

- 0000 USA, WBCQ Monticello ME: The Margo Sierra Show.
- 0030 BBC (AE/AS): From the Weeklies. Review of the British weekly press.
- 0045 BBC (AE/AS): Britain Today. See S 0045.
- 0045 Canada, RCI Montreal: C'est la Vie. An irreverent and revealing current affairs program on Francophone

**HAUSER'S HIGHLIGHTS
CANADA: RCI**

- B-98 from Sackville in English includes:
- 0600-0629 M-F 6090 9750
- 1300-1359 daily 9640 13650 17715
- 1400-1459 M-F same
- 1400-1659 Sun same
- 2100-2159 9725 11945 13650
- 13690 15150 17820
- 2200-2229 5995 9805 11945
- 13690 15150
- 2300-2329 daily 5960 6040 9535 9755
- 11865
- 2330-2359 Sat, Sun same
- 2330-2459 M-F 5960 9755
- 0000-0029 Tue-Sat 6040 9535 11855
- 0000-0059 Sun, Mon 5960 9755
- 0200-0259 6155 9535 9755 9780
- 11865
- 0300-0329 Tue-Sat 6155 9755 9780
- 0300-0359 Sun, Mon same
- (RCI via Bill Westenhaver)
- (another version shows 11865 also at 0000, not 11855 -gh)

FREQUENCIES

0100-0200	Anguilla, Caribbean Beacon	6090am				0100-0200	Spain, R Exterior Espana	6055am			
0100-0200	Australia, Radio	9660pa 17715pa	12080as 17750as	15240pa 17795pa	15415as 21740pa	0100-0200	Sri Lanka, Sri Lanka BC	6005as	9730as	15425as	
0100-0200 vl	Australia, VL8K Katherine	5025do				0100-0130	Switzerland, Swiss R Intl	9885am	9905am		
0100-0200 vl	Australia, VL8T Tent Crk	4910do				0100-0200	UK, BBC Asian Service	5965as	6195as	9410as	9605as
0100-0200	Canada, CBC N Quebec Svc	9625do				0100-0200	UK, BBC World Service	11955as	15280as	15310as	15360as
0100-0200	Canada, CFRX Toronto	6070do				0100-0200	UK, Merlin Network One	5970sa	5975am	6175na	9590am
0100-0200	Canada, CFVP Calgary	6030do				0100-0200	Ukraine, R Ukraine Intl	9915sa	12095sa		
0100-0200	Canada, CHNX Halifax	6130do				0100-0200	USA, KAIJ Dallas TX	3985eu	7325eu	9560eu	
0100-0200	Canada, CKZN St John's	6160do				0100-0200	USA, KTBN Salt Lk City UT	5905eu	5915eu	6020eu	7180na
0100-0200	Canada, CKZU Vancouver	6160do				0100-0200	USA, KWHR Naalehu HI	7240eu	9445na	12050na	
0100-0200	Costa Rica, RF Peace Intl	6975am	15050am	21460am		0100-0200	USA, Voice of America	5810va	9815am		
0100-0105	Croatia, Croatian Radio	9925am				0100-0200	USA, WBCQ Monticello ME	7415na			
0100-0200	Cuba, Radio Havana	6000na	9820na	13605na		0100-0200	USA, WEWN Birmingham AL	5825eu	13615na		
0100-0127	Czech Rep, Radio Prague	6200na	7345na			0100-0200 stwhfa	USA, WGTG McCaysville GA	5085am	6890am		
0100-0200	Ecuador, HCJB	9745na	12015na	21455va		0100-0200	USA, WHRA Greenbush ME	7395va			
0100-0150	Germany, Deutsche Welle	9640am	6040na	6085na	6145am	0100-0200	USA, WHRI Noblesville IN	7315am			
0100-0130 m	Germany, V O Deliverance	6155na				0100-0200	USA, WHRI Noblesville IN	5745am			
0100-0200 s	Germany, Good News World R	6155eu				0100-0200 twhfsm	USA, WHRI Noblesville In	5755am			
0100-0200	Germany, Overcomer Ministr	11660as				0100-0200	USA, WINB Red Lion PA	11950am			
0100-0115	Ghana, Ghana Broadc Corp	3366do	4915do			0100-0200	USA, WJCR Upton KY	7490na	13595as		
0100-0200 vl	Guatemala, Radio Cultural	3300do				0100-0200	USA, WRMI/R Miami Intl	9955ca			
0100-0200	Indonesia, Voice of	9525as	11765as	15510as		0100-0200	USA, WRNO New Orleans LA	7355am			
0100-0130	Iran, VOIRI	6055eu	7260eu	9022eu	9685eu	0100-0200	USA, WSHB Cypress Crk SC	7535na	9430am		
0100-0200	Ireland, Unt Christian BC	6200do				0100-0200	USA, WWBS Macon GA	11905na			
0100-0110	Italy, RAI Intl	6010na	9675na	11800na		0100-0200	USA, WWCR Nashville TN	3215na	5070na	5935na	7435na
0100-0200	Japan, Radio/NHK	6150af	11860as	11870af	15325as	0100-0200	USA, WYFR Okeechobee FL	6065na	9505na	15165as	
		15570as	15590as	17685pa	17810as	0100-0130	Uzbekistan, R Tashkent	7190as	9375as	9530as	9715as
		17835sa	21670pa			0100-0127	Vietnam, Voice of	5940am	7250am		
0100-0200	Liberia, LCN/R Liberia Int	5100do				0125-0200	Netherlands, Radio	9855as	11655as	12090as	
0100-0200	Malaysia, Radio	7295do				0130-0200	Albania, R Tirana Intl	6220na	6228na	7160na	
0100-0200 vl	Namibia, NBC	3270af	3289af			0130-0200	Austria, R Austria Intl	7325na	9495sa	9870sa	
0100-0125	Netherlands, Radio	6020na	6165na	9845na	9855as	0130-0150	Greece, Voice of	7450na	9375na	9420na	11645na
		11655as	12090as			0130-0200	Sweden, Radio	9435as	11985au		
0100-0200	New Zealand, R NZ Intl	17675pa				0140-0200	Vatican State, Vatican R	5980as	7335as	9650as	
0100-0200 vl	Papua New Guinea, NBC	9675do									
0100-0200	Philippines, FEBC/R Intl	15450as									
0100-0130 mtwhfa	Serbia, Radio Yugoslavia	9580na	11870na								
0100-0200	Singapore, R Corp Singapore	6150do									
0100-0130	Slovakia, R Slovakia Intl	5930na	7300af	9440sa							

SELECTED PROGRAMS

Sundays

- 0100 BBC (AE): Newsdesk. See S 0000.
- 0100 BBC (AS): World News. Broadcast on the hour of 5, 10, or 15 minutes in length.
- 0100 USA, WBCQ Monticello ME: Hal Wacker.
- 0100 USA, WEWN Birmingham AL: Holiday Program (Catholic University of the Americas) (27th). Christmas concert encore.
- 0110 BBC (AS): Pause for Thought. Spiritual reflection.
- 0115 BBC (AS): Health Matters. Keeps track of new developments in the world of medical science, as well as ways of keeping fit.
- 0130 BBC (AE): Variable Feature. Special features and new series.
- 0130 BBC (AS): World News. See S 0100.
- 0130 UK, BBC London (AE): On Your Behalf. The return of the program for listeners with a keen sense of curiosity. Malcolm Billings fields the questions and finds the answers.
- 0145 BBC (AE/AS): Sports Roundup. The latest sports news.

Mondays

- 0100 BBC (AE): Newsdesk. See S 0000.
- 0100 BBC (AS): World News. See S 0100.
- 0100 USA, WBCQ Monticello ME: Radio New York International (live).
- 0110 BBC (AS): Pause for Thought. See S 0110.
- 0115 BBC (AS): The Farming World. Reports on new developments from around the world.
- 0130 BBC (AE): Variable Feature. See S 0130.
- 0130 BBC (AS): World News. See S 0100.
- 0145 BBC (AS): Sports Roundup. See S 0145.

Tuesdays

- 0100 BBC (AE): Newsdesk. See S 0000.
- 0100 BBC (AS): World News. See S 0100.
- 0100 USA, WBCQ Monticello ME: Scriptures for America.
- 0100 USA, WEWN Birmingham AL: Holiday Program (Pillars of Faith) (22nd). On the Incarnation.
- 0110 BBC (AS): Pause for Thought. See S 0110.

- 0115 BBC (AS): Insight. See M 1630.
- 0130 BBC (AE): Seven Days. See M 0615.
- 0130 BBC (AS): World News. See S 0100.
- 0145 BBC (AE): Variable Feature. See S 0130.
- 0145 BBC (AS): Sports Roundup. See S 0145.
- 0145 UK, BBC London (AE): Wood, Guts and Brass (1st, 8th). Michael Oliver meets some of the makers of musical instruments and talks to them about their craft.

Wednesdays

- 0100 BBC (AE): Newsdesk. See S 0000.
- 0100 BBC (AS): World News. See S 0100.
- 0100 USA, WBCQ Monticello ME: Scriptures for America.
- 0100 USA, WEWN Birmingham AL: Holiday Program (Mother Angelica Live) (23rd). Christmas special.
- 0110 BBC (AS): Pause for Thought. See S 0110.
- 0115 BBC (AS): Insight. See M 1630.
- 0130 BBC (AE): Discovery. See T 0230.
- 0130 BBC (AS): World News. See S 0100.
- 0145 BBC (AS): Sports Roundup. See S 0145.

Thursdays

- 0100 BBC (AE): Newsdesk. See S 0000.
- 0100 BBC (AS): World News. See S 0100.
- 0100 USA, WBCQ Monticello ME: Scriptures for America.
- 0110 BBC (AS): Pause for Thought. See S 0110.
- 0115 BBC (AS): Insight. See M 1630.
- 0130 BBC (AE): Omnibus. See M 0630.
- 0130 BBC (AS): World News. See S 0100.
- 0145 BBC (AS): Sports Roundup. See S 0145.

Fridays

- 0100 BBC (AE): Newsdesk. See S 0000.
- 0100 BBC (AS): World News. See S 0100.
- 0100 USA, WBCQ Monticello ME: Scriptures for America.
- 0100 Germany, Deutsche Welle: Christmas with Dresden's Famous Choir of the Holy Cross with Hardy Graupner (25th).
- 0100 Germany, Deutsche Welle: New Year's Concert on Radio Deutsche Welle (Jan 1st).
- 0110 BBC (AS): Pause for Thought. See S 0110.

- 0115 BBC (AS): Insight. See M 1630.
- 0130 BBC (AE): Composer of the Month. See T 0630.
- 0130 BBC (AS): World News. See S 0100.
- 0145 BBC (AS): Sports Roundup. See S 0145.

Saturdays

- 0100 BBC (AE): Newsdesk. See S 0000.
- 0100 BBC (AS): World News. See S 0100.
- 0100 USA, WBCQ Monticello ME: Khaos A.D.
- 0100 Germany, Deutsche Welle: Boxing Day Sports Special with Roy Forbes (26th).
- 0100 Germany, Deutsche Welle: A Home Away from Home? (Jan 2nd). Foreigners' impressions of life in Germany with Irene Quaille.
- 0110 BBC (AS): Insight. See M 1630.
- 0110 BBC (AS): Pause for Thought. See S 0110.
- 0130 BBC (AE): Variable Feature. See S 0130.
- 0130 BBC (AS): World News. See S 0100.
- 0130 UK, BBC London (AE): To Be Continued (5th, 12th). Investigating the popular forms of radio and TV drama programs.
- 0145 BBC (AE): Poems by Post. See S 1615.
- 0145 BBC (AS): Sports Roundup. See S 0145.

HAUSER'S HIGHLIGHTS
SWEDEN: R. SWEDEN

- B-98 English to NAM:
- 1230 UTC 7280 or 9455 kHz
- 1430 15240 or 17870, 21810
- 0230 7280 or 9455
- 0330 7115 or 9435
- (R. Sweden via Elmer Escoto)

FREQUENCIES

0200-0300	Anguilla, Caribbean Beacon	6090am				0200-0300	Taiwan, Radio Taipei Intl	5950na	9680na	11740am	11825pa
0200-0300 twhfa	Argentina, RAE	11710am						15345as			
0200-0300	Australia, Radio	9660pa	11880as	12080as	15240pa	0200-0300 vl	Tanzania, Radio	5050do			
		15415as	15510pa	17715pa	17750as	0200-0300	UK, BBC African Service	6135af			
		21725pa				0200-0300	UK, BBC Asian Service	9605as	11955as	15280as	15310as
0200-0300 vl	Australia, VL8K Katherine	5025do						15360as			
0200-0300 vl	Australia, VL8T Tent Crk	4910do				0200-0300	UK, BBC World Service	5970sa	5975am	6175na	6195eu
0200-0300	Canada, CBC N Quebec Svc	9625do						9410eu	9590am	9915sa	
0200-0300	Canada, CFRX Toronto	6070do				0200-0300	UK, Merlin Network One	3985eu	9560eu		
0200-0300	Canada, CFVP Calgary	6030do				0200-0300	USA, KAIJ Dallas TX	5810am	9815am		
0200-0300	Canada, CHNX Halifax	6130do				0200-0300 vl	USA, KJES Mesquite NM	7555am			
0200-0300	Canada, CKZN St John's	6160do				0200-0300	USA, KTBN Salt Lk City UT	7510am			
0200-0300	Canada, CKZU Vancouver	6160do				0200-0300	USA, KWHR Naalehu HI	17510as			
0200-0259	Canada, R Canada Intl	6155am	9535am	9755am	9780am	0200-0300	USA, Voice of America	7115as	7200as	9740as	9850as
		11865am						11705as	15250as	15300as	17740as
		4955va				0200-0300	USA, WBCQ Monticello ME	7415na			
0200-0300 twhfa	Colombia, Rdif Nacional	6975am	15050am	21460am		0200-0300	USA, WEWN Birmingham AL	5825eu			
0200-0300	Costa Rica, RF Peace Intl	9925am				0200-0300 stwhfa	USA, WGTG McCaysville GA	5085am	6890am		
0200-0205	Croatia, Croatian Radio	9925am				0200-0300	USA, WHRA Greenbush ME	7395va			
0200-0300	Cuba, Radio Havana	6000na	9820na	13605na		0200-0300	USA, WHRI Noblesville IN	7315am			
0200-0300	Ecuador, HCJB	9745na	12015na	21455va		0200-0300 twhfas	USA, WHRI Noblesville IN	5745am			
0200-0300	Egypt, Radio Cairo	9475na				0200-0300 sm	USA, WHRI Noblesville IN	5755am			
0200-0250	Germany, Deutsche Welle	6035as	7225as	7285as	9515as	0200-0300	USA, WINB Red Lion PA	11950am			
		9615as	9815as			0200-0300	USA, WJCR Upton KY	7490na	13595as		
		11660as				0200-0300 vl	USA, WRMI/R Miami Intl	9955ca			
0200-0300	Germany, Overcomer Ministr	9580na	11685na			0200-0300	USA, WRNO New Orleans LA	7355am			
0200-0230	Hungary, Radio Budapest	6200do				0200-0300	USA, WSHB Cypress Crk SC	5850na	7535va		
0200-0300	Ireland, Unt Christian BC	4885co	4935do			0200-0300	USA, WWBS Macon GA	11905na			
0200-0300	Kenya, Kenya Broadc Corp	7295co				0200-0300	USA, WWCR Nashville TN	3215na	5070na	5935na	7435na
0200-0300	Malaysia, Radio	7185co				0200-0300	USA, WYFR Okeechobee FL	6065na	9505na		
0200-0250	Myanmar, Radio	3270af	3289af			0215-0225	Nepal, Radio	5005do	7165do		
0200-0300 vl	Namibia, NBC	9855as	11655as	12090as		0225-0300	Netherlands, Radio	9855as	11655as		
0200-0225	Netherlands, Radio	17675pa				0230-0257	Czech Rep, Radio Prague	9480me	11600as		
0200-0300	New Zealand, R NZ Intl	9675do				0230-0245	Pakistan, Radio	7485as	11975as	15489as	
0200-0300 vl	Papua New Guinea, NBC	1545cas				0230-0300 vl	Philippines, R Pilipinas	11885as	15120as	15270as	
0200-0300	Philippines, FEBC/R Intl	6155na	9570na	9690as	11740as	0230-0300	Sweden, Radio	7280am	9455am		
0200-0300	Romania, R Romania Intl	11940as	15380as			0230-0300	UK, BBC World Service	9895am			
0200-0300	Russia, Voice of Russia WS	7105ra	12050na	15425na	15520na	0230-0300	Vietnam, Voice of	5940am			
0200-0300	Singapore, R Corp Singapore	6150do				0250-0300 sf	Greece, Voice of	7450na	9375na	9420na	11645na
0200-0300	South Korea, R Korea Intl	7275am	11725am	11810am	15575am	0250-0300	Vatican State, Vatican R	7305ca	9605am		
0200-0300	Sri Lanka, Sri Lanka BC	6005as	9730as	15425as							

SELECTED PROGRAMS

Sundays

- 0200 BBC (AE/AF/AS): Newday. Coverage of the breaking stories and a background briefing on the main news issues of the day.
- 0200 Canada, RCI Montreal: RCI News. News, weather, and sports from Radio Canada International.
- 0200 USA, WBCQ Monticello ME: Khaos A.D.
- 0207 Canada, RCI Montreal: Venture Canada. A new weekly magazine promoting Canadian business achievement.
- 0230 BBC (AE): Music Review. News and views from the world of music.
- 0230 BBC (AF): In Praise of God. Weekly programme of worship and meditation.
- 0230 BBC (AS): Letter from America. See S 0030.
- 0230 USA, WBCQ Monticello ME: Radio Free New York (live).
- 0231 Canada, RCI Montreal: Earth Watch. The magazine on environment, science and ecology matters.
- 0245 BBC (AS): Variable Feature. See S 0130.
- 0245 UK, BBC London (AS): Wood, Guts and Brass (6th). See T 0145.

Mondays

- 0200 BBC (AE/AF/AS): Newday. See S 0200.
- 0200 Canada, RCI Montreal: RCI News. See S 0200.
- 0200 USA, WBCQ Monticello ME: Radio New York International (live).
- 0207 Canada, RCI Montreal: The Arts in Canada. A look at the Canadian arts scene.
- 0230 BBC (AE): Meridian Arts. See S 0630.
- 0230 BBC (AF): Variable Feature. See S 0130.
- 0230 BBC (AS): The Works. Alun Lewis looks at the impact of tomorrow's technology.
- 0231 Canada, RCI Montreal: The Mailbag. See S 1437.

Tuesdays

- 0200 BBC (AE/AF/AS): Newday. See S 0200.
- 0200 Canada, RCI Montreal: RCI News. See S 0200.
- 0200 USA, WBCQ Monticello ME: The Hour of the Time (live).
- 0200 USA, WEWN Birmingham AL: Holiday Program (EWTN Radio Christmas Card) (22nd).
- 0211 Canada, RCI Montreal: Spectrum. See M 1439.
- 0230 BBC (AE): Meridian On Screen. The latest cinematic offerings are discussed.
- 0230 BBC (AF): Variable Feature. See S 0130.

- 0230 BBC (AS): Discovery. In-depth look at scientific research.
- 0230 UK, BBC London (AF): Wood, Guts and Brass (1st.8th). See T 0145.
- 0245 BBC (AF): Seven Days. See M 0615.
- 0255 Canada, RCI Montreal: News. See S 1600.

Wednesdays

- 0200 BBC (AE/AF/AS): Newday. See S 0200.
- 0200 Canada, RCI Montreal: RCI News. See S 0200.
- 0200 USA, WBCQ Monticello ME: The Hour of the Time (live).
- 0200 USA, WEWN Birmingham AL: Holiday Program (Catholic University of the Americas) (23rd). Christmas concert.
- 0200 USA, WEWN Birmingham AL: Holiday Program (The Joy of Music) (9th). Handel's Messiah.
- 0211 Canada, RCI Montreal: Spectrum. See M 1439.
- 0230 BBC (AE): Meridian. A topical program about the world of the arts featuring books, a live report about theater, or a special event.
- 0230 BBC (AF): The Farming World. See M 0115.
- 0230 BBC (AS): One Planet. Charles Haviland and Richard Black host this new program about development and the environment.
- 0245 BBC (AF): Record News. See S 1230.
- 0255 Canada, RCI Montreal: News. See S 1600.

Thursdays

- 0200 BBC (AE/AF/AS): Newday. See S 0200.
- 0200 Canada, RCI Montreal: RCI News. See S 0200.
- 0200 USA, WBCQ Monticello ME: The Hour of the Time (live).
- 0211 Canada, RCI Montreal: Spectrum. See M 1439.
- 0230 BBC (AE): Meridian Books. A discussion of a current book of note.
- 0230 BBC (AF): Assignment. A weekly examination of a topical issue.
- 0230 BBC (AS): Variable Feature. See S 0130.
- 0230 UK, BBC London (AE/AS): The Idea of the City (3rd,10th). See T 0330.
- 0255 Canada, RCI Montreal: News. See S 1600.

Fridays

- 0200 BBC (AE/AF/AS): Newday. See S 0200.
- 0200 Canada, RCI Montreal: RCI News. See S 0200.
- 0200 USA, WBCQ Monticello ME: The Hour of the Time (live).
- 0200 USA, WEWN Birmingham AL: Holiday Program (Adeste Fideles) (1st th). The Christmas story told in words and music.

- 0200 Germany, Deutsche Welle: Christmas with Dresden's Famous Choir of the Holy Cross with Hardy Graupner (25th).
- 0200 Germany, Deutsche Welle: New Year's Concert on Radio Deutsche Welle (Jan 1st).
- 0211 Canada, RCI Montreal: Spectrum. See M 1439.
- 0230 EBC (AE): Focus on Faith. Alison Hilliard talks to church leaders about their hopes for the future.
- 0230 EBC (AF): Variable Feature. See S 0130.
- 0230 BBC (AS): Assignment. See H 0230.
- 0255 Canada, RCI Montreal: News. See S 1600.

Saturdays

- 0200 BBC (AE/AF/AS): Newday. See S 0200.
- 0200 Canada, RCI Montreal: RCI News. See S 0200.
- 0200 USA, WBCQ Monticello ME: Friday Night Live.
- 0200 Germany, Deutsche Welle: Boxing Day Sports Special with Foy Forbes (26th).
- 0200 Germany, Deutsche Welle: A Home Away from Home? (Jan 2nd). See A 0100.
- 0211 Canada, RCI Montreal: Spectrum. See M 1439.
- 0230 BBC (AE/AF/AS): People and Politics. Background to the British political scene.
- 0255 Canada, RCI Montreal: News. See S 1600.

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FREQUENCIES

0300-0400	Anguilla, Caribbean Beacon	6090am				0300-0400	UK, BBC African Service	3255af	6005af	6190af	9600af
0300-0400	Australia, Radio	9660pa 15510pa	12080as 17715pa	15240pa 17750as	15415as 21725pa	0300-0400	UK, BBC Asian Service	11730af 9605as 21660as	15310as	15360as	17790as
0300-0400 vl	Australia, VL8K Katherine	5025do				0300-0330	UK, BBC World Service	5970sa 9410eu 12095me	5975am 9895am	6175na 9915sa	6195eu 11760me
0300-0400 vl	Australia, VL8T Tent Crk	4910do				0300-0400	UK, Merlin Network One	3985eu			
0300-0400	Australia, Defense Forces R	14790as				0300-0400	USA, KAIJ Dallas TX	5810va	9815am		
0300-0330 smwfa	Belarus, R Belarus Intl	7105eu	7210eu			0300-0330 vl	USA, KJES Mesquite NM	7555na			
0300-0400	Bulgaria, Radio	7375na	9485na			0300-0400	USA, KTBN Salt Lk City UT	7510am			
0300-0400 vl	Canada, CBC N Quebec Svc	9625do				0300-0400	USA, KWHR Naalehu HI	17510as			
0300-0400	Canada, CFRX Toronto	6070do				0300-0400	USA, Voice of America	6035af 7340af	6080af 7415af	7105af 9575af	7290af 9885af
0300-0400	Canada, CFVP Calgary	6030do				0300-0330 mtwh	USA, Voice of America	4960af			
0300-0400	Canada, CHNX Halifax	6130do				0300-0400	USA, WBCQ Monticello ME	7415na			
0300-0400	Canada, CKZN St John's	6160do				0300-0400	USA, WEWN Birmingham AL	5825eu			
0300-0400	Canada, CKZU Vancouver	6160do				0300-0400 stwhfa	USA, WGTG McCaysville GA	5085am	6890am		
0300-0329 twhfa	Canada, R Canada Intl	6155am	9755am	9780am		0300-0400	USA, WHRA Greenbush ME	7465va			
0300-0359 sm	Canada, R Canada Intl	6155am	9755am	9780am		0300-0400	USA, WHRI Noblesville IN	7315am			
0300-0400	China, China Radio Intl	9690am				0300-0400 twhfaf	USA, WHRI Noblesville IN	5745am			
0300-0400	Costa Rica, RF Peace Intl	7975am	15050am			0300-0400 sm	USA, WHRI Noblesville IN	5755am			
0300-0305	Croatia, Croatian Radio	9925na				0300-0400	USA, WINB Red Lion PA	11950am			
0300-0400	Cuba, Radio Havana	6000na	9820na	13605na		0300-0400	USA, WJCR Upton KY	7490na	13595as		
0300-0327	Czech Rep, Radio Prague	7345na	9435na			0300-0400	USA, WRMI/R Miami Intl	9955ca			
0300-0400	Ecuador, HCJB	9745na	12015na	21455va		0300-0400	USA, WRNO New Orleans LA	7355am			
0300-0330	Egypt, Radio Cairo	9475am				0300-0400	USA, WSHB Cypress Crk SC	5850na	7535va		
0300-0350	Germany, Deutsche Welle	6045na	6120na	9535am	9640na	0300-0400	USA, WWBS Macon GA	11905na			
0300-0400	Germany, Overcomer Ministr	11660as				0300-0400	USA, WWCR Nashville TN	3215na	5070na	5935na	7435na
0300-0400 vl	Guatemala, Radio Cultural	3300do				0300-0400	USA, WYFR Okeechobee FL	6065na			
0300-0400	Iraq, Radio Iraq Intl	11785am				0300-0310	Vatican State, Vatican R	7305ca	9605am		
0300-0400	Ireland, Unt Christian BC	6200do				0300-0400	Zambia, Natl BC Corp	6165do	6265do		
0300-0400 as/vl	Italy, IRRS	7120va				0300-0400 vl	Zimbabwe, Zimbabwe BC	3306do	4828do		
0300-0400	Japan, Radio/NHK	17810as	17825ca	21610pa		0310-0340	Vatican State, Vatican R	7360af	9660af		
0300-0400	Kenya, Kenya Broadc Corp	4885do	4935do			0330-0357	Czech Rep, Radio Prague	9480va	11600as		
0300-0400	Kyrgyzstan, Kyrgyz Radio	4010do	4050do			0330-0400	Finland, YLE/R Finland	9780eu	11900am		
0300-0400 vl	Lesotho, Radio Lesotho	4800do				0330-0400	Hungary, Radio Budapest	9840na	11910na		
0300-0400	Malaysia, Radio	7295do				0330-0400 vl	Philippines, R Pilipinas	13770as	15330as	17730as	
0300-0325	Moldova, R Moldova Intl	7520na				0330-0400	Sweden, Radio	7115am	9435am		
0300-0400 vl	Namibia, NBC	3270af	3289af			0330-0355	UAE, Radio Dubai	12005na	13675na	15400na	
0300-0325	Netherlands, Radio	9855as	11655as			0330-0400	UK, BBC African Service	9610af			
0300-0400	New Zealand, R NZ Intl	17675pa				0330-0400	UK, BBC Asian Service	5975am	6175na	9895am	11760me
0300-0400 vl	Papua New Guinea, NBC	9675do				0330-0400	UK, BBC World Service	12095me			
0300-0330 vl	Philippines, R Pilipinas	11885as	15120as	15270as		0330-0400 s	UK, BBC World Service	6180eu	6195eu	9410eu	
0300-0400	Russia, Voice of Russia WS	7105na 15595na	12050na	15425na	15520na	0330-0400	Vietnam, Voice of	5905am	7260am		
0300-0325	S Africa, Channel Africa	9525af				0340-0350	Greece, Voice of	7450na	9375na	9420na	11645na
0300-0400	Singapore, R Corp Singapore	6150do				0345-0400	Tajikistan, Radio	7245as	9905as	11620as	
0300-0400	Sri Lanka, Sri Lanka BC	6005as	9730as	15425as		0345-0400 as	Uganda, Radio	4976do			
0300-0400	Taiwan, Radio Taipei Intl	5950na 15345as	9680na	11745as	11825as	0356-0400	Zambia, Christian Voice	3330af	6065af		
0300-0400 vl	Tanzania, Radio	5050do									
0300-0330	Thailand, Radio	15460na									
0300-0315 mtwhf	Uganda, Radio	4976do									

SELECTED PROGRAMS

Sundays

- 0300 BBC (AE/AF/AS): World News. See S 0100.
- 0300 Canada, RCI Montreal: CBC Radio News. See S 0000.
- 0300 USA, WBCQ Monticello ME: Radio Free New York (live).
- 0305 BBC (AE/AF): World Business Review. A look back at the previous week's business and a preview of upcoming events.
- 0305 BBC (AE/AF/AS): Sports Roundup. See S 0145.
- 0306 Canada, RCI Montreal: The Vinyl Cafe. Host Stuart McLean with gossip and music from the neighborhood music store or with a live concert from around Canada.
- 0330 BBC (AE): From Our Own Correspondent. BBC correspondents comment on the background to the news.
- 0330 BBC (AF): African Quiz (1). A monthly test of the listener's knowledge of Africa.
- 0330 BBC (AF): Postmark Africa. Expert answers to any question under the sun.
- 0330 BBC (AS): Global Business. NEW! Roger White presents this weekly series of interviews, features and discussions with the movers and shakers of the international business community.

Mondays

- 0300 BBC (AE/AF/AS): World News. See S 0100.
- 0300 Canada, RCI Montreal: CBC Radio News. See S 0000.
- 0300 USA, WBCQ Monticello ME: Radio New York International (live).
- 0305 BBC (AE/AF): Write On. See S 0030.
- 0306 Canada, RCI Montreal: Tapestry. A look at the broad range of spiritual and human issues facing people of various cultures and religions.
- 0315 BBC (AE/AF/AS): Sports Roundup. See S 0145.
- 0330 BBC (AE): The Works. See M 0230.
- 0330 BBC (AF): Network Africa. Breakfast show of news, sport, personalities, music, and listener's comments.
- 0330 BBC (AS): Off the Shelf. Daily readings from the best of world literature.

0345 BBC (AS): Westway Access. See M 0030.

Tuesdays

- 0300 BBC (AE/AF/AS): World News. See S 0100.
- 0300 Canada, RCI Montreal: CBC Radio News. See S 0000.
- 0300 USA, WBCQ Monticello ME: The Hour of the Time (live).
- 0305 BBC (AE/AF): World Business Report. See M 1205.
- 0311 Canada, RCI Montreal: Spectrum. See M 1439.
- 0315 BBC (AE/AF/AS): Sports Roundup. See S 0145.
- 0330 BBC (AE): Variable Feature. See S 0130.
- 0330 BBC (AF): Network Africa. See M 0330.
- 0330 BBC (AS): Off the Shelf. See M 0330.
- 0330 UK, BBC London (AE): The Idea of the City (1st, 8th, 15th). John Pickford looks at the evolution of cities through history and the impact of urban life on human behavior.
- 0345 BBC (AS): Westway. See M 0430.

Wednesdays

- 0300 BBC (AE/AF/AS): World News. See S 0100.
- 0300 Canada, RCI Montreal: CBC Radio News. See S 0000.
- 0300 USA, WBCQ Monticello ME: The Hour of the Time (live).
- 0305 BBC (AE/AF): World Business Report. See M 1205.
- 0311 Canada, RCI Montreal: Spectrum. See M 1439.
- 0315 BBC (AE/AF/AS): Sports Roundup. See S 0145.
- 0330 BBC (AE): One Planet. See W 0230.
- 0330 BBC (AF): Network Africa. See M 0330.
- 0330 BBC (AS): Off the Shelf. See M 0330.
- 0345 BBC (AS): Science Extra. See S 1501.

Thursdays

- 0300 BBC (AE/AF/AS): World News. See S 0100.
- 0300 Canada, RCI Montreal: CBC Radio News. See S 0000.
- 0300 USA, WBCQ Monticello ME: The Hour of the Time (live).
- 0305 BBC (AE/AF): World Business Report. See M 1205.
- 0311 Canada, RCI Montreal: Spectrum. See M 1439.
- 0315 BBC (AE/AF/AS): Sports Roundup. See S 0145.
- 0330 BBC (AE): Variable Comedy/Quiz Feature. See W 1130.

0330 BBC (AF): Network Africa. See M 0330.

0330 BBC (AS): Off the Shelf. See M 0330.

0345 BBC (AS): Westway. See M 0430.

Fridays

- 0300 BBC (AE/AF/AS): World News. See S 0100.
- 0300 Canada, RCI Montreal: CBC Radio News. See S 0000.
- 0300 USA, WBCQ Monticello ME: The Hour of the Time (live).
- 0300 Germany, Deutsche Welle: Christmas with Dresden's Famous Choir of the Holy Cross with Hardy Graupner (25th).
- 0300 Germany, Deutsche Welle: New Year's Concert on Radio Deutsche Welle (Jan 1st).
- 0305 BBC (AE/AF): World Business Report. See M 1205.
- 0311 Canada, RCI Montreal: Spectrum. See M 1439.
- 0315 BBC (AE/AF/AS): Sports Roundup. See S 0145.
- 0330 BBC (AE): Assignment. See H 0230.
- 0330 BBC (AF): Network Africa. See M 0330.
- 0330 BBC (AS): Off the Shelf. See M 0330.
- 0345 BBC (AS): The Learning Zone. See S 1515.
- 0345 BBC (AS): Waveguide (25th). See S 1515.

Saturdays

- 0300 BBC (AE/AF/AS): World News. See S 0100.
- 0300 Canada, RCI Montreal: CBC Radio News. See S 0000.
- 0300 USA, WBCQ Monticello ME: Friday Night Live.
- 0300 Germany, Deutsche Welle: Boxing Day Sports Special with Roy Forbes (26th).
- 0300 Germany, Deutsche Welle: A Home Away from Home? (Jan 2nd). See A 0100.
- 0305 BBC (AE/AF): World Business Report. See M 1205.
- 0311 Canada, RCI Montreal: Spectrum. See M 1439.
- 0315 BBC (AE/AF/AS): Sports Roundup. See S 0145.
- 0330 BBC (AE): Science in Action. See F 1430.
- 0330 BBC (AF): Focus on Faith. See F 0230.
- 0330 BBC (AS): The Vintage Chart Show. See H 1530.

FREQUENCIES

0400-0500	Anguilla, Caribbean Beacon	6090am				0400-0500	UK, BBC African Service	3255af	6005af	6190af	7160af
0400-0500	Australia, Radio	9660pa	12080as	15240pa	15415as			9600af	15420af		
		15150pa	17715pa	17750as	21725pa	0400-0500	UK, BBC Asian Service	9605as	11955as	15280as	15310as
0400-0500 vl	Australia, VL8K Katherine	5025do						17790as	21660as		
0400-0500 vl	Australia, VL8T Tent Crk	4910do				0400-0430	UK, BBC World Service	3955eu	5975am	6175na	6180eu
0400-0500	Australia, Defense Forces R	14790as						6195eu	9410eu	9895am	11760me
0400-0500	Canada, CBC N Quebec Svc	9625do						12095eu	15575as	17640eu	
0400-0500	Canada, CFRX Toronto	6070do				0400-0500	UK, Merlin Network One	3985eu			
0400-0500	Canada, CFVP Calgary	6030do				0400-0500	UK, Merlin Network One	3985eu			
0400-0500	Canada, CHNX Halifax	6130do				0400-0500	Ukraine, R Ukraine Intl	6020eu	6080eu	7410eu	9550na
0400-0500	Canada, CKZN St John's	6160do						12040na	13590na		
0400-0500	Canada, CKZU Vancouver	6160do				0400-0500	USA, KAIJ Dallas TX	5810va	9815am		
0400-0429	Canada, R Canada Intl	6150me	9505me	9645me		0400-0500	USA, KTVB Salt Lk City UT	7510am			
0400-0500	China, China Radio Intl	9560am	9730am			0400-0500	USA, KVOH Los Angeles CA	9975am			
0400-0500	Costa Rica, RF Peace Intl	6975am	15050am			0400-0500	USA, KWHR Naalehu HI	17780as			
0400-0405	Croatia, Croatian Radio	9925na				0400-0500	USA, Voice of America	6035af	6080af	7170af	7290af
0400-0500	Cuba, Radio Havana	6000na	9820na	13605na				7415af	9575af	9885af	
0400-0500	Ecuador, HCJB	9745na	12015na	21455va		0400-0500	USA, WBCQ Monticello ME	7415na			
0400-0450	Germany, Deutsche Welle	6015af	6065af	7225af	7280af	0400-0500	USA, WEWN Birmingham AL	5825eu			
		9565af				0400-0500 stwhfa	USA, WGTG McCaysville GA	5085am	6890am		
0400-0500	Germany, Overcomer Minist	9605as				0400-0500	USA, WHRA Greenbush ME	7465va			
0400-0500 vl	Guatemala, Radio Cultural	3300do				0400-0500	USA, WHRI Noblesville IN	5755am	7315am		
0400-0500	Ireland, Unt Christian BC	6200do				0400-0500 sm	USA, WHRI Noblesville IN	5755am			
0400-0500 as/vl	Italy, IRRS	7120va				0400-0500	USA, WINB Red Lion PA	11950am			
0400-0500	Kenya, Kenya Broadc Corp	4885do	4935do			0400-0500	USA, WJCR Upton KY	7490na	13595as		
0400-0500 vl	Lesotho, Radio Lesotho	4800do				0400-0500 mtwhfa	USA, WMK Bethel PA	9465va			
0400-0410 vl/m-f	Malawi, MBC	5993do				0400-0500 m	USA, WRMI/R Miami Intl	9955ca			
0400-0500	Malaysia, Radio	7295do				0400-0500	USA, WRNO New Orleans LA	7395am			
0400-0500 vl	Malaysia, RTM Kuching	7160do				0400-0500	USA, WSHB Cypress Crk SC	7535eu	9840af	12020af	
0400-0430 mtwhfa	Mexico, Radio Mexico Intl	5935na	9705na			0400-0500	USA, WWBS Macon GA	11905na			
0400-0425	Moldova, R Moldova Intl	7520na				0400-0500	USA, WWCR Nashville TN	2390na	3215na	5070na	5935na
0400-0500	New Zealand, R NZ Intl	17575pa				0400-0500	USA, WYFR Okeechobee FL	6065na	9505na	9985va	
0400-0500 vl	Papua New Guinea, NBC	9675do				0400-0500	Zambia, Christian Voice	3330af	6065af		
0400-0500	Romania, R Romania Intl	9570na	11940na	15325as	17720as	0400-0500	Zambia, Natl BC Corp	6165do	6265do		
0400-0500	Russia, Voice of Russia WS	9825na	12000na	12050na	13640na	0400-0500 vl	Zimbabwe, Zimbabwe BC	3306do	4828do		
		13790na	15425na	15455na	15595na	0415-0440 vl	Italy, RAI Intl	5975af	7235af		
0400-0430	S Africa, Channel Africa	5955af				0425-0500	Nigeria, FRCN/Radio	3326do	4770do	4990do	
0400-0500	Singapore, R Corp Singapore	6150do				0430-0500	Netherlands, Radio	6165na	9590na		
0400-0430	Sri Lanka, Sri Lanka BC	6005as	9730as	15425as		0430-0500	Swaziland, Trans World R	3200af	4775af		
0400-0430	Switzerland, Swiss R Intl	9885am	9905am			0430-0500	UK, BBC World Service	5975am	6175am	11760me	15575as
0400-0500 vl	Tanzania, Radio	5050do						17640me			
0400-0500	Turkey, Voice of	6010va	7240va	9655va	21715va	0430-0500 as	UK, BBC World Service	3955eu	6180eu	6195eu	9410eu
0400-0415	Uganda, Radio	4976do						12095eu			
						0455-0500	Nigeria, Voice of	7255af	15120af		

SELECTED PROGRAMS

Sundays

- 0400 BBC (AE/AF/AS): Newdesk. See S 0000.
- 0400 Canada, RCI Montreal: RCI News. See S 0200.
- 0400 USA, WBCQ Monticello ME: The Fred Flintstone Music Show.
- 0405 Canada, RCI Montreal: Venture Canada. See S 020*.
- 0430 BBC (AE): Global Business. See S 0330.
- 0430 BBC (AF): Art Beat. A new arts program for Africa.
- 0430 BBC (AS): From Our Own Correspondent. See S 0530.

Mondays

- 0400 BBC (AE/AF/AS): The World Today. Examines thoroughly a topical aspect of the international scene.
- 0400 Canada, RCI Montreal: RCI News. See S 0200.
- 0400 USA, WBCQ Monticello ME: Radio New York International (live).
- 0407 Canada, RCI Montreal: The Mailbag. See S 1437.
- 0430 BBC (AE): Westway. The World Service's first-ever regular drama (soap opera) serial.
- 0430 BBC (AF): Network Africa. See M 0330.
- 0430 BBC (AS): Variable Music Feature. See S 1130.
- 0430 UK, BBC London (AS): Electronic Jukebox. See M *530.

Tuesdays

- 0400 BBC (AE/AF/AS): The World Today. See M 0400.
- 0400 Canada, RCI Montreal: RCI News. See S 0200.
- 0400 USA, WBCQ Monticello ME: The Hour of the Time (live).
- 0411 Canada, RCI Montreal: Spectrum. See M 1439.
- 0430 BBC (AE): Insight. See M 1630.
- 0430 BBC (AF): Network Africa. See M 0330.
- 0430 BBC (AS): Multitrack Hit-List. See M 1615.
- 0445 BBC (AE): Off the Shelf. See M 0330.

Wednesdays

- 0400 BBC (AE/AF/AS): The World Today. See M 0400.

- 0400 Canada, RCI Montreal: RCI News. See S 0200.
- 0400 USA, WBCQ Monticello ME: The Hour of the Time (live).
- 0411 Canada, RCI Montreal: Spectrum. See M 1439.
- 0430 BBC (AE): Insight. See M 1630.
- 0430 BBC (AF): Network Africa. See M 0330.
- 0430 BBC (AS): Megamix. See T 1615.
- 0455 BBC (AE): Off the Shelf. See M 0330.

Thursdays

- 0400 BBC (AE/AF/AS): The World Today. See M 0400.
- 0400 Canada, RCI Montreal: RCI News. See S 0200.
- 0400 USA, WBCQ Monticello ME: The Hour of the Time (live).
- 0411 Canada, RCI Montreal: Spectrum. See M 1439.
- 0430 BBC (AE): Insight. See M 1630.
- 0430 BBC (AF): Network Africa. See M 0330.
- 0430 BBC (AS): Multitrack X-Press. See W 1615.
- 0455 BBC (AE): Off the Shelf. See M 0330.

Fridays

- 0400 BBC (AE/AF/AS): The World Today. See M 0400.
- 0400 Canada, RCI Montreal: RCI News. See S 0200.
- 0400 USA, WBCQ Monticello ME: The Hour of the Time (live).
- 0400 Germany, Deutsche Welle: Christmas with Dresden's Famous Choir of the Holy Cross with Hardy Graupner (25th).
- 0400 Germany, Deutsche Welle: New Year's Concert on Radio Deutsche Welle (Jan 1st).
- 0411 Canada, RCI Montreal: Spectrum. See M 1439.
- 0430 BBC (AE): Insight. See M 1630.
- 0430 BBC (AF): Network Africa. See M 0330.
- 0430 BBC (AS): John Peel. See M 1130.
- 0445 BBC (AE): Off the Shelf. See M 0330.

Saturdays

- 0400 BBC (AE/AF/AS): Newdesk. See S 0000.
- 0400 Canada, RCI Montreal: RCI News. See S 0200.

- 0400 USA, WBCQ Monticello ME: Friday Night Live.
- 0400 Germany, Deutsche Welle: Boxing Day Sports Special with Roy Forbes (26th).
- 0400 Germany, Deutsche Welle: A Home Away from Home? (Jan 2nd). See A 0100.
- 0411 Canada, RCI Montreal: Spectrum. See M 1439.
- 0430 BBC (AE): Insight. See M 1630.
- 0430 BBC (AE): Weekend (Eu). European magazine program co-produced by European broadcasters.
- 0430 BBC (AF): African News. News bulletins with the latest reports from across the continent.
- 0430 BBC (AS): Multitrack Alternative. See F 1430.
- 0431 BBC (AF): African Quiz (1). See S 0330.
- 0431 BBC (AF): This Week and Africa. A roundup of the week's political developments across the continent.
- 0445 BBC (AE): Off the Shelf. See M 0330.

PROPAGATION FORECASTING

JACQUES D'AVIGNON, VE3VIA
248 TOWERHILL ROAD
PETERBOROUGH, ON K9H 7N1
CANADA

DISTRIBUTOR ASAPS PROPAGATION SOFTWARE
E-MAIL: MONITOR@RAC.CA

FREQUENCIES

0500-0600	Anguilla, Caribbean Beacon	6090am				0500-0600	UK, BBC African Service	3255af	6005af	6190af	7160af
0500-0600	Australia, Radio	9660pa	12080as	15240pa	15510pa	0500-0600	UK, BBC Asian Service	9600af	15420af	17885af	
		17715pa	21820pa					9740as	11955as	15280as	15310as
0500-0600 vl	Australia, VL8K Katherine	5025do						15360as	17760as	17790as	21660as
0500-0600 vl	Australia, VL8T Tent Crk	4910do				0500-0600	UK, BBC World Service	3955eu	5975am	6175am	6180eu
0500-0600 vl	Cameroon, Radio Cameroon	4850do						6195eu	9410eu	11760me	12095eu
0500-0600	Canada, CBC N Quebec Svc	9625do						15575eu	17640me		
0500-0600	Canada, CFRX Toronto	6070do				0500-0600	UK, Merlin Network One	3985eu			
0500-0600	Canada, CFVP Calgary	6030do				0500-0600	USA, KAIJ Dallas TX	5810va	9815am		
0500-0600	Canada, CHNX Halifax	6130do				0500-0600	USA, KTVB Salt Lk City UT	7510am			
0500-0600	Canada, CKZU Vancouver	6160do				0500-0600	USA, KVOH Los Angeles CA	9975am			
0500-0600	Costa Rica, RF Peace Intl	6975am	15050am			0500-0600	USA, KWHR Naalehu HI	17780as			
0500-0505	Croatia, Croatian Radio	5945eu				0500-0600	USA, Voice of America	5970af	6035af	6080af	7170af
0500-0600	Cuba, Radio Havana	9550na	9820na	9830na				7295af	9700af	9775af	11825af
0500-0600	Ecuador, HCJB	9745na	12015na	21455va				12080af	15205me		
0500-0550	Germany, Deutsche Welle	5960na	6100na	6120na	6185na	0500-0600	USA, WBCQ Monticello ME	7415na			
0500-0600	Germany, Overcomer Ministr	13810as				0500-0600	USA, WEWN Birmingham AL	5825eu			
0500-0600	Ireland, Unt Christian BC	6200do				0500-0600 stwhfa	USA, WGTG McCaysville GA	5085am			
0500-0515	Israel, Kol Israel	9435eu	11605eu	17535va		0500-0600	USA, WHRA Greenbush ME	7435va			
0500-0600 as/vl	Italy, IRRS	7120va				0500-0600	USA, WHRI Noblesville IN	5755am	7315am		
0500-0600	Japan, Radio/NHK	6110na	7230eu	9835na	11715as	0500-0600 sm	USA, WHRI Noblesville IN	5755am			
		11760as	11840as	11850pa	15230pa	0500-0600	USA, WINB Red Lion PA	11950am			
		15990as				0500-0600	USA, WJCR Upton KY	7490na	13595as		
0500-0600	Kenya, Kenya Broadc Corp	4885do	4935do			0500-0600 mtwhfa	USA, WMLK Bethel PA	9465va			
0500-0600 vl	Lesotho, Radio Lesotho	4800do				0500-0600 mtwhfa	USA, WRMI/R Miami Intl	9955ca			
0500-0600	Liberia, Star Radio	5880af				0500-0600	USA, WRNO New Orleans LA	7395am			
0500-0600	Liberia, LCN/R Liberia Int	5100do				0500-0600	USA, WSHB Cypress Crk SC	7535eu	9835af		
0500-0510 vl/m-f	Malawi, MBC	5993do				0500-0505	USA, WWCR Nashville TN	2390na	5070na	5935na	
0500-0600	Malaysia, Radio	7295do				0500-0505 mtwhf	USA, WWCR Nashville TN	3215na			
0500-0600 vl	Malaysia, RTM Kuching	4895do	7160do			0500-0505 as	USA, WWCR Nashville TN	3210na			
0500-0530 mwhf	Mexico, Radio Mexico Intl	5985na	9705na			0500-0600	USA, WYFR Okeechobee FL	5985na	9985eu	11580af	
0500-0600 vl	Namibia, NBC	3270af	3289af			0500-0530	Vatican State, Vatican R	4005eu	5883eu	7250eu	9660af
0500-0525	Netherlands, Radio	6165na	9590na					11625af	15570af		
0500-0600	New Zealand, R NZ Intl	17675pa				0500-0600	Zambia, Christian Voice	3330af	6065af		
0500-0505	Nigeria, FRCN/Radio	3326do	4770do	4990do		0500-0600	Zambia, Natl BC Corp	6165do	6265do		
0500-0600	Nigeria, Voice of	7255af	15120af			0500-0530 vl	Zimbabwe, Zimbabwe BC	3306do	4828do		
0500-0600	North Korea, R Pyongyang	3560as	11710eu	13790as		0505-0600	Swaziland, Trans World R	9500af			
0500-0600 vl	Papua New Guinea, NBC	9675do				0505-0600	USA, WWCR Nashville TN	2390na	3210na	5070na	5935na
0500-0600	Russia, Voice of Russia WS	9825na	12000na	12050na	13645na	0525-0600	Ghana, Ghana Broadc Corp	3366do	4915do		
		13790na	15425na	15495na	15995na	0530-0600	Austria, R Austria Intl	6015na	6155eu	13730na	15410me
0500-0530	S Africa, AWR Africa	5960af	6100af					17870me			
0500-0530	S Africa, Channel Africa	15215af				0530-0600	Finland, YLE/R Finland	11945as	17830au		
0500-0600	Singapore, R Corp Singapore	6150do				0530-0600 a	Kyrgyzstan, Kyrgyz Radio	4010do	4050do		
0500-0556	Spain, R Exterior Espana	6055am				0530-0600	Serbia, Radio Yugoslavia	9580na	11870na		
0500-0600	Swaziland, Trans World R	3200af	4775af			0530-0600	Thailand, Radio	15115eu			
0500-0530	Switzerland, Swiss R Intl	6165eu				0530-0600	UAE, Radio Dubai	17830eu	21605eu		
0500-0600 vl	Tanzania, Radio	5050do				0530-0600 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
0500-0515	Uganda, Radio	4976do				0555-0600	Malaysia, Voice of	6175as	9750as	15295au	

SELECTED PROGRAMS

Sundays

- 0500 BBC (AE/AF/AS): Newday. See S 0200.
- 0500 Switzerland, Swiss R Intl: News. Five minutes of world news.
- 0500 USA, WBCQ Monticello ME: The Planet.
- 0530 BBC (AF): Postmark Africa. See S 0330.
- 0530 BBC (AS): Westway Compilation Edition. Catch up on the week's episodes of the World Service's drama serial.

Mondays

- 0500 BBC (AE/AF/AS): The World Today. See M 0400.
- 0500 Switzerland, Swiss R Intl: News. See S 0500.
- 0500 USA, WBCQ Monticello ME: Keith E. Lamonia.
- 0530 BBC (AE/AS): Variable Feature. See S 0130.
- 0530 BBC (AF): Network Africa. See M 0330.

Tuesdays

- 0500 BBC (AE/AF/AS): The World Today. See M 0400.
- 0500 Switzerland, Swiss R Intl: News. See S 0500.
- 0500 USA, WBCQ Monticello ME: Watchman of the Night.
- 0530 BBC (AE): Outlook. See M 1405.
- 0530 BBC (AF): Network Africa. See M 0330.
- 0530 BBC (AS): Omnibus. See M 0630.
- 0555 BBC (AE): Take Five. A short series of human interest stories.

Wednesdays

- 0500 BBC (AE/AF/AS): The World Today. See M 0400.
- 0500 Switzerland, Swiss R Intl: News. See S 0500.
- 0500 USA, WBCQ Monticello ME: Watchman of the Night.
- 0530 BBC (AE): Outlook. See M 1405.
- 0530 BBC (AF): Network Africa. See M 0330.
- 0530 BBC (AS): Sports International. Live commentaries and interviews, features and discussions.
- 0545 BBC (AE): Take Five. See T 0555.

Thursdays

- 0500 BBC (AE/AF/AS): The World Today. See M 0400.
- 0500 Switzerland, Swiss R Intl: News. See S 0500.
- 0500 USA, WBCQ Monticello ME: Watchman of the Night.
- 0530 BBC (AE): Outlook. See M 1405.
- 0530 BBC (AF): Network Africa. See M 0330.
- 0530 BBC (AS): Variable Feature. See S 0130.
- 0555 BBC (AE): Music Brief. A five-minute interlude.

Fridays

- 0500 BBC (AE/AF/AS): The World Today. See M 0400.
- 0500 Switzerland, Swiss R Intl: News. See S 0500.
- 0500 USA, WBCQ Monticello ME: Watchman of the Night.
- 0500 Germany, Deutsche Welle: Christmas with Dresden's Famous Choir of the Holy Cross with Hardy Graupner (25th).
- 0500 Germany, Deutsche Welle: New Year's Concert on Radio Deutsche Welle (Jan 1st).
- 0530 BBC (AE): Outlook. See M 1405.
- 0530 BBC (AF): Network Africa. See M 0330.
- 0530 BBC (AS): Focus on Faith. See F 0230.
- 0555 BBC (AE): Science View. See S 0040.

Saturdays

- 0500 BBC (AE/AF/AS): Newday. See S 0200.
- 0500 Switzerland, Swiss R Intl: News. See S 0500.
- 0500 USA, WBCQ Monticello ME: Watchman of the Night.
- 0500 Germany, Deutsche Welle: Boxing Day Sports Special with Roy Forbes (26th).
- 0500 Germany, Deutsche Welle: A Home Away from Home? (Jan 2nd). See A 0100.
- 0500 USA, WEWN Birmingham AL: Holiday Program (Pillars of Faith) (26th). On the Incarnation.
- 0530 BBC (AE): Outlook. See M 1405.
- 0530 BBC (AF): African News. See A 0430.
- 0530 BBC (AS): Variable Feature. See S 0130.

- 0530 UK, BBC London (AE/AS): The Idea of the City (5th, 12th). See T 0330.
- 0531 BBC (AF): Talkabout Africa. See W 1615.
- 0555 BBC (AE): Spotlight. See F 1555.

HAUSER'S HIGHLIGHTS
JAPAN: R. JAPAN

English to Ams, B-98:		
0000-0100	11705	Sackville
0100-0200	17835 21670	Yamata
0300-0400	17825	Yamata
0500-0600	6110	Sackville
0500-0600	9835 15230	Yamata
0600-0700	9835	Yamata
1100-1200	6120	Sackville
1400-1600	9505	Yamata
1700-1800	9505	Yamata
2100-2200	13630	Yamata
(NHK via K. Hishikawa, via Wolfgang Büssel)		

FREQUENCIES

0600-0700	Anguilla, Caribbean Beacon	6090am				0600-0700	Singapore, RCorp Singapore	6150do			
0600-0700	Australia, Radio	9660pa	12080as	15240pa	15415as	0600-0700 vl	Solomon Islands, SIBC	5020do			
		15510pa	17715pa	17750as	21725pa	0600-0700 vl	Tanzania, Radio	5050do			
0600-0700 vl	Australia, VL8K Katherine	5025do				0600-0700	UK, BBC African Service	6005af	6190af	7160af	9600af
0600-0700 vl	Australia, VL8T Tent Crk	4910do						11835af	11940af	15420af	17885af
0600-0700 vl	Canada, CBC N Quebec Svc	9625do				0600-0700	UK, BBC Asian Service	7145pa	9740as	11955pa	15310as
0600-0700	Canada, CFRX Toronto	6070do						15360as	17760as	17790as	21660as
0600-0700	Canada, CFVP Calgary	6030do				0600-0700	UK, BBC World Service	5975am	6175am	6180eu	6195eu
0600-0700	Canada, CHNX Halifax	6130do						7325eu	9410eu	11760me	12095eu
0600-0700	Canada, CKZU Vancouver	6160do						15565eu	15575eu	17640me	
0600-0629 mtwhf	Canada, R Canada Intl	6090va	6150va	9740af	9760va	0600-0700	UK, Merlin Network One	6110eu	6110eu	13720eu	
		11905va				0600-0700	USA, KAIJ Dallas TX	5810va	5810va	9815am	
0600-0700	Costa Rica, RF Peace Intl	6975am	15050am			0600-0700	USA, KTVN Salt Lk City UT	7510am			
0600-0605	Croatia, Croatian Radio	5945eu	9830eu	13830au		0600-0700	USA, KVOH Los Angeles CA	9975ca			
0600-0700	Cuba, Radio Havana	9550na	9820na	9830na		0600-0700	USA, KWHR Naalehu HI	17780as			
0600-0700	Ecuador, HCJB	9745na	12015na	21455va		0600-0630	USA, Voice of America	5970af	6035af	6080af	7170af
0600-0650	Germany, Deutsche Welle	6045af	7225af	9565af	11785af			7285af	11805af	11825eu	11905af
		17820as	21695me					12080af	15205me	15600af	
0600-0700	Germany, Overcomer Ministr	13810as				0600-0700	USA, WEWN Birmingham AL	5825eu			
0600-0615	Ghana, Ghana Broadc Corp	3366do	4915do			0600-0700	USA, WHRA Greenbush ME	7435va			
0600-0700	Ireland, Unt Christian BC	6200do				0600-0700	USA, WHRI Noblesville IN	5755am	7315am		
0600-0700 vl	Italy, IRRS	3985va				0600-0700 sm	USA, WHRI Noblesville IN	5755am			
0600-0700	Japan, Radio/NHK	5975eu	7230eu	9835na	11740as	0600-0700	USA, WJCR Upton KY	7490na	13595as		
		11840as	11850pa	15590as		0600-0700 mtwhfa	USA, WMLK Bethel PA	9465va			
0600-0700	Kenya, Kenya Broadc Corp	4885do	4935do			0600-0700 mtwhf	USA, WRMI/R Miami Intl	9955ca			
0600-0700	Kuwait, Radio	15110as				0600-0700	USA, WRNO New Orleans LA	7395am			
0600-0700 vl	Lesotho, Radio Lesotho	4800do				0600-0700	USA, WSHB Cypress Crk SC	7535va	9835eu		
0600-0700	Liberia, Radio Veritas	5470do				0600-0700	USA, WWCR Nashville TN	2390na	3210na	5070na	5935na
0600-0700	Liberia, Star Radio	5880af				0600-0700	USA, WYFR Okeechobee FL	5985am	7355va		
0600-0700	Liberia, LCN/R Liberia Int	5100do				0600-0700	Yemen, Radio Aden	9780do			
0600-0700	Malaysia, Radio	7295do				0600-0700	Zambia, Christian Voice	3330af	6065af		
0600-0700 vl	Malaysia, RTM Kuching	4895do	7160do			0600-0700	Zambia, Natl BC Corp	6165do	6265do		
0600-0625	Malaysia, Voice of	6175as	9750as	15295au		0600-0700 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
0600-0700 vl	Namibia, NBC	3270af	3289af			0605-0700	Swaziland, Trans World R	6100af	9500af		
0600-0700	New Zealand, R NZ Intl	17675pa				0630-0700	Austria, R Austria Intl	6015na			
0600-0630	Nigeria, FRCN/Radio	3326do	4770do	4990do		0630-0700	Switzerland, Swiss R Intl	6165eu			
0600-0700	Nigeria, Voice of	7255af	15120af			0630-0700	USA, Voice of America	5995af	7170af	11825eu	11950af
0600-0700 vl	Papua New Guinea, NBC	9675do						15205me			
0600-0700	Romania, R Romania Intl	9510na	11940na			0630-0700 as	USA, Voice of America	5970af	6035af	6080af	7285af
0600-0700	Russia, Voice of Russia WS	9450au	17495au	17665au	21760au			11805af	12080af	15600af	
		21790au				0630-0645 mtwhfa	Vatican State, Vatican R	4005eu	5883eu	7250eu	9645eu
0600-0630	S Africa, Channel Africa	15215af						11740eu	15595eu		
0600-0635	S Africa, Trans World R	11735af				0641-0656	Romania, R Romania Intl	9550eu	9625eu	9665eu	11885eu
0600-0610	Sierra Leone, SLBS	3316do				0645-0700	Vatican State, Vatican R	11625af	13765af	15570af	

SELECTED PROGRAMS

Sundays

- 0600 BBC (AE/AF/AS): World News. See S 0100.
- 0600 USA, WBCQ Monticello ME: The Planet.
- 0615 BBC (AE/AS): Letter from America. See S 0030.
- 0615 BBC (AF): Variable Feature. See S 0130.
- 0615 UK, BBC London (AF): On Your Behalf. See S 0130.
- 0630 BBC (AE): A Jolly Good Show. Dave Lee Travis presents your record requests and dedications in his own unique way.
- 0630 BBC (AE): Play of the Week (Am). A different radio drama program each week (alternative programming for the Americas).
- 0630 BBC (AF): African Perspective. A considered view of life and issues facing the African continent.
- 0630 BBC (AS): Meridian Arts. A weekly program about the world of the arts.

Mondays

- 0600 BBC (AE): The World Today. See M 0400.
- 0600 BBC (AF/AS): World News. See S 0100.
- 0600 Canada, RCI Montreal: RCI News. See S 0200.
- 0600 USA, WBCQ Monticello ME: Keith E. Lamonia.
- 0611 Canada, RCI Montreal: First Edition. The best way for listeners in Europe, Africa and the Middle East to get updated on the previous day's news and what's happening in Canada.
- 0615 BBC (AF): Sports Roundup. See S 0145.
- 0615 BBC (AS): Seven Days. Roundup of the week's news, plus sports highlights, finance and the weather.
- 0630 BBC (AE): Omnibus. Each week a half-hour program on practically any topic under the sun.
- 0630 BBC (AF): Network Africa. See M 0330.
- 0630 BBC (AS): Jazzmatazz. The request program that lives up to its title.

Tuesdays

- 0600 BBC (AE): The World Today. See M 0400.
- 0600 BBC (AF/AS): World News. See S 0100.
- 0600 Canada, RCI Montreal: RCI News. See S 0200.
- 0600 USA, WBCQ Monticello ME: Watchman of the Night.
- 0611 Canada, RCI Montreal: First Edition. See M 0611.
- 0615 BBC (AF): Sports Roundup. See S 0145.
- 0615 BBC (AS): Insight. See M 1630.
- 0630 BBC (AE): Variable Feature. See S 0130.
- 0630 BBC (AF): Network Africa. See M 0330.
- 0630 BBC (AS): Composer of the Month. In depth looks at classical composers and their music. A different composer is featured each month.

Wednesdays

- 0600 BBC (AE): The World Today. See M 0400.
- 0600 BBC (AF/AS): World News. See S 0100.
- 0600 Canada, RCI Montreal: RCI News. See S 0200.
- 0600 USA, WBCQ Monticello ME: Watchman of the Night.
- 0611 Canada, RCI Montreal: First Edition. See M 0611.
- 0615 BBC (AF): Sports Roundup. See S 0145.
- 0615 BBC (AS): Insight. See M 1630.
- 0630 BBC (AE): Sports International. See W 0530.
- 0630 BBC (AF): Network Africa. See M 0330.
- 0630 BBC (AS): Meridian On Screen. See T 0230.

Thursdays

- 0600 BBC (AE): The World Today. See M 0400.
- 0600 BBC (AF/AS): World News. See S 0100.
- 0600 Canada, RCI Montreal: RCI News. See S 0200.
- 0600 USA, WBCQ Monticello ME: Watchman of the Night.
- 0611 Canada, RCI Montreal: First Edition. See M 0611.
- 0615 BBC (AF): Sports Roundup. See S 0145.
- 0615 BBC (AS): Insight. See M 1630.
- 0630 BBC (AE): Meridian Books. See H 0230.
- 0630 BBC (AF): Network Africa. See M 0330.

- 0630 BBC (AS): Meridian Arts. See S 0630.

Fridays

- 0600 BBC (AE): The World Today. See M 0400.
- 0600 BBC (AF/AS): World News. See S 0100.
- 0600 Canada, RCI Montreal: RCI News. See S 0200.
- 0600 USA, WBCQ Monticello ME: Watchman of the Night.
- 0600 Germany, Deutsche Welle: Christmas with Dresden's Famous Choir of the Holy Cross with Hardy Graupner (25th).
- 0600 Germany, Deutsche Welle: New Year's Concert on Radio Deutsche Welle (Jan 1st).
- 0611 Canada, RCI Montreal: First Edition. See M 0611.
- 0615 BBC (AE): Insight. See M 1630.
- 0615 BBC (AF): Sports Roundup. See S 0145.
- 0615 BBC (AS): Insight. See M 1630.
- 0630 BBC (AE): Variable Feature. See S 0130.
- 0630 BBC (AF): Network Africa. See M 0330.
- 0630 BBC (AS): Music Review. See S 0230.
- 0645 BBC (AE): Variable Feature. See S 0130.

Saturdays

- 0600 BBC (AE): Newsday. See S 0200.
- 0600 BBC (AF/AS): World News. See S 0100.
- 0600 USA, WBCQ Monticello ME: Watchman of the Night.
- 0600 Germany, Deutsche Welle: Boxing Day Sports Special with Roy Forbes (26th).
- 0600 Germany, Deutsche Welle: A Home Away from Home? (Jan 2nd). See A 0100.
- 0615 BBC (AF): Letter from America. See S 0030.
- 0615 USA, WBCQ Monticello ME: Watchman of the Night.
- 0630 BBC (AE): Meridian Arts. See S 0630.
- 0630 BBC (AF): African News. See A 0430.
- 0630 BBC (AS): Meridian Books. See H 0230.
- 0631 BBC (AF): African Quiz (1). See S 0330.
- 0631 BBC (AF): This Week and Africa. See A 0431.

FREQUENCIES

0700-0800	Anguilla, Caribbean Beacon	6090am			
0700-0800	Australia, Radio	9660pa	12080as	15240pa	15415as
		15510pa	17715pa	17750as	21725pa
0700-0800 vl	Australia, VL8K Katherine	5025do			
0700-0800 vl	Australia, VL8T Tent Crk	4910do			
0700-0800	Canada, CFRX Toronto	6070do			
0700-0800	Canada, CFVP Calgary	6030do			
0700-0800	Canada, CHNX Halifax	6130do			
0700-0800	Canada, CKZU Vancouver	6160do			
0700-0800	Costa Rica, RF Peace Intl	6975am	15050am		
0700-0710 mtwhfa	Croatia, Croatian Radio	5945eu		13820au	
0700-0727	Czech Rep, Radio Prague	7345eu	9505eu		
0700-0800	Ecuador, HCJB	9640pa	9775eu	21455va	
0700-0800 as	Eq Guinea, R East Africa	15186af			
0700-0800 mtwhf	Eq Guinea, Radio Africa	15186af			
0700-0800	Germany, Sunrise Radio	5850va			
0700-0800 s	Germany, Good News World R	13740as			
0700-0800	Germany, Overcomer Ministr	13810as			
0700-0715	Ghana, Ghana Broadc Corp	3366do	4915do		
0700-0800	Guyana, GBC/Voice of	3290do	5950do		
0700-0800	Ireland, Unt Christian BC	6200do			
0700-0730 vl	Italy, IRRS	3985va			
0700-0800	Kenya, Kenya Broadc Corp	4885do	4935do		
0700-0800 vl	Lesotho, Radio Lesotho	4800do			
0700-0800	Liberia, Radio Veritas	5470do			
0700-0800	Liberia, Star Radio	5880af			
0700-0715	Liberia, LCN/R Liberia Int	5100do			
0700-0800	Malaysia, Radio	7295do			
0700-0800	Myanmar, Radio	9730do			
0700-0715 vl	Namibia, NBC	3270af	3289af		
0700-0705	New Zealand, R NZ Intl	17675pa			
0700-0800	Palau, KHBN/Voice of Hope	9965as	9985as		
0700-0800 vl	Papua New Guinea, NBC	9675do			
0700-0800	Romania, R Romania Intl	17735af	21480af		
0700-0800	Russia, Voice of Russia WS	9450au	15490au	17495au	17665au
		21760au	21790au		
0700-0710	Sierra Leone, SLBS	3316do			
0700-0800	Singapore, RCorp Singapore	6150do			
0700-0730	Slovakia, R Slovakia Intl	9440eu	15460au	17550au	
0700-0800 vl	Solomon Islands, SIBC	5020do			
0700-0705	Swaziland, Trans World R	4775af	6100af	9500af	
0700-0800	Taiwan, Radio Taipei Intl	5950na			
0700-0800 vl	Tanzania, Radio	5050do			
0700-0730	UK, BBC African Service	6005af	6190af	9600af	11835af
		11940af	17830af		
0700-0800 as	UK, BBC African Service	17885af			
0700-0800	UK, BBC Asian Service	7145pa	9740as	11955pa	15310as
		15360as	17760as	17790as	21660as
0700-0800	UK, BBC World Service	5975am	6175am	6195eu	7325eu
		9410eu	11760me	12095eu	15485eu
		15565eu	15575eu	17640me	
0700-0800	UK, Merlin Network One	6110eu	9915eu	13720eu	17630eu
		21550eu			
0700-0800	USA, KAIJ Dallas TX	5810va	9815am		
0700-0800	USA, KTBN Salt Lk City UT	7510am			
0700-0800	USA, KWHR Naalehu HI	11565as			
0700-0800	USA, KWHR Naalehu HI	11565as	17780as		
0700-0800	USA, WEWN Birmingham AL	5825eu			
0700-0800	USA, WHRA Greenbush ME	7435va			
0700-0800	USA, WHRI Noblesville IN	5755am	7315am		
0700-0800 sm	USA, WHRI Noblesville IN	5755am			
0700-0800	USA, WJCR Upton KY	7490na	13595as		
0700-0800 mtwhfa	USA, WMLK Bethel PA	9465va			
0700-0800 mtwhf	USA, WRMI/R Miami Intl	9955ca			
0700-0800	USA, WRNO New Orleans LA	7395am			
0700-0800	USA, WSHB Cypress Crk SC	7535va	9835eu		
0700-0800	USA, WWCR Nashville TN	2390na	3210na	5070na	5935na
0700-0800	USA, WYFR Okeechobee FL	7355eu	9985af	13695va	
0700-0715 vl	Vanuatu, Radio	3945do	4960do		
0700-0800	Zambia, Christian Voice	6065af			
0700-0800	Zambia, Natl BC Corp	6165do	6265do		
0700-0800 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
0706-0800	New Zealand, R NZ Intl	9700pa			
0715-0730 s	Greece, Voice of	9375eu	9425au	9755au	11645eu
		15650au			
0715-0800 vl	Namibia, NBC	6060af	6175af		
0730-0740 s	Greece, Voice of	9375eu	9425eu	9755au	11645eu
		15650au			
0730-0800 smtwha	Malta, VO Mediterranean	9600eu			
0730-0800	Netherlands, Radio	9720pa	9820pa		
0730-0800	Switzerland, Swiss R Intl	9885af	11860af	13635af	
0730-0800	UK, BBC African Service	6190af	9600af	11940af	15400af
		17830af			
0730-0800 as	UK, BBC World Service	15575eu			
0730-0745	Vatican State, Vatican R	11625af	13765af	15570af	
0740-0800	Guam, TWR/KTWR	15200as			
0745-0800 s	Albania, Trans World R	9685eu			

0745-0800 s	Ghana, Ghana Broadc Corp	3366do	4915do
0745-0755 as	Monaco, Trans World Radio	9870eu	
0755-0800 mtwhf	Monaco, Trans World Radio	9870eu	

0800 UTC

0800-0900	Albania, Trans World R	9685eu			
0800-0900	Anguilla, Caribbean Beacon	6090am			
0800-0900	Australia, Radio	5995pa	9580pa	9580pa	9710pa
		12080as	15415as	15510pa	17715pa
		17750as	21725pa		
0800-0830 vl	Australia, VL8K Katherine	5025do			
0800-0830 vl	Australia, VL8T Tent Crk	4910do			
0800-0900 vl	Canada, CBC N Quebec Svc	9625do			
0800-0900	Canada, CFRX Toronto	6070do			
0800-0900	Canada, CFVP Calgary	6030do			
0800-0900	Canada, CHNX Halifax	6130do			
0800-0900	Canada, CKZU Vancouver	6160do			
0800-0900	Costa Rica, RF Peace Intl	15050am			
0800-0900	Ecuador, HCJB	9640pa	9775eu	21455va	
0800-0900 as	Eq Guinea, R East Africa	15186af			
0800-0900 mtwhf	Eq Guinea, Radio Africa	15186af			
0800-0900	Germany, Sunrise Radio	6110va			
0800-0900	Germany, Overcomer Ministr	13810as			
0800-0805 s	Ghana, Ghana Broadc Corp	3366do			
0800-0900	Guam, TWR/KTWR	15200as			
0800-0900	Guyana, GBC/Voice of	3290do	5950do		
0800-0900	Indonesia, Voice of	9525as	11765as	15510as	
0800-0900	Ireland, Unt Christian BC	6200do			
0800-0900	Kenya, Kenya Broadc Corp	4885do	4935do		
0800-0900	Liberia, Radio Veritas	5470do			
0800-0900	Liberia, LCN/R Liberia Int	5100do			
0800-0900	Malaysia, Radio	7295do			
0800-0900	Monaco, Trans World Radio	9870eu			
0800-0830	Myanmar, Radio	9730do			
0800-0900	N Mariana Is, KHBI Saipan	15665eu			
0800-0900 vl	Namibia, NBC	6060af	6175af		
0800-0900	Netherlands, Radio	9720pa	9820pa		
0800-0900	New Zealand, R NZ Intl	9700pa			
0800-0900 as	Palau, KHBN/Voice of Hope	9985as			
0800-0900 vl	Papua New Guinea, NBC	9675do			
0800-0900	Russia, Voice of Russia WS	9450au	17495au	17665au	21760au
		21790au			
0800-0810	Sierra Leone, SLBS	3316do			
0800-0900	Singapore, RCorp Singapore	6150do			
0800-0900 vl	Solomon Islands, SIBC	5020do			
0800-0900	South Korea, R Korea Intl	9570au	13670eu		
0800-0900 vl	Tanzania, Radio	5050do			
0800-0900	UK, BBC African Service	6190af	11940af	15400af	17830af
0800-0900 as	UK, BBC African Service	17885af			
0800-0900	UK, BBC Asian Service	7145pa	9740as	11955pa	15310as
		15360as	17760as	17790as	21660as
0800-0900	UK, BBC World Service	7325eu	9410eu	12095eu	15485eu
		15565eu	17640eu		
0800-0900 as	UK, BBC World Service	15575as			
0800-0900	UK, Merlin Network One	9915eu	13660eu	13720eu	17630eu
		21550eu			
0800-0900	USA, KAIJ Dallas TX	5810va	9815am		
0800-0900	USA, KNLS Anchor Point AK	7365as			
0800-0900	USA, KTBN Salt Lk City UT	7510am			
0800-0900	USA, KWHR Naalehu HI	9930as	11565as		
0800-0900	USA, WEWN Birmingham AL	5825eu			
0800-0900	USA, WHRI Noblesville IN	5755am	7315am		
0800-0900 sm	USA, WHRI Noblesville IN	5755am			
0800-0900	USA, WJCR Upton KY	7490na	13595as		
0800-0900 mtwhfa	USA, WMLK Bethel PA	9465va			
0800-0900 mtwhf	USA, WRMI/R Miami Intl	9955ca			
0800-0900	USA, WRNO New Orleans LA	7395am			
0800-0900	USA, WSHB Cypress Crk SC	7535eu	9835eu	9845au	
0800-0900	USA, WWCR Nashville TN	2390na	3210na	5070na	5935na
0800-0900	USA, WYFR Nashville TN	3945do	4960do		
0800-0815 vl	Vanuatu, Radio	3945do	4960do		
0800-0900	Zambia, Christian Voice	6065af			
0800-0900	Zambia, Natl BC Corp	6165do	6265do		
0800-0900 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
0805-0810 s	Croatia, Croatian Radio	5945eu			
0805-0810	Pakistan, Radio	15530eu	17835eu		
0815-0900 mtwtf	Nigeria, FRCN/Radio	3326do	4770do	4990do	
0815-0900 f	Seychelles, FEBA Radio	15540as			
0830-0900 vl	Australia, VL8A Alice Spg	2310do			
0830-0900 vl	Australia, VL8K Katherine	2485do			
0830-0900 vl	Australia, VL8T Tent Crk	2325do			
0830-0900	Austria, R Austria Intl	6155eu	13730eu	17615as	21765au
0830-0856	Belgium, R Vlaanderen Int	9925eu			
0830-0900	Switzerland, Swiss R Intl	9885va	13685va		
0855-0900	Guam, TWR/KTWR	15330as			

FREQUENCIES

0900-0920	Albania, Trans World R	9685eu			
0900-1000	Anguilla, Caribbean Beacon	6090am			
0900-1000	Australia, Radio	6080as	9580pa	11880as	17750as
0900-1000 vl	Australia, VL8A Alice Spg	2310do			
0900-1000 vl	Australia, VL8K Katherine	2485do			
0900-1000 vl	Australia, VL8T Tent Crk	2325do			
0900-1000	Bhutan, Bhutan BC Service	5030do			
0900-1000	Canada, CFRX Toronto	6070do			
0900-1000	Canada, CFVP Calgary	6030do			
0900-1000	Canada, CHNX Halifax	6130do			
0900-1000	Canada, CKZU Vancouver	6160do			
0900-1000	China, China Radio Intl	9785pa	9890pa	11755pa	
0900-1000	Costa Rica, RF Peace Intl	15050am			
0900-0910 mtwhfa	Croatia, Croatian Radio	7185eu	9830eu	13820au	
0900-0927	Czech Rep, Radio Prague	17485af	21745as		
0900-1000	Ecuador, HCJB	9640pa	21455va		
0900-1000 as	Eq Guinea, R East Africa	15186af			
0900-1000 mtwhf	Eq Guinea, Radio Africa	15186af			
0900-0950	Germany, Deutsche Welle	6160pa	9565af	11775as	12055as
		15145af	15410af	17800af	17820as
		21600af			
0900-1000	Germany, Sunrise Radio	6110va			
0900-1000	Germany, Overcomer Ministr	5965eu			
0900-0915 mtwtf	Ghana, Ghana Broadc Corp	3366do	4915do		
0900-0930	Guam, TWR/KTWR	15200as			
0900-0930	Guyana, GBC/Voice of	3290do	5950do		
0900-1000	Ireland, Unt Christian BC	6200do			
0900-1000	Kenya, Kenya Broadc Corp	4935do			
0900-1000	Liberia, Radio Veritas	5470do			
0900-0915	Liberia, LCN/R Liberia Int	5100do			
0900-1000	Malaysia, Radio	7295do			
0900-1000 vl	Malaysia, RTM Kuching	4895do	7160do		
0900-0930 s	Malta, VO Mediterranean	9600eu			
0900-1000 s	Malta, VO Mediterranean	9600eu			
0900-0950 s	Monaco, Trans World Radio	9870eu			
0900-1000 twhf	N Mariana Is, KHBI Saipan	9355as	13840pa		
0900-1000 vl	Namibia, NBC	6060af	6175af		
0900-0925	Netherlands, Radio	9720pa	9820pa		
0900-1000	New Zealand, R NZ Intl	9700pa			
0900-1000 vl	Papua New Guinea, NBC	4890do			
0900-1000	Russia, Voice of Russia WS	9450au	17495au	17665au	21760au
		21790au			
0900-1000	Singapore, RCorp Singapore	6150do			
0900-1000 vl	Solomon Islands, SIBC	5020do			
0900-1000 vl	Tanzania, Radio	5050do			
0900-1000	UK, BBC African Service	6190af	11940af	15400af	17830af
		17885af			
0900-0915	UK, BBC Asian Service	6065as	6195as	9580as	9740as
		11765as	11955as	15310as	15360as
		17760as	17790as	21660as	
0900-1000	UK, BBC World Service	9410eu	11760me	12095eu	15190sa
		15485eu	15565eu	15575eu	17640eu
		17705eu			
0900-1000	UK, Merlin Network One	9915eu	13660eu	17630eu	21550eu
0900-1000	USA, KAIJ Dallas TX	5810va	9815am		
0900-1000	USA, KTBN Salt Lk City UT	7510am			
0900-1000	USA, KWHR Naalehu HI	9930as	11565pa		
0900-1000	USA, WEWN Birmingham AL	5825eu			
0900-1000	USA, WHRI Noblesville IN	5755am	7315am		
0900-1000 sm	USA, WHRI Noblesville IN	5755am			
0900-1000	USA, WJCR Upton KY	7490na	13595as		
0900-1000 mtwhf	USA, WRMI/R Miami Intl	9955ca			
0900-1000	USA, WRNO New Orleans LA	7395am			
0900-1000	USA, WSHB Cypress Crk SC	7395sa	7535eu	9835eu	
0900-1000	USA, WWCR Nashville TN	2390na	3210na	5070na	5935na
0900-1000	Zambia, Christian Voice	6065af			
0900-1000	Zambia, Natl BC Corp	6165do	6265do		
0900-1000 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
0915-1000	Ghana, Ghana Broadc Corp	6130do	7295do		
0915-0945	UK, BBC Asian Service	15310as	17790as		
0915-0945 as	UK, BBC Asian Service	6195as	9740as	11765as	15360as
		21660as			
0920-0935 as	Albania, Trans World R	9685eu			
0920-1000	Armenia, Voice of	15270eu			
0920-0930 t	Kyrgyzstan, Kyrgyz Radio	4010do	4050do		
0930-1000	Austria, R Austria Intl	17615as	21765au		
0930-1000	Canada, CKZN St John's	6160do			
0930-1000	Georgia, Radio	11910eu			
0930-1000	Guam, TWR/KTWR	9865as			
0930-1000	Italy, AWR Europe	7230eu			
0930-1000	Netherlands, Radio	12065as	13710as		
0930-1000	Philippines, FEBC/R Intl	11635as			
0935-0950 s	Albania, Trans World R	9685eu			
0945-1000	UK, BBC Asian Service	6195as	9740as	11765as	15360as
		17760as	17790as	21660as	
0945-1000 a	UK, BBC Asian Service	6065as	9580as	11945as	11955as
		15280as			
0945-1000 smtwfh	UK, BBC Slow Speed News	6065as	9580as	11945as	11955as
		15280as			
1000-1100	Anguilla, Caribbean Beacon	6090am			
1000-1100	Australia, Radio	6080as	9580pa	11880as	17750as
1000-1100 vl	Australia, VL8A Alice Spg	2310do			
1000-1100 vl	Australia, VL8K Katherine	2485do			
1000-1100 vl	Australia, VL8T Tent Crk	2325do			
1000-1100 vl	Canada, CBC N Quebec Svc	9625do			
1000-1100	Canada, CFRX Toronto	6070do			
1000-1100	Canada, CFVP Calgary	6030do			
1000-1100	Canada, CHNX Halifax	6130do			
1000-1100	Canada, CKZN St John's	6160do			
1000-1100	Canada, CKZU Vancouver	6160do			
1000-1100	China, China Radio Intl	9785pa	9890pa	11755pa	
1000-1100	Costa Rica, RF Peace Intl	15050am			
1000-1100	Ecuador, HCJB	9640pa			21455va
1000-1100 as	Eq Guinea, R East Africa	15186af			
1000-1100 mtwhf	Eq Guinea, Radio Africa	15186af			
1000-1100	Germany, Sunrise Radio	6110va			
1000-1100 a	Germany, Good News World R	5910eu			
1000-1100	Germany, Overcomer Ministr	5965eu			
1000-1030	Guam, AWR/KSDA	11660as			
1000-1100	Guam, TWR/KTWR	9865as			
1000-1100	India, All India Radio	11585as	13700va	15040va	17387pa
		17840as			
1000-1100	Ireland, Unt Christian BC	6200do			
1000-1100	Japan, Radio/NHK	9695as	11850pa	15590as	
1000-1100	Kenya, Kenya Broadc Corp	4935do			
1000-1100	Malaysia, Radio	7295do			
1000-1100 irreg	Malaysia, RTM KotaKinabalu	5980do			
1000-1030 s	Malta, VO Mediterranean	9600eu			
1000-1100 twhf	N Mariana Is, KHBI Saipan	15665as	15725as		
1000-1100 vl	Namibia, NBC	6060af	6175af		
1000-1030	Netherlands, Radio	12065as	13710as		
1000-1015	New Zealand, R NZ Intl	9700pa			
1000-1100	Nigeria, Voice of	7255af	15120af		
1000-1100 vl	Papua New Guinea, NBC	4890do			
1000-1100	Philippines, FEBC/R Intl	11635as			
1000-1030	Singapore, RTE Radio	11740as			
1000-1100	Singapore, RCorp Singapore	6150do			
1000-1100 vl	Solomon Islands, SIBC	5020do			
1000-1100 vl	Tanzania, Radio	5050do			
1000-1100	UK, BBC African Service	6190af	11940af	17885af	
1000-1100 as	UK, BBC African Service	15400af	17830af		
1000-1030	UK, BBC Asian Service	6195as	9740as	11765as	15310as
		15360as	17790as	21660as	
1000-1100	UK, BBC World Service	6195am	9410eu	11760me	12095eu
		15485eu	15565eu	15575eu	17640eu
		17705eu			
1000-1100 as	UK, BBC World Service	15190sa			
1000-1100	UK, Merlin Network One	9915eu	13660eu	17630eu	21550eu
1000-1100	USA, KAIJ Dallas TX	5810va	9815am		
1000-1100	USA, KTBN Salt Lk City UT	7510am			
1000-1100	USA, KWHR Naalehu HI	9930as	11565pa		
1000-1100	USA, Voice of America	5985pa	6165ca	7405ca	9590ca
		11720as	15425as		
1000-1100	USA, WEWN Birmingham AL	5825eu			
1000-1100	USA, WHRI Noblesville IN	6040am	9495am		
1000-1100	USA, WJCR Upton KY	7490na	13595as		
1000-1100 mtwhf	USA, WRMI/R Miami Intl	9955ca			
1000-1100	USA, WRNO New Orleans LA	7395am			
1000-1100	USA, WSHB Cypress Crk SC	7395sa	7395sa		
1000-1100	USA, WWCR Nashville TN	2390na	3210na	5070na	5935na
1000-1100 mtwhfa	USA, WYFR Okeechobee FL	5950na			
1000-1030	Vietnam, Voice of	9840as	12020as	15010as	
1000-1100	Zambia, Christian Voice	6065af			
1000-1100	Zambia, Natl BC Corp	6165do	6265do		
1000-1100 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
1005-1010 s	Croatia, Croatian Radio	7185eu	9830eu		
1015-1100 occsnal	New Zealand, R NZ Intl	9700pa			
1030-1057	Czech Rep, Radio Prague	7345eu	11640eu		
1030-1100	Georgia, Radio	11910eu			
1030-1100	Guam, AWR/KSDA	11660as	11795as		
1030-1100	Netherlands, Radio	6045eu	9860eu	12065as	13710as
1030-1100	South Korea, R Korea Intl	11715am			
1030-1100	Sri Lanka, Sri Lanka BC	11835as	17850as		
1030-1100	UAE, Radio Dubai	13675eu	15370eu	15395eu	21605eu
1030-1100	UK, BBC Asian Service	6195as	9740as	11765pa	15310as
		17790as			



Your Name in Lights!

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

FREQUENCIES

1200-1300	Anguilla, Caribbean Beacon	11775am				1200-1300	UK, BBC African Service	6190af	11940af	17830af	17885af
1200-1300	Australia, Radio	6020pa	6080as	9580pa	9660pa			21660af			
		9770as				1200-1300	UK, BBC Asian Service	6195as	9580as	9740as	11955as
1200-1300 vl	Australia, VL8A Alice Spg	2310do						15280as	15310as	17785as	
1200-1300 vl	Australia, VL8K Katherine	2485do				1200-1300	UK, BBC World Service	5965na	6195am	9410eu	9515na
1200-1300 vl	Australia, VL8T Tent Crk	2325do						11760me	12095eu	15220am	15485eu
1200-1300	Brazil, R Nacional Bras	15445am						15565eu	15575as	17640eu	17705eu
1200-1300	Bulgaria, Radio	15700eu	17500eu			1200-1300	UK, Merlin Network One	9915eu	13645eu	17630eu	21550eu
1200-1215	Cambodia, Natl Radio Of	11940as				1200-1300	USA, KAIJ Dallas TX	5810va	9815am		
1200-1300 vl	Canada, CBC N Quebec Svc	9625do				1200-1300	USA, KTBN Salt Lk City UT	7510am			
1200-1300	Canada, CFRX Toronto	6070do				1200-1300	USA, KWHR Naalehu HI	9930as	11565pa		
1200-1300	Canada, CFVP Calgary	6030do				1200-1300	USA, Voice of America	6110as	9645as	9760as	11705as
1200-1300	Canada, CHNX Halifax	6130do						11715as	15425as		
1200-1300	Canada, CKZN St John's	6160do				1200-1300	USA, WEWN Birmingham AL	7425na	9465na	15745eu	
1200-1300	Canada, CKZU Vancouver	6160do				1200-1300 mtwhfa	USA, WGTG McCaysville GA	9400am			
1200-1229	Canada, R Canada Intl	6150as	11730as			1200-1300	USA, WHRI Noblesville IN	6040am	9495am		
1200-1300	China, China Radio Intl	6950pa	7385pa	9565as	9715as	1200-1300	USA, WJCR Upton KY	7490na	13595as		
		9945as	11660as	11675as	11795eu	1200-1300	USA, WRMI/R Miami Intl	9955ca			
		11980as				1200-1300	USA, WRNO New Orleans LA	7395am			
1200-1230 vl	China, China Radio Intl	8660as	11700as	12110as		1200-1300	USA, WSHB Cypress Crk SC	6095am	9455am		
1200-1300	Ecuador, HCJB	12005am	15115am	21455va		1200-1300	USA, WWCR Nashville TN	5070na	5935na	7435na	15685na
1200-1300 as	Eqt Guinea, R East Africa	15186af				1200-1300 mtwhfa	USA, WYFR Okeechobee FL	5950na			
1200-1300	Eqt Guinea, Radio Africa	9530as				1200-1300	USA, WYFR Okeechobee FL	5850na	6015na	17750na	
1200-1300	France, Radio France Intl	11600as	13625ca	15540af	17575am	1200-1228	Uzbekistan, R Tashkent	7285as	9715as	15295as	17775as
1200-1300	Germany, Sunrise Radio	6110va				1200-1300	Zambia, Christian Voice	6065af			
1200-1300	Germany, Overcomer Ministr	5965eu				1200-1300	Zambia, Natl BC Corp	6165do	6265do		
1200-1230	Iran, VOIRI	9585as	11830as	11875as	13605me	1200-1300 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
		15260as				1206-1300 occsnal	New Zealand, R NZ Intl	6105pa			
1200-1300	Ireland, Unt Christian BC	6200do				1209-1215 mtwhf	UK, BBC Caribbean Report	6195ca	15220ca		
1200-1300	Jordan, Radio	11690eu				1209-1215 as	UK, BBC World Service	6195am	15220am		
1200-1220 fa	Kazakhstan, R Almaty Intl	9505eu	9620eu	11720as		1210-1240	Mongolia, Voice of	12085au			
1200-1300	Kenya, Kenya Broadc Corp	4935do				1215-1300	Egypt, Radio Cairo	17595as			
1200-1230 mtwhf	Kyrgyzstan, Kyrgyz Radio	4010do	4050do			1220-1240 w	Kazakhstan, R Almaty Intl	9505eu	9620eu	11720as	
1200-1300	Malaysia, Radio	7295do				1230-1300	Bangladesh, Bangla Betar	7185as	9550as		
1200-1300 irreg	Malaysia, RTM KotaKinabalu	5980do				1230-1300	Guam, AWR/KSDA	15225as			
1200-1300 twhtfas	N Mariana Is, KHBI Saipan	9355as	9385pa			1230-1300	Italy, AWR Europe	7230as			
1200-1300 vl	Namibia, NBC	6060af	6175af			1230-1300	South Korea, R Korea Intl	6055as	9570as	9640am	13670as
1200-1225	Netherlands, Radio	6045eu	9860eu			1230-1300	Sri Lanka, Sri Lanka BC	9730as	15425as		
1200-1205 occsnal	New Zealand, R NZ Intl	9700pa				1230-1300	Sweden, Radio	7280na	9455na		
1200-1300	Palau, KHBN/Voice of Hope	9965as				1230-1300	Thailand, Radio	9810va			
1200-1300 vl	Papua New Guinea, NBC	4890do				1230-1300	Vietnam, Voice of	9840as	12020as	15010as	
1200-1300	Singapore, R Singapore Int	6015as	6150as			1240-1250	Greece, Voice of	17525af			
1200-1300	South Korea, R Korea Intl	7285as				1240-1300 t	Kazakhstan, R Almaty Intl	9505eu	9620eu	11720as	
1200-1300	Taiwan, Radio Taipei Intl	7130as	9610au			1240-1255 smtwh	UK, BBC Slow Speed News	7140me	11820me	13660af	15180af
1200-1300 vl	Tanzania, Radio	5050do						15555me	17585af		

SELECTED PROGRAMS

Sundays

- 1200 BBC (AE): World News. See S 0100.
- 1200 BBC (AF/EAs): Play of the Week (from 1130). See S 1130.
- 1200 BBC (AS): World News. See S 0100.
- 1200 Canada, RCI Montreal (Asia): RCI News. News, weather, and sports from Radio Canada International.
- 1205 BBC (AE/AS): Write On. See S 0030.
- 1207 Canada, RCI Montreal (Asia): The Mailbag. Listener letters, musical selections, and happenings in Canada.
- 1215 BBC (AE): In Praise of God. See S 0230.
- 1215 BBC (AS): Britain Today. See S 0045.
- 1230 BBC (AF/EAs): Letter from America. See S 0030.
- 1230 BBC (AS): Record News. Focus on the most interesting new releases of classical recordings.
- 1245 BBC (AE/AF/AS): Sports Roundup. See S 0145.

Mondays

- 1200 BBC (AE): World News (Carib). See M 1100.
- 1200 BBC (AE/AF/AS): World News. See S 0100.
- 1200 Canada, RCI Montreal (Asia): RCI News. See S 1200.
- 1205 BBC (AE): World Business Report (Carib). See M 205.
- 1205 BBC (AE/AF/AS): World Business Report. Latest news from the markets in the Far East, Europe and the USA.
- 1210 BBC (AE): Caribbean Report (Carib). See M 1105.
- 1211 Canada, RCI Montreal (Asia): Spectrum. A weekday magazine program of current affairs, features, and a business report.
- 1215 BBC (AE/AF/AS): Britain Today. See S 0045.
- 1230 BBC (AE): Seven Days. See M 0615.
- 1230 BBC (AF): Variable Feature. See S 0130.
- 1230 BBC (AS): Off the Shelf. See M 0330.
- 1230 UK, BBC London (AF): On Your Behalf. See S 013C.
- 1245 BBC (AE/AF/AS): Sports Roundup. See S 0145.

Tuesdays

- 1200 BBC (AE): World News (Carib). See M 1100.

- 1200 BBC (AE/AF/AS): World News. See S 0100.
- 1200 Canada, RCI Montreal (Asia): RCI News. See S 1200.
- 1205 BBC (AE): World Business Report (Carib). See M 1205.
- 1205 BBC (AF/AS): World Business Report. See M 1205.
- 1210 BBC (AE): Caribbean Report (Carib). See M 1105.
- 1211 Canada, RCI Montreal (Asia): Spectrum. See M 1211.
- 1215 BBC (AE/AF/AS): Britain Today. See S 0045.
- 1230 BBC (AE): Health Matters. See S 0115.
- 1230 BBC (AF): Westway. See M 0430.
- 1230 BBC (AS): Off the Shelf. See M 0330.
- 1245 BBC (AE/AF/AS): Sports Roundup. See S 0145.

Wednesdays

- 1200 BBC (AE): World News (Carib). See M 1100.
- 1200 BBC (AE/AF/AS): World News. See S 0100.
- 1200 Canada, RCI Montreal (Asia): RCI News. See S 1200.
- 1205 BBC (AE): World Business Report (Carib). See M 1205.
- 1205 BBC (AE/AF/AS): World Business Report. See M 1205.
- 1210 BBC (AE): Caribbean Report (Carib). See M 1105.
- 1211 Canada, RCI Montreal (Asia): Spectrum. See M 1211.
- 1215 BBC (AE/AF/AS): Britain Today. See S 0045.
- 1230 BBC (AE): Science Extra. See S 1501.
- 1230 BBC (AF): Variable Feature. See S 0130.
- 1230 BBC (AS): Off the Shelf. See M 0330.
- 1230 UK, BBC London (AF): To Be Continued (2nd, 9th, 16th). See A 0130.
- 1245 BBC (AE/AF/AS): Sports Roundup. See S 0145.

Thursdays

- 1200 BBC (AE): World News (Carib). See M 1100.
- 1200 BBC (AE/AF/AS): World News. See S 0100.
- 1200 Canada, RCI Montreal (Asia): RCI News. See S 1200.
- 1205 BBC (AE): World Business Report (Carib). See M 1205.
- 1205 BBC (AE/AF/AS): World Business Report. See M 1205.
- 1210 BBC (AE): Caribbean Report (Carib). See M 1105.
- 1211 Canada, RCI Montreal (Asia): Spectrum. See M 1211.

- 1215 BBC (AE/AF/AS): Britain Today. See S 0045.
- 1230 BBC (AE): Variable Feature. See S 0130.
- 1230 BBC (AE): Waveguide (24th). See S 1515.
- 1230 BBC (AF): From Our Own Correspondent. See S 0330.
- 1230 BBC (AS): Off the Shelf. See M 0330.
- 1245 BBC (AE/AF/AS): Sports Roundup. See S 0145.

Fridays

- 1200 BBC (AE): World News (Carib). See M 1100.
- 1200 BBC (AE/AF/AS): World News. See S 0100.
- 1200 Canada, RCI Montreal (Asia): RCI News. See S 1200.
- 1205 BBC (AE): World Business Report (Carib). See M 1205.
- 1205 BBC (AE/AF/AS): World Business Report. See M 1205.
- 1210 BBC (AE): Caribbean Report (Carib). See M 1105.
- 1211 Canada, RCI Montreal (Asia): Spectrum. See M 1211.
- 1215 BBC (AE/AF/AS): Britain Today. See S 0045.
- 1230 BBC (AE): Variable Feature. See S 0130.
- 1230 BBC (AF): Westway. See M 0430.
- 1230 BBC (AS): Off the Shelf. See M 0330.
- 1230 UK, BBC London (AE): Wood, Guts and Brass (4th, 11th). See T 014E.
- 1245 BBC (AE/AF/AS): Sports Roundup. See S 0145.

Saturdays

- 1200 BBC (AE/AF/AS): World News. See S 0100.
- 1200 Canada, RCI Montreal (Asia): RCI News. See S 1200.
- 1205 BBC (AE/AF/AS): World Business Report. See S 0305.
- 1206 Canada, RCI Montreal (Asia): Earth Watch. The magazine on environment, science and ecology matters.
- 1215 BBC (AE/AF): A Jolly Good Show. See S 0630.
- 1215 BBC (AS): Britain Today. See S 0045.
- 1245 BBC (AE): Poems by Post. See S 1615.
- 1245 BBC (AF): Football Extra. See F 1505.
- 1245 BBC (AS): Variable Comedy/Quiz Feature. See W 1130.
- 1255 BBC (AF): Spotlight. See F 1555.

FREQUENCIES

1400-1500	Anguilla, Caribbean Beacon	11775am				1400-1500	Switzerland, Swiss R Intl	9575as	15185as		
1400-1500	Australia, Radio	5995pa	6020pa	6080as	9580pa	1400-1500 vl	Tanzania, Radio	5050do			
		9660pa				1400-1430	Thailand, Radio	9530va			
1400-1500 vl	Australia, VLBA Alice Spg	2310do				1400-1430	Turkey, Voice of	15295as	17815as		
1400-1500 vl	Australia, VL8K Katherine	2485do				1400-1500	UK, BBC African Service	6190af	11940af	17830af	21490af
1400-1500 vl	Australia, VL8T Tent Crk	2325do						21660af			
1400-1500 vl	Canada, CBC N Quebec Svc	9625do				1400-1500	UK, BBC Asian Service	5990as	6195as	9740as	11750as
1400-1500	Canada, CFRX Toronto	6070do						15310as			
1400-1500	Canada, CFVP Calgary	6030do				1400-1500	UK, BBC World Service	9410eu	9515na	11865na	12095eu
1400-1500	Canada, CHNX Halifax	6130do						15220na	15485eu	15565eu	15575eu
1400-1500	Canada, CKZN St John's	6160do						17640eu	17705eu	17840am	
1400-1500	Canada, CKZU Vancouver	6160do				1400-1500	UK, Meriin Network One	9915eu	13680eu	17630eu	21550eu
1400-1459 mtwhfs	Canada, R Canada Intl	9640am	13650am	17715am		1400-1500	USA, KAIJ Dallas TX	13815va			
1400-1500	China, China Radio Intl	7260as	7405na	9535as	9700as	1400-1500 vl	USA, KJES Mesquite NM	11715na			
		11825as				1400-1500	USA, KTVN Salt Lk City UT	7510am			
1400-1500	Ecuador, HCJB	12005am	15115am	21455va		1400-1500	USA, KWHR Naalehu HI	9930as	11565pa		
1400-1500 as	Eqt Guinea, R East Africa	15186af				1400-1500	USA, Voice of America	6110as	7125as	7215as	9645as
1400-1500	France, Radio France Intl	11910as	15405as	17560af				9760as	11705as	15205me	15395as
1400-1500	Germany, RTE Radio	15625eu						15425as			
1400-1500	Germany, Sunrise Radio	6110va				1400-1500	USA, WEWN Birmingham AL	7425na	9465na	15745eu	
1400-1500	Germany, Voice of Hope	15715as				1400-1500 mtwhfa	USA, WGTG McCaysville GA	9400am			
1400-1500	Germany, Overcomer Ministr	5965eu	13810me			1400-1500	USA, WHRI Noblesville IN	6040am		15105am	
1400-1500	Ireland, Unt Christian BC	6200do				1400-1500	USA, WJCR Upton KY	7490na		13595as	
1400-1500	Japan, Radio/NHK	9505na	11730as	11880af		1400-1430 a	USA, WRMI/R Miami Intl	9955ca			
1400-1500	Jordan, Radio	11690eu				1400-1500	USA, WRNO New Orleans LA	7395am			
1400-1500	Kenya, Kenya Broadc Corp	4935do				1400-1500	USA, WWCR Nashville TN	9475na	12160na	13845na	15685na
1400-1500	Malaysia, Radio	7295do				1400-1500	USA, WYFR Okeechobee FL	11502as	11830na	11970na	17750na
1400-1500 vl	Malaysia, RTM Kuching	4895do	7160do			1400-1405	Vatican State, Vatican R	13765au			
1400-1500 irreg	Malaysia, RTM KotaKinabalu	5980do				1400-1500	Zambia, Christian Voice	6065af			
1400-1500	N Mariana Is, KHBI Saipan	9355as				1400-1500	Zambia, Natl BC Corp	6165do	6265do		
1400-1500 vl	Namibia, NBC	6060af	6175af			1400-1500 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
1400-1500	Netherlands, Radio	9890as	15585as			1415-1425	Nepal, Radio	5005do	7165do		
1400-1500 occsnal	New Zealand, R NZ Intl	6105pa				1430-1500	Australia, Radio	9500as	11660as		
1400-1410	Pakistan, Radio	9650as	11570me	15170af		1430-1459	Canada, R Canada Intl	9555va	11915va	15325va	
1400-1500 as	Palau, KHBN/Voice of Hope	9985as				1430-1500 vl	China, China Radio Intl	8660as	9880as		
1400-1500 vl	Papua New Guinea, NBC	4890do				1430-1500	Guam, AWR/KSDA	11580as			
1400-1500	Philippines, FEBC/R Intl	11995as				1430-1500	Mongolia, Voice of	9720as	12085as		
1400-1455 as	S Africa, Channell Africa	11900af	17895af	21530af		1430-1500	Myanmar, Radio	5966do			
1400-1500	Singapore, RTE Radio	15360as				1430-1500	S Africa, RTE Radio	21745af			
1400-1500	Singapore, RCorp Singapore	6150do				1430-1500	Sweden, Radio	15240na	17870na	21810na	
1400-1500	Sri Lanka, Sri Lanka BC	9730as	15425as			1430-1500 as	USA, WRMI/R Miami Intl	9955ca			

SELECTED PROGRAMS

Sundays

- 1400 BBC (AE/AF/AS): News Summary. See S 1100.
- 1400 Canada, RCI Montreal: CBC Radio News. See S 0000.
- 1401 BBC (AE/AF/AS): Variable Feature. See S 0130.
- 1411 Canada, RCI Montreal: This Morning (hour 1). David Enright and Avril Benoit co-host the Sunday Edition of this CBC magazine program (hour 1 of 3 hours).
- 1430 Canada, RCI Montreal: RCI News. See S 0200.
- 1437 Canada, RCI Montreal: The Mailbag. Listener letters, musical selections, and happenings in Canada.
- 1445 BBC (AS): Health Matters. See S 0115.

Mondays

- 1400 BBC (AE/AF/AS): World News. See S 0100.
- 1400 Canada, RCI Montreal: CBC Radio News. See S 0000.
- 1405 BBC (AE/AF/AS): Outlook. An up-to-the-minute mix of conversation, controversy and color from around the world.
- 1406 Canada, RCI Montreal: This Morning. David Enright and Avril Benoit co-host this CBC magazine program.
- *430 BBC (AE/AF/AS): Variable Feature. See S 0130.
- *430 Canada, RCI Montreal: RCI News. See S 0200.
- *439 Canada, RCI Montreal: Spectrum. A weekday magazine program of current affairs, features, and a business report.
- *445 BBC (AS): Variable Feature. See S 0130.

Tuesdays

- 1400 BBC (AE/AF/AS): World News. See S 0100.
- 1400 Canada, RCI Montreal: CBC Radio News. See S 0000.
- 1405 BBC (AE/AF/AS): Outlook. See M 1405.
- 1406 Canada, RCI Montreal: This Morning. See M 1406.
- 1430 BBC (AE/AF): Multitrack Hit-List. See M 1615.
- 1430 BBC (AS): Discovery. See T 0230.
- 1430 Canada, RCI Montreal: RCI News. See S 0200.
- 1439 Canada, RCI Montreal: Spectrum. See M 1439.

Wednesdays

- 1400 BBC (AE/AF/AS): World News. See S 0100.
- 1400 Canada, RCI Montreal: CBC Radio News. See S 0000.
- 1405 BBC (AE/AF/AS): Outlook. See M 1405.
- 1406 Canada, RCI Montreal: This Morning. See M 1406.
- 1430 BBC (AE/AF): Megamix. See T 1615.
- 1430 BBC (AS): Sports International. See W 0530.

- 1430 Canada, RCI Montreal: RCI News. See S 0200.
- 1439 Canada, RCI Montreal: Spectrum. See M 1439.

Thursdays

- 1400 BBC (AE/AF/AS): World News. See S 0100.
- 1400 Canada, RCI Montreal: CBC Radio News. See S 0000.
- 1405 BBC (AE/AF/AS): Outlook. See M 1405.
- 1406 Canada, RCI Montreal: This Morning. See M 1406.
- 1430 BBC (AE/AF): Multitrack X-Press. See W 1615.
- 1430 BBC (AS): Assignment. See H 0230.
- 1430 Canada, RCI Montreal: RCI News. See S 0200.
- 1439 Canada, RCI Montreal: Spectrum. See M 1439.

Fridays

- 1400 BBC (AE/AF/AS): World News. See S 0100.
- 1400 Canada, RCI Montreal: CBC Radio News. See S 0000.

- 1405 BEC (AE): Outlook. See M 1405.
- 1405 BEC (AF): Focus on Africa. See M 1505.
- 1405 BEC (AS): Outlook. See M 1405.
- 1406 Canada, RCI Montreal: This Morning. See M 1406.
- 1430 BEC (AE/AF): Multitrack Alternative. Latest developments on the British music scene.
- 1430 BEC (AS): Science in Action. The latest in science and technology.
- 1430 Canada, RCI Montreal: RCI News. See S 0200.
- 1439 Canada, RCI Montreal: Spectrum. See M 1439.

Saturdays

- 1400 BEC (AE/AF/AS): World News. See S 0100.
- 1405 BBC (AE/AF/AS): Sportsworld. The weekly sports magazine.
- 1430 Canada, RCI Montreal: RCI News. See S 0200.
- 1435 Canada, RCI Montreal: Venture Canada. See S 0207.

MT MONITORING TEAM

Gayle Van Horn
Frequency Manager
gayle@grove.net

Jim Frimmel
Program Manager
frimmel@star-telegram.com

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

Dave Datko, California
Mark Fine, VA

THANK YOU...

ADDITIONAL CONTRIBUTORS TO THIS MONTH'S SHORTWAVE GUIDE:

Maggy Akærblon/RCI; Joe Brashier/WHRI; Carl Craig, Shelbyville, TN; Glenn Hauser, Enid, OK/World of Radio & DX Report; Paul Jablonowski, USA, Jim Moats, Ravenna, OH; Mike Osborne/KNLS; Kathy Otto/Channel Africa; Al Quaglieri, Albany, NY; Adrian Sainsbury, R NZ Intl; Jeff White/WRMI; George Wocd/Media Scan/BBCMS/World Media; Cumbre DX; NASWA Journal/LN; Usenet newsgroups.

FREQUENCIES

1500-1600	Anguilla, Caribbean Beacon	11775am				1500-1600	Russia, Voice of Russia WS	4730as	4940as	4975as	7510as
1500-1600	Australia, Radio	5995pa 9580pa	6020pa 9660pa	6080as 11660as	9500as	1500-1530	S Africa, Channel Africa	11655as	12025as	15510as	17570as
1500-1600 vl	Australia, VL8A Alice Spg	2310do				1500-1530 twhfa	Seychelles, FEBA Radio	17870af			
1500-1600 vl	Australia, VL8K Katherine	2485do				1500-1545 sm	Seychelles, FEBA Radio	11600as			
1500-1600 vl	Australia, VL8T Tent Crk	2325do				1500-1600	Singapore, RTE Radio	15360as	15625as		
1500-1600 vl	Canada, CBC N Quebec Svc	9625do				1500-1600	Singapore, RCorp Singapore	6150do			
1500-1600	Canada, CFRX Toronto	6070do				1500-1600	Sri Lanka, Sri Lanka BC	9730as	15425as		
1500-1600	Canada, CFVP Calgary	6030do				1500-1600 vl	Tanzania, Radio	5050do			
1500-1600	Canada, CHNX Halifax	6130do				1500-1600	UK, BBC African Service	6190af	11860af	11940af	15400af
1500-1600	Canada, CKZN St John's	6160do						15420af	17830af	21470af	21490af
1500-1600	Canada, CKZU Vancouver	6160do				1500-1600	UK, BBC Asian Service	21660af	5975as	5990as	6195as
1500-1600 s	Canada, R Canada Intl	9640am	13650am	17715am				9740as	11750as	15310as	7135as
1500-1600	China, China Radio Intl	7160as	9785va			1500-1600	UK, BBC World Service	9410eu	9515na	11865na	12040eu
1500-1600	Ecuador, HCJB	12005am	15115am	21455va				12095eu	15220na	15485eu	15575eu
1500-1600 as	Eqt Guinea, R East Africa	15186af				1500-1600	UK, Merlin Network One	17705eu	9915eu	13680eu	21550eu
1500-1600	Germany, Sunrise Radio	6110va				1500-1600	USA, KAIJ Dallas TX	9915eu	13815va	15725am	
1500-1530	Germany, Voice of Hope	15715as				1500-1600	USA, KJES Mesquite NM	13815va	11715na		
1500-1600	Germany, Overcomer Ministr	6015eu	13810me			1500-1600 vl	USA, KTBN Salt Lk City UT	11715na			
1500-1530	Guam, TWR/KTWR	15330as				1500-1600	USA, KWHR Naalehu HI	7510am			
1500-1600	Ireland, Unt Christian BC	6200do				1500-1600	USA, KWHR Naalehu HI	9930as	11565pa		
1500-1530	Israel, Kol Israel	15650va	17535va			1500-1600	USA, Voice of America	7125as	7215as	9575me	9645as
1500-1600	Japan, Radio/NHK	7200as	9505na	9750as	11730as			15205me	15395as		
1500-1600	Jordan, Radio	11690eu				1500-1600	USA, WEWN Birmingham AL	9455na	11875na	15745eu	
1500-1600	Kenya, Kenya Broadc Corp	4935do				1500-1600 mtwhfa	USA, WGTG McCaysville GA	9400am			
1500-1510	Liberia, LCN/R Liberia Int	5100do				1500-1600	USA, WHRI Noblesville IN	13760am	15105am		
1500-1600	Malaysia, Radio	7295do				1500-1600	USA, WJCR Upton KY	7490na	13595as		
1500-1600 irreg	Malaysia, RTM KotaKinabalu	5980do				1500-1600 as	USA, WRMM/R Miami Intl	9955ca			
1500-1530	Mexico, Radio Mexico Intl	5985na	9705na			1500-1600	USA, WRNO New Orleans LA	7395na			
1500-1600	Myanmar, Radio	5986do				1500-1600	USA, WWCR Nashville TN	9475na	12160na	13845na	15685na
1500-1600 vl	Namibia, NBC	6060af	6175af			1500-1600	USA, WYFR Okeechobee FL	11830na	17750na		
1500-1525	Netherlands, Radio	9890as	15585as			1500-1502	USA, WYFR Okeechobee FL	11550as			
1500-1600 occsnal	New Zealand, R NZ Intl	6105pa				1500-1600	Zambia, Christian Voice	6065af			
1500-1600	Nigeria, Voice of	7255af	15120af			1500-1600	Zambia, Natl BC Corp	6165do	6265do		
1500-1600	North Korea, R Pyongyang	3560as	9640va	9975me	11335am	1500-1600 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
		11735am	13650va			1530-1600	Guam, AWR/KSDA	11625as	11925as		
1500-1530 as	Palau, KHBN/Voice of Hope	9985as				1530-1545	India, All India Radio	6150as			
1500-1600 vl	Papua New Guinea, NBC	4890do				1530-1600	Iran, VOIRI	11775as	13605as	15130au	
1500-1600	Philippines, FEBC/R Intl	11995as				1535-1550	Vatican State, Vatican R	13765au	15500au		
						1550-1600 a	Vatican State, Vatican R	13765va	15500va		

SELECTED PROGRAMS

Sundays

- 1500 BBC (AE): World News. See S 0100.
- 1500 BBC (AF/AS): News Summary. See S 1100.
- 1500 Canada, RCI Montreal: CBC Radio News. See S 0000.
- 1501 BBC (AF/AS): Science Extra. Either Soundbyte (virtual games and the Internet) or Seeing Stars (a look at the night skies).
- 1501 BBC (AS): Play of the Week (SAs). A different radio drama program each week (alternative programming for South Asia).
- 1505 BBC (AE): Sports Roundup. See S 0145.
- 1506 Canada, RCI Montreal: This Morning (hour 2). David Enright and Avril Benoit co-host the Sunday Edition of this CBC magazine program (hour 2 of 3 hours).
- 1515 BBC (AE): Concert Hall. Classical music concerts.
- 1515 BBC (AF): The Learning Zone. For people who want to learn more about subjects such as science, health, the world and work and literature while practicing English listening skills.
- 1515 BBC (AF): Waveguide (27th). The latest information on international broadcasting with reviews of receivers and news about reception.
- 1515 BBC (AS): Variable Feature. See S 0130.
- 1515 UK, BBC London (AS): On Your Behalf. See S 0130.
- 1530 BBC (AF): BBC English. For learners of English.
- 1530 BBC (AS): Variable Music Feature. See S 1130.
- 1530 UK, BBC London (AS): Electronic Jukebox. See M 1530.

Mondays

- 1500 BBC (AE/AF/AS): World News. See S 0100.
- 1500 BBC (AS): East Asia Today (EAs). See S 2300.
- 1505 BBC (AE/AS): Sports Roundup. See S 0145.
- 1505 BBC (AF): Focus on Africa. Up-to-the-minute reports on the day's events from all over the continent.
- 1515 BBC (AE/AS): Westway Access. See M 0030.
- 1530 BBC (AE): Variable Music Feature. See S 1130.
- 1530 BBC (AF): The Learning Zone. See S 1515.

- 1530 BBC (AS): Meridian Arts. See S 0630.
- 1530 BBC (AS): Outlook (EAs). See M 1405.
- 1530 UK, BBC London (AE/AS): Electronic Jukebox. Take a virtual trip into "the sound of now" that's filling the floors of clubland the world over.
- 1545 BBC (AF): BBC English. See S 1530.

Tuesdays

- 1500 BBC (AE/AF/AS): World News. See S 0100.
- 1500 BBC (AS): East Asia Today (EAs). See S 2300.
- 1505 BBC (AE/AS): Sports Roundup. See S 0145.
- 1505 BBC (AF): Focus on Africa. See M 1505.
- 1515 BBC (AE): Westway. See M 0430.
- 1515 BBC (AS): Concert Hall. See S 1515.
- 1530 BBC (AE): The Greenfield Collection. This classical music program replaces Ray on Record.
- 1530 BBC (AF): The Learning Zone. See S 1515.
- 1530 BBC (AS): Outlook (EAs). See M 1405.
- 1555 BBC (AS): Take Five (EAs). See T 0555.

Wednesdays

- 1500 BBC (AE/AF): World News. See S 0100.
- 1500 BBC (AS): East Asia Today (EAs). See S 2300.
- 1500 BBC (AS): World News. See S 0100.
- 1500 USA, WEWN Birmingham AL: Holiday Program (The Journey Home) (23rd). Guests Doug and Lani Bogart.
- 1505 BBC (AE): Sports Roundup. See S 0145.
- 1505 BBC (AF): Focus on Africa. See M 1505.
- 1505 BBC (AS): Sports Roundup. See S 0145.
- 1515 BBC (AE): Performance. See S 2310.
- 1515 BBC (AS): From Our Own Correspondent. See S 0330.
- 1530 BBC (AE): Everywoman. Anna Umbina and Jane Garvey introduce features and reports on the activities of women across the globe.
- 1530 BBC (AF): The Learning Zone. See S 1515.
- 1530 BBC (AS): Meridian On Screen. See T 0230.
- 1530 BBC (AS): Outlook (EAs). See M 1405.
- 1555 BBC (AS): Science View (EAs). See S 0040.

Thursdays

- 1500 BBC (AE/AF): World News. See S 0100.
- 1500 BBC (AS): East Asia Today (EAs). See S 2300.
- 1500 BBC (AS): World News. See S 0100.
- 1505 BBC (AE/AS): Sports Roundup. See S 0145.
- 1505 BBC (AF): Focus on Africa. See M 1505.
- 1515 BBC (AE): Westway. See M 0430.
- 1515 BBC (AS): Science Extra. See S 1501.
- 1530 BBC (AE): The Vintage Chart Show. Each week a classic Top 20 from the past with Paul Burnett.
- 1530 BBC (AF): The Learning Zone. See S 1515.
- 1530 BBC (AS): Composer of the Month. See T 0630.
- 1530 BBC (AS): Outlook (EAs). See M 1405.
- 1545 BBC (AF): BBC English. See S 1530.
- 1555 BBC (AS): Take Five (EAs). See T 0555.

Fridays

- 1500 BBC (AE/AF): World News. See S 0100.
- 1500 BBC (AS): East Asia Today (EAs). See S 2300.
- 1500 BBC (AS): World News. See S 0100.
- 1505 BBC (AE/AS): Football Extra. A review of the week's action and the upcoming weekend matches.
- 1505 BBC (AF): Focus on Africa. See M 1505.
- 1515 BBC (AE/AS): Variable Feature. See S 0130.
- 1515 UK, BBC London (AE): To Be Continued (4th, 11th). See A 0130.
- 1515 UK, BBC London (AE): To Be Continued (4th, 11th/18th). See A 0130.
- 1515 UK, BBC London (AS): On Your Behalf. See S 0130.
- 1530 BBC (AE): Science in Action. See F 1430.
- 1530 BBC (AF): The Learning Zone. See S 1515.
- 1530 BBC (AS): Meridian Books. See H 0230.
- 1530 BBC (AS): Outlook (EAs). See M 1405.
- 1555 BBC (AS): Spotlight (EAs). Focus on the theater.

Saturdays

- 1500 BBC (AE/AF/AS): World News. See S 0100.
- 1505 BBC (AE/AF/AS): Sportsworld. See A 1405.

FREQUENCIES

1600-1700	Algeria, R Algiers Intl	11715af	15160me	1600-1700 vl	Tanzania, Radio	5050do			
1600-1700	Anguilla, Caribbean Beacon	11775am		1600-1645	UAE, Radio Dubai	13630eu	13675eu	15395eu	21605eu
1600-1700	Australia, Radio	5995pa 9580pa	6020pa 9660pa	6080as 9500as	1600-1700	UK, BBC African Service	3255af 17830af	6190af 21470af	15400af 21660af
1600-1700 vl	Australia, VL8A Alice Spg	2310do		1600-1606	UK, BBC Asian Service	3915as	5975as	5990as	6195as
1600-1700 vl	Australia, VL8K Katherine	2485do		1600-1700	UK, BBC World Service	7160as 9410eu	9740as 9515na	11750as 12095eu	15310as 15485eu
1600-1700 vl	Australia, VL8T Tent Crk	2325do		1600-1700	UK, Merlin Network One	15575eu	17840am		
1600-1700 vl	Canada, CBC N Quebec Svc	9625do		1600-1700	USA, KAJ Dallas TX	6185eu	21550eu		
1600-1700	Canada, CFRX Toronto	6070do		1600-1700 vl	USA, KJES Mesquite NM	13815va	15725am		
1600-1700	Canada, CFVP Calgary	6030dc		1600-1700	USA, KTVB Salt Lk City UT	11715na			
1600-1700	Canada, CHNX Halifax	6130dc		1600-1700	USA, KWHR Naalehu HI	15590am			
1600-1700	Canada, CKZN St John's	6160dc		1600-1700	USA, Voice of America	9930as			
1600-1700	Canada, CKZU Vancouver	6160do		1600-1700	USA, WEWN Birmingham AL	6035af	6110u	7125as	7215as
1600-1659 s	Canada, R Canada Intl	9640am	13650am	17715am	1600-1700 mtwhfa	9575me	9645as	9760as	11920af
1600-1700	China, China Radio Intl	9565af	9620af		1600-1700	USA, WGTV McCalysville GA	12040af	13710af	15205me
1600-1627	Czech Rep, Radio Prague	5930eu	17485af		1600-1700	USA, WHRI Noblesville IN	15395as	15410af	15225af
1600-1700	Ethiopia, Radio	7165af		1600-1700	USA, WJCR Upton KY	11875na	13615na	15745eu	
1600-1700	France, Radio France Intl	11615af	11705af	12015af	1600-1700	USA, WRMI/R Miami Intl	9955ca		
		15460af	15530af	17850af	1600-1700	USA, WRNO New Orleans LA	15420am		
1600-1650	Germany, Deutsche Welle	6170as	7120af	7225as	1600-1700	USA, WSHB Cypress Crk SC	18930af		
		9585as	9735af	11810af	1600-1700	USA, WWCR Nashville TN	9475na	12160na	13845na
		17800af		15145af	1600-1700	USA, WYFR Okeechobee FL	11705na	11830na	15695va
1600-1700	Germany, Sunrise Radio	6110va			1600-1700	USA, WYFR Okeechobee FL	11705na	11830na	15695va
1600-1630 s	Germany, Universal Life	11840af			1600-1700	USA, WYFR Okeechobee FL	11705na	11830na	15695va
1600-1700 a	Germany, Good News World R	11840va			1600-1700	USA, WYFR Okeechobee FL	11705na	11830na	15695va
1600-1700	Germany, Overcomer Ministr	6015eu	13810me		1600-1700	USA, WYFR Okeechobee FL	11705na	11830na	15695va
1600-1700	Guam, AWR/KSDA	11980as			1600-1700	USA, WYFR Okeechobee FL	11705na	11830na	15695va
1600-1630	Guam, TWR/KTWR	15330as			1600-1700	USA, WYFR Okeechobee FL	11705na	11830na	15695va
1600-1630	Iran, VOIRI	11775as	13605as	15130au	1600-1700	USA, WYFR Okeechobee FL	11705na	11830na	15695va
1600-1700	Ireland, Unt Christian BC	6200de			1600-1700	USA, WYFR Okeechobee FL	11705na	11830na	15695va
1600-1700	Jordan, Radio	11690eu			1600-1700	USA, WYFR Okeechobee FL	11705na	11830na	15695va
1600-1700	Kenya, Kenya Broadc Corp	4935do			1600-1700	USA, WYFR Okeechobee FL	11705na	11830na	15695va
1600-1700	Lebanon, Voice of Hope	9960me			1600-1700	USA, WYFR Okeechobee FL	11705na	11830na	15695va
1600-1700	Malaysia, Radio	7295do			1600-1700	USA, WYFR Okeechobee FL	11705na	11830na	15695va
1600-1630 smtwha	Mexico, Radio Mexico Intl	5985na	9705na		1600-1700	USA, WYFR Okeechobee FL	11705na	11830na	15695va
1600-1700 vl	Namibia, NBC	6060af	6175af		1600-1700	USA, WYFR Okeechobee FL	11705na	11830na	15695va
1600-1650 occsnal	New Zealand, R NZ Intl	6105pa			1600-1700	USA, WYFR Okeechobee FL	11705na	11830na	15695va
1600-1700	Nigeria, Voice of	7255af	15120af		1600-1700	USA, WYFR Okeechobee FL	11705na	11830na	15695va
1600-1630	Pakistan, Radio	9650as	11570me	15325eu	1600-1700	USA, WYFR Okeechobee FL	11705na	11830na	15695va
		15469eu	17720af		1600-1700	USA, WYFR Okeechobee FL	11705na	11830na	15695va
1600-1700 vl	Papua New Guinea, NBC	4890do			1600-1700	USA, WYFR Okeechobee FL	11705na	11830na	15695va
1600-1700	Russia, Voice of Russia WS	4730me	4940me	4975me	1600-1700	USA, WYFR Okeechobee FL	11705na	11830na	15695va
		7325me	9975me	11775me	1600-1700	USA, WYFR Okeechobee FL	11705na	11830na	15695va
		15470me	15540me	15550as	1600-1700	USA, WYFR Okeechobee FL	11705na	11830na	15695va
1600-1630	S Africa, Channel Africa	6000af			1600-1700	USA, WYFR Okeechobee FL	11705na	11830na	15695va
1600 1700	South Korea, R Korea Intl	5975as	9515va	9870as	1600-1700	USA, WYFR Okeechobee FL	11705na	11830na	15695va
1600-1630	Sri Lanka, Sri Lanka BC	9730as	15425as		1600-1700	USA, WYFR Okeechobee FL	11705na	11830na	15695va
1600-1700	Swaziland, Trans World R	9500af			1600-1700	USA, WYFR Okeechobee FL	11705na	11830na	15695va
1600 1615	Switzerland, Swiss R Intl	9575as	15265as		1600-1700	USA, WYFR Okeechobee FL	11705na	11830na	15695va

SELECTED PROGRAMS

Sundays

- 1600 BBC (AE/AF/AS): World News. See S 0100.
- 1600 Canada, RCI Montreal: News. News from either the Canadian Broadcasting Corporation (CBC) or Radio Canada International (RCI).
- 1605 BBC (AF): Concert Hall. See S 1515.
- 1606 Canada, RCI Montreal: This Morning (hour 3). David Enright and Avril Benoit co-host the Sunday Edition of this CBC magazine program (hour 3 of 3 hours).
- 1615 BBC (AE): Variable Feature. See S 0130.
- 1615 BBC (AS): Poems by Post. Listeners request the poems and they are read by some of Britain's finest actors.
- 1630 BBC (AE): Variable Feature. See S 0130.
- 1630 BBC (AS): Anything Goes. See S 1130.
- 1630 Canada, RCI Montreal (Asia): RCI News. See S 1200.
- 1637 Canada, RCI Montreal (Asia): The Mailbag. See S 1207.

Monday

- 600 BBC (AE/AF/AS): World News. See S 0100.
- 615 BBC (AE): Seven Days. See M 0615.
- 615 BBC (AF): Fast Track. The latest African sports news and action.
- 615 BBC (AS): Multitrack Hit-List. The UK Top 20.
- 630 BBC (AE): Insight. An examination of a topical aspect of the international scene.
- 630 Canada, RCI Montreal (Asia): RCI News. See S 1200.
- 641 Canada, RCI Montreal (Asia): Spectrum. See M 1211.
- 645 BBC (AE): Britain Today. See S 0045.
- 645 BBC (AF): Insight. See M 1630.
- 645 BBC (AS): Britain Today. See S 0045.

Tuesdays

- 1600 BBC (AE/AF/AS): World News. See S 0100.

- 1600 USA, WEWN Birmingham AL: Holiday Program (The Abundant Life) (22nd). Christmas special.
- 1615 BBC (AE): Science Extra. See S 1501.
- 1615 BBC (AF): African Perspective. See S 0630.
- 1615 BBC (AS): Megamix. A youth magazine series which covers new trends, entertainment, sport and other issues.
- 1630 BBC (AE): Insight. See M 1630.
- 1630 Canada, RCI Montreal (Asia): RCI News. See S 1200.
- 1641 Canada, RCI Montreal (Asia): Spectrum. See M 1211.
- 1645 BBC (AE/AS): Britain Today. See S 0045.
- 1645 BBC (AF): Insight. See M 1630.

Wednesdays

- 1600 BBC (AE/AF/AS): World News. See S 0100.
- 1600 USA, WEWN Birmingham AL: Holiday Program (Life on the Rock) (23rd). Christmas special.
- 1615 BBC (AF): Talkabout Africa. Telephone conversations with BBC correspondents on late-breaking African events.
- 1615 BBC (AS): Multitrack X-Press. New pop records, interviews, news and competitions.
- 1630 BBC (AE): Insight. See M 1630.
- 1630 Canada, RCI Montreal (Asia): RCI News. See S 1200.
- 1641 Canada, RCI Montreal (Asia): Spectrum. See M 1211.
- 1645 BBC (AE/AS): Britain Today. See S 0045.
- 1645 BBC (AF): Insight. See M 1630.

Thursdays

- 1600 BBC (AE/AF/AS): World News. See S 0100.
- 1600 Germany, Deutsche Welle: Christmas Traditions in Northern Germany with John Walker (24th).
- 1600 Germany, Deutsche Welle: That Was 1998 - A look back over the year with Michael Behrens (31st).
- 1615 BBC (AE): Record News. See S 1230.

- 1615 BBC (AF): Postmark Africa. See S 0330.
- 1615 BBC (AS): Variable Feature. See S 0130.
- 1630 BBC (AE): Insight. See M 1630.
- 1630 Canada, RCI Montreal (Asia): RCI News. See S 1200.
- 1641 Canada, RCI Montreal (Asia): Spectrum. See M 1211.
- 1645 BBC (AE/AS): Britain Today. See S 0045.
- 1645 BBC (AF): Insight. See M 1630.

Fridays

- 1600 BBC (AF/AS): World News. See S 0100.
- 1600 Germany, Deutsche Welle: 750th Anniversary of Cologne Cathedral with Breandain O'Shea (25th).
- 1600 Germany, Deutsche Welle: Looking Ahead to the Year 2000 (Jan 1st). See F 1100.
- 1615 BBC (AE): Variable Feature. See S 0130.
- 1615 BBC (AF): Fast Track. See M 1615.
- 1615 BBC (AS): Multitrack Alternative. See F 1430.
- 1615 JK, BBC London (AE): On Your Behalf. See S 0130.
- 1630 BBC (AE): Insight. See M 1630.
- 1630 Canada, RCI Montreal (Asia): RCI News. See S 1200.
- 1641 Canada, RCI Montreal (Asia): Spectrum. See M 1211.
- 1645 BBC (AE/AS): Britain Today. See S 0045.
- 1645 BBC (AF): Insight. See M 1630.

Saturdays

- 1600 BBC (AE/AF/AS): World News. See S 0100.
- 1605 BBC (AE/AF/AS): Sports World. See A 1405.
- 1630 Canada, RCI Montreal (Asia): RCI News. See S 1200.
- 1630 USA, WEWN Birmingham AL: Holiday Program (The Joy of Music) (12th). Christmas - Part 1.
- 1636 Canada, RCI Montreal (Asia): Venture Canada. See A 1335.

FREQUENCIES

1700-1800	Anguilla, Caribbean Beacon	11775am				1800-1900	Anguilla, Caribbean Beacon	11775am			
1700-1800	Australia, Radio	5995pa 11880pa	6080as	9500as	9580pa	1800-1900 mtwhf	Argentina, RAE	15345eu			
1700-1800 vl	Australia, VL8A Alice Spg	2310do				1800-1900	Australia, Radio	6080as 7240pa 9660as 11880pa	9500as	9580pa	
1700-1800 vl	Australia, VL8K Katherine	2485do				1800-1900 vl	Australia, VL8A Alice Spg	2310do			
1700-1800 vl	Australia, VL8T Tent Crk	2325do				1800-1900 vl	Australia, VL8K Katherine	2485do			
1700-1800	Canada, CBC N Quebec Svc	9625do				1800-1900 vl	Australia, VL8T Tent Crk	2325do			
1700-1800	Canada, CFRX Toronto	6070do				1800-1830	Azerbaijan, R Dada Gorgud	9165me			
1700-1800	Canada, CFVP Calgary	6030do				1800-1900	Bangladesh, Bangla Betar	7185eu	9550eu		
1700-1800	Canada, CHNX Halifax	6130do				1800-1900	Brazil, R Nacional Bras	15265va			
1700-1800	Canada, CKZN St John's	6160do				1800-1900	Canada, CFRX Toronto	6070do			
1700-1800	Canada, CKZU Vancouver	6160do				1800-1900	Canada, CFVP Calgary	6030do			
1700-1800	China, China Radio Intl	5220af	7405af	9570af	11910af	1800-1900	Canada, CHNX Halifax	6130do			
1700-1800	Costa Rica, RF Peace Intl	15050am				1800-1900	Canada, CKZN St John's	6160do			
1700-1727	Czech Rep, Radio Prague	5930eu	17485af			1800-1900	Canada, CKZU Vancouver	6160do			
1700-1800	Egypt, Radio Cairo	15255af				1800-1900	Costa Rica, RF Peace Intl	15050am			
1700-1800	Eq Guinea, Radio Africa	15186af				1800-1830	Egypt, Radio Cairo	15255af			
1700-1730	France, Radio France Intl	11615af	15210af	15460af		1800-1900	Eq Guinea, Radio Africa	15186af			
1700-1800	Germany, Sunrise Radio	6110va				1800-1900	Germany, Sunrise Radio	6110va			
1700-1730 a	Germany, Universal Life	11745af				1800-1900	Germany, Universal Life	11840eu			
1700-1800 a	Germany, Good News World R	11725va				1800-1830 s	Germany, Overcomer Ministr	11925me			
1700-1800	Germany, Overcomer Ministr	13810me				1800-1900	Greece, Voice of	7450eu	9425eu	17705sa	17765na
1700-1800	Ireland, Unt Christian BC	6200do				1800-1815	India, All India Radio	7410eu	9650af	9950eu	11620eu
1700-1800	Italy, RAI International	15330af				1800-1900	Ireland, Unt Christian BC	11935af	13780af	15075af	15200af
1700-1800	Japan, Radio/NHK	6090as 15355af 11690eu	7110eu	9535na	9825as	1800-1900	Kenya, Kenya Broadc Corp	6200do 4935do			
1700-1730	Jordan, Radio	11690eu				1800-1900	Kuwait, Radio	11990am			
1700-1800	Kenya, Kenya Broadc Corp	4935do				1800-1900	Lebanon, Voice of Hope	9960me			
1700-1800	Lebanon, Voice of Hope	9960me				1800-1900	Liberia, Radio Veritas	5470do			
1700-1800	Liberia, Star Radio	5880do				1800-1900	Liberia, Star Radio	5880af			
1700-1800	Malaysia, Radio	7295do				1800-1900	Liberia, LCN/R Liberia Int	5100do			
1700-1751 mtwhf	New Zealand, R NZ Intl	6145pa				1800-1900	Malaysia, Radio	7295do			
1700-1715 vl	Palau, KHBN/Voice of Hope	9965as				1800-1900 s	Morocco, RTVM Marocaine	17595af			
1700-1800 vl	Papua New Guinea, NBC	4890do				1800-1900 mtwhfa	N Mariana Is, KHBI Saipan	9355eu	9385va		
1700-1800	Romania, R Romania Intl	9510eu	11940eu	15250eu		1800-1830	Netherlands, Radio	6020af	7120af	11655af	
1700-1800	Russia, Voice of Russia WS	9675me 15540me	11775me	11850me	12065me	1800-1900	New Zealand, R NZ Intl	11675pa			
1700-1730	S Africa, Channel Africa	17870af				1800-1900	North Korea, R Pyongyang	4405as 13760am	6575eu	9335eu	11710am
1700-1800 mtwhf	Spain, R Exterior Espana	15170af				1800-1900 vl	Papua New Guinea, NBC	4890do			
1700-1800 a	Swaziland, Commercial R	6155do				1800-1900	Philippines, R Pilipinas	11720as	11890as	15190as	
1700-1745 mtwh	Swaziland, Trans World R	3200af				1800-1855	Poland, Polish R Warsaw	6095eu	7285eu		
1700-1800	Swaziland, Trans World R	9500af				1800-1900	Russia, Voice of Russia WS	7445af 11695eu	9740eu	9765eu	9775eu
1700-1800 vl	Tanzania, Radio	5050do				1800-1830	S Africa, AWR Africa	5960af	15540af		
1700-1800	UK, BBC African Service	3255af 11860af	6005af	6190af	9630af	1800-1830	S Africa, Channel Africa	17870af	6100af		
1700-1745	UK, BBC Asian Service	3915as 9740as	5975as	7160as	9510as	1800-1900 mtwhf	Spain, R Exterior Espana	15170af			
1700-1800	UK, BBC World Service	6095me 12095eu	6180eu	6195eu	9410eu	1800-1900 irreg	Sudan, Radio Omdurman	9200af	9220af		
1700-1800	UK, Merlin Network One	3965eu	6185eu	21550eu		1800-1900 a	Swaziland, Commercial R	6155do			
1700-1800	USA, KAIJ Dallas TX	13815va				1800-1830	Swaziland, Trans World R	3200af	9500af		
1700-1800	USA, KTNB Salt Lk City UT	15590am				1800-1900 vl	Tanzania, Radio	5050do			
1700-1800	USA, KWHR Naalehu HI	9930as				1800-1900	UK, BBC African Service	3255af 17830af	6190af	11860af	15400af
1700-1800	USA, Voice of America	6040af 9645as 15205af	6110as	7125as	7215as	1800-1830	UK, BBC Asian Service	5975as	9510as	9740as	
		17895af	9645as	9760me	11920af	1800-1900	UK, BBC World Service	6095me 12095eu	6180eu	6195eu	9410eu
1700-1800 mtwhf	USA, Voice of America	5990as 9795as	6045as	9525as	9670as			6095me 12095eu	15485eu	15575eu	
1700-1800	USA, WEWN Birmingham AL	11875na				1800-1900	UK, Merlin Network One	3965eu	6125eu	21550eu	
1700-1800 mtwhfa	USA, WGTG McCaysville GA	9400am				1800-1900	USA, KAIJ Dallas TX	13815va	15725am		
1700-1800	USA, WHRI Noblesville IN	13760am	15105am			1800-1900	USA, KTNB Salt Lk City UT	15590am			
1700-1800	USA, WINB Red Lion PA	13790eu				1800-1900	USA, KWHR Naalehu HI	9930as			
1700-1800	USA, WJCR Upton KY	7490na	13595as			1800-1900	USA, Voice of America	6035af 11975af	6040af	9760me	11920af
1700-1800 smtwhf	USA, WMLK Bethel PA	9465va						11875na 9400am	13710af	15410af	15580af
1700-1800	USA, WRNO New Orleans LA	15420am				1800-1900	USA, WEWN Birmingham AL	11875na	13615na	15745eu	
1700-1800	USA, WSHB Cypress Crk SC	18930af				1800-1900 mtwhfa	USA, WGTG McCaysville GA	9400am			
1700-1800	USA, WWCR Nashville TN	9475na	12160na	13845na	15685na	1800-1900	USA, WHRA Greenbush ME	17655af			
1700-1800	USA, WYFR Okeechobee FL	15695eu				1800-1900	USA, WHRI Noblesville IN	9495am	13760am		
1700-1800	Zambia, Christian Voice	3330af	4965af			1800-1900	USA, WINB Red Lion PA	13790eu			
1700-1800	Zambia, Natl BC Corp	6165do	6265do			1800-1900	USA, WJCR Upton KY	7490na	13595as		
1700-1800	Zimbabwe, Zimbabwe BC	3306do	4828do			1800-1900 smtwhf	USA, WMLK Bethel PA	9465va			
1715-1745 vl	Palau, KHBN/Voice of Hope	9965as				1800-1900	USA, WRNO New Orleans LA	15420am			
1715-1730	Vatican State, Vatican R	4005eu 11810eu	5883eu	7250eu	9645eu	1800-1900	USA, WSHB Cypress Crk SC	13770eu	18930af		
1730-1800	Ascension Is, RTE Radio	17885af				1800-1900	USA, WWCR Nashville TN	9475na	12160na	13845na	15685na
1730-1800	Austria, R Austria Intl	6155eu 13730va	9655me	11855me	13710as	1800-1830	USA, WYFR Okeechobee FL	15695va			
1730-1756	Belgium, R Vlaanderen Int	5910eu	12080eu	13650me		1800-1900	Vietnam, Voice of	7440eu	9840eu	12020eu	15010eu
1730-1800	Guam, AWR/KSDA	9355as				1800-1900	Yemen, Radio Aden	9780do			
1730-1745 vl	India, All India Radio	3245do	4800do			1800-1900	Zambia, Christian Voice	3330af	4965af		
1730-1800	Netherlands, Radio	6020af	7120af	11655af		1800-1900 vl	Zambia, Natl BC Corp	6165do	6265do		
1730-1800	Philippines, R Pilipinas	11720as	11890as	15190as		1830-1856	Zimbabwe, Zimbabwe BC	3306do	4828do		
1730-1800	S Africa, AWR Africa	12130af				1830-1900 mtw a	Belgium, R Vlaanderen Int	13745af			
1730-1800	Slovakia, R Slovakia Intl	5920eu	6055eu	7345eu		1830-1900 s	Germany, Universal Life	6010af			
1730-1800 s	Sweden, Radio	13855va				1830-1900 w	Germany, Universal Life	11735af			
1730-1800 mtwhfa	Sweden, Radio	6065va 9750as				1830-1900	Mongolia, Voice of	9720eu	12085eu		
1730-1800 s	UK, BBC Asian Service	13765af				1830-1900 w	N Mariana Is, KFBS Saipan	9465eu			
1730-1800	Vatican State, Vatican R	9750as	12045as	15565as		1830-1900	Netherlands, Radio	6020af 15315af	7120af	9895af	11655af
1745-1800	Bangladesh, Bangla Betar	7185eu	9550eu					6020af	7120af	9895af	11655af
1745-1800	India, All India Radio	7410eu	9650af	9950eu	11620eu	1830-1900	Sri Lanka, Sri Lanka BC	6005as			
		11935af	13780af	15075af	15200af	1830-1900	UK, BBC African Service	6005af	9630af		
1745-1800 vl	Palau, KHBN/Voice of Hope	9965as				1830-1900	UK, BBC Asian Service	9740pa			
1745-1800	UK, BBC Asian Service	5975as	9510as	9740as		1830-1900 as	USA, Voice of America	7150af	9845af	15455af	
1752-1800	New Zealand, R NZ Intl	11675pa				1840-1850	Greece, Voice of	11645af	15150af		

FREQUENCIES

2100-2200	Anguilla, Caribbean Beacon	11775am			
2100-2200	Australia, Radio	7240as 17715pa	9660pa 21740pa	11880pa	12080as
2100-2130	Australia, Radio	9500as			
2100-2130 vl	Australia, VL8A Alice Spg	2310do			
2100-2130 vl	Australia, VL8K Katherine	2485do			
2100-2200 vl	Australia, VL8T Tent Crk	5025do			
2100-2130 vl	Australia, VL8T Tent Crk	2325do			
2100-2200 vl	Australia, VL8T Tent Crk	4910do			
2100-2115 vl	Cameroon, Radio Cameroon	4850do			
2100-2200 vl	Canada, CBC N Quebec Svc	9625do			
2100-2200	Canada, CFRX Toronto	6070do			
2100-2200	Canada, CFVP Calgary	6030do			
2100-2200	Canada, CHNX Halifax	6130do			
2100-2200	Canada, CKZN St John's	6160do			
2100-2200	Canada, CKZU Vancouver	6160do			
2100-2159	Canada, R Canada Intl	7235va 13650va 11945va	7235va 13690va	9725va 15150va	9805va 17820af
2100-2130	China, China Radio Intl	11975af			
2100-2200	China, China Radio Intl	6950eu			
2100-2200	Costa Rica, RF Peace Intl	15050am			
2100-2130	Cuba, Radio Havana	13720eu			
2100-2200	Ecuador, HCJB	15115eu			
2100-2200	Egypt, Radio Cairo	15375af			
2100-2200	Eqt Guinea, Radio Africa	15186af			
2100-2150	Germany, Deutsche Welle	9615af 11785af	9670as 11865af	9690af 15275va	9765as
2100-2200	Germany, Voice of Hope	6000eu			
2100-2200	Germany, Overcomer Ministr	11840as			
2100-2200	India, All India Radio	7150pa 9950eu	7410eu 11620va	9650eu 11715pa	9910pa
2100-2200	Iraq, Radio Iraq Intl	11785va			
2100-2200	Ireland, Unt Christian BC	6200do			
2100-2200 fas/vl	Italy, IRRS	3955va			
2100-2200	Japan, Radio/NHK	6035pa	9725eu	11850pa	13630na
2100-2200 vl	Lesotho, Radio Lesotho	4800do			
2100-2200	Liberia, Radio Veritas	5470do			
2100-2115	Liberia, LCN/R Liberia Int	5100do			
2100-2200	Malaysia, Radio	7295do			
2100-2130 smthf	Mexico, Radio Mexico Intl	5985na	9705na		
2100-2200 vl	Namibia, NBC	3270af	3289af		
2100-2200	New Zealand, R NZ Intl	17675pa			
2100-2200	Nigeria, FRCN/Radio	3326do	4770do	4990do	11710am
2100-2200	North Korea, R Pyongyang	4405as 13760am	6575eu	9335eu	
2100-2200 vl	Papua New Guinea, NBC	4890do			
2100-2125	Poland, Polish R Warsaw	6035eu	6095eu	7285eu	9525eu
2100-2200	Romania, R Romania Intl	7105eu	9550eu	9690eu	
2100-2200	Russia, Voice of Russia WS	7350eu 9775eu 11930eu	9440af 9820eu 11980eu	9710eu 11675eu	9765eu 11850af
2100-2130	South Korea, R Korea Intl	3970eu			
2100-2200	South Korea, R Korea Intl	15575eu			
2100-2130	Sri Lanka, Sri Lanka BC	6005as			
2100-2200	Syria, Radio Damascus	12085na	13610na		
2100-2200 vl	Tanzania, Radio	5050do			
2100-2110	Uganda, Radio	4976do			
2100-2200	UK, BBC African Service	3255af	6005af	6190af	11835af
2100-2200	UK, BBC Asian Service	3915as 9740pa	5965as 11945as	5975pa	6195as
2100-2200	UK, BBC World Service	5975am 9410eu	6180eu 12095sa	6195eu	7325eu
2100-2200	UK, Merlin Network One	3985eu			
2100-2200	USA, KAJJ Dallas TX	13815va	15725am		
2100-2200	USA, KTBN Salt Lk City UT	15590am			
2100-2200	USA, KWHR Naalehu HI	15405as			
2100-2200	USA, Voice of America	6035af 11870pa 15410af	6040me 11975af 15580af	6095me 13710af 17725af	7415af 15185pa 17735pa
2100-2200	USA, WEWN Birmingham AL	11875na	13615na	15745eu	
2100-2200 mtwhfa	USA, WGTG McCaysville GA	9400am			
2100-2200	USA, WHRA Greenbush ME	15460af			
2100-2200	USA, WHRI Noblesville IN	5755am	9495am		
2100-2200 sm	USA, WHRI Noblesville IN	5755am			
2100-2200	USA, WINB Red Lion PA	13790am			
2100-2200	USA, WJCR Upton KY	7490na	13595as		
2100-2200 smthf	USA, WMLK Bethel PA	9465va			
2100-2200	USA, WRNO New Orleans LA	15420am			
2100-2200	USA, WSHB Cypress Crk SC	9355eu	11550eu	13770eu	
2100-2200	USA, WWCR Nashville TN	7435na	9475na	12160na	13845na
2100-2200	USA, WYFR Okeechobee FL	11855na	15215va	15695va	17845va
2100-2110	Vatican State, Vatican R	4005eu	5883eu	7250eu	9645eu
2100-2200	Zambia, Christian Voice	3330af	4965af		
2100-2200	Zambia, Natl BC Corp	6165do	6265do		
2100-2200 vl	Zimbabwe, Zimbabwe BC	3306do	4828do		
2115-2200	Egypt, Radio Cairo	9900eu			
2115-2130 mtwhf	UK, BBC Caribbean Report	5975ca	15390ca	17715ca	
2115-2130 as	UK, BBC World Service	5975am			
2130-2200 th	Belarus, R Belarus Intl	7105eu	7210eu		
2130-2157	Czech Rep, Radio Prague	11600va			
2130-2200	Ghana, Ghana Broadc Corp	3366do			
2130-2200	Guam, AWR/KSDA	15610as			
2130-2200	Iran, VOIRI	6025au	6175au		
2130-2135 mtwhf	Latvia, Radio Latvia Intl	5935eu			

2130-2155	Moldova, R Moldova Intl	7520eu			
2130-2200 as	Sweden, Radio	6065eu	9430af		
2130-2200	Turkey, Voice of	9525va			
2130-2145 1f	UK, BBC Calling Falklands	11680as			
2130-2200	USA, Voice of America	6040me 17735pa	6095me	11870pa	15185pa
2130-2200 smthf	USA, Voice of America	6035af 15580af	7415af 17725af	11975af	15410af
2130-2200	Uzbekistan, R Tashkent	9540eu	9545eu		

2200 UTC

2200-2300	Anguilla, Caribbean Beacon	11775am			
2200-2300	Australia, Radio	12080as	17715pa	17795pa	21740pa
2200-2300 vl	Australia, VL8K Katherine	5025do			
2200-2300 vl	Australia, VL8T Tent Crk	4910do			
2200-2300	Bulgaria, Radio	7535eu	7545eu		
2200-2300	Canada, CBC N Quebec Svc	9625do			
2200-2300	Canada, CFRX Toronto	6070do			
2200-2300	Canada, CFVP Calgary	6030do			
2200-2300	Canada, CHNX Halifax	6130do			
2200-2300	Canada, CKZN St John's	6160do			
2200-2300	Canada, CKZU Vancouver	6160do			
2200-2229	Canada, R Canada Intl	5995va 11705as 11945va	7235va 13690va	9735va	9805va 15150va
2200-2300	China, China Radio Intl	9880eu			
2200-2230	China, China Radio Intl	3985eu			
2200-2300	Costa Rica, RF Peace Intl	15050am	21460am		
2200-2245	Egypt, Radio Cairo	9900eu			
2200-2300	Eqt Guinea, Radio Africa	15186af			
2200-2300	Germany, Voice of Hope	6000eu			
2200-2300	Germany, Overcomer Ministr	11840as			
2200-2215	Ghana, Ghana Broadc Corp	4915do			
2200-2230	Hungary, Radio Budapest	3975eu	11700eu		
2200-2230	India, All India Radio	7150pa 9950eu	7410eu 11620va	9650eu 11715pa	9910pa
2200-2230	Iran, VOIRI	6025au			
2200-2300	Ireland, Unt Christian BC	6200do			
2200-2300 fas/vl	Italy, IRRS	3955va			
2200-2225	Italy, RAI Intl	5990pa	9675pa	11900as	
2200-2215	Liberia, LCN/R Liberia Int	5100do			
2200-2300	Malaysia, Radio	7295do			
2200-2300 vl	Namibia, NBC	3270af	3289af		
2200-2300	New Zealand, R NZ Intl	17675pa			
2200-2215	Nigeria, FRCN/Radio	3326do	4770do	4990do	
2200-2300 vl	Papua New Guinea, NBC	4890do			
2200-2230	Serbia, Radio Yugoslavia	6100eu	6185eu		
2200-2300	Sierra Leone, SLBS	3316do			
2200-2300 as	Spain, R Exterior Espana	9595af	9680eu		
2200-2205	Syria, Radio Damascus	12085na	13610na		
2200-2300	Taiwan, Radio Taipei Intl	15600eu	17750eu		
2200-2230	Turkey, Voice of	9525va			
2200-2300	UK, BBC African Service	11835af	15400af		
2200-2300	UK, BBC Asian Service	5965as 9890as	6195as 11955as	7110as 12080ps	9660as
2200-2300	UK, BBC World Service	5975am 9410eu	6175na 9590am	6195na 9915as	7325eu 12095sa
2200-2300	UK, Merlin Network One	3985eu	7170eu	9835eu	
2200-2300	Ukraine, R Ukraine Intl	5905eu	6020eu	6080eu	7180eu
2200-2300	USA, KAJJ Dallas TX	7240eu 9560eu	7380eu 12040na	7410eu 13590eu	9550na
2200-2300	USA, KATN Salt Lk City UT	13815va	15725am		
2200-2300	USA, KWHR Naalehu HI	15590am			
2200-2300	USA, Voice of America	17510as 7215as 15185as	9770as 9890as	8990as 11760as	11760as 17820as 12080af
2200-2230 mtwhf	USA, Voice of America	15290as 6035af 13710af	15305as 7415af	17735pa 11975af	17820as 12080af
2200-2300	USA, WBCQ Monticello ME	7415na			
2200-2300	USA, WEWN Birmingham AL	5825na	13615na	15745eu	
2200-2300 mtwhfa	USA, WGTG McCaysville GA	9400am			
2200-2300	USA, WHRA Greenbush ME	13760va			
2200-2300	USA, WHRI Noblesville IN	5755am	9495am		
2200-2300 sm	USA, WHRI Noblesville IN	5755am			
2200-2300	USA, WINB Red Lion PA	11950am			
2200-2300	USA, WJCR Upton KY	7490na	13595as		
2200-2300 as	USA, WRMI/R Miami Intl	7490na 9955ca			
2200-2300	USA, WRNO New Orleans LA	15240am			
2200-2300	USA, WSHB Cypress Crk SC	7510eu	15285sa		
2200-2300	USA, WWCR Nashville TN	5070na	7435na	9475na	13845na
2200-2300	USA, WYFR Okeechobee FL	11855na	15215va	17845va	
2200-2210	Zambia, Natl BC Corp	6165do	6265do		
2230-2300	Albania, R Tirana Intl	6025eu	7165eu		
2230-2300	Austria, R Austria Intl	5945eu	6155eu	13730af	
2230-2300	Belgium, R Vlaanderen Int	13670na			
2230-2300	Cuba, Radio Havana	9550am			
2230-2257	Czech Rep, Radio Prague	9435na	11600na		
2230-2300	UK, BBC World Service	5975am 12095sa	6175na 9590na	9915sa	
2240-2250	Greece, Voice of	9420au	11645au		
2245-2300	Ghana, Ghana Broadc Corp	3366do	4915do		
2245-2300	India, All India Radio	7410as	9705as	9950as	11620as
2245-2300	Vatican State, Vatican R	7305au	9600au	11830au	

FREQUENCIES

2300-0000	Anguilla, Caribbean Beacon	6090am				2300-0000	Turkey, Voice of	7280eu	9655va		
2300-0000	Australia, Radio	9660pa 21740pa	12080as	17715pa	17795pa	2300-0000	UK, BBC Asian Service	3915as 7110as	5965as 11945as	6035as 11955as	6195as 17790as
2300-0000 vl	Australia, VL8K Katherine	5025do				2300-0000	UK, BBC World Service	5975am 12095sa	6175na	9590na	9915sa
2300-0000 vl	Australia, VL8T Tent Crk	4910do				2300-0000	UK, Merlin Network One	3985eu	7170eu	7325eu	9835eu
2300-0000	Canada, CBC N Quebec Svc	9625do				2300-0000	USA, KAIJ Dallas TX	13740na	13815va		
2300-0000	Canada, CFRX Toronto	6070do				2300-0000	USA, KTVN Salt Lk City UT	15590am			
2300-0000	Canada, CFVP Calgary	6030do				2300-0000	USA, KWHR Naalehu HI	17510as			
2300-0000	Canada, CHNX Halifax	6130do				2300-0000	USA, Voice of America	7215as 15185as 17820as	9770as 15290as	9890as 15305as	11760as 17735pa
2300-0000	Canada, CKZU St John's	6160do				2300-0000	USA, WBCQ Monticello ME	7415na			
2300-0000	Canada, CKZU Vancouver	6160do				2300-0000	USA, WEWN Birmingham AL	5825na	9975eu	13615na	
2300-2329	Canada, R Canada Intl	5960am 11865am	6040am	9535am	9755am	2300-0000 mtwhfa	USA, WGTG McCaysville GA	5085am			
2300-0000	Costa Rica, RF Peace Intl	15050am	21460am			2300-0000	USA, WHRA Greenbush ME	13760va			
2300-2330	Cuba, Radio Havana	9550am				2300-0000	USA, WHRI Noblesville IN	5755am	9495am		
2300-0000	Egypt, Radio Cairo	9900am				2300-0000 sm	USA, WHRI Noblesville IN	5755am			
2300-2350	Germany, Deutsche Welle	5990as	6045as	6130as	7235as	2300-0000	USA, WINB Red Lion PA	11950am			
2300-0000 s	Germany, Good News World R	9405sa				2300-0000	USA, WJCR Upton KY	7490na	13595as		
2300-0000	Germany, Overcomer Ministr	11840as				2300-0000 s	USA, WRMI/R Miami Intl	9955ca			
2300-0000	Ghana, Ghana Broadc Corp	4915af				2300-0000	USA, WRNO New Orleans LA	7355am			
2300-2330 as	Guam, AWR/KSDA	11775as	9705as	9950as	11620as	2300-0000	USA, WSHB Cypress Crk SC	7510eu	15285sa		
2300-0000	India, All India Radio	7410as				2300-0000	USA, WWCR Nashville TN	3215na	5070na	7435na	13845na
2300-0000	Ireland, Unt Christian BC	6200do				2300-0000	USA, WYFR Okeechobee FL	11855na			
2300-2315	Liberia, LCN/R Liberia Int	5100do				2300-2315	Vatican State, Vatican R	7305au	9600au	11830au	
2300-0000	Malaysia, Radio	7295do				2330-2359 as	Canada, R Canada Intl	6040am	9535am	11865am	
2300-0000 vl	Namibia, NBC	3270af	3289af			2330-0000 mtwhf	Guam, AWR/KSDA	11775as			
2300-0000	New Zealand, R NZ Intl	17675pa				2330-0000	Netherlands, Radio	6020na	6165na	9845na	
2300-2315	Nigeria, FRCN/Radio	3326do	4770do	4990do		2330-0000	Vietnam, Voice of	9840eu	12020eu	15010eu	
2300-0000	North Korea, R Pyongyang	11335am	13760am	15130am		2335-2345	Greece, Voice of	9395sa	9425sa	11595sa	11645sa
2300-0000 vl	Papua New Guinea, NBC	9675do				2345-0000 mtwhf	UK, BBC Asian Service	3915as			
2300-0000	Romania, R Romania Intl	6130eu	7195eu	9570na	11830na						
2300-0000	Sierra Leone, SLBS	3316do									
2300-0000	Singapore, R Corp Singapore	6150do									

SELECTED PROGRAMS

Sundays

- 2300 BBC (AE): World News. See S 0100.
- 2300 BBC (AS): East Asia Today. News, analysis, press reviews and reports from BBC correspondents.
- 2300 Canada, RCI Montreal: The World This Weekend. Half-hour of up-to-the-minute news and business reports, a feature documentary, arts and entertainment stories with Michael Crabb, sports with Dintars Cers, and a news quiz.
- 2300 USA, WBCQ Monticello ME: American Viewpoint.
- 2305 BBC (AE): Science View. See S 0040.
- 2310 BBC (AE): Performance. John Stearne explores each week one of the great voices of the century.
- 2325 BBC (AE): Pop Short. A five-minute popular music program.
- 2330 BBC (AE): In Praise of God. See S 0230.
- 2330 BBC (AS): Anything Goes. See S 1130.
- 2330 Canada, RCI Montreal: CBC Radio News. See S 0000.
- 2335 Canada, RCI Montreal: The Inside Track. An award-winning program of sports journalism, examining the impact of sports on the lives of Canadians.

Mondays

- 2300 BBC (AE): World News. See S 0100.
- 2300 BBC (AS): East Asia Today. See S 2300.
- 2300 Canada, RCI Montreal: The World at Six. CBC radio's major newscast of the day, presenting the important stories in depth and in context.
- 2300 USA, WBCQ Monticello ME: World Net Christian Radio.
- 2305 BBC (AE): Outlook. See M 1405.
- 2305 BBC (AE): Multitrack Hit-List. See M 1615.
- 2330 BBC (AS): Insight. See M 1630.
- 2330 Canada, RCI Montreal: As It Happens. Mary Lou Finlay and Barbara Budd host this daily phone-in show that introduces listeners to the newsmakers of the day and people whose stories might otherwise not be told.
- 2345 BBC (AS): Seven Days. See M 0615.

Tuesdays

- 2300 BBC (AE): World News. See S 0100.
- 2300 BBC (AS): East Asia Today. See S 2300.
- 2300 Canada, RCI Montreal: The World at Six. See M 2300.
- 2300 USA, WBCQ Monticello ME: World Net Christian Radio.
- 2305 BBC (AE): Outlook. See M 1405.
- 2330 BBC (AE): Megamix. See T 1615.
- 2330 BBC (AS): Insight. See M 1630.
- 2330 Canada, RCI Montreal: As It Happens. See M 2330.
- 2345 BBC (AS): Performance. See S 2310.

Wednesdays

- 2300 BBC (AE): World News. See S 0100.
- 2300 BBC (AS): East Asia Today. See S 2300.
- 2300 Canada, RCI Montreal: The World at Six. See M 2300.
- 2300 USA, WBCQ Monticello ME: World Net Christian Radio.
- 2305 BBC (AE): Outlook. See M 1405.
- 2330 BBC (AE): Multitrack X-Press. See W 1615.
- 2330 BBC (AS): Insight. See M 1630.
- 2330 Canada, RCI Montreal: As It Happens. See M 2330.
- 2345 BBC (AS): Science Extra. See S 1501.

Thursdays

- 2300 BBC (AE): World News. See S 0100.
- 2300 BBC (AS): East Asia Today. See S 2300.
- 2300 Canada, RCI Montreal: The World at Six. See M 2300.
- 2300 USA, WBCQ Monticello ME: World Net Christian Radio.
- 2300 Germany, Deutsche Welle: Christmas with Dresden's Famous Choir of the Holy Cross with Hardy Graupner (24th).
- 2300 Germany, Deutsche Welle: New Year's Concert on Radio Deutsche Welle (31st).
- 2305 BBC (AE): Outlook. See M 1405.
- 2330 BBC (AE): John Peel. See M 1130.
- 2330 BBC (AS): Insight. See M 1630.
- 2330 Canada, RCI Montreal: As It Happens. See M 2330.
- 2345 BBC (AS): Health Matters. See S 0115.

Fridays

- 2300 BBC (AE/AS): World News. See S 0100.
- 2300 Canada, RCI Montreal: The World at Six. See M 2300.
- 2300 USA, WBCQ Monticello ME: World Net Christian Radio.
- 2300 Germany, Deutsche Welle: 750th Anniversary of Cologne Cathedral with Brendan O'Shea (25th).
- 2300 Germany, Deutsche Welle: Looking Ahead to the Year 2000 (Jan 1st). See F 1100.
- 2305 BBC (AE): Outlook. See M 1405.
- 2305 BBC (AS): Spotlight. See F 1555.
- 2310 BBC (AS): Variable Feature. See S 0130.
- 2310 UK, BBC London (AS): Wood, Guts and Brass (4th, 11th). See T 0145.
- 2325 BBC (AS): Pop Short. See S 2325.
- 2330 BBC (AE): Multitrack Alternative. See F 1430.
- 2330 BBC (AS): Insight. See M 1630.
- 2330 Canada, RCI Montreal: As It Happens. See M 2330.
- 2345 BBC (AS): Record News. See S 1230.

Saturdays

- 2300 BBC (AE): Play of the Week (from 2230). See S 1130.
- 2300 BBC (AS): News Summary. See S 1100.
- 2300 Canada, RCI Montreal: The World This Weekend. See S 2300.
- 2300 USA, WBCQ Monticello ME: A Different Kind of Oldies Show.

- 2300 USA, WBCQ Monticello ME: Worldwide Rock & Roll Party.
- 2300 USA, WEWN Birmingham AL: Holiday Program (Urbi et Orbi) (26th). Pope John Paul II's Christmas message.
- 2301 BBC (AS): From Our Own Correspondent. See S 0330.
- 2330 BBC (AE): World of Music. See F 1130.
- 2330 BBC (AS): Science in Action. See F 1430.
- 2330 Canada, RCI Montreal: CBC Radio News. See S 0000.
- 2335 Canada, RCI Montreal: The Mystery Project. A half-hour series of detective mystery dramas created by Canadian writers.

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English for B-98
WEU:
1200 UTC 15700, 17500 kHz
2000 5850, 7535
2200 7535, 7545
NAm
0000 7375, 9485
0300 7375, 9485
(R. Bulgaria via BC-DX)

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How to Spot Santa Claus!

The various layers of the ionosphere have been used for many decades to direct back to earth the signals transmitted by thousands of shortwave stations world-wide.

If the layers are so good at redirecting to earth the various shortwave signals, is it possible to use the ionosphere to return some of the signal to the transmitter site? For nearly 40 years now, research has been conducted in this area. Many countries — Australia, the U.S., and possibly Canada and many others — have been involved in such research, and the systems have now reached the operational stage.

What was originally designed to be a wartime tool has evolved into a secondary use as a peaceful weather forecasting tool. In the US, at least two installations of the OTHR (Over The Horizon Radar) were set up on the East Coast to monitor transportation activities in the Atlantic and the Gulf of Mexico. On the West Coast, at least one system was in operation a few years ago.

The principle of operation is very simple: send a pulse at various frequencies and wait for the echo to come back. Chances are that the return signal will contain not only information about the presence of missiles, bombers, or airliners, but if you study carefully the "signatures" being returned you might get a glimpse at the state of the ocean from which the signal was returned. If you can correlate the signatures received with some actual weather information, you might be able to "read" the wind speed and the wave height at various points on the ocean.

This is not the science fiction story it sounds: OTHR installations are now being used by the National Oceanographic and Atmospheric Administration (NOAA) to study what happens out there in the North Atlantic ocean. The US Air Force (USAF) has given NOAA permission to use their OTHR installation in northern Maine, from which it is possible to monitor most of the North Atlantic Ocean and the Gulf of Mexico. If you have access to the Net, you will find some interesting information on this technique.

These OTHR installations are also used

OPTIMUM WORKING FREQUENCIES (MHz) For the Period 15 December 1998 to 14 January 1999 Flux=160 SSN=121 Predictions prepared using ASAPS for Windows®

UTC	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
TO/FROM US WEST COAST																									
SOUTH AMERICA	26	23	19	16	15	13	12	12	12	12	10	10	9		17	26	29	29	28	28	28	28	29	28	
WESTERN EUROPE	10	10	9	9	9	9	9	9	9	9	9	9			10	15	22	25	22	18	15	13	12	11	
EASTERN EUROPE (P)	8	8	9	9	9	10	10	10	10	10	9	9	9	9	10	13	16	12	11						8
MEDITERRANEAN	14	14	14	13	13	12	12	12	11	11					12	18	23	22	20	17	16	15	14	14	
MIDDLE EAST (P)	11	11	11	11	14	12	11						9	9	9	11	15	13	11	11			11	11	
CENTRAL AFRICA	21	20	18	16	13	12	12	12							15	24	24	24	22	21	21	22	23	22	
SOUTH AFRICA	18	17	15	13	12	12	11								18	23	23	23	23	22	21	20	19	19	
SOUTH EAST ASIA (P)	24	28	25	21	16						10	10	10	10	10	10	12	16	16	14	13				13
FAR EAST	28	27	24	19	16	13	10	10	9	9	9	9	9	9	9	9	10	9					14	22	28
AUSTRALIA	22	23	24	24	19	17	15	13	12	12	12	12	11	9	9	10	18	17	16	17	20	21	21	22	
TO/FROM US MIDWEST																									
SOUTH AMERICA	23	18	16	14	13	12	11	11	11	10	9	9	9	14	23	27	27	26	26	26	26	26	26	25	
WESTERN EUROPE	12	12	11	11	10	10	10	10	11	11	11	11	13	20	26	30	29	26	22	19	16	14	13		
EASTERN EUROPE	8	8	8	8	8	8	10	11	11	10	10	10	11	15	21	17	13							8	8
MEDITERRANEAN	14	14	13	13	12	12	12	12	12					14	21	27	28	24	21	18	17	16	15	14	
MIDDLE EAST (P)	11	11	11	11	13	12	12	11					10	11	14	19	16	13	12	11	11	11	11	11	
CENTRAL AFRICA	21	20	16	14	13	13	12	12						17	24	24	24	24	22	21	21	23	24	22	
SOUTH AFRICA	18	17	15	13	12	12	12							19	24	23	23	23	23	22	21	20	20	19	
SOUTH EAST ASIA (P)	21	24	20	16	13						10	10	9	9	10	13	17	15	14	13	13	11	10	12	
FAR EAST	28	25	21	17	14	12	10	10	10	10	10	9	9	9	10	11	10	10					14	23	29
AUSTRALIA	22	23	23	19	16	14		12	12	12	11	10	10	9	11	18	18	17	16	17	20	20	21	21	
TO/FROM US EAST COAST																									
SOUTH AMERICA	17	14	13	12	11	11	11	10	9	8	8	9	15	22	26	25	24	24	23	23	23	23	23	20	
WESTERN EUROPE	11	10	10	9	9	9	9	9	9	10	10	11	15	23	27	29	28	27	24	21	18	15	13	12	
EASTERN EUROPE	8	8	8	8	8	8	10	11	10	10	10	10	12	20	25	23	19	14	12	10	9	9	9	8	
MEDITERRANEAN	15	14	13	12	11	10	11	11	11	11			17	25	28	28	28	24	21	19	18	17	16	15	
MIDDLE EAST (P)	12	12	11	11	13	13	12	12	12	12	12	12	14	22	24	21	18	15	13	12	12	12	12	12	
CENTRAL AFRICA	19	17	15	14	14	13	13	12					17	24	25	25	25	25	25	23	22	22	23	24	21
SOUTH AFRICA	18	17	15	13	12	13	13						16	24	25	24	23	23	23	23	22	22	21	20	19
SOUTH EAST ASIA (P)	17	18	15	14	13						11	11	12	15	21	20	16	14	13	13	13	12	10	11	
FAR EAST	24	20	17	15	13	13	12	12	11	11	11	11	11	11	11	11	11	11				11	13	21	27
AUSTRALIA	22	20	17					11	12	11	11	10	10	13	21	20	17	16	16	17	19	20	21	21	

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

for real-time monitoring of the ionosphere, monitoring of naval and aerial traffic, and many other research projects. Many years ago, an airliner lost complete primary electrical system HF communication, navigation equipment, etc. What they had left was a VHF backup communication system and they were close enough to the Newfoundland coast to be able to communicate with the air traffic services. The crew had no idea where they were and had no idea how to get back to the closest emergency airport. With

the help of the OTHR installation in Maine, the crew was directed back to a safe landing in Gander, Newfoundland.

Now with Christmas coming, I am positive that the sleigh coming down from the North Pole will be detected and tracked till it reaches the safety of the inhabited area of the world by the various installations of OTHR.

To all a Happy Hanukkah and Merry Christmas. Happy New Year and good DXing in 1999.

Holiday Gifts via Shortwave

The holiday season is a special time of year for all of us — perhaps even more so for those shortwave listeners, like myself, who received their first radio as a Christmas or Hanukkah gift. To borrow a familiar phrase, shortwave radio really is “the gift that keeps on giving.” Just a suggestion — maybe someone you know would like to see a new shortwave radio under their tree this year.

Publication deadlines preclude the preparation of a definitive list of holiday programming for this column. Nonetheless, it is possible to provide you with some listening clues based on the past practices of some stations. But part of the fun is just tuning around and listening for the sounds of the season around the world.

In the weeks leading up to Christmas and Hanukkah, Radio Austria International uses its nightly *Report from Austria* to provide listeners with glimpses of how Austrians celebrate, share and worship. Check especially around December 8th — the Feast of the Immaculate Conception, Christmas Eve, Christmas Day, New Year’s Eve, New Year’s Day and January 6th — the Feast of the Epiphany.

Radio Austria International also annually broadcasts the traditional New Year’s Day concert of beautiful Strauss waltzes by the Vienna Philharmonic Orchestra. While this wonderful and festive event can be seen and heard on public television and radio in the United States, there’s something really special about hearing it live and direct on shortwave with commentary in German. The concert starts at 1015 UTC and can continue to 1200. Frequencies in use last year were 6155, 13730, 15455 and 17870 kHz. I had the best luck with 13730, especially after 1100 when the beam to North America came into use.

As a missionary station, you would expect HCJB, the Voice of the Andes, to celebrate Christmas in a big way and the Quito, Ecuador, broadcaster doesn’t disappoint. Special seasonal programs, as well as special editions of regular programs, can be expected. Jorge Zambrano annually presents a program of Ecuadorian carols both in a special edition of *Studio Nine* (which airs weeknights at 0110 and 0410) and in at least one of his weekly *Musica del Ecuador* programs (Saturdays UTC at 0130 and 0430).

Special classical music for the season has been on offer in the past from *Inspirational Classics* (Fridays UTC at 0230) and a full performance of Handel’s *Messiah* is a regular annual event on HCJB. Some broadcasts from Christmases past usually turn up as well. And, of course, there are numerous opportunities to hear sacred hymns, music of praise and inspirational passages appropriate to the season.

The BBC World Service annually has a nice balance of new and traditional programs for Christmas. There’s the *Queen’s Annual Christmas Message* and *A Festival of Nine Lessons and Carols*. The latter, carried live from King’s College Cambridge, is a quintessentially British celebration and institution. Biblical passages presaging and describing the birth of Jesus are interspersed with traditional British carols and hymns and result in a program that fully captures the joyful and holy tenor of the “holy day.”

From the BBC, listeners can also expect to hear several Christmas and Hanukkah stories on *Off the Shelf* (weeknights at 0445 UTC) and at least one play appropriate to the season on *Play of the Week* (Fridays at 2330 and Saturdays at 0630 UTC). The BBC also takes the opportunity to review the news and sports of the year gone by in special programs that appear during the last week of the month.

Radio Canada International has traditionally broadcast stories read by “Fireside Al,” an alter-ego of one of *As It Happens’* past presenters. These have included such classics as O. Henry’s *Gift of the Magi*. In addition, *As It Happens* (weekdays between 2330 and 0100) annually broadcasts messages between Canadian troops, stationed overseas at Canadian bases or as peacekeepers in the world’s trouble spots, and their families back home in Canada.

Lesser known to many listeners, the 24-hour German language service of Deutsche Welle annually suspends its regular programming on Christmas Eve, Christmas Day and the day after Christmas to broadcast a wide selection of seasonal music, performances and religious services throughout each day.

This programming is made even more enjoyable by the fact that DW delivers a strong signal to stateside (and worldwide, for that matter) receivers virtually around the clock. This improves the listenability of music on shortwave to the point that the radio can be

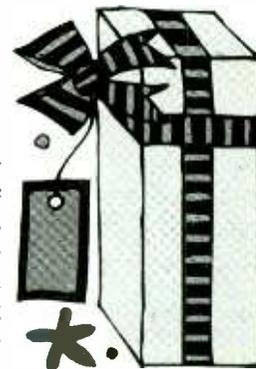
left on in the background during the family celebrations, adding an international dimension without assaulting the ears of less “experienced” listeners.

Additionally, apart from meditations on Christmas on Vatican Radio’s and WEWN’s regular programs, both stations can be expected to broadcast Midnight Mass. The US based religious shortwave broadcasters (WYFR, WEWN, WHRI, etc.) will likely have their own forms of celebration as well. Indeed, it would be fair to say that most, if not all, stations around the world will have some programming appropriate to the season.

Most of these will take the form of special features, reports and music broadcast within regular magazine-style programs, highlighting aspects of celebrations and observances within their home countries. Kol Israel, in both its English and Hebrew language services, will do the same for the Hanukkah season. And the Voice of Russia, originating as it does from a Christian Orthodox tradition, will undoubtedly offer programs and music reflecting Russian Orthodox traditions for Christmas, which falls on or around January 7.

Speaking of January, a great (and safe) way to spend New Year’s Eve is to grab your time charts, propagation forecasts and shortwave radio and tune around the world as each nation and time zone rings in the New Year. Champagne or another form of your favorite “tuning oil” is optional.

However you choose to celebrate, please accept my heartfelt wishes for a happy and safe Holiday Season for you and yours. And, of course, good listening!



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SATELLITE RADIO GUIDE

INTERNATIONAL SHORTWAVE BROADCASTERS (via satellite)

By Larry Van Horn, MT Assistant Editor

WRN One English to North America

Galaxy 5, 125 degrees West, transponder 6 (TBS) 3.820 GHz, V-Pol, audio subcarrier 6.80 MHz. WRN program details can be heard at 0625, 1525 and 1955 Eastern. Program information is also available on TBS Text page 204. You can reach WRN by email at online@wrn.org or through their website on the internet at <http://www.wrn.org>. Many programs can also be heard in Canada on *CBC English Overnight*. WRN is relayed 24 hours a day on many cable systems via the CSPAN Audio One Network. All times are U.S. Eastern Time and all programs in English.

Time	Station
0000	Radio Telefis Eireann (RTE) – Dublin, Ireland (Irish Collection)
0100	Swiss Radio International – Berne, Switzerland
0130	Monday-Friday: Radio Vlaanderen International – Brussels, Belgium (Brussels Calling) Saturday: United Nations Radio – New York, NY USA Sunday: Glenn Hauser's <i>World of Radio</i>
0200	Polish Radio – Warsaw, Poland
0230	Radio Canada International – Montreal, Canada
0300	Radio Australia – Melbourne, Australia
0400	Voice of Russia – Moscow, Russia
0500	Radio Prague – Prague, Czech Republic
0530	Radio Netherlands – Hilversum, Netherlands
0630	YLE Radio Finland – Helsinki, Finland
0700	Radio Australia – Melbourne, Australia
0800	Radio Telefis Eireann (RTE) – Dublin, Ireland
0900	Radio Prague – Prague, Czech Republic
0930	Monday-Saturday: Channel Africa – Auckland Park, South Africa Sunday: United Nations Radio – New York, NY USA
1000	Monday-Saturday: YLE Radio Finland – Helsinki, Finland Sunday: Voice of America <i>Communications World</i> – Washington, DC USA
1030	Radio Vlaanderen International – Brussels, Belgium (Brussels Calling)
1100	Radio France International – Paris, France
1200	Monday-Friday: <i>Caribbean Tempo</i> from CANA Radio Saturday: Glenn Hauser's <i>World of Radio</i> Sunday: <i>Norden This Week and Health Watch</i>
1215	Monday-Friday: Vatican Radio – Vatican City (World News)
1230	Radio Austria International – Vienna, Austria
1300	Monday-Friday: British Broadcasting Corporation – London, England (Europe Today) Saturday: Radio New Zealand International, Wellington Sunday: Radio Denmark – Copenhagen, Denmark (Copenhagen Calling)
1330	Radio Telefis Eireann (RTE) – Dublin, Ireland
1400	Radio Vlaanderen International – Brussels, Belgium (Brussels Calling)
1430	Radio Netherlands – Hilversum, Netherlands
1530	Radio Sweden – Stockholm, Sweden
1600	Swiss Radio International – Berne, Switzerland
1630	Polish Radio – Warsaw, Poland
1700	Radio Telefis Eireann (RTE) – Dublin, Ireland
1900	Radio Netherlands – Hilversum, Netherlands
2000	Radio Australia – Melbourne, Australia
2030	Monday-Friday: Radio Slovakia International – Bratislava, Slovakia Saturday: Network Africa – Johannesburg, South Africa Sunday: Radio Denmark – Copenhagen, Denmark (Copenhagen Calling)
2100	YLE Radio Finland – Helsinki, Finland
2130	Radio Sweden – Stockholm, Sweden
2200	Radio Prague – Prague, Czech Republic
2230	Radio Austria International – Vienna, Austria
2300	Polish Radio – Warsaw, Poland
2330	Radio Budapest – Budapest, Hungary

WRN Two Multi-Lingual to North America

Galaxy 5, 125 degrees West, transponder 6 (TBS) 3.820 GHz, V-Polarization, Audio subcarrier 6.2 MHz. Note that some programs listed below are subject to pre-emption without notice. All times are U.S. Eastern Time.

Time	Station
0000	World Radio Network from National Public Radio
0600	YLE Radio Finland – Helsinki, Finland (News in Finnish). On Saturdays a phone-in for children in Finnish until 0630.
0610	YLE Radio Finland – Helsinki, Finland (Easy listening music with announcements in Finnish and English)
0630	YLE Radio Finland – Helsinki, Finland (News of the past 24 hours in Finnish)

0700	Interval signal
0800	Radio na Gaeltachta (News in Irish)
0900	Radio Prague – Prague, Czech Republic (Programming in Czech)
0927	Interval signal
1000	YLE Radio Finland – Helsinki, Finland (Regional broadcasts from various parts of Finland in Finnish)
1030	YLE Radio Finland – Helsinki, Finland (News in Finnish)
1100	YLE Radio Finland – Helsinki, Finland (Variable programming in Finnish—often light music)
1200	Interval signal
1300	Voice of Russia – Moscow, Russia (Russian Programming)
1400	Radio Vlaanderen International – Brussels, Belgium (Brussels Calling with Dutch programming)
1430	Identification tone
1630	Radio Austria International – Vienna, Austria (German Programming)
1700	Radio Budapest – Budapest, Hungary (Hungarian Programming)
1800	Polish Radio – Warsaw, Poland (Polish programming)
1830	YLE Radio Finland – Helsinki, Finland (Devotional programming in Finnish)
1855	YLE Radio Finland – Helsinki, Finland (News in Finnish)
1900	YLE Radio Finland – Helsinki, Finland (News of the past 24 hours in Finnish)
1925	YLE Radio Finland – Helsinki, Finland (News in Swedish)
1930	YLE Radio Finland – Helsinki, Finland (French programming)
1945	YLE Radio Finland – Helsinki, Finland (Light music in Finnish)
2030	YLE Radio Finland – Helsinki, Finland (Easy listening music). Announcements partially in English. Saturdays a phone-in for children in Finnish
2100	YLE Radio Finland – Helsinki, Finland (Documentaries and Theater of the Air in Finnish). Sunday: Classical music with a preview in English.
2200	YLE Radio Finland – Helsinki, Finland (English programming)
2230	YLE Radio Finland – Helsinki, Finland (Newsroundup in Finnish)
2300	Interval signal
2330	Radio Austria International – Vienna, Austria (German programming)

WRN One English to Europe

Astra 1B, 19 degrees East, transponder 22 (VH-1) 11.538 GHz, V-Polarization, audio subcarrier 7.38 MHz. All programs in English and WRN program information can be heard daily at 0125 and 2025 UTC. Program information is also available on VH-1 Text page 222, 223, 224. All times BST/UTC+1 Hour (for Central European Time add 1 hour).

Time	Station
0000	Radio Budapest – Budapest, Hungary
0030	Radio Netherlands – Hilversum, Netherlands
0127	<i>Earth & Sky</i> (Daily Science Series)
0130	Radio Sweden – Stockholm, Sweden
0200	National Public Radio <i>All Things Considered</i> (repeat)
0300	Tuesday-Saturday: Canadian Broadcasting Corporation <i>As It Happens</i>
0300	Monday-Monday: Radio Canada International – Montreal, Canada (World News and Features)
0400	Polish Radio – Warsaw, Poland
0430	Monday-Friday: Radio Budapest – Budapest, Hungary Saturday: Glenn Hauser's <i>World of Radio</i> Sunday: United Nations Radio – New York, NY USA
0500	Tuesday-Saturday: Public Radio International <i>Market Place</i> Sunday: Channel Africa – Auckland Park, South Africa Monday: Radio Denmark – Copenhagen, Denmark (Copenhagen Calling)
0530	Radio Austria International – Vienna, Austria
0600	Swiss Radio International – Berne, Switzerland
0700	National Public Radio <i>All Things Considered</i> (repeat)
0800	Radio Australia – Melbourne, Australia
0900	Monday-Friday: Radio Budapest – Budapest, Hungary Saturday: Radio New Zealand International, Wellington Sunday: Adventist World Radio
0930	Monday-Friday: Radio Canada International – Montreal, Canada Saturday: United Nations Radio – New York, NY USA Sunday: Voice of America <i>Communications World</i> – Washington, DC USA
1000	Radio Prague – Prague, Czech Republic
1030	Monday-Saturday: Channel Africa – Auckland Park, South Africa Sunday: Glenn Hauser's <i>World of Radio</i>
1100	Monday-Friday: Radio Australia – Melbourne, Australia Saturday: National Public Radio <i>Car Talk</i> Sunday: Public Radio International <i>Prairie Home Companion</i> until 1300 UTC/1400 CET

INTERNATIONAL SHORTWAVE BROADCASTERS / SCPC SERVICES

1200	Monday-Friday: National Public Radio <i>Morning Edition</i> Saturday: National Public Radio <i>Fresh Air</i>
1300	Monday-Friday: National Public Radio <i>Morning Edition</i> Saturday/Sunday: National Public Radio <i>Weekend Edition</i>
1400	Radio France International – Paris, France
1500	Monday-Friday: Voice of Russia – Moscow, Russia Saturday: Radio New Zealand International – Wellington Sunday: Voice of America <i>Communications World</i> – Washington, DC USA
1530	Adventist World Radio
1600	Radio Australia – Melbourne, Australia
1700	Monday-Friday: Caribbean Tempo from CANA Radio Saturday: Glenn Hauser's <i>World of Radio</i> Sunday: Radio Denmark – Copenhagen, Denmark (Copenhagen Calling)
1800	Monday-Friday: Radio Slovakia International – Bratislava, Slovakia Saturday: Network Africa – Johannesburg, South Africa Sunday: <i>Norden This Week</i> and <i>Health Watch</i>
1830	Radio Telefis Eireann (RTE) – Dublin, Ireland (News and Sports)
1900	Radio Vlaanderen International – Brussels, Belgium (Brussels Calling)
1930	Radio Netherlands – Hilversum, Netherlands
2027	<i>Earth & Sky</i> (Daily Science Series)
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 <i>The World</i> Saturday/Sunday: National Public Radio <i>All Things Considered</i>

WRN Two Multi-Lingual to Europe

Hotbird-4, 13 degrees East, transponder 121 (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).

Time	Station
0000	*WRN1 European schedule
0100	Radio Prague – Prague, Czech Republic
0130	*WRN1 European schedule
0309	Vatican Radio – Vatican City
0745	*WRN1 European schedule
0830	Sunday: Vatican Radio – Vatican City until 1130
0930	Monday-Saturday: Vatican Radio – Vatican City until 1130, except Wednesday to 1200
1130	*WRN1 European schedule except Wednesday
1200	Monday-Friday: Radio Studio Delta Saturday/Sunday: *WRN1
1300	Vatican Radio – Vatican City
1530	Monday-Friday: Radio Studio Delta Saturday/Sunday: *WRN1 European schedule
1630	Vatican Radio – Vatican City
2230	*WRN1 European schedule
2300	Monday-Friday: Radio Studio Delta Saturday/Sunday: *WRN1 European schedule

WRN3 German to Europe

Astra 1B, 19 Grad Ost, Transponder 16 (Sky Movies), 11.436 GHz vertikal, Audio Tonunterträger 7.38 MHz und Astra Digital Radio (ADR) Astra 1C, Transponder 33 (ZDF), 10.964 GHz horizontal, auf Monokanal B, 7.56 MHz. Alle Programme auf Deutsch.

Single Channel Per Carrier (SCPC) Services

By Robert Smathers
roberts@nmia.com

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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-Horizontal 12 (C-band)

1204.90 (75.1)	Radio Marti—U.S. Information Agency Spanish language radio service to Cuba
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GE-2 Transponder-Vertical 13 (C-band)

1178.70 (81.3)	NASA space shuttle audio
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GE-3 Transponder-Horizontal 13 (C-band)

1207.90 (52.1)	Wisconsin Voice of Christian Youth (VCY) America Radio Network—religious programming
1204.45 (55.55)	KJAV-FM (104.9) Alamo, Tex—Spanish language religious programming/ <i>Nuevo Radio Christiana Network</i>

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
1201.30 (58.7)	Wisconsin Voice of Christian Youth (VCY) America Radio Network—religious programming

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— <i>Radio Korea</i>
1443.40 (56.6)	Voice of Free China (International Shortwave Broadcaster) Taipei, Taiwan
1438.30 (61.7)	WWRV-AM (1330) New York, NY—Spanish religious programming and music, ID— <i>Radio Vision Christiana de Internacional</i>
1436.50 (63.5)	West Virginia Metro News—network news feeds

Galaxy 6 Transponder 3-Horizontal (C-band)

1404.80 (55.2)	KOA-AM (850)/KTLK-AM (760) Denver, Colo—news and talk radio/Denver Broncos NFL radio network/Colorado college sports
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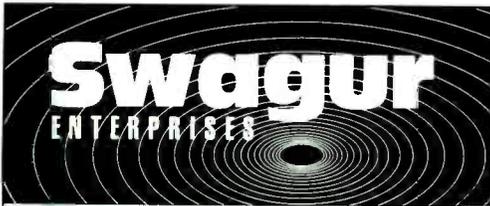
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SATELLITE RADIO GUIDE

SINGLE CHANNEL PER CARRIER (SCPC) SERVICES

1404.60 (55.4)	WGN-AM (720) Chicago, IL—news and talk radio/Northwestern college sports/Chicago Bears NFL radio network	1383.10 (76.9)	KIRO-AM (710) Seattle, WA—news and talk radio/Seattle Seahawks NFL radio network	1447.20 (52.8)	La Grande Cadena Raza
1404.40 (55.6)	Illinois News Network—network news feeds/W MVP-AM (1000) Chicago, IL—talk/Chicago Blackhawks NHL radio network	1382.90 (77.1)	Michigan News Network—network news feeds	1447.00 (53.0)	XEMZA-AM 560, Manzanillo, Mexico
1404.20 (55.8)	Tribune Radio Networks/Wisconsin Radio Network	1382.60 (77.4)	Soldiers Radio Satellite (SRS) network—U.S. Army information and entertainment radio/Army college sports	Anik E1 Transponder 21-Horizontal (C-band)	
1402.70 (57.3)	WLAC-AM (1510) Nashville, TN—news and talk/Road Gang trucker program (overnight)/Tennessee college sports	1382.00 (78.0)	Westwood One College Sports feeds/Occasional audio	1036.70 (63.3)	In-store music
1402.20 (57.8)	NorthWest Ag News Network - Agriculture info for the Pacific Northwest	1381.60 (78.4)	KEX-AM (1190) Portland, OR—news and talk radio	1037.00 (63.0)	In-store music
1402.00 (58.0)	Occasional audio/Clemson college sports	1381.40 (78.6)	Occasional audio	1037.50 (62.5)	In-store music
1401.50 (58.5)	USA Radio Network	1381.20 (78.8)	KJR-AM (950) Seattle, WA—sports talk radio/Washington State college sports	SBS5 Transponder 2-Horizontal (Ku-band)	
1399.50 (60.5)	Occasional audio	1377.10 (82.9)	In-Touch—reading service	1013.60 (80.4)	Wal-Mart in-store network
1399.20 (60.8)	Occasional audio	1376.00 (84.0)	Kansas Audio Reader Network—reading service	1013.20 (80.8)	Wal-Mart in-store network
1399.00 (61.0)	Sports Byline USA/Sports Byline Weekend	1375.40 (84.6)	USA Radio Network/AgriNet Agriculture news service	1012.80 (81.2)	Sam's Wholesale Club in-store network
1398.50 (61.5)	Occasional audio	Galaxy 6 Transponder 4-Vertical (C-band)			
1398.30 (61.7)	WSB-AM (750) Atlanta, GA—news/talk/Georgia college sports				
1398.00 (62.0)	Occasional audio	1376.00 (64.0)	Data Transmissions	1004.50 (89.5)	Wal-Mart in-store network
1397.80 (62.2)	Occasional audio/Colorado Avalanche NHL radio network	Galaxy 6 Transponder 6-Vertical (C-band)			
1397.50 (62.5)	Minnesota Talking Book Radio Network—reading service for the blind				
1397.10 (62.9)	Wisconsin Radio Network/Green Bay Packers NFL radio network/Wisconsin college sports	1347.00 (53.0)	WCRP-FM (88.1) Guayama, PR—Spanish language religious programming	1004.00 (90.0)	Wal-Mart in-store network
1396.90 (63.1)	Occasional audio	Anik E2 Transponder 1-Horizontal (C-band)			
1396.70 (63.3)	Radio America Network				
1396.40 (63.4)	Georgia News Network (GNN)—network news feeds	1446.00 (54.0)	Canadian Broadcasting Corporation (CBC) Radio—North (Quebec) service	1003.60 (90.4)	Sam's Wholesale Club in-store network
1396.00 (64.0)	WHO-AM (1040) Des Moines, IA—talk radio/Iowa News Network—network news feeds/Iowa college sports	Anik E2 Transponder 7-Horizontal (C-band)			
1395.80 (64.2)	WTMJ-AM (620) Milwaukee, WI—talk radio/Green Bay Packers NFL radio network/Wisconsin college sports				
1395.60 (64.4)	WGST-AM/FM (640/105.7) Atlanta, GA ID Planet Radio—news and talk radio/Atlanta Falcons NFL radio network	1326.00 (54.0)	Canadian Broadcasting Corporation (CBC) Radio—North (Eastern Arctic) service	1003.20 (90.8)	Wal-Mart in-store network
1395.40 (64.6)	Michigan News Network—network news feeds/Michigan college sports	Anik E2 Transponder 13-Horizontal (C-band)			
1395.00 (65.0)	Occasional audio				
1394.70 (65.3)	WJR-AM (760) Detroit, MI—news and talk radio/Michigan News Network	1206.00 (54.0)	Canadian Broadcasting Corporation (CBC) Radio—North (MacKenzie) service	1404.80 (55.2)	RFD Radio Service
1394.50 (65.5)	XEPRS-AM (1090) Tijuana, Mexico—Spanish language programming	1205.00 (54.5)	Canadian Broadcasting Corporation (CBC) Radio—Occasional feeds/events	1404.60 (55.4)	Wyoming News Network—network news feeds/Northern Sports Network/Wyoming college sports
1394.30 (65.7)	Michigan News Network/Michigan State college sports	Anik E2 Transponder 17-Horizontal (C-band)			
1385.40 (74.6)	WDUQ-FM (90.5) Pittsburgh, PA—Jazz format				
1384.60 (75.4)	WDUQ-FM (90.5) Pittsburgh, PA—Jazz format	1126.00 (54.0)	Canadian Broadcasting Corporation (CBC) Radio—North (Western Arctic) service	1400.60 (59.4)	Learfield Communications/Indiana college sports
1384.40 (75.6)	KOA-AM (850)/KTLK-AM (760) Denver, CO—news and talk radio/Colorado college sports/Denver Broncos NFL radio network	1125.50 (54.5)	Canadian Broadcasting Corporation (CBC) Radio—North (Newfoundland and Labrador) service	1400.40 (59.6)	Learfield Communications/MissouriNet/St. Louis Rams NFL radio network
1384.20 (75.8)	WSB-AM (750) Atlanta, GA—news/talk/Georgia college sports	Anik E2 Transponder 23-Horizontal (C-band)			
1383.70 (76.3)	Motor Racing Network (occasional audio) NASCAR racing				
		1006.00 (54.0)	Societe Radio-Canada (SRC) Radio—AM Network	1400.20 (59.8)	Occasional audio/Data transmissions
		1005.50 (54.5)	Canadian Broadcasting Corporation (CBC) Radio—North (Yukon) service	1400.00 (60.0)	Learfield Communications/Purdue college sports
		Solidaridad 1 Transponder 1-Vertical (C-band)			
		1447.90 (52.1)	Antenna Radio Noticias	1396.60 (63.4)	Kansas Information Network/Kansas AgNet—network news feeds/Southwest Missouri State college sports
		1447.60 (52.4)	Antenna Radio Noticias	1396.20 (63.8)	MissouriNet/Illinois college sports
				1396.10 (63.9)	Occasional audio/Illinois college sports
				1395.90 (64.1)	Western Montana Radio Network/Red River Farm Network/Montana college sports
				1395.70 (64.3)	MissouriNet/Kansas State college sports
				1386.40 (73.6)	Learfield Communications/Kansas City Chiefs NFL radio network
				1386.20 (73.8)	Radio Iowa/Iowa college sports
				1386.00 (74.0)	United broadcasting Network—talk radio
				1384.60 (75.4)	Capitol Radio Network/Tennessee Oilers NFL radio network/North Carolina State college sports
				1384.00 (76.0)	Occasional audio/ABC Direction Network—network news feeds
				1383.80 (76.2)	Occasional audio/Syracuse college sports
				1383.40 (76.6)	Capitol Radio Network/North Carolina college sports
				1382.90 (77.1)	MissouriNet/Missouri college sports
				1382.50 (77.5)	Virginia News Network—network news feeds
				1382.10 (77.9)	Learfield Communications/MissouriNet/Illinois college sports



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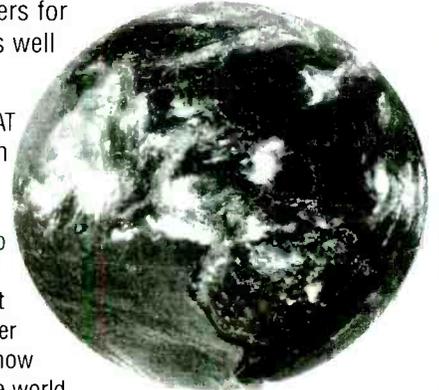


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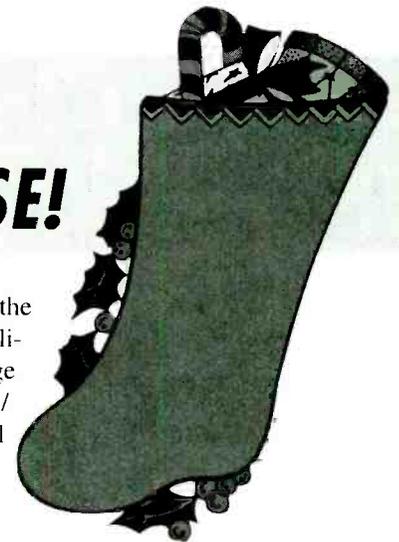
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Tuning in Shortwave via Satellite

There have always been a couple of drawbacks to listening to shortwave radio broadcasts. First, there's the problem of "What's on and where do I find it?" That's easily solved by subscribing to *MT* and thumbing through the terrific "Shortwave Guide" section.

Then there's the problem of propagation. Solar storms, goofy sun spot counts, and atmospheric mayhem create all kinds of listening problems. Then somebody in the house cranks up a hair dryer or vacuum cleaner or turns on a light with a dimmer switch. More problems.

Suddenly, a storm pops up somewhere between here and Europe and it's "You're listening to the Voice of (crackle crackle) now leaving this frequency and moving to (crackle crackle) MHz." Arrrrgh!

I've been a shortwave listener all my life and I run into these problems all the time. But, it wasn't until I put my first satellite system together back in 1984 that I realized that there is an alternative to listening to shortwave on a shortwave radio. For more than ten years many of the major shortwave broadcasters have been retransmitting their world service schedules via satellite, and the best part is that it's never been easier or cheaper to tune in!

Who's on the Birds

One of the most notable radio services on satellite is the World Radio Network (WRN). This popular cable service is everywhere. Europeans tune in via several satellite locations and in the U.S. millions tune in via their local cable-TV systems. WRN also transmits via C-band satellite on no fewer than three locations. Their varied schedule of international broadcasters is like having a scanning shortwave radio that jumps from country to country throughout the day bringing the voices of the world to your home, static and fade free, every day of the year.

WRN1 is the English schedule to North America (see page 62) and is found on Galaxy 5 (125° W). Here you'll find broadcasts in English from no fewer than 16 countries including, Ireland, Switzerland, Poland, Canada, Australia, The Netherlands, Finland and that's just the first six hours! The WRN1 schedule is also relayed 24 hours a day on CSPAN's Audio One service on Satcom C3 (131° W).

WRN2 is the multi-lingual service to North America which is also found on Galaxy 5. Here you'll find most of the same international broad-

casters, but, this time in their native languages. Both services may also be heard on the Internet at their web site (www.wrn.org). You can also find a complete listing of both WRN schedules there. And, if you look closely at the schedule you'll notice Glenn Hauser's *World of Radio* is transmitted every Sunday at 1:30 pm ET on WRN1.

One of the reasons most of us have shortwave radios is to tune into the BBC World Service, the venerable old voice of news respectability. The World Service is transmitted 24 hours a day on another CSPAN audio subcarrier. If you've ever spent hours chasing down the BBC on different bands trying to find a frequency that you can actually enjoy listening to, you'll be thrilled to tune in via satellite and listen to those great news presenters and the world class music in high fidelity. No fading, static or adjacent channel interference all day long.

Among the many international broadcasters found on satellite (see chart) are CBC from Canada, Deutsche Welle from Germany, Antenna Satellite from Greece, and RAI from Italy. You'll also be able to tune in World Harvest Radio International, the Arab Radio Network, Hindu programming, and more. All this is possible using a standard C/Ku-band satellite TV receiver. With the addition of a Ku-band LNB, an SCPC receiver and a digital satellite receiver you can pick up radio programming in Chinese, Russian, Spanish, and French. You'll even be able to tune into Radio Marti and VOA Express!

How You Can Tune In

I mentioned earlier that it's never been easier or cheaper to tune in to these world service broadcasts and here's why: The new domestic broadcast satellites are considerably more powerful than their predecessors of ten years ago. In addition, the receiving equipment is far more capable than was previously available. That combination, coupled with the fact that the entire big dish satellite industry has been in a tail spin for the last four years, has made receiving equipment extraordinarily cheap.

You can take advantage of this current environment by checking out your local area for bargains. First, check around your town, city or county. Millions of people across America are giving away their big dish satellite systems to get in on the small dish fad. Many dealers are taking big dish systems away in trade for the little ones, their back room shelves are packed with stuff they can't sell. Make an offer! Take advantage of manufacturer close-outs on products no longer being produced but which are still in the factory sealed cartons and under warranty.

Even if you order brand new products you'll find substantial savings by doing a little price shopping. Look on the Internet. I found prices on the new 4DTV digital receiver to vary as much as \$400 on that one item alone! Get a catalog from Skyvision (800-543-3025 or www.skyvision.com) and see what's available. If you haven't priced big dish satellite gear in a while, you might be pleasantly surprised.

INTERNATIONAL BROADCASTERS ON SATELLITE

Service	Satellite	Channel
World Radio Network 1	Satcom C3 131° W	channel 7 5.22 MHz
BBC World Service	Satcom C3 131° W	channel 7 5.40 MHz
World Radio Network 1	Galaxy 5 125° W	channel 6 6.20 MHz
World Radio Network 2	Galaxy 5 125° W	channel 6 6.80 MHz
Russian -American Radio Network	SBS 5 * 123° W	channel 12 6.20 MHz
CBC AM & FM service in French and English	Anik E2 107.3° W	
CBC Yukon, Arctic, NWT Service	Anik E2 107.3° W	
Radio Red National (Mexico)	Solidaridad 1 * 109.2° W	channel 1 **
Radio Tropical (Caribbean)	GE-1 103° W	channel 4 7.60 MHz
Apna Sangeet (Hindu)	GE-1 103° W	channel 16 7.40 MHz
Radio Deutsche Welle (Stereo)	GE-1 103° W	channel 22 7.38/7.56 MHz
Antenna Satellite Radio (Greek)	Spacenet 4 101° W	channel 16 7.80 MHz
Asia Radio Network (Korean)	Galaxy 6 ** 99° W	channel 1
RAI Radio (Italy)	Galaxy 7 91° W	channel 14 7.38 MHz
Radio Marti	GE-2 85° W **	channel 12
VOA Express	GE-2 85° W (DVB Digital)	channel 3502
* Ku-band		
** SCPC		

Whatever you do, don't make excuses about why you're not enjoying satellite delivered shortwave radio. "But, Ken, I don't have enough room at my place." Baloney! I've heard from one reader who doesn't even have a backyard. He's got only a balcony and he's got three dishes on it! I've had excellent results using dishes as small as 54" to tune into satellite radio, but, the bigger your dish, the better your listening pleasure. A well designed, black mesh, 6 foot dish will be adequate for most all but the fringes of the continental U.S. Best results will be with a 10 foot dish.

■ Liberating Entertainment

All these radio services are fun to tune in to and once you have your system up and running you'll wonder why you waited so long. But, you'll find out something else, too. In addition to shortwave broadcasters there are dozens more radio stations from all over the U.S. and Canada with more music and talk than you can imagine. You tune them in the same way you do the international broadcasters, and the best news is that it doesn't cost a dime.

Oh, by the way, you may also discover that the same equipment that lets you tune in to shortwave on satellite also brings you dozens of channels of free television programming, including some channels available nowhere else. PBS, NASA, UPN, Warner Bros, CBC-TV, America 1, CSPAN, shopping channels, syndicated program feeds, sports feeds, news feeds, and international broadcasters are all up there in the clear. When all of your friends who suffer with limited cable-TV service or small dish satellite gripe about their continually rising monthly rates, you'll just have to laugh.

■ Mailbag

• Ralph Siebert, K1TV, from Georgia wrote to let me know that his favorite channel, Deutsche Welle, (GE-1 channel 22) has live audio on their Internet site (www.dwelle.de), and they are also found in Digital Video Broadcast (DVB) standard on Panamsat 5 (58° W).

Right you are Ralph, and my favorite European news magazine, *European Journal*, airs in German, English and Spanish at different times on DW. Ralph also points out that DW publishes a monthly program guide for DW programming which includes some interesting articles and can be ordered for free. Details are on their web site.

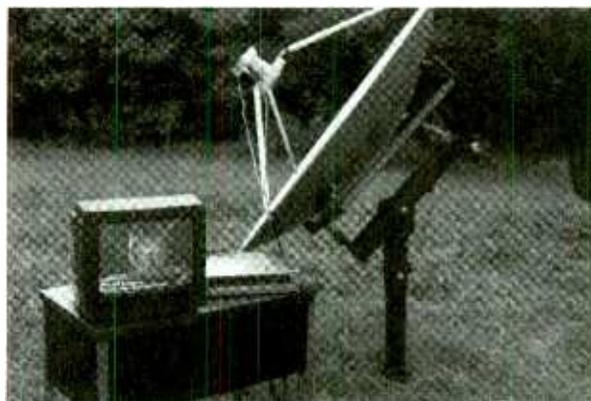
• Mark Harmer from Pennsylvania liked our idea of the "Poor Man's DBS" in the September issue of *ST* and has three questions: "(1) Can I really get CBC and BBC World where I am? (2) Would trees about 50-75 feet away kill the signal. And, (3) Any suggestions as to how I could hook up with a cheaper local dealer?"

Good questions, Mark! (1) Yes, you can get CBC and BBC World where you live, but you'll need a dish with an actuator motor to view channels on Panamsat 5 and Anik E2, and (2) It's possible that the trees would be in the way. It depends entirely on how tall they are and whether or not they are conifers or deciduous. With deciduous trees at least they'll lose their leaves for about half the year. What you're looking for is an unobstructed view to the south and west. (3) A lot of dealers have an inflated view of what some of their junk is worth. My advice is to drag out the phone book and look through the Yellow Pages under Satellite TV. Call as many dealers as you can; you'll be surprised at the price discrepancies. Again, look to the Internet and catalog dealers for more comparisons.

• Angus More from Illinois has a similar question. "Over the last few years, I've often wondered if it would be possible to receive C-band from a dish under 5 feet in diameter. Then, when I read this month's (September *ST*) issue, you confirmed my suspicions with the picture of a 54-inch dish...However, after searching the net and local satellite distributors, I have yet to find this size dish available..."

[Photo]

Yes, you can get decent reception with dish as small as 54 inches (see photo) and yes, it's true that smaller dishes with polar mounts (for scanning the skies) are harder to come by.



Tuning in on the cheap! Here's a 54" dish with a 40° LNBF and a receiver, salvaged from a dealer's junk shelf, tuning into Deutsche Welle TV. The DW Radio services are on subcarriers which can be tuned in even by this 15 year old analog receiver. (Photo by Ken Reitz)

However, there are a couple of good sources: Try www.digiear.com. This is an Internet-only retailer which has an excellent dish in the 54-inch range made by Jonsa. Those not on the Net can reach them at PME Smalleear/Digiear 6680 Lincoln Avenue, Lockport, NJ 14094 or call 716-639-7778.

The aforementioned Skyvision company also has small dishes and polar mounts. The best small dishes are solid, not mesh, as you want to have as much reflective surface as possible.

• Tom Deal writes via E-mail: "Do you know where TNN and ESPN feed their motor sport coverage?"

Tom, I can usually find them on SBS 6 Ku-band at 74° West.

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Listening Tips for the Beginner

A very common piece of mail (both electronic and snail) received by Old Uncle Skip often begins something like this: "I just bought my first shortwave receiver and I can't hear (*fill in any country or station you choose*). What's the problem?"

The lament is a common one, brought about by the fact that, here in the US, we are used to dialing in dozens of locally strong signals on our regular AM/FM broadcast receivers in our homes and cars.

One of the things that makes shortwave listening such a challenge is that the signals often take a little extra effort to track down and monitor. Atmospheric conditions change the distance and quality of shortwave signals. Stations regularly change their frequencies, broadcast times, power levels and antenna directions.

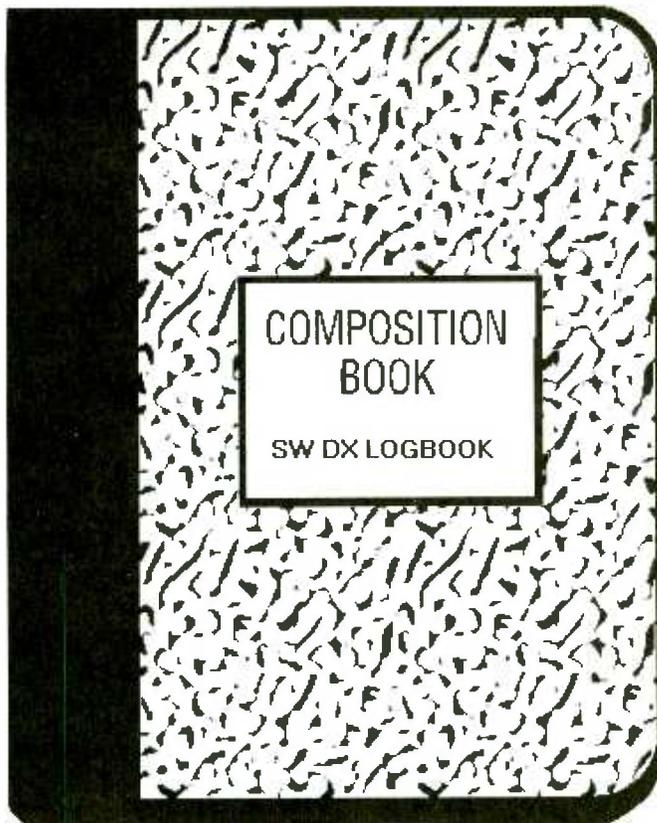
Learning to live with these challenges is really not that difficult. It's mostly a matter of changing how you think about radio signals. Let's go over a few basics to help you get a fair shot at those stations you long to hear.

■ Know Your Equipment

One of the first things you need to do is get a good handle on your hardware. Take some time to learn about your receiver. Old Uncle Skip is a prime proponent of the term "When in doubt, read the manual." Poring over the documentation that came in the box with your receiver gives you maximum access to all of your rig's abilities. Since modern receivers seem to have more buttons than an old maid's shoes, review of the receiver manual from time to time will refresh your memory on how to keep everything flying. Most manuals will also make suggestions concerning antennas and accessories that will further improve your listening.

Speaking of accessories, these may also come with documentation that may explain certain quirks in operation that must be dealt with to get things humming along in your listening post.

If you have been reading *MT* for any length of time, you have probably come across a few hardware tips from time to time that may apply to your monitoring methods and madness. When I come across something worth trying out, I simply mark it off with a "highlighter" pen for future reference. Some



folks prefer to make a clipping file. Any student of the sciences can tell you the value of maintaining a notebook. Whatever method you may choose, if you don't take time to keep track of helpful hints, they won't be very helpful.

■ Know the Spectrum

Once you've got your hardware *grok*ed, it's time to get a handle on what there is to listen to. This is so much more than simply being able to reel off a list of frequencies. Knowing the frequencies that various signals are broadcast on is not even half the battle. Sure, knowing *where* to listen for a signal will get you an entry or two in your log book, but knowing *how* to listen for stuff that is unexpected will also give you unexpected rewards.

For starters, get to know the **propagation conditions** that are reported in Jacques d'Avignon's column in *MT*. Knowing which portions of the bands are "hot" will always point you to new listening opportunities. Once you zero in on the bands that are going to bear

the most fruit, tune around and get a notion of what is out there.

Of course you will log all the stations you hear, but you will also want to keep track of all the other signals that frequent the band. This column has often reflected the notion that getting to know a few megahertz of the bands at a time is the key to long term listening skills. Again, your logs and notes will serve to refresh your memory and turn you into a real DXpert.

Remember, there is no substitute for listening, listening and more listening! A beginner with modest equipment who keeps his or her ear to the speaker is going to progress further in the hobby than the "expert" with a multi-thousand-dollar listening post who

only twists the dials for an hour or two on weekends. Tenacity is the watchword for successful radio monitoring.

■ Know What Time It Is

Since you are starting up a notebook, you might want to set aside a few pages devoted to time. As we know from both philosophy and science, time is an abstract concept. For reasons far beyond the scope of this column, time is recorded in many different ways. Whether you are listening around the world or down the street, you will encounter time zones, local time, Coordinated Universal Time (UTC), military time (Zulu), Greenwich Mean Time (GMT) — maybe even Gregorian and Julian calendars. Magazines such as *MT* regularly provide charts and hints to help monitors make sense out of time systems. Make good use of these tools. And while we're at it, here's Old Uncle Skip's short course on common time problems:

First get used to converting your local time into the 24-hour format. Midnight is zero

hour (Just like in all those old war movies). 1:00 a.m. through 12:00 noon remain the same as always. When you get to 1:00 p.m. you add twelve to each appointed hour. 1:00 p.m. becomes 13:00, 2:00 p.m. becomes 14:00 and so on until you reach midnight and zero hour again. Getting this notion down prepares you for a quick and dirty system of learning Coordinated Universal Time (also known as UTC), the system used by most international broadcasters.

To find UTC, first convert your local time to 24-hour format. If you live in the Eastern Time zone add 5 hours to get the current UTC for your area. If your area is in Daylight Saving Time subtract 1 hour from your answer (or just add 4 hours in the first place). Central Time folks will add 6 hours, Mountain Timers add 7 hours and Pacific Time Zoners will add 8 hours. Again, don't forget to subtract 1 hour from your answer during Daylight Saving Time.

The other easy answer to keeping track of UTC time is to simply keep your subscription to *MT* current and follow the tops of the pages of "The Shortwave Guide" section. We can't make it any easier than that, folks!

■ Know Where Your Notes Are

The shortwave monitoring hobby often comes down to keeping lists. Even in this modern Information Management age, sometimes the "old ways" are the best ways. They are also the easiest and least expensive ways for beginners in the radio hobby. Old Uncle Skip's shack is populated with no less than five computers; however, it also includes a good old fashioned log book and card file.

A traditional log book serves as a history of what I have heard over time. My file box serves as my frequency and station hit list. Sure, I have all this data entered into a computer system and I do use that system for ongoing trends and analysis. Still, the traditional tools of the trade, log book and file box, are often faster for basic record keeping while actually listening. Besides, have you ever heard the noises that computers can generate right in the middle of the bands we all enjoy monitoring?

While you can purchase commercially produced log books from many of the suppliers listed in the pages of *Monitoring Times*, you might find it fun to develop your own logging system. Again, a plain old notebook will do. Just remember to keep track of all the basic data. 1 - Date, 2 - Time (UTC and Local), 3 - Frequency, 4 - Station, 5 - Program data, 6 - Signal quality data, 7 - Verification (QSL) information.

Some people find it useful to keep track of other information such as local weather conditions or the propagation indexes that are given over WWV and WWVH. It's your log book. You can write what you want to!

The good old file box can serve as a master frequency catalog, not only of things you have heard but also things you are trying to hear. Let's say you've been trying to catch the Lower Slobovian relay of Radio Freedomia. You might make up a file card with all the days, times and frequencies this station may appear. If you're really hot on the trail you can make multiple cards that are cross-referenced by time and frequency. This way, when you sit down to DX, you know exactly what is the best place to go hunting for that rare catch.

3" x 5" file cards are the most common, but do your eyes a favor and invest in the 5" x 7" size instead. I know this may sound like a silly issue, but make sure you use good quality writing instruments when you are record keeping. If you take down information with a smudgy ballpoint pen or a felt tipped marker that bleeds through onto the next page, over time, your data collection will be useless. And write BIG! You're not going to stay young forever and I have the bifocals to prove it!

■ Know Yourself

Now along with the direct knowledge you've received in the above few paragraphs, it's time to take a good, long look at yourself as well. Try to judge honestly how much of your whole life you plan to devote to your radio hobby. Radio monitoring can be the spice of life, but I have found that, for most people, it makes a pretty poor meal three times a day.

The basic guidelines for a healthy pastime are usually easy to see. If your listening habits are disturbing your work, your schooling, or your relationships with your friends and family, you are no longer a hobbyist, you are an

addict. Just like those melodramatic anti-drug commercials on TV say: addictions are life destroying, not life enhancing. Try to keep your perspective clear on this point because we all hope that your interest in monitoring will be lifelong. Heck, our advertisers are betting on it!

While you are working so hard to keep your perspective on your monitoring practices, you might as well take a crack at keeping your perspective on your monitoring goals and achievements. Even with super equipment, lots of practice, and an advanced degree in the science of propagation, a good chunk of what happens is still pure luck. Don't be overly impressed with the successes of others. They were in the right place at the right time to hear some things. You will be in the right place at the right time for others.

In terms of total stations heard, the only thing most so-called experts have over you as a beginner is more time at the dials. Don't worry, over time you'll get there too. Relax, this is supposed to be fun, remember? Never forget that the only person you have to impress is yourself!



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Keeping Up with the Latest

Looking around the Internet, one must be impressed with the effort that individuals and organizations make in order to provide timely information on their chosen subjects. Official organizations, such as departments of National Oceanographic and Atmospheric Administration (NOAA) and National Aeronautics and Space Administration (NASA), operate sites for the virtually immediate dissemination of satellite imagery, and these are excellently supplemented by an increasing number of sites operated by weather satellite enthusiasts around the world.

Hobbyists living in those countries that have high telephone call charges are somewhat disadvantaged in this field. Here in Britain, daytime charges for individuals, even for local calls that include Internet access, are quite high — the equivalent of several cents per minute, despite a complex discount scheme. Only educational establishments have “free” online access, under a government directive. This means that hobbyists in Britain who have set up automated image capture must upload the images at individual cost, and this effectively limits the number of people who feel able to perform this voluntary service.

I have had a look at several “personal” sites around the world, where people whose names appear regularly on the WXSAT (weather satellite) forum on the Internet, provide timely images from their WXSAT receiving equipment. At the time of checking, the following sites were active and up-to-date:

- <http://homepages.ihug.co.nz/~rob/latest.htm>
Robert Read's site in Christchurch, New Zealand: When I checked on October 7, Robert had an artificially colored NOAA-14 image showing a weather system approaching New Zealand — and had bravely included his own weather forecast!
- <http://www.castrop-rauxel.neturf.de/~markus.brylka/wxsat/>
Markus Brylka has his receiving station in Essen, Germany, where he maintains a web site carrying a selection of images from NOAA, METEOSAT and OKEAN spacecraft. The METEOSAT (European) image was just a few hours old, and there were links to current NOAA images, and to other private sites.
- <http://ourworld.compuserve.com/homepages/>

Milan_Konecny/Weather.htm

Milan Konecny has also provided an automatic facility to receive, process and upload WXSAT images to his web site. These include artificial color that very much enhance the effect. I frequently receive letters from beginners to WXSAT reception who are convinced that WXSATS transmit color pictures.

• <http://www.drdaile.com>

Another address that also carries WXSAT images updated regularly is Dale Ireland's site: Dale is a receiver of the coveted “Cool site of the Day” award, apparently for the astronomical information also provided on his site. The above address includes links to his WXSAT page, and a live camera showing Silverdale, Seattle. Here in Britain we can only dream of such facilities!

If any readers are aware of other sites that merit mention please email me.

■ Operational WXSATS

The Russian Meteor 2-21 WXSAT was operating from mid-September, though my expectation is that by late October, Meteor 3-5 will have been reactivated. Meteor 2-21 is not in the best of health. Launched in 1993, an antenna deployment problem seems to have limited the quality of its automatic picture transmissions (APT). Signal strength on 137.85 MHz is very variable during all passes, with only a few minutes of intermittent telemetry providing suitable data for image production. Deep fades are the norm, and even an occasional loss of the 2.4 kHz subcarrier has been observed. A study of the orbital planes of both Meteor satellites shows that in late October Meteor 3-5's orbit will have moved to a more favorably illuminated plane with respect to the sun.

The passage of autumn sees a continuing reduction in the sun's daytime illumination for the northern hemisphere — meaning that visible-light APT images from all the NOAA WXSATS have significantly lost their sparkle. If you use the *wxsat* program to produce images fed from your receiver, you can increase the *BasicAmp* parameter slightly to improve image contrast. By experimenting — in conjunction with using the extensive notes provided in the *help* facility — a setting for the midday NOAA-14 pass can be found that produces brighter images.



FIG 1: NOAA-14 image from October 7 received (and enhanced) in Plymouth, UK.

■ Geostationary WXSAT status: FENG-YUN-2B partly reactivated

Under the auspices of the World Meteorological Organization (WMO), the constellation of geostationary weather satellites has been launched and operated - with regular replacements. America controls the GOES fleet, Europe controls the Meteosat satellites, Japan controls GMS, Russia controls GOMS and China is developing the FENG-YUN-2B system.

GOES Coverage

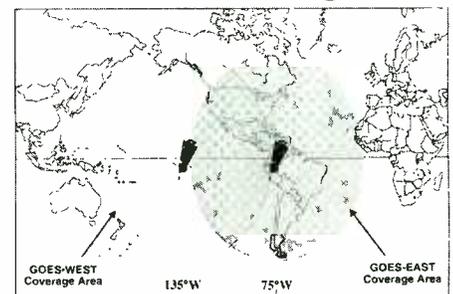


FIG 2: GOES coverage

In this context, the INSAT series of three-axis stabilized, geosynchronous satellites, operated by the Indian government as communications birds, are not technically weather satellites. However, they do carry out meteorological imaging (one of their scientists sent me an INSAT whole-disc image), so they are included in the information on WXSATs provided by the WMO.

■ Background to the INSATs

These Indian satellites were designed and built as a group of similar satellites; INSAT-

2s have been operated during the 1990s, and INSAT-3s are scheduled for launch during the next decade. Satellites are sequentially designated A, B, C, etc., and the later series carry a meteorological imager.

INSAT-1D is a three-axis stabilized communications bird carrying a Very High Resolution Radiometer (VHRR), and positioned at 74 East longitude. This radiometer has two spectral channels — one operating in the visible with 2 km spatial resolution, and a thermal infrared channel with 8 km spatial resolution.

The next in the series, INSAT-2E, is scheduled for launch this November, carrying a meteorological payload. The new satellite will replace the currently operational INSAT-1D and will have an additional water vapor window. From 1999 to 2003, India expects to build and launch INSAT-3A, -3B, -3C and -3D. INSAT-3A will carry an imager and is scheduled for launch in 2000 AD.

■ FENG-YUN-2B breathes

China's first geostationary meteorological satellite, FENG-YUN-2A, failed when the rocket blew up during a fueling accident in the spring of 1994. Three years later, the Chinese Meteorological Administration (CMA) launched FENG-YUN-2B, in a second attempt. It was positioned at 105 degrees East longitude on June 10, 1997.

The FENG-YUN-2 series of geostationary WXSATs is built by the Shanghai Institute of Satellite Engineering, and is very similar to the Japanese GMS-5 satellite, originally built by the American Hughes Corporation.

FENG-YUN-2B is spin-stabilized, and began regular service late in 1997. NASA arranged to receive the data in Adelaide at the University of Southern Australia, and planned to make some full-resolution data available over the Internet through Hawaii to NASA's Ames Research Center and Goddard Space Flight Center. There, the data joined similar data already being provided for GOES-8/9 and GMS-5.

In autumn 1997 I contacted Dr James Dodge of NASA concerning the availability of FENG-YUN images. Some test images were quickly made available, and then regular images were placed on the Internet by NASA staff:

<http://rsd.gsfc.nasa.gov/goesb/chesters/pub/goes/970621.fy2.firstvis.gif>
Chinese web site: <http://www.cma.go.cn/fy2/fy2.htm>

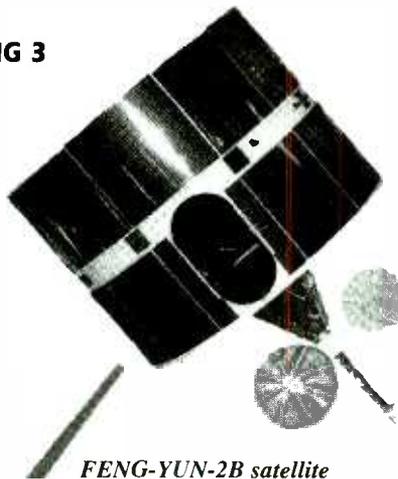
On April 8, 1998, FENG-YUN-2B ceased transmission of Very High Resolution Infrared Spin Scan Radiometer (VISSR) images, due to a problem with the S-band antenna on

the spacecraft, but two days later resumed transmissions for a few hours. The China Meteorological Agency satellite controllers managed to regain earth lock and ranging with the S-band antenna for 12 hours on April 14, 1998, but there have been no S-VISSR retransmissions until about mid-September 1998. However, CMA can still get raw image downlinks a few times per day, and they can make one daily full-earth picture on the ground.

Mike Kenny of the Bureau of Meteorology, Melbourne, Australia, recently reported that they (the Bureau) had continued to monitor Feng-Yun-2B and that the 1702.5 MHz telemetry signal is stable from 0030 to 0700 UTC daily, indicating that the spacecraft has regained antenna pointing capability during this time. To date, there has been no SV or WEFAX transmissions received in Australia, but there have been reports of VISSR data being received from the spacecraft.

■ Basic FENG-YUN-2 Spacecraft system data

FIG 3



FENG-YUN-2B satellite

Attitude Stability: Spin stabilized (100 rotation/min)

Orbital Altitude: 35800 km

Services planned: S-VISSR, L-Fax, etc.

Scan Radiometer

Channel	Waveband (micron)	Nadir Resolution (km x km)	Temporal Resolution
Visible	0.55-1.05	1.25 x 1.25	1 hour
Water Vapor	6.2 - 7.6	5 x 5	1 hour
InfraRed	10.5-12.5	5 x 5	1 hour

My thanks to Dennis Chesters (who humorously describes himself as "one irresponsible employee of NASA"), and Donald Hinsman of the WMO — both of whom provided news on the status of the various international weather satellite programs.

■ Hurricane Georges

Within an hour or two of the approach of Hurricane Georges to continental America

being announced on UK television, I received an emailed picture of its latest position from Steve Padar. I had briefly met Steve at the UK Remote Imaging Group conference last May. Steve uses a 4 foot diameter solid aluminum rotor driven dish. A Quorum receiver, Timestep bit-synch card and the Windows High Resolution Picture Transmission (HRPT) program from Timestep complete his set-up, and he produced this picture — a multi-spectral image with Channel 1 red, Channel 2 green, and Channel 4 blue.



FIG 4: Hurricane Georges from Steve Padar September 22, 0901 UTC

■ America's OSEI

The Operational Significant Event Imagery program is provided by the National Oceanic and Atmospheric Administration (NOAA), National Environmental Satellite, Data, and Information Service (NESDIS). It provides extensive satellite imagery originating from GOES-8, GOES-10, GMS, METEOSAT, NOAA-12 (AVHRR) and NOAA-14.

Just before press-time, I checked the current offerings and as well as flood, fire and volcanic images; there was one identifying a tropical wave in the Atlantic ocean that was being monitored in case it strengthened into a depression.

The OSEI homepage offers a mailing list for daily updates, and can be found at: <http://www.osei.noaa.gov/updaterecent.html>

FREQUENCIES
NOAA-14 transmits APT on 137.62 MHz
NOAA-12 and -15 transmit APT on 137.50 MHz
NOAAs transmit beacon data on 137.77 or 136.77 MHz
METEOR 2-21 or 3-5 transmit APT on 137.85 MHz when in sunlight
RESURS-01-4 may transmit APT on 137.30 MHz occasionally.
OKEAN-4 and SICH-1 sometimes transmit APT briefly on 137.40 MHz
GOES-8 and GOES-9 use 1691 MHz for WEFAX



Who Controls Government Frequencies?



Every time we issue a new Federal Communications Commission (FCC) database here at Grove Enterprises, a common complaint heard from customers is that there aren't any federal government, military or air traffic control frequencies in the database. It is, in fact, one of the more common misconceptions among radio hobbyists that the FCC manages the entire radio spectrum here in the United States (including the federal government frequencies). This just isn't true.

The FCC regulates the private sector's use of the spectrum largely by developing and enforcing rules mandated by legislation, and by licensing private companies' use of the radio spectrum. Regulations are on a case-by-case basis in response to industry and private needs and according to the votes of the FCC's five commissioners. It is the National Telecommunications and Information Administration (NTIA) which, operating under the Commerce Department, actually manages the federal government's use of the spectrum.

NTIA is the principal federal voice for executive branch positions on crucial domestic and international telecommunications and information issues, including representing the administration's positions before the FCC. In contrast to NTIA, the FCC is an independent agency. It neither represents nor reports to the executive branch.

Government frequency spectrum usage – often involving safety of life (air traffic control) and national security concerns – is best managed through the executive branch. Because commercial considerations could potentially dominate in a conflict of interest, spectrum allocation decisions for critical government functions are kept separate from the commercial allocation decisions made by the FCC.

The U.S. government is allocated *exclusive* use of a very small portion of the spectrum. The remainder is controlled either by the FCC (representing private sector use) or is mutually handled between the FCC and NTIA (federal government). The

government has no spectrum reserves *per se*, it only uses what it needs to provide critical services to the public, such as national defense, law enforcement, and air traffic control.

There is a national plan for spectrum use called an allocation table. This table specifies the radio services, service priority (e.g., primary or secondary), and whether the service is for nongovernment, or government, or both (shared). The table is divided into approximately 800 frequency bands from 0 to 300,000 MHz. Of the 300,000 MHz allocated, the government has exclusive use of 1.4% (4,271 MHz), nongovernment users have exclusive use of 5.5% (16,561 MHz), and the remaining 93.1% (279,168 MHz) is shared between government and nongovernment users.

In actual practice, the vast majority of spectrum being used by both the private sector and the federal government is below 30,000 MHz (or 30 GHz). From an allocation point of view, in the 0 to 30,000 MHz range the government's exclusive allocation is 7% (2,271 MHz), nongovernment users have 30% (8,961 MHz), and the remaining 63% (18,768 MHz) is shared.

Since 1984, the entire *Government Master Frequency* file has been classified. Therefore, current and detailed discrete government frequency information is not available to the radio hobbyist.

If you would like an overview of federal and nonfederal spectrum use and have internet access, point your web browser to URL: <http://www.ntia.doc.gov/osmhome/nebbia.html>. In order to serve its purpose as a quick reference, the amount of information on this webpage has been limited. Federal systems and missions which would have necessitated classification of the summary have been omitted, though they represent a significant portion of federal requirements. Also, although federal agencies lease many services from private sector providers, those frequencies are of course still indicated as nongovernment. Therefore, the summary is not entirely accurate in its portrayal of U.S. spectrum requirements or its

representation of the allocation table.

Uses are stated in terms of general function and actual equipment names are usually not specified, nor is there any indication of the level of financial investment in each system.

Another useful section of the NTIA website contains the *NTIA Manual of Regulations and Procedures for Federal Radio Frequency Management* (edition 9/95, with revisions for September 1996, January and May 1997). You will find this useful publication at:

<http://www.ntia.doc.gov/osmhome/redbook/redbook.html>

■ *MT's* Government Master File

We have been working on a project for several years now to document the U.S. government's usage of the more popular federal radio bands. Starting with this issue of *Fed File*, we will present that information to *MT* readers. We begin our exploration of the federal frequencies with a bandscan of 162-162.9875 MHz (Table 1). Information for this bandscan has been compiled from hundreds of monitor reports from around the country and we are deeply indebted to all the radio hobbyists who have helped us on this project.

So set those scanners into the search mode and let us know what you are hearing!

■ Goodbye to John

It is my privilege to take a moment to thank my dear friend John Fulford for penning this column the last 4-1/2 years. John, you did a marvelous job with a tough topic, and your regular presence in these pages will be missed. We look forward to seeing your byline from time to time in feature articles.

In a way, I feel this is a homecoming for me; unbeknownst to many, I wrote this column for over a year and a half back in the 1980s. Those of you who remember Rod Pearson will know what I'm talking about.

See you in two months; until then, good hunting!

TABLE ONE: FEDERAL FREQUENCY ALLOCATIONS: 162-162.9875 MHZ

162.0000	Army and National Science Foundation	162.5500	National Weather Service (NOAA weather assignment)
162.0125	Air Force and NASA	162.5625	(No Reported Activity)
162.0250	Air Force, Bureau of Indian Affairs, Bureau of Prisons, Coast Guard, Corps of Engineers, Energy Department, Environmental Research Labs (Commerce), FAA, FBI, Fish and Wildlife Service, Forest Service (Region 4/6), International Boundary and Water Commission, Labor Department, NASA, National Radio Astronomy Observatory, Navy, Nuclear Regulatory Commission, TVA, Veterans Administration	162.5750	National Weather Service (NOAA weather assignment)
		162.5875	Army and Post Office
		162.5906	Low power, non-voice 5 kHz bandwidth splinter frequency (until January 1, 2005)
		162.5937	Low power, non-voice 5-10 kHz bandwidth splinter frequency (until January 1, 2005)
162.0375	(No reported activity)	162.5968	Low power, non-voice 5 kHz bandwidth splinter frequency
162.0500	Army, Coast Guard, Corps of Engineers, Customs, Energy Department, FAA, FBI, Geological Survey (Interior), National Marine Fisheries Service, National Weather Service	162.6000	Air Force; low power, non-voice up to 11 kHz bandwidth splinter frequency (after January 1, 2005)
162.0625	(No Reported Activity)	162.6031	Low power, non-voice 5 kHz bandwidth splinter frequency (after January 1, 2005)
162.0750	Environmental Research Labs and National Weather Service (Nationwide)	162.6125	Air Force, Army, Coast Guard (District 5), Corps of Engineers (Lower Mississippi River), Capitol Police, Customs, Energy Department (Nationwide), FBI, Fish and Wildlife Service, Forest Service (Region 4/6), Labor Department, Maritime Administration, NASA, National Park Service, Post Office
162.0875	(No Reported Activity)		
162.1000	Army, Energy Department, National Marine Fisheries Service, National Weather Service	162.6250	FAA and Navy
162.1125	NASA (Nationwide)	162.6375	FBI (nationwide)
162.1250	Air Force, Coast Guard (Nationwide), Energy Department, Environmental Research Labs, General Services Administration, Geological Survey, Maritime Administration, NASA, Veterans Administration	162.6500	(No Reported Activity)
		162.6625	Army, Commerce Department (Nationwide), Energy Department
162.1375	(No Reported Activity)	162.6750	(No Reported Activity)
162.1500	FBI, Interior Department (Nationwide), National Weather Service (Nationwide)	162.6875	White House Communications Agency (Nationwide-Yankee)
162.1625	(No Reported Activity)	162.7000	(No Reported Activity)
162.1750	Commerce Department (Nationwide), Energy Department, Geological Survey, International Boundary and Water Commission, National Bureau of Standards (Nationwide), National Science Foundation	162.7125	Air Force, FBI, US Marshalls Service (nationwide)
		162.7250	(No Reported Activity)
162.1875	(No Reported Activity)	162.7375	FBI (nationwide)
162.2000	Environmental Research Labs, FAA, Geological Survey, Navy	162.7500	(No Reported Activity)
162.2125	(No Reported Activity)	162.7625	FAA and FBI (nationwide)
162.2250	Agriculture Department, Air Force, Army, Coast Guard (Nationwide), Corps of Engineers, Energy Department, Forest Service (Region 1/4), Labor Department, Navy, Post Office, Veterans Administration	162.7750	(No Reported Activity)
		162.7875	DEA (Nationwide), FBI, Marshalls Service (Nationwide)
		162.7968	Low power, non-voice 5 kHz bandwidth splinter frequency (after January 1, 2005)
162.2375	Interior Department (Nationwide)	162.8000	(No Reported Activity); low power, non-voice up to 11 kHz bandwidth splinter frequency (after January 1, 2005)
162.2500	Air Force, Army, Capitol Police, Coast Guard, Corps of Engineers, FAA, FBI, Navy, Post Office	162.8031	Low power, non-voice 5 kHz bandwidth splinter frequency
162.2625	(No Reported Activity)	162.8062	Low power, non-voice 5-10 kHz bandwidth splinter frequency (until January 1, 2005)
162.2750	Corps of Engineers, FAA, Smithsonian Institute, Veterans Administration	162.8083	Low power, non-voice 5 kHz bandwidth splinter frequency (until January 1, 2005)
162.2875	(No Reported Activity)	162.8093	Low power non-voice 5 kHz bandwidth splinter frequency (after January 1, 2005)
162.3000	Energy Department, FAA	162.8125	Low power, non-voice up to 11 kHz bandwidth splinter frequency (after January 1, 2005)
162.3125	(No Reported Activity)	162.8156	Low power non-voice 5 kHz bandwidth splinter frequency (after January 1, 2005)
162.3250	Coast Guard (Nationwide), FAA	162.8250	Customs, FBI, Immigration and Naturalization Service (nationwide), Marshalls Service
162.3375	(No Reported Activity)	162.8375	(No Reported Activity)
162.3500	Army, Coast Guard, Corps of Engineers, FAA, FBI	162.8500	FBI, Immigration and Naturalization Service (nationwide), Labor Department
162.3625	National Weather Service (future NOAA weather assignment)	162.8625	(No Reported Activity)
162.3750	National Weather Service (NOAA weather assignment)	162.8750	FBI, Immigration and Naturalization Service (nationwide)
162.3875	(No Reported Activity)	162.8875	(No Reported Activity)
162.4000	National Weather Service (NOAA weather assignment)	162.9000	FBI, Immigration and Naturalization Service (nationwide), Labor Department
162.4125	(No Reported Activity)		
162.4250	National Weather Service (NOAA weather assignment)	162.9125	(No Reported Activity)
162.4375	National Weather Service (future NOAA weather assignment)	162.9250	Coast Guard, Customs, FBI, Immigration and Naturalization Service (nationwide)
162.4500	National Weather Service (NOAA weather assignment)		
162.4625	(No Reported Activity)	162.9375	(No Reported Activity)
162.4750	National Weather Service (NOAA weather assignment)	162.9500	FBI, Immigration and Naturalization Service (nationwide)
162.4875	(No Reported Activity)	162.9625	Agriculture Department
162.5000	FAA, National Weather Service (NOAA weather assignment)	162.9750	Energy Department, FBI, Immigration and Naturalization Service (nationwide)
162.5125	National Weather Service (future NOAA weather assignment)	162.9875	NASA (nationwide)
162.5250	National Weather Service (NOAA weather assignment)		
162.5375	(No Reported Activity)		

Aeronautical Freq-for-all

Welcome aboard! In response to many requests and contributions, we devote this column to aero frequencies. The following frequencies are in MHz.

Indianapolis International Airport:

Approach-124.950, 123.950
Departure-119.300, 119.050, 121.100
Tower-120.900
Ground Control 121.900, 121.800
Clearance delivery-128.750

Pittsburgh International Airport:

Approach Control (North)-121.25124.150/
363.800, 121.25
(South) -123.95/360.8; 120.875
Departure-124.750/338.200, 119.350/388.000
Tower-119.100, 128.300/291.700, 236.600,
135.025
Ground Control-121.900 (South)/348.600 127.8
(North)
Clearance Delivery-126.750/353.7
ARINC Ramp Control-131.375
Unicom-122.950
ATIS-Arrivals-127.250

ATIS-Departures-135.900

Military Operations-Pittsburgh IAP:

911AW (Screamer ops/Trice CP)-252.100
171ARN ANG CP (Steel Control) - 293.7
ACC Common/Wing CP-311.000/321.000

Air Refueling Communications:

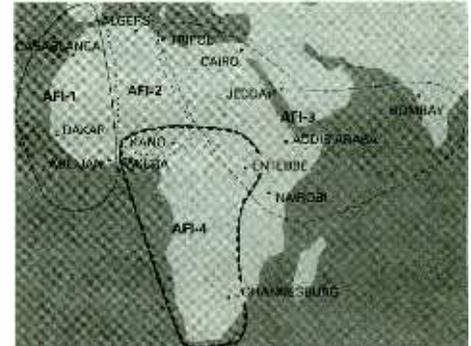
AR-217 Refueling Primary- 283.900
Secondary-282.700
AR-18L Primary-352.600
Secondary-282.700
AR-218H Primary-366.300

■ Shortwave Listening

Now for some HF MWARA (Major World Air Route Areas) Control Station frequencies (kHz), contributed by Kal White and updated by Larry Van Horn.

AFI 1 (Africa 1)

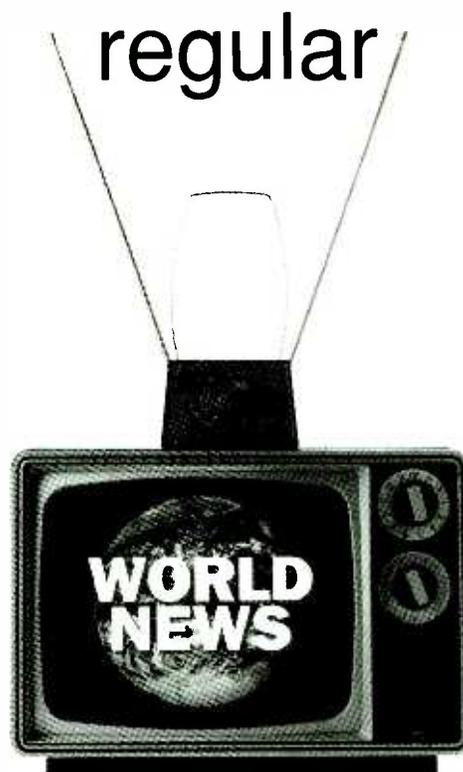
Abidjan, Ivory Coast - 6535 6673 8861 13257
Bamako, Mali - 6673 8861
Bouake, Ivory Coast - 6673
Casablanca, Morocco - 3452 5554 6535 8861
13357



Dakar, Senegal - 3452 5565 6535 6673 8861
11291 13357 13315 17955
Monrovia (Roberts), Liberia - 3452 6638 6673
8861 8882
Nouadhibou, Mauritania - 6673 8861
Nouakchott, Mauritania - 6673 8861
Sal, Cape Verde Islands - 3452

AFI 2 (Africa 2)

Algiers, Algeria - 5652 8894 13273
Gao, Mali - 8894



Kano, Nigeria - 3411 5519 8826 13304
Niamey, Niger - 3419 5652 8894 13273
Tripoli, Libya - 3419 5652 8894 13273
Tunis, Tunisia - 3411 5519 8826.

AFI 3 (Africa 3)

Addis Ababa, Ethiopia - 3467 5658 6574 8870
11300 13288 17961
Aden, Yemen - 3467 5658 11300 13288
Benghazi, Libya - 3467 5658 11300 13336
Bujum Bura, Burundi - 8888 11300 13288 13294
13306
Cairo, Egypt - 3467 5658 6574 11300 13288
Dar es Salaam, Tanzania - 5658 8870 11300
13288
Djibouti, Djibouti - 5658 11300
Hargeisa, Somalia - 5658 11300
Jeddah, Saudi Arabia - 5658 11300
Khartoum, Sudan - 3467 5658 11300 13288
13336
Mahe, Seychelles - 3467 5658 11300 13288
17961
Mogadishu, Somalia - 5658 11300
Nairobi, Kenya - 11300
Riyah, Yemen - 5505 6624 8847 8959 11300
13336
Sanaa, Yemen - 8918 11300

AFI 4 (Africa 4)

Accra, Ghana - 5493 6586 8903 13294
Brazzaville, Congo - 2878 5493 6559 8873
8903 13294
Johannesburg, South Africa - 6559
Kano, Nigeria - 3411 5519 8826 13304

Kinshasha, Zaire - 2851 2878 5493 6559 8888
8903 13294 13304
Lagos, Nigeria - 5519 8826
Luanda, Angola - 2878 5493 8903 13294
Lusaka, Zaire - 2878 5493 8873 8879
Mahe, Seychelles - 8903 10018
Niamey, Niger - 2878 5493 6586 8903 13294
Salazar, Sao Tome - 5493 8903 13294
Windhoek, Namibia - 8861

■ Airline Callsigns

Finally, we finish our list of airline callsigns started back in September.

SUGAR ALFA - Shaheen Airport Services
SUN COUNTRY - Sun Country Airlines, Inc.
SURVEY-CANADA - Geographical Air Surveys, Ltd.
SYRIANAIR - Syrian Arab Airlines
TACA - TACA International Airlines, S.A.
TANKER - Canadian Interagency Forest Fire Centre
TAROM - TAROM Romanian Air Transport
TEE AIR - Tower Air, Inc.
THAI-AIR - Thai Airways Co., Ltd.
THAINTER - Thai Airways International, Ltd.;
THUNDER BAY - Welch Aviation, Inc.
THUNDERBIRD - Northern Thunderbird Air, Ltd.
TIME AIR - Time Air, Ltd.
TITAN AIR - Viking Express, Inc.
TOMCAT - Cologne Commercial Flight GmbH, Koln
TONGA ROYAL - Friendly Islands Airways, Ltd.
TORONTAIR - Toronto Airways, Ltd.
TOYOTA - Toyota Canada, Inc.
TRADER - Canair Cargo

TRANS ARABIAN - Trans Arabian Air Transport
TRANSAFRIK - Air Transafrik, Ltd
TRANSAIR - TAA-Trans-Australia Airlines
TRANSBRASIL - Transbrasil S.A. Linhas Aereas
TRANSPAC - C and M Aviation
TRANSPORT - Transport Canada
TRIANGLE - Atlantic Island Air
TROOPER - Maryland State Police
TROPICAIR - Tropical Air Services
TURKAIR - Turk Hava Yollari (Turkish Airlines Co.)
TYROLEAN - Tyrolean Airways
UGLY VAN - Inter-Island Air, Inc.
UNICORN - Prince of Wales VIP Flight
UNIFORCE - United Arab Emirates Air Force
UNIFORM OSCAR - Empresa "Aero Uruguay" S.A.
VENTURE - Capital Aviation Services, Ltd.
VIASA - Venezolana International de Aviacion S.A.
VIKING - Scanair, Ltd.
VIRGIN - Virgin Atlantic Airways
WATERBIRD - Virgin Islands Seaplane Shuttle, Inc.
WATERSKI - Trans States (Trans World Express)
WESTPAC - Western Pacific Air Service
WHISPERJET - Princess Air
WHISTLER - Canadian Helicopters, Ltd
WISCONSIN - Air Wisconsin
YEMENI - Yemenia Yemen Airways
ZEBRA - African Safari Airways, Ltd.

That's all for now. We'll continue our look at HF M'WARA frequencies in January. Until then, 73 and out.

EXTRA STRENGTH

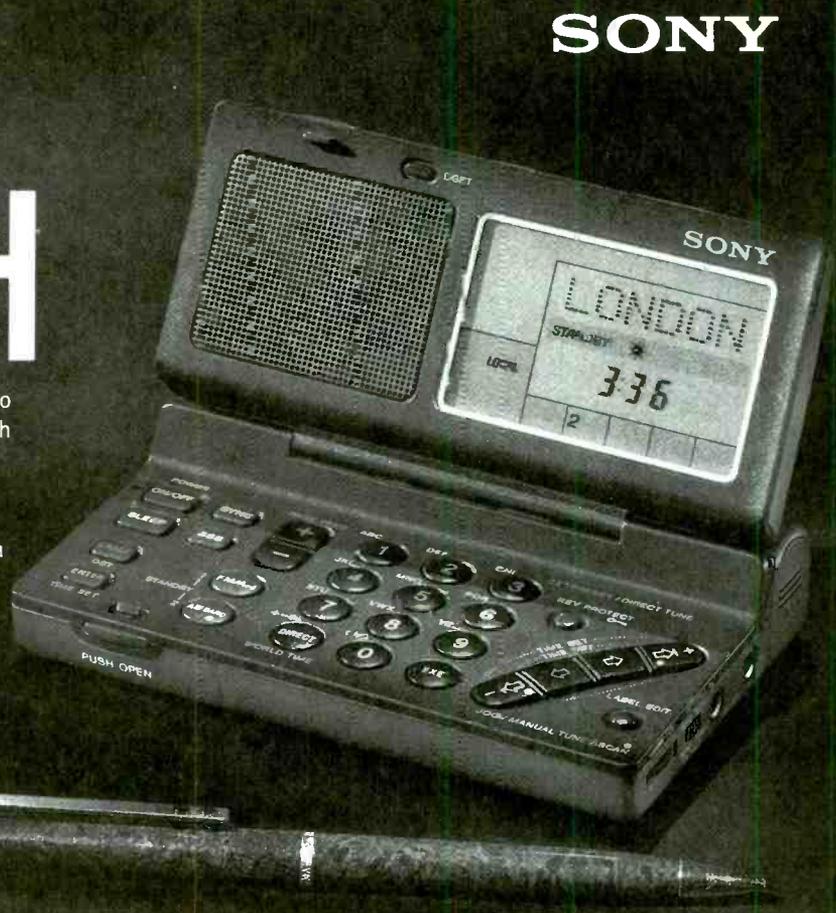
Listen to late-breaking world events at their source. Tune in to major sporting events, and cheer on your favorite team. Brush up on your French. . . or your Arabic. . . or your Chinese. **Sony World Band Receiver™** Radios bring the world in loud and clear—wherever you are—with the latest in receiver technology. Whether you're a novice or a radio buff, there's a Sony World Band Receiver Radio with user-friendly features designed for you. MSRP* from \$59.95 to \$649.95.

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¿Habla Español?

A hot-button issue these days is the use of foreign languages — especially Spanish — in the United States. Since this is *Monitoring Times*, not *Time*, I won't be discussing the politics of the issue. But the fact is, there are hundreds of foreign-language radio stations in the U.S., and your DX log will be incomplete without them. In most parts of the U.S., you won't have any trouble finding foreign-language stations. Identifying them is another story.

A good place to start is to determine whether the station is, in fact, in the U.S..

Most of the country is close enough to Mexico and Cuba to receive domestic-band broadcasts from those countries; and some very high-powered stations in northern South America also frequently make it into the States.

Cuban stations can often be distinguished by the lack of commercials. One of the larger Cuban radio networks, Radio Reloj, sends "RR" in Morse Code once a minute; if you hear this, you aren't listening to a domestic station.

Mexican stations are required to give station identification announcements on the hour (much as U.S. stations are). All Mexican AM station calls begin with the letters "XE" which, when spoken in Spanish, sound like "ehkees ay." If you hear this, followed shortly by the name of a Mexican city, you've just heard the legal identification of a Mexican station. The South American stations are a bit more difficult to identify if you don't understand Spanish, but there are other clues.

Speaking of station ID announcements, just because a U.S. station doesn't broadcast in English doesn't mean it doesn't have to give an ID. Listen across the hour, and you should hear the identification announcement. Unfortunately, it will usually be given by someone for whom English is a second language, so it will often be a bit difficult to understand.

If you think the station is indeed in the U.S., listen carefully for commercials. You'll recognize them quickly. What you're listening for are the names of streets and suburbs. Proper names aren't translated. If you hear an ad that mentions "Evanston" and "Green Bay Road" on 1590 kHz, a quick check of a Chicago-vicinity street map will confirm you had WOXN-1590 Evanston. When compared



Houma, Louisiana, is in the middle of Cajun country, and there are broadcasts in French in that area. However, KCIL-107.5 is strictly an English-language country music station.

to English stations, the ads on foreign-language stations are much more likely to contain street addresses, and most ads are for local commerce.

What about languages other than Spanish? Of course, French-language programming can frequently be heard on Canadian stations. These stations are becoming harder to hear in the U.S. as the CBC's French-language arm, Radio-Canada, continues to move its high-powered AM stations to FM. Still, the old CBC AM transmitters will be taken over by private broadcasters, and chances are most of them will continue to broadcast in French. Radio-Canada is non-commercial, but frequent mentions of Canadian cities in news and weather can usually identify these stations.

In the Rocky Mountain states, you can find a few Native American stations. Most are on FM (KINI-96.1 in Nebraska and KILI-90.1 in South Dakota are widely heard by E-skip) but there are a handful on the AM dial. One, KTNN-660 on the Navajo Nation in Arizona, can be heard through much of the West (and occasionally farther east) at night. In fact, it's the only Arizona station in my log. Most programming on KTNN (at least at night) is English, but I have heard Navajo-language talk and music. I find these stations very interesting listening, and have been known to forget about a skip opening after stumbling across KILI!

■ Bits and Pieces

• Reader Benjamin Loveless in Michigan has been DXing the expanded band with a Superadio III and Kenwood ham rig. His loggings include WMDM-1690, KBGG-

1700, WNML-1670, WTDY-1670, and WBAH-1660. (The latter is the "Radio Unica" I'm sure many of you are hearing in Spanish; it's the former WJDM in New Jersey.) Ben notes a rather poor QSL return rate from the "classic clear channel" stations. He's getting about one card back for every four he sends out.

Ben also has some more information about the widely-heard Traveler Information Service (TIS) stations on 1630 in the Detroit area. He says they have several low-power transmitters at major freeway intersections in metro Detroit.

"Antennas are a 10 foot loaded whip, usually next to a cellular tower. Began in the early spring with a continuous time announcement that was several minutes off!" I think Ben is being generous, some DXers reported them over an hour off for awhile! Ben writes that if you're in the right area, you can get three of these at the same time.

• Wayne Heinen of the National Radio Club says the 19th edition NRC *AM Radio Log* will be available by the time you read this. It's \$22.95 (less if you're a NRC member) from Box 164, Mannsville NY 13661-0164. Speaking of the NRC, Wayne says it also has a new Web site at <http://nrcdxas.org>.

Last year at this time, we were hearing some of the best AM DX conditions ever. Will it be that good this year? Will yours truly log any more European stations on the AM band? Stay tuned! And please let us know what you're hearing. Write me at Box 98, Brasstown NC 28902-0098, or by email w9wi@bellsouth.net.

FOREIGN-LANGUAGE STATIONS IN THE U.S.

Here are some of the more widely-heard North American stations broadcasting in languages other than English.

Freq	Call	City	Language
660	KTNN	Window Rock, Arizona	Navajo & English
710	WAQI	Miami, Florida	Spanish
830	WFNO	Norco, Louisiana	Spanish
860	CJBC	Toronto, Ontario	French
1020	KTNQ	Los Angeles, California	Spanish
1430	CHKT	Toronto, Ontario	Chinese
1480	WZRC	New York, New York	Korean
1540	CHIN	Toronto, Ontario	various

Voice of the Pig's Ear

Our loggings champion this month is the **Voice of the Pig's Ear**, a relatively new station that has replaced WREC as the most active shortwave pirate. Their male announcer mixes rock music with ultra-conservative political commentary, using a slogan of "Right Wing Radical Lunatic Fringe Radio." Unfortunately the station has not announced a maildrop, so it is thus far maintaining no contact with its audience.

■ Clandestine Web Site

Martin Schoech announces that Clandestine Radio Watch, an excellent biweekly source for updated clandestine station news, uses <http://www.swl.net/swl-de/swl-cla.htm> as its new internet web site. It's affiliated with Clandestine Radio Intel, another wonderful resource, at <http://www.qsl.net/yb0rmi/clang.htm> on the web.

■ PSE QSL?

A handful of pirate stations don't use postal maildrops, but nevertheless will sometimes QSL loggings printed in shortwave bulletins. Two excellent publications are your best hope for nabbing a verification by this method. *The ACE* (monthly) and *Free Radio Weekly* print detailed loggings by station, date, time, and frequency. ACE dues are \$21 in the USA, \$26 US in Canada and Mexico, and \$40 US elsewhere via PO Box 12112, Norfolk, VA 23541.

The *FRW* newsletter arrives via e-mail. Contributors get it free, or \$5 US will get you a subscription via PO Box 146, Stoneham, MA 02180. Another newsletter, Andrew Yoder's *Pirate Pages*, has ceased publication.

■ Europirate Schedules

SWRS, still the European pirate best heard in North America, says that it now uses 21450 kHz near 1500-1800 UTC, with 11470 kHz in use after that. You can write them via the Wuppertal address. **Radio 510** has been using 3960, 3985, and 7120 kHz on weekends. Their latest schedule is found at <http://www.radio510.org/> on the internet, or you can use the Basel address for mail. Other Europirates cluster around 3900-4000 and 6200-6300 kHz, best heard around North American sunset or European sunrise on weekends.

■ Shortwave Pirate Activity

Unless indicated otherwise, pirate radio



Radio Xanax prescribes odd dramas for relaxation.

stations heard by our readers last month all used frequencies within 500 kHz of 6955 kHz, typically from two 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.

Action Radio- Their updated internet web site is at <http://www.angelfire.com/ne/actionradio> (Blue Ridge Summit)

Blind Faith Radio- Classic rock, sometimes by Blind Faith, is heard from Dr. Napalm. (None, verifies *FRW* loggings)

Central Florida Pirate Radio- A new one with rock music. (None)

Deliverance Radio- If banjo music and squealing is your cup of tea, you'll like them. (None)

Free Hope Experience- Major Spook programs classic rock. (Blue Ridge Summit)

Holy Cow Radio- They have tested, but no regular broadcasting ensued. (None)

Jerry Rigged Radio- Sometimes their rock music is replaced by foreign tunes. (Providence)

KAT- Cat music and parodies, broadcast from the KAT fraternity at the University of Wisconsin. (Blue Ridge Summit)

KBLK- Rap music and commentary on race relations dominate their shows. (None)

K-2000- This one has won awards for its parodies of DXing and DXers. (Providence)

Mystery Radio- Complex rock compositions define their distinctive format. (Stoneham)

Partial India Radio- A highly amusing parody of licensed broadcaster **All India Radio**. (Stoneham)

POLKA- Polkas are played here; sometimes the announcer sings along. (Stoneham)

Radio Azteca- Bram Stoker's parodies of pirates and DXing are always amusing. (Belfast)

Radio Barnyard- They are the voice of farm animals. (None)

Radio Caliente- This South American pirate has an unusual North American relay arrangement. (Merlin)

Radio Metallica Worldwide- Despite transmitter problems, Dr. Tornado's 10 kilowatts still blast away, sometimes on 7415 kHz. (Blue Ridge Summit)

Radio Nonsense- Joe Mama's elaborate productions mix rock music and comedy. (Belfast)

Radio Xanax- "The Relaxation Station" normally airs odd dramas. (Stoneham)

The Scream of the Butterfly- Their classic rock is now relayed by **Radio Eclipse**. (Providence)

Voice of Anarchy- Leonard Longwire selects a different musical style for each broadcast. (Belfast)

Voice of the Forest- This new one programs music by female artists with a bird call interval signal.

(none; verifies logs in *The ACE*)

Voice of the Twilight Alehouse- A new comedy pirate that is named after its theme song. (Providence)

WACK Radio- They're famous for their toll-free number announced during each show. (None; not responding to phoned reports)

WARR- Captain Nobear mixes rock and comedy, but he still does not contact listeners. (None)

WLWLIS- They promote **WLIS**; the call stands for "We Love WLIS." (Providence)

WKND- Radio Animal's veteran operation features rock music and pirate commentary. (Blue Ridge Summit)

WMFQ- They mix rock music, chanted ID's, and promotion of the QSL process. (Providence)

WSRR- Dr. Love normally plays soul music on Solid Rock Radio. (Belfast)

WUNH- Mellville Grunion's rocker is verifying reception reports. (Providence)

Reception reports to pirate stations require 3 first class stamps for USA maildrops or \$2 US to foreign addresses. Send your letters to PO Box 1, Belfast, NY 14711, PO Box 28413, Providence, RI 02908; PO Box 109, Blue Ridge Summit, PA 17214; PO Box 146, Stoneham, MA 02180; PO Box 293, Merlin, Ontario N0P 1W0; PO Box 510, 4010 Basel, Switzerland; and PO Box 220342, Wuppertal, Germany.

■ Thanks!

Your input is always welcome via PO Box 98, Brasstown, NC 28902, or via the e-mail address atop the column. We appreciate material sent in this month by: David Alpert, New York, NY; John Arendt, Oswego, IL; A. J. Michaels, Pittsburgh, PA; Shawn Axelrod, Winnipeg, Manitoba; Ranier Brandt, Hoefler, Germany; Jerry Coatsworth, Merlin, Ontario; Ross Comeau, Andover, MA; Joe Filipkowski, Providence, RI; Harold Frogde, Midland, MI; Paul Griffin, San Francisco, CA; William Hassig, Mt. Prospect, IL; William Hearty, Kent, OH; Jeffrey Jones, Sunnysvale, CA; Rich and Talea Jurrans, Katy, TX; Paul Lautzenheiser, Wooster, OH; Harald Kuhl, Germany; Michael Lenane, Lakeland, FL; Zacharias Liangas, Italy; Chris Lobdell, Stoneham, MA; Ben Loveless, Bloomfield Hills, MI; Gigi Lytle, Lubbock, TX; Bill McClintock, Minneapolis, MN; Anita McCormack, Parkersburg, WV; Greg Majewski, Oakdale, CT; Armando Mastrapa, Miami, FL; Kevin Nauta, Grand Rapids, MI; Al Quagliari, Albany, NY; Jesse Rose, Hampton, VA; Jeff Ryan, Warwick, RI; Martin Schoech, Merseburg, Germany; Lee Silvi, Mentor, OH; DJ Stevie, Basel, Switzerland; Robert Thomas, Bridgeport, CT; Larry Van Horn, Brasstown, NC; Niel Wolfsh, Toronto, Ontario; Andrew Yoder, Blue Ridge Summit, PA; and David Zantow, Janesville, WI.

A Review of RadioScience Observing

Chances are, if you're attracted to longwave, it's due (at least in part) to the strange signals that can be found there. Indeed, there are many signals which you'll not hear anywhere else in the spectrum. Whistlers, tweeks, dawn chorus and other mysterious sounds can all be found in lowest extremes of the radio spectrum. It's an area that is wide open to experimentally-minded hobbyists.

If you are drawn to this type of listening, you'll want to know about a new book called *RadioScience Observing*, by Joe Carr. The book is targeted squarely at listeners who enjoy the unusual, the unexplained, and the bizarre parts of radio monitoring.

I was impressed by the wide range of topics covered in this book. One can learn a great deal about basic receiver principles, radio signal propagation, natural radio signals, loop antennas, chart recorders, and even extra-terrestrial signals. (An entire chapter is devoted to hearing signals from the Planet Jupiter!)

The print quality and layout of the book are superb. Nice, clear type is used throughout, and there is judicious use of white space. Interesting charts, diagrams and tables are sprinkled throughout the book to expand or clarify topics discussed in the text. A very complete index is included at the back of the book which should help readers quickly locate any topic of interest.

Finally, A CD-ROM is included inside the back cover, which contains sound samples of the radio signals described in the text. WWVB, whistlers, tweeks, the sounds of Jupiter, and scores of other signals can all be played with the click of a mouse. The CD is a helpful accessory that complements the book nicely.

RadioScience Observing (413 pages) explores the world of natural radio and related topics. Below is a chapter-by-chapter summary of the book as adapted from the author's preface.

- 1. The Cosmos: Radio Signal Generator. This chapter discusses the origins of natural radio signals.
- 2. Radio Astronomy. This brief chapter discusses the basic things you need to know about amateur radio astronomy.
- 3. Radio Receiver Systems. This chapter describes the various forms of radio receiver design, as well as information on how to interpret receiver specifications.
- 4. Radio Signal Propagation. This chapter presents the fundamentals of radio propagation in order to allow you to have some appreciation of what you hear when doing RadioScience Observing.
- 5. Signals, Noise and Reception. This short chapter discusses the roles of signals, noise and the importance of signal-to-noise ratio in doing radio detection.
- 6. Whistler Hunting. This chapter tells you how to do whistler hunting and build the simple receivers needed.
- 7. Solar Flare and S.I.D. Hunting. In this chapter you will find information on the origin of Sudden Ionospheric Disturbances (SIDs), how to observe the flare events, and how to build the simple 15 to 40 kHz receivers used to detect them.
- 8. Monitoring the Planet Jupiter. This chapter shows you how to monitor signals from Jupiter, which can be found over the range of 18 to 30 MHz.
- 9. Observing Radio Phenomenon During Eclipses. Solar eclipses affect the ionization of the Earth's atmosphere. With proper preparation, good RadioScience Observing during eclipses can be done both by amateur radio operators (who can legally use transmitters) and receiver operators.
- 10. Very Low Frequency (VLF) Receivers (10 - 100 kHz). This chapter shows you how to build the receivers needed for conducting RadioScience observations.
- 11. Low Frequency, Medium Wave and Shortwave Receivers. This chapter discusses various LF/MF and SW receivers available on the commercial market.
- 12. Loop Antennas for VLF Reception. This chapter shows you the basics of small loops and how to build them.
- 13. Meteor Detection by Radio. When meteors streak through the upper atmosphere they leave an ionized trail behind them that can reflect radio signals. These signals can be used not only for meteor detection, but also for interesting propagation studies.
- 14. Antenna Fundamentals. Radio antennas are the heart and soul of a good reception system. This chapter discusses the fundamental theory of radio antennas.
- 15. Radio Antenna Examples. This chapter shows you how to build antennas that are useful for RadioScience Observing.
- 16. Using a Geiger Counter to Detect Solar Flares. This is an invited chapter by Vicki Rae Mims. It recounts her award winning science fair project.
- 17. Instrumentation Circuits. A small number of analog circuits are very useful for helping to dig out signals: integrators, precise rectifiers, minimum value detectors and so forth are discussed.
- 18. Mechanical Recorders. This chapter discusses the basics of mechanical recorders, and will allow you to do a better job of purchasing and maintaining these instruments.
- 19. Computer-based Recording. Low-cost analog-to-digital converters (A/D) and personal computers make it possible and reasonable to record data from RadioScience Observing receivers directly to a computer file. This chapter tells you how to do it.
- 20. Spectrum Analysis of RadioScience Signals. A number of software programs are on the market that permit you to do Fourier analysis of waveforms received during RadioScience Observing sessions.
- 21. Doing Good Science Observing. The basics of good science and observing are discussed in this chapter. Although it pertains to RadioScience Observing, it is also applicable to other areas of amateur science as well.
- 22. Search for Extraterrestrial Intelligence (SETI). This is an invited chapter by Dr. H. Paul Shuch, N6TX Executive Director, The SETI League, Inc.



"Beyond the Earth's atmosphere, on the other side of the sky, is a universe teeming with radio emission."

--Carl Sagan in Contact

If you're still filling out your holiday wish list, you'll want to consider putting this book near the top. *RadioScience Observing* (\$29.95, published by Howard W. Sams/PROMPT Publishing) is available from Grove Enterprises (800-438-8155 or online at www.groveent.com).

My best wishes to you and your family for a joyous holiday season. See you next month.

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Consumer Choices in the Cellular Market

With the advent of competition and the maturing of the mobile telephone market, a number of companies are beginning to offer alternatives to traditional cellular service, especially in the areas of price and service.

When cellular telephone service first began, providers sold airtime at different rates depending on when and where the call was made. These rates created a pricing structure that was often confusing to the average consumer and made it difficult to comparison shop in the few instances where there was true competition.

Since capacity in a cellular network is limited, carriers discouraged use during the busiest hours of the day by charging a high per-minute "peak" rate and a lower, "off-peak" rate during evening hours and weekends.

When a cellular subscriber moves beyond the coverage area of the provider, called the "home" system, and uses the facilities of another carrier, the subscriber is said to be "roaming." These customers were almost always billed an extra fee, called a roaming charge, for the privilege of using a different system.

Just like landline service, calls from a cellular phone to numbers outside of the local calling area were billed an additional long distance fee.

With all these variables, and the details explained only in the fine print of cellular service contracts, many subscribers have been shocked to receive large bills after using their mobile phone in non-traditional ways.

■ Flat rate pricing

Some major carriers have begun offering an alternative referred to in the industry as "flat-rate pricing." For a fixed monthly fee

subscribers purchase a certain number of airtime minutes that are used for any type of call, whether peak or off-peak, at home or roaming, and local or long distance.

■ AT&T

AT&T Wireless Services started the trend with their Digital One Rate plan, offering a monthly package of minutes that has no extra charges for roaming or long distance. Each plan also comes with voicemail, caller ID, and text messaging. To take advantage of this plan, potential subscribers must pass a credit check, pay an activation fee, sign a one-year contract, and purchase a multi-mode phone capable of operating on AT&T's network of analog and digital service areas.

Besides these hurdles, AT&T has recently come under some fire for the "round up" policy of charging customers in full minute increments. For instance, if a customer makes a call that lasts 61 seconds, AT&T charges them for 2 minutes. Under a 600 minute plan, a customer could run out of package minutes after using only 305 minutes of actual airtime.

AT&T has also introduced flat-rate pricing for their wireless data service, giving subscribers who stay within their local area unlimited use about \$55 per month, and national users unlimited use for \$65 per month. This "Wireless IP" service is also known as

Cellular Digital Packet Data (CDPD), but remains largely unused in most areas.

■ Sprint PCS

Last October Sprint PCS introduced their own flat-rate nationwide calling plan, offering three different blocks of minutes for a fixed price. Each of these plans include voicemail, caller ID, call waiting, first incoming minute free, as well as long distance at no extra cost. Contrary to AT&T, no contract is required and there is no activation fee.

Coverage is limited to the Sprint PCS digital network, and normal roaming and long distances will apply when the caller is not on the Sprint network.

■ Bell Atlantic Mobile

A large wireless provider in the northeast United States, Bell Atlantic Mobile, offers their SingleRate USA plan, selling 1600 minutes of airtime for \$159.99 per month. Agreements with other analog and digital service providers

give the SingleRate USA plan similar coverage to AT&T's nationwide network. A one year contract is required. Bell Atlantic Mobile also gives subscribers the option of renting a phone for \$5 a month rather than purchasing a phone.

■ Wireless replacing wired

It is no coincidence that flat-rate pricing brings wireless usage closer to the typical residential landline service. Major wireless carriers, especially those with an associated long distance network, would like to see customers move away from landline service and switch all their telephones to wireless. For busy people who are away from home most of the time and use their home phone line for little more than a place to plug in an answering machine, it may make sense to permanently



TABLE 1: COMPARISON OF THREE NATIONAL FLAT-RATE PLANS

Company Service	AT&T Digital One Rate	Sprint PCS Home Rate USA	Bell Atlantic Mobile SingleRate USA
600 minutes	\$89.99	\$69.99	n/a
1000 minutes	\$119.99	\$99.99	n/a
1400 minutes	\$149.99	n/a	n/a
1500 minutes	n/a	\$149.99	n/a
1600 minutes	n/a	n/a	\$159.99
Additional minutes	25 cents per minute	25 cents per minute	20 cents per minute
Analog roaming	yes	no	yes
Contract	one year	none	one year

disconnect wired service and use a mobile phone as the "home phone."

A leader in this migration has been Finland, where almost half of all residents have a mobile phone. In 1996 Finnish telephone revenue from mobile and land-based calls were even at 40 percent. Last year, for the first time, mobile calls accounted for more revenue than land-based calls, reaching 46 percent of total telephone revenue.

Although the market in the United States is much larger and more diverse than Finland, the U.S. presently has more than 60 million wireless subscribers and added 12 million in the last year alone. With serious competition, aggressive marketing, and consumer alternatives, expect that number to grow even more rapidly.

■ Pre-paid cellular

Another major change in the wireless telephone arena is the way customers pay for airtime. Traditional wireless service is "post-pay," where subscribers pay for the call after it is made. This almost always requires a credit check and other assurances that the bill will be paid. However, more than 30 percent of all applicants for wireless service are refused due to bad credit or no credit history at all. Other potential customers don't make use of wireless services because a long-term contract doesn't fit their needs.

Prepaid cellular service, popularized in Europe, is gaining ground in the United States. Prepaid allows customers to pay for calls before they're made by purchasing airtime in advance, rather than paying after receiving a monthly bill. This has number of advantages for the carrier, including reducing their exposure to unpaid airtime. It is also very lucrative, with profit margins exceeding 20 percent.

Despite the high price, prepaid is rapidly gaining popularity, with some carriers reporting more than half of all new subscribers are prepaid. Businesses are turning to prepaid wireless accounts to have a fixed, predictable monthly charge with no surprises from unauthorized employee usage. Individuals are finding an additional benefit — many prepaid telephone accounts are anonymous. By paying in cash, these users maintain a certain amount of privacy, especially if the service provider does not retain call records.

There are two main types of prepaid service, the switch-independent and the switch-based. Switch-independent prepaid service requires a cellular telephone handset that has been specially programmed to operate as a prepaid phone. These handsets display the dollar amount of airtime remaining, and allow the customer to enter special codes to add

more airtime.

Switch-based prepaid service can operate over almost any cellular telephone, but requires additional software services at the service provider's switch to determine whether a caller has money remaining in their account.

A major player in the prepaid market is Topp Telecom, which sells the TracFone through a number of retail outlets. By mid-1998 Topp had more than 70,000 subscribers and was selling more than five million minutes of airtime each month.

For \$149.95 a customer receives a Uniden PCD2000 phone and 60 minutes of airtime. Additional airtime may be purchased, starting at 30 minutes for \$30 on up to 200 minutes for \$100. Airtime is charged against the phone at three different rates, depending on where the caller is and the type of call being made. A local call in the home system deducts one minute for every minute of airtime. Long distance calls are deducted at a rate of 1.5 minutes for every minute of airtime. Calls made while roaming deduct 2 minutes for every minute of airtime. Although unused airtime does not expire, one airtime card must be redeemed every 60 days (30 days in Los Angeles) to maintain the cellular telephone number.

■ Prepaid PCS

Although most prepaid cellular services use the traditional analog technology, at least two of the new Personal Communications Services (PCS) providers are offering prepaid plans.

Sprint PCS offers a prepaid account and sells prepaid airtime cards from retail outlets or directly from Sprint PCS. Powertel, a Global System for Mobiles (GSM) operator serving the southeastern United States, has a prepaid plan requiring no deposit, no credit check, and no monthly bill. Calls are charged at a flat rate of 35 cents per minute whether local or long distance, and airtime vouchers are available in amounts up to \$90. A Powertel handset is required. Omnipoint, another GSM provider, offers a similar plan with airtime coupons up to \$200.

A wide variety of prepaid plans are available from all sorts of companies. Before signing up with any of them, understand the charges and read the fine print. Prepaid certainly isn't the cheapest way to get wireless service, and some prepaid agreements allow the company to charge extra for a variety of things. One plan requires \$15 just to process a service request, including the cancellation of an account (no matter what the reason, including the loss or theft of the phone). Many plans have an additional monthly "line fee" or other

minimum usage amount on top of any airtime charges. Some prepaid airtime may expire if not used promptly.

That's all for this month. More background information on PCS, cellular, and satellite communications is available on my website at <http://www.decode.com>, and I welcome electronic mail at dan@decode.com. Until next time, happy monitoring!

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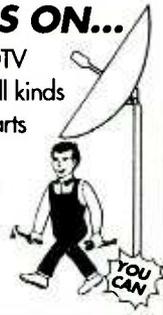
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All-Purpose Op-Amps

A new Windows 95/98/NT program and the Commtronics Engineering CE-232 Scanner/Computer Interface¹ instigated this month's op-amp circuit.

For years, the CE-232 — an interface for the PRO-2004, PRO-2005, and PRO-2006 and selected other scanners — was controlled by a DOS program that comes with the interface. However, one major feature of the CE-232 was unsupported by the software: eight channels of 8-bit Analog-to-Digital (A/D) converters! Early this year, I mentioned the feature to Windows developer, Paul Turton, who romped to the challenge with *Pro-Turbo* for the CE-232.

Pro-Turbo² does everything the old MS-DOS program did and much more, including full support for those eight mysterious A/D converters.

■ Analog-to-Digital Converters?

The beauty of computers interfaced with radios is this: If an A/D can convert an analog signal to digital code, then a computer can read, process, and store the information. The CE-232's eight 8-bit A/D converters are perfect for receiving all kinds of analog information from the radio; and the Pro-Turbo software is perfect for processing the data and making sure the computer stores it in an intelligible manner.

The point is, you can't stick just any analog signal into the input of an A/D. You could blow it up, and A/Ds aren't cheap. A simple technique called signal conditioning is required, not only for the safety of the A/D, but also for the accuracy of the data. Well, when Paul Turton liberated those awesome A/D converters in the CE-232, I had to figure out the signal conditioning requirements. I had two powerful applications in mind: S-metering and frequency measurement of incoming signals!

■ The Concept

Suppose there are ten transmitters on a frequency; it's pretty hard to tell them apart, even with the logging function that comes with most interface software nowadays. However, if not only the signal hits are logged, but the relative signal strengths and precision frequency offsets as well, then you've got "thumbprints" that can be used to differenti-

ate the signals. Chances are that no two transmitters will arrive at your location with exactly the same signal strength; and chances are that no two will be on exactly the same frequency.

The PRO-2004/5/6 and certain other scanners have an internal circuit in which the voltage can indicate even minor frequency offsets from the tuning of the receiver. My old "Center Tune Meter" modification (MOD-27) used LEDs to show frequency offsets in 1250 Hz increments, but an A/D converter can resolve offsets down to less than 100 Hz! (8-bits = $2^8 = 256$ points of measure; so 256 points across 20 kHz of intermediate frequency [IF] bandwidth is 78 Hz per point!)

■ Signal Conditioning

My old MOD-25 S-meter circuit taps and demodulates the receiver's third IF for a DC output of about 0-.8V to indicate relative signal strengths. These two tools are pretty cool for the avid radioist, but the computer age left them wallowing in the dust since analog and digital don't usually mix very well.

The output of my S-Meter circuit is about 0-.8V, directly proportional to signal strength. The "center-tune" function of the scanner has a range of about 7V to 1.5V, inversely proportional to the frequency offset over a range of +/- 10 kHz.

This poses two distinctly different problems. The S-meter's 0-.8V is pretty weak and uses only about 16% of the resolution capabilities of a 5V A/D. The second problem has two issues, chief of which is that a 7V input will blow a 5V A/D to kingdom-come. Then there is that inverse relationship where 7V represents about -10 kHz of center and 1.4V is +10 kHz of center.

Proper signal conditioning protects expensive devices, gets the most out of an application, and

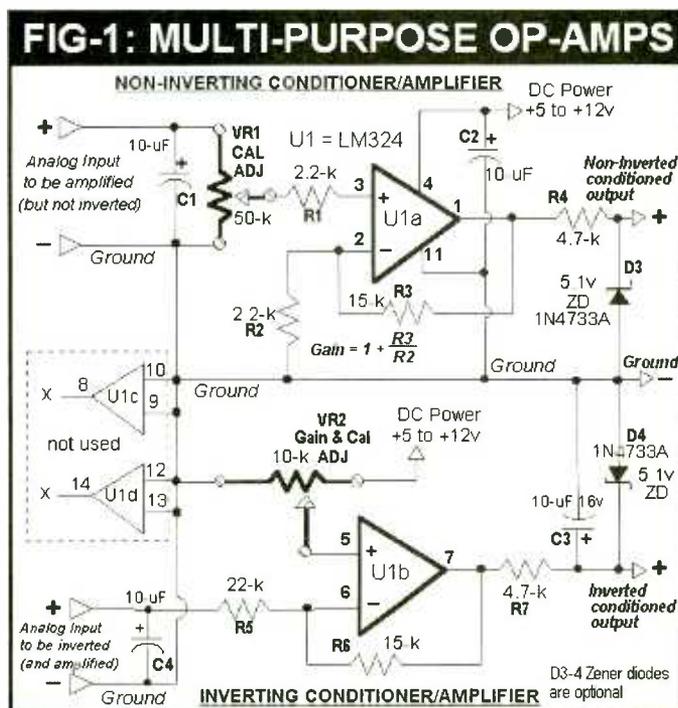
helps give an accurate result. Fortunately, it's relatively easy with the modern op-amp (operational amplifier) chip. Add a few resistors and capacitors, and maybe a calibration potentiometer, and you're all set — and that's the topic of the rest of this article. Though Pro-Turbo and the CE-232 Interface provided the original impetus, op-amps have hundreds of uses around shop and shack.

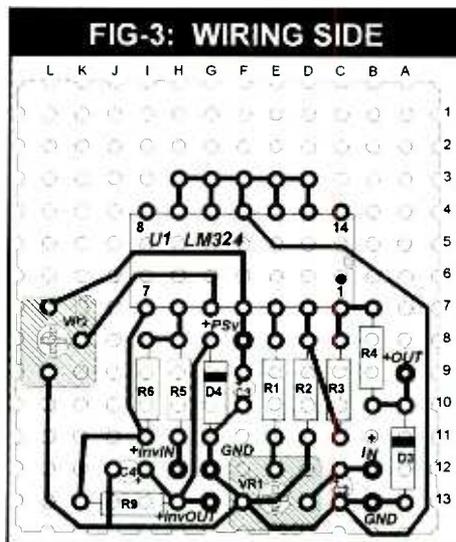
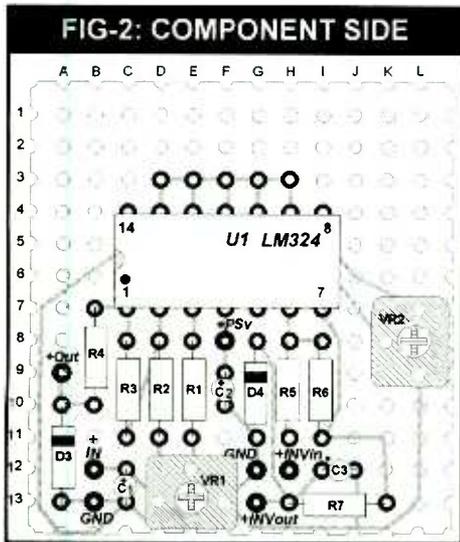
■ Op-Amps for the Experimenter

Figure 1 is the schematic diagram, using the LM-324, a quad analog op-amp. My circuit uses two of the four sections, so there are two spare channels for future projects. You can build one channel of the circuit independently of the other if you want. That is, the upper half from the ground line up is one circuit, quite independent of the second channel starting with the ground line and down.

Channel 1 is a non-inverting amplifier, the gain of which is fixed by the combination of R2 and R3. The formula is shown in Figure 1, should you want to experiment with it. Channel 2 is an inverting amplifier (or attenuator). The difference between the two is not of polarity — rather, of direction — so don't get confused.

A non-inverting function maintains the





slope of the input signal. That is, an input changing from 0.1V to 0.2V into a gain of 10 will be outputted as 1V rising to 2V. An inverting function would output 2V decreasing to 1V, you see. In all cases, the polarity of the signal remains positive (+) with respect to ground.

Figures 2 and 3 show how to build the op-amp signal conditioner on a piece of perfboard. Follow those "maps" and you won't run into trouble.

Applications

Channel 1 of the op-amp is for moderate amplification without inverting the signal. It's ideal for an S-meter circuit that puts out maybe 0-0.7V, give or take. As shown, the Ch-1 op-amp will output a more useful 0-5V S-metering signal; good for driving an analog meter, an LED bargraph meter, or even a DVM for excellent resolution of minor differences of signal strength. Of course, it's ideal for a 5V A/D converter, too! <grin>

Channel 2 inverts the signal direction and has a mild attenuation factor to limit the output swing to 5V. I designed it for that "center-tune" signal in the PRO-2004/5/6 and PRO-2035/2042 scanners available at IC-2, Pin 9, where the signal varies from about 1V to 7V, inversely proportional to frequency offsets. My mind thinks in direct proportion, for one thing, and two, I didn't want to blow up my A/D converter.

So, the two channels are good examples to cut your teeth on analog op-amps, and they're not limited to A/D and computer applications, either.

Calibrations

The gain (amplification factor) of U1a in Fig-1 is fixed by R2 and R3. You can change one or both values for

any desired reasonable gain. VR1 is provided, not so much as a gain-adjust; rather it is a calibration adjustment to match whatever signal range you feed into Ch-1 to the fixed gain of the amplifier. Say you have an analog signal of 0-2V and you want an output of 0 to 5V. You might choose a 20-k resistor for R3 and a 10-k resistor for R2 to yield a gain of 3, $(1 + 20/10)$. Then you'd adjust VR1 for a max input of 1.667V to Pin 3 of U1a to get the desired 5V output $(1.667 \times 3 = 5.0)$

The gain of U1b is established largely by R5 and R6, and VR2 is a calibration adjustment that sets the maximum output of U1b to let you match a precise output to a known input.

Suggestions/Recommendations

1. Use a DC power supply that's at least 2 volts greater than the maximum desired outputs of U1. An 8V supply is perfect for 5V outputs, but you can use 12V, too. DC power isn't critical, but it should be regulated and well filtered.
2. Build this circuit on perfboard as shown and use it as a learning-aid before conjuring up your needs and applications. You need one or two voltmeters and the Analog Signal Emulator shown in Figure 4. Connect a power supply as shown in Fig-5 and connect a voltmeter to the "Variable

Analog Output." Adjust the potentiometer for a desired output as seen on the meter. Then connect the voltmeter to the outputs of U1 as shown in Fig-1; connect the Analog Emulator "Variable Analog Output" to one of the inputs to the op-amp.

Then slightly adjust the Emulator's potentiometer while watching the output of the op-amp on the voltmeter. It helps to have two voltmeters, one measuring the input and the other at the output of the op-amp so that you can see the effects on the output as the input changes. Believe me, you'll learn a lot about op-amps in a short time if you take this extra time and trouble at first.

3. The inputs of unused channels of the op-amp must be grounded, as shown in Fig-1.
4. Zener diodes D3 and D4 are optional. I used them to limit the outputs to 5.1V so that my A/D converters wouldn't blow up if the input limits were exceeded. If you're not feeding an A/D, then D3-4 probably aren't needed or desired.

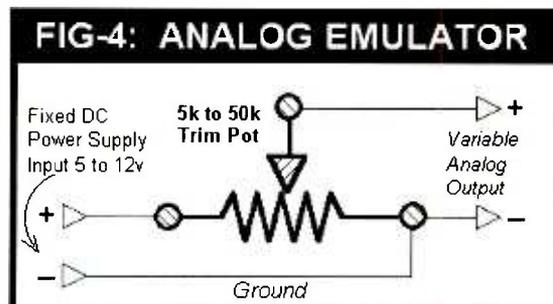
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Footnotes

1. I am not affiliated with Pro-Turbo, though I am a designer and the supplier of the CE-232. For more information on the CE-232, contact me by e-mail, fax, or snail mail to the addresses at the end of this article, or see my latest book, *The Ultimate Scanner* (Cheek³), for plans on "rolling your own."
2. You can get more information about Pro-Turbo and even download a demo version from: <http://www.iaw.on.ca/~jabba/pro-turbo.htm> or send e-mail to: ppturton@iaw.on.ca or jabba@iaw.on.ca

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Christmas-Tree Antennas

Yes, Virginia, there really are Christmas tree antennas. One of them, the tannenbaum array of one-wavelength dipoles, looks like the illustration in fig. 1. "Tannenbaum" is a German word sometimes interpreted in English as "Christmas tree," though a more accurate translation is "pine tree." Looking at fig. 1 it takes only a little imagination to see the four Christmas trees in this design.

Tannenbaum antennas are large: sometimes hundreds of feet in length. They are made of very heavy wire and hung like a curtain from tall towers. In fact, because of their flat, expansive construction, beams of this general sort are known as "curtain beam antennas."

In the past, beams such as the tannenbaum were used extensively for shortwave (high-frequency) broadcasting. Even after the advent of the yagi and log-periodic arrays, curtain beams were quite common and are still employed in some installations. They were frequently used in important military and government shortwave installations. In fact, the tannenbaum antenna was used for shortwave broadcasting from the old League of Nations (predecessor to today's United

Nations) headquarters in Geneva, Switzerland.

■ A Real Christmas Tree Antenna

Every few years I come across another article about using real, live trees as antennas. As I've mentioned in past columns, the basic idea for a tree antenna, Christmas or otherwise, is to put a nail through the bark into the tree trunk at a spot perhaps six inches to a foot or more from the ground. You might try nails at various heights to find the best match to your feedline. This match may differ for different bands. Please use small nails and do as little damage to the tree as possible.

Use a four-to-one balun and connect from one side of the high-impedance winding to the nail. The other side of the high impedance winding goes to a ground rod driven into the earth at the base of the tree. The ground is also connected to one side of the low-impedance balun winding. The remaining side of the low-impedance winding is connected to the center conductor of the coax feedline.

Live tree antennas have frequently been

successfully utilized for both transmitting and receiving. I suspect that the use of sizable power levels for transmitting on such an antenna might damage or kill the tree. However, I've had good luck using tall trees as all-band receiving antennas.

■ A Fake Christmas Tree Antenna

I once read an article which described the use of an artificial Christmas tree as an antenna. Talk about a stealth antenna! The artificial tree was set up in the yard outside the house. The tree's metal frame was insulated from ground and served as the antenna's element. The coax-feedline center connector was attached to the bottom of the tree. The feedline's shield was connected to a ground rod driven into the earth at the base of the tree.

A set of tree lights on the tree might make that coax running to the tree look less out of place, but for safety you wouldn't want the tree lights actually connected to the electric house mains on such a "Christmas tree."

For this antenna, the taller the tree the better, unless you want it resonant for a particular band; then a specific length will

be needed. But the specific length will be hard to predict, and ordinary formulas won't work here due to the capacitive-loading effect of the metal branches. This loading will make it responsive at lower frequencies than an antenna of its height would otherwise be. So, for receiving it's probably more reasonable to just make it as tall as practical and forget about making it resonant. If you want to transmit on this antenna, it will probably be necessary to use an antenna tuner or some match-

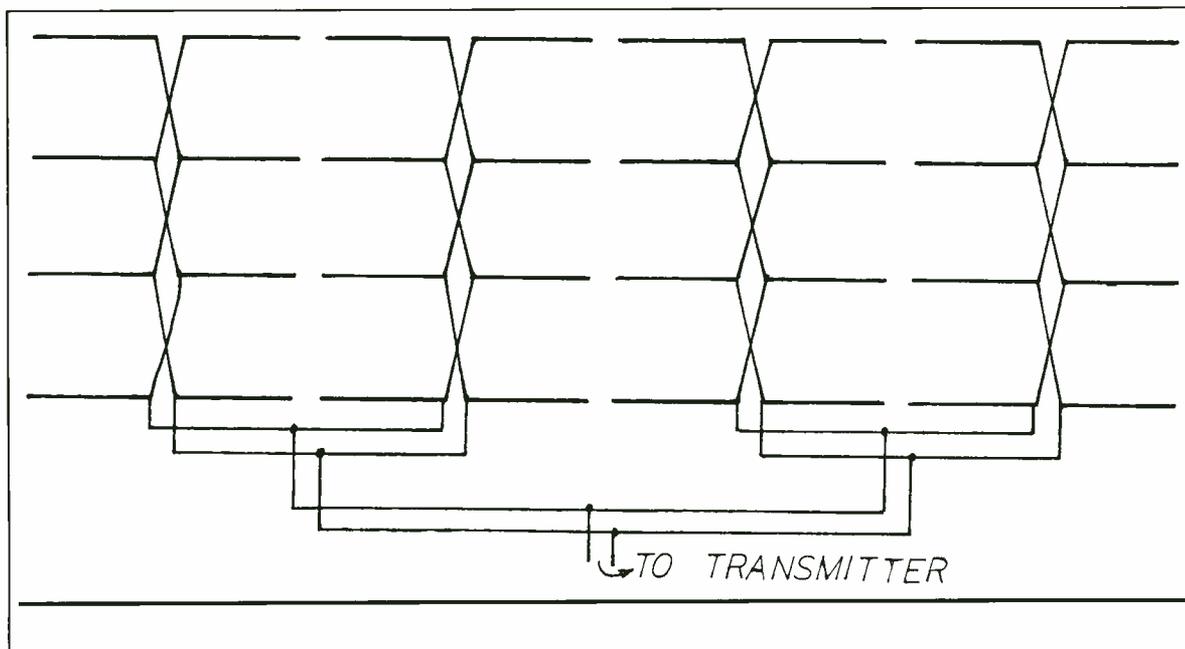


FIG. 1. A tannenbaum curtain beam antenna. A similar curtain is hung a quarter wavelength behind this beam to act as a reflector, thus giving the antenna more gain and directivity than that of the array as shown.

ing device between the coax and antenna.

The fake Christmas tree antenna is one antenna-alternative for those who don't want to put up an ordinary antenna outside. Bear in mind, though, that a simple wire strung high, long, and in the clear will undoubtedly make a better receiving antenna. On the other hand, if you want a quick and easy antenna, one that doesn't call attention to itself and takes up little space, it might be worth putting a tree on your lawn this season.

RADIO RIDDLES

■ Last Month:

I asked "What is a sferic?" Then I told you that that term was related to that month's topic: noise.

Well, the background of received noise which we must tolerate when listening to our shortwave, mediumwave, or longwave receivers is often incorrectly called "static." Lightning bolts generate strong bursts of electrical noise which propagate worldwide. This noise is the basic component of the noise which ends up as background interference to our shortwave reception.

Such received, background-noise interference, which is generated in the atmosphere and propagated through the atmosphere, is properly called "atmospheric noise," or simply "sferics." Lightning, common in the earth's atmosphere during any season, is considerably more common in summer in many places. That's one reason why we have better DXing (chasing distant stations) in winter.

To some degree, it is actually possible to track storms which produce lightning by tracking the sferics which they generate. For this a directional antenna and a special sferic receiver are employed.

The term "static" may have originated to describe the popping sound resulting from the discharge of static electricity build-up on an antenna in certain situations, especially storms. The airborne particles in sand, dust and snow storms often carry small static electric charges which may accumulate on an antenna during the storm. The charge thus developed may periodically build to a sufficiently high level that it will discharge at some place in the antenna system which is close to a grounded object. In some situations the discharge is into the air via a phenomenon known as "corona."

If there is no place where static charges can easily discharge, they may travel down the line and damage some components in your receiver. I have heard that sand storms caused this sort of damage to some of the solid state receivers of our armed forces in Operation Desert Storm. Tubes are much more resistant to damage by such static charges than are solid-state devices, and so some somewhat-elderly, tube-type equipment was quickly flown in to replace the more modern but disabled solid-state sets.

■ This Month:

We have quoted the infamous Kurt N. Sturba in this column on several occasions. What is the name of the antenna which appears to be the basis for the derivation of his name (pseudonym). Hint: Of what class of antennas is the tannenbaum beam a member?

You'll find an answer for this month's riddle, and much more, in next month's issue of *Monitoring Times*. Til then have a great holiday, and a happy new year. Peace, DX, 73

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More Good Stuff!

While at the Tidewater Hamfest in Virginia Beach, Virginia, I came across a book entitled *Easy Wire Antenna Handbook* by Dave Ingram, K4TWJ. As mentioned in this column last month, Dave is a very active writer who can describe an idea so anyone can understand it. So seeing his name on the book prompted me to purchase a copy: glad I did!

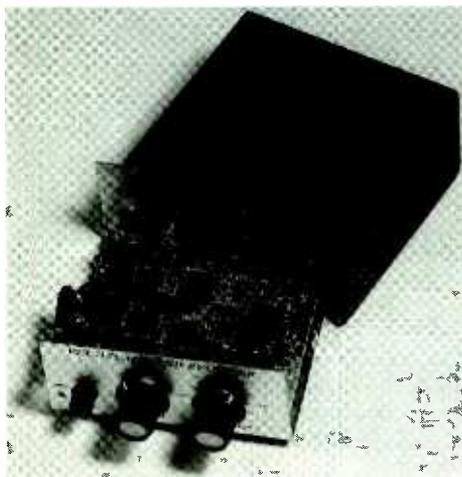
Dave's book has about 35 antenna projects and several transmatch projects the newcomer can easily duplicate.

Antenna projects range from simple dipole, multiband antennas, slopers, wide band antennas, several super DX antennas, and invisible antennas.

Feedlines and matching systems are described in simple terms and Dave describes a neat antenna tuner for the beginner to build.

One antenna that I have used several times over the years is described on page 56. It is a pair of phased dipoles and provides an easy way to obtain 3 to 4 dB of unidirectional gain, a switching system allows the user to change direction of the antenna from the shack. If your interest is low band DXing this antenna will appeal to you.

Price of this manual is \$15.95 plus \$4.00 S&H from CQ Communications, 76 North Broadway, Hicksville, NY 11801 or phone 800-853-9797.



■ Vectronics Kits

A new manufacturer of kits has recently introduced a line of shortwave and amateur radio kits. Presently 30 different kits are offered from a simple crystal radio, TV transmitter, VHF/UHF gear, keyers, HF transmitters/receivers and many other interesting products. Prices are reasonable. Write for a catalog to VECTRONICS, 1007 Hwy 25, Starkville, MS 39759 or phone 601-323-6551.

■ Your Ham Radio Store

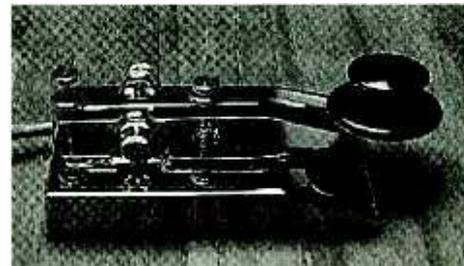
While perusing the latest Radio Shack catalog, I noted they offered a fairly large quantity of amateur gear aside from their 2 meter HT and mobile rigs. Of special interest is a selection of Hy Gain antennas; verticals, HF beams and VHF antennas, a keyer, VOX headset and many other products. While you cannot go into your local Shack and look at their selection of ham gear, you can purchase through their catalog; just go into the store and tell the salesperson what you want, they place the order, and you will receive the item in a short time.

While not exactly a ham radio department store, it does offer the newcomer a safe way of purchasing a selection of ham gear. Radio Shack's return policy is one of the best in the world, so you can purchase a product and know that if it does not suit your needs you can take it back to the store and get a full refund; not always easy to do via a mail order store.

■ New Nye Hand Key

Wm. M. Nye is a name that has been prominent in amateur radio for many years. They produced a wide range of products for hams ranging from switches to transmitters. The Nye Master Hand Key has always been one of my favorite hand keys — easy to adjust and use, and they are extremely durable and feel good in the hand.

Nye's new key is a deluxe version of the Classic Master hand key. It has a highly polished chrome base, nickel plated hard-



ware and a Navy Knob. A great deal of hand work goes into the manufacture of this key. Each key has a serial number stamped in the base (the first nine keys having single digit numbers have already been sold). Proceeds from the sale of these keys is going into a fund for an annual award to promote the learning and use of Morse code.

Price for the model 330C is \$139.00. Each key carries a two year warranty. Nice for the collection, but even better to use on the air.

For more info or to order contact Morse Express, 3140 S. Peoria St., Unit K-156, Aurora, CO 80014-3155, by phone 303-752-3382, or via internet www.MorseX.com.

■ E-Mail Again

A few readers expressed a desire to see N3IK have an E-Mail address and be available via the internet.

In fact one reader expressed an opinion that I am old fashioned. I do not use a goose quill pen to write the column! *Gee whiz, guys* — I've been involved with computers since the mid 60's. I have no objection to E-Mail, and at one time I was available via the internet, but the mode holds little attraction for me. I suppose that's because I am a fairly active amateur and just don't have time.

If Santa is good to me and brings a new high speed modem, I might make the switch from pony express to E-Mail, so be patient, I'm thinking about it!

Best to all for the holidays, 73 de Ike, N3IK

Two Neat Weather Radios

If there's one piece of radio gear that I think every family should own, it's a weather radio with alert capability.

If you're unfamiliar with the concept of weather radio, here's the deal: throughout the United States, the National Oceanic and Atmospheric Administration (NOAA) sponsors a network of radio stations that provide continuous broadcasting of the latest weather information from local National Weather Service offices. There are hundreds of these stations across the country, and they broadcast on one of seven frequencies:

- 162.550 MHz
- 162.450 MHz
- 162.400 MHz
- 162.500 MHz
- 162.475 MHz
- 162.525 MHz
- 162.425 MHz

This broadcast system also includes bulletins from the U.S. Emergency Alert System and the Federal Emergency Management Agency. When an immediate hazard — such as a tornado, hurricane, or chemical incident — threatens, the NOAA stations can transmit an alert tone that will activate weather radios equipped to receive it. While not all areas of the nation are covered by the NOAA weather radio network, most are, and the ability to receive a timely alert could be a lifesaver for you and those you love.



Oregon Scientific WR-8000

Recently, I tested two weather radios with alert function. The first is the Oregon Scientific All Hazards/Emergency Alert Monitor (Model WR-8000, \$69.95 suggested retail). It could well be called "The Camper's Friend." It not only includes all seven NOAA weather radio channels and the alert function, but it also has a compass, a clock with time and date, an alarm, a digital thermometer, and a freeze warning system. A metal bale allows you to prop the radio at an angle on a desk or table or to hang it on the wall, and there is a plastic clip to hang it from your belt.

The water-resistant WR-8000 is about 3 inches wide at its widest, about 6.5 inches tall including the short rubber ducky antenna, and about an inch thick at its maximum depth. It's powered by three AA alkaline batteries, which provide about 100 hours of standby time. A liquid crystal display constantly shows the

time but can also show date, temperature, or volume level. Press a button, and the LCD is backlit. Volume is adjusted using up and down slewing buttons; there is no volume knob.

When the WR-8000 is turned on in either standard listening mode or one of the standby modes (in which an alert signal can be received), a green light-emitting diode blinks. If an alert is received in standby/mute mode, the LED turns red. If an alert is received in standard standby mode, the LED blinks red, a tone sounds and the speaker turns on. There is no means of testing to make sure the emergency alert capability is functioning properly.

I can heartily recommend the WR-8000 as carry-around multi-function weather alert radio. It does the job and then some. Note well: for the compass to function properly, it must be swung away from the radio on its clear plastic arm at a 90-degree angle to the face of the unit. For more information, contact Oregon Scientific at 1-800-853-8883 or visit www.oregonscientific.com.

■ Midland's mid-price radio

Midland's 74-109 Weather Receiver (suggested retail \$39.95) with Alert is primarily designed for home use. It measures 6.25 inches wide by 4.75 inches deep by about 1.5 inches high. There are brackets on the back of the radio so that it can be fastened to a wall if desired. For increased sensitivity a telescoping metal antenna can be extended from the back.

Primarily powered by a "wall wart" transformer, the 74-109 also includes a connector for a 9-volt back-up battery that keeps the unit functioning if the AC power goes out. It also gives you the capability to unplug the unit from the power cord and take it with you in case you need to head for the basement.

The 74-109 receives all seven weather channels, and offers the choice of three different alert modes. The first simply blinks a red LED when an alert is received. The second blinks the LED and sounds an alarm tone like a siren. The third alert mode simply turns on the NOAA weather radio broadcast when an alert signal is received from the weather radio network. There is a button on the face of the radio for testing the alert mode. Other buttons let you listen to the weather radio broadcasts or put the 74-109 in alert standby mode.

The 74-109 exhibits the highest sensitivity



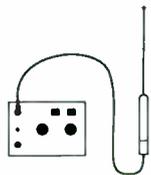
of any weather radio I have seen so far — that's an advantage for folks living on the fringes of the NOAA weather radio station coverage. In addition, this weather radio offers a jack for attaching an external antenna for even greater sensitivity. Another jack allows control of an external alert device, such as a bright light or warning horn. Volume for the 74-109 is controlled by a wheel on the side of the radio that serves as the on/off switch.

The Midland 74-109 gets my highest personal recommendation. It offers outstanding performance at an excellent price. For more information, call Midland at 1-816-241-8500 or visit www.midlandradio.com.

Severe weather strikes every state in the union, in one form or another. If you don't have a weather radio with alert function, you need one. I don't want any of my readers to have first-hand knowledge of stormchaser Warren Faidley's vanity plate: "CU IN OZ."

Earth Monitor™

The Kiwa Earth Monitor is an ELF-Extremely Low Frequency receiver for listening to the natural radio signals from planet Earth. Hear whistlers, tweeks, the dawn chorus with this sensitive receiver. Tuning range is from 50 Hz to 15 kHz. Features include a remote field probe antenna, noise filter and variable bandpass filter.



Kiwa Electronics

612 South 14th Ave., Yakima WA 98902

☎ 509-453-5492 or 1-800-398-1146 (orders)
 🌐 [kiwa@wolffenet.com](http://www.kiwa.com) (Internet/catalog)
<http://www.kiwa.com>

Q. Can you explain the time differences between the U.S. and UTC? (Numerous)

A. Universal Coordinated Time (UTC), variously called military time, 24 hour universal time, Greenwich Mean Time (GMT), Army time, Zulu time (and probably others as well), is an attempt to standardize worldwide time to avoid confusion in astronomy, communications, and other sciences.

Before this coordinated effort, noon was arbitrarily defined as the time when the sun reaches its highest overhead position; the problem with that was, except for locations on a line drawn from pole to pole, it was never noon for everyone in a town at the same time.

Later, 24 separate time zones, one for each hour of the day, were conceived. Each time zone was 15 degrees in longitude apart from the adjacent time zone (24 hours times 15 degrees equals 360 degree — the full circle around the earth). Now folks could share the same local

time for approximately 1000 miles.

The beginning reference was delegated to be the prime meridian, zero degrees longitude, a line running through Greenwich Observatory in England. Since the earth rotates toward the east, it is always later east of us (the sun is higher in the sky), and earlier west of us (when the sun is overhead for us, it is still low in the east when viewed from the west of us).

In the United States, the East Coast sees the sun five hours later than the British see it, so Eastern Standard Time is five hours earlier than UTC. When it is 1200 UTC (noon at Greenwich), it is 0700 on the US East Coast. For each of the remaining U.S. time zones (Central, Mountain, and Pacific), it is progressively one hour earlier. During the summer (Daylight Savings Time), we boost our clocks one hour ahead, making our separation from UTC an hour less.

Holding a flashlight (the sun) over a world globe makes the whole thing a lot easier to understand, as you imagine western locations having to look east to see the sun lower in the

morning sky! (Also see this month's "Beginner's Corner.")

Q. If I was watching channel 7 TV on the moon, would I receive one station or channel 7 worldwide? And how far out? (John Fleming, Downey, CA)

A. When the astronauts monitor busy channels from space, they hear a mishmash of signals all at once. This is one of the problems the astronaut-hams had in trying to talk on 145.550 MHz during their orbital hamming. It's also the reason that cellular phones won't work in airplanes — they would simultaneously dial up cell sites all over the country!

We eventually lose radio contact with deep space probes as they pass out of our solar system; even a billion miles is only 1-1/2 hours of signal travel. Of course, the signal is very small, not at all like the broadcast powerhouses, but the antennas are high gain, and the frequency is clear.

The strength of the received signal in outer space depends upon the frequency, broadcast power, and directivity. Within limits, the higher the frequency, the more likely it will penetrate our ionosphere; remember, shuttle primary communications in space are conducted at 2 GHz. But even signals from Jupiter may be heard in the 20 MHz range, and ham satellites in orbit have repeaters on 29 MHz.

Q. Somebody told me if you could travel in space far enough, you would pick up radio and TV signals from forty years ago. What's your theory on this subject? (John Fleming, Part Two)

A. It would be true only if you could travel faster than light. If you launched at the same time as a signal was sent, and were going the speed of light, that signal would be alongside you, and would exhibit a 100% Doppler shift in frequency. If you were going half the speed of light, and attempted to radio back to Earth on 100 MHz, they would hear you on 50 MHz.

At this moment, *I Love Lucy* is passing about 50 light years from here, and someone at that distant point in our galaxy could conceivably receive the program — if it hadn't dissipated into heat, or been absorbed by interstellar dust, or isn't just a mishmash of signals all on the same frequency from TV stations around the globe as we discussed in paragraph one.

Bob's Tip of the Month

Using the Grove FCC Database on Windows 98



- Right-click on the START bar (the gray section, not the START button)
- Click on PROPERTIES
- Click on START MENU PROGRAMS
- Click on ADD
- Click on BROWSE
- Double-click on PROGRAM FILES
- Double-click on FCC DATABASE MANAGER
- Double-click on FCC DBMGR
- Click on NEXT
- Click on NEXT again
- Create a name for the shortcut (i.e., Grove FCC Database Manager)
- Click FINISH

Now, simply click the shortcut icon to run the program. An elegant fix.

Just after the new Grove FCC Database was released, it was discovered that after the program was loaded on a Windows 98 platform, it couldn't be found! It worked just fine on Windows 95, so where did it go?

It turns out that the creation of a shortcut finds the program just fine. After loading the disk on a Windows 98 platform following the original instructions, proceed as follows:



WINRADIO®

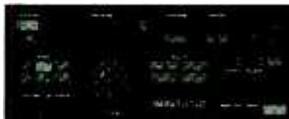
**From the Pioneers of Computer Controlled Radio
now comes a whole new range.**



Internal Model (WR-1500i)



*External Model (WR-1500e)
(computer not included)*



*The WINRADIO Virtual
Control Panel*



Spectrum Scope

The popular WINRADIO WR1000i is the world's first commercially available PC-controlled scanning receiver. No wonder it has received the coveted Most Innovative Receiver Award for the Year 1998, by WRTH.

However, this fine receiver has now finally encountered serious competition:

Our own.

WINRADIO Communications now proudly introduce a new series of radio-controlled PC-based receivers, in both internal and external versions:

- WR1000i ... 100% internal 1300MHz scanning receiver
- WR1000e ... 100% external 1300MHz scanning receiver with standard RS-232 control and optional PCMCIA (PC-card) interface
- WR1500i ... 100% internal 1500MHz scanning receiver
- WR1500e ... 100% external 1500MHz scanning receiver with standard RS-232 control and optional PCMCIA (PC-card) interface

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!

Multi-channel operation is simple to achieve, as up to eight WINRADIO internal receivers can be used simultaneously in one PC.

The advantage of an external model is in its portability – the optional plug-and-play PC card interface (PCMCIA) allows a very fast and simple installation for any portable PC. Serial RS-232 interface is also available as standard.

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.

Software options:

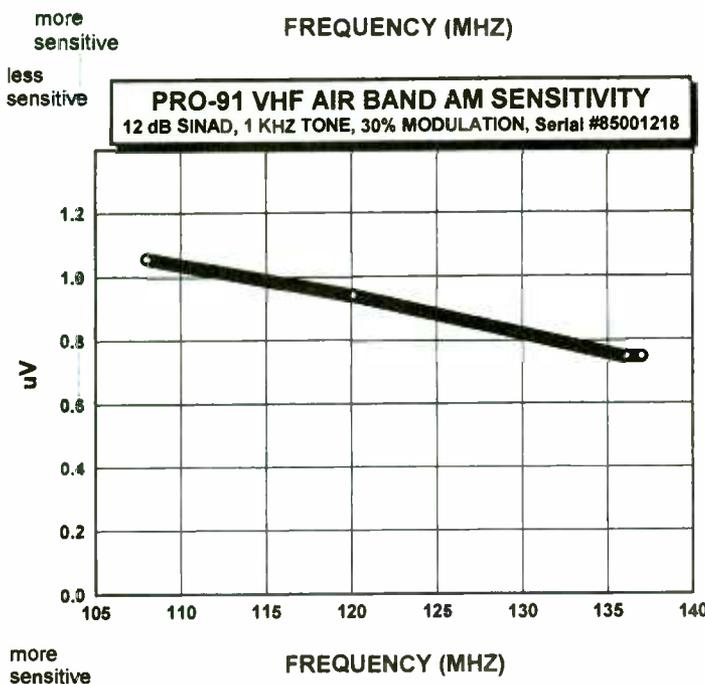
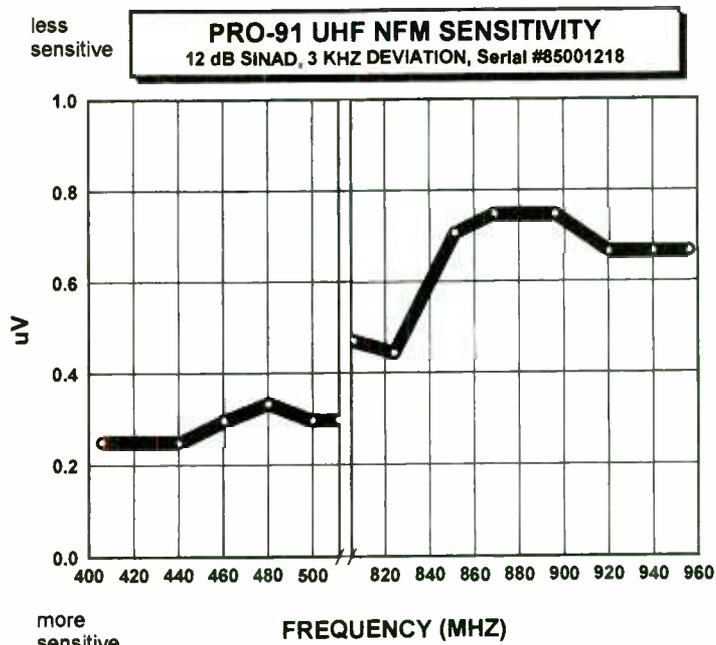
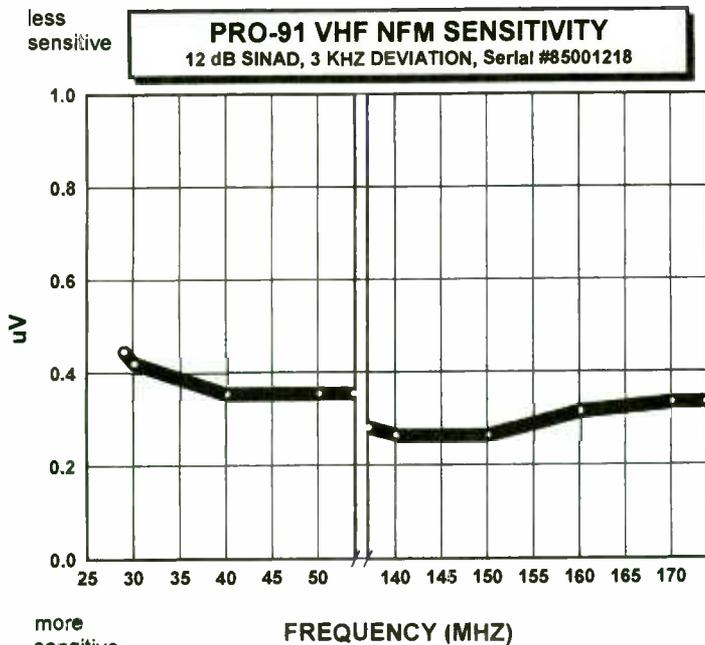
- WINRADIO Digital Suite software for decoding of WEFAX, HF fax, packet, ACARS, DTMF, CTCSS; for signal classification, audio spectrum analysis, squelch-controlled playback and recording.
- WINRADIO Database Manager

Hardware options (for external models):

- WINRADIO Portable Power Source for a truly portable computer-controlled radio system, containing nickel-metal-hydride batteries and an intelligent battery charging facility with battery charge indication.
- WINRADIO PC Card Adaptor allows the use of PCMCIA card interfaces commonly used with laptop computers.

WINRADIO receivers are available from selected radio dealers in North America.
See our Web site www.winradio.com for more details or email enquiries to info@winradio.com.

*Technical Specifications are subject to change without notice.
WINRADIO, WINRADIO Digital Suite and VISITUNE are trademarks of WINRADIO Communications.
Availability subject to FCC certification (application pending at time of printing). Contact us for details.*



sion PRO-91 employs IFs (intermediate frequencies) near 380.7, 10.85 and 0.450 MHz and the image rejection on our test unit is very good at the frequencies we measured. A half dozen cellular phone signals leak through in the 855 MHz range, 21.7 MHz below their actual frequency but reduced in strength by about 41 dB.

Our PRO-91 audio is crisp and clear, though not earsplitting, and accompanied by a slight hiss. We find a few birdies in our PRO-91 and some of them are on preprogrammed

service search frequencies. Harmonics of the crystal controlled 10.4 MHz second local oscillator are responsible for birdies at 31.2, 41.6, and 52 MHz, as in the PRO-2050 and BC235XLT.

■ Usability and Performance

The LCD display has large digits and is easy to read. Pressing the lamp key lights the display with an ample orange hue. The lamp extinguishes 15 seconds after pressing the lamp key and cannot be latched.

Physically, the PRO-91 is similar to other recent Radio Shack models: dark and plain. The dark gray keys are close together and are camouflaged against the like-colored case, though the keys have a good feel and a keypress confirmation beep which can be enabled or disabled. The supplied rubber helical antenna is too rigid.

While connected to an outdoor antenna, our PRO-91 experiences intermodulation interference in the 161 MHz range from a paging transmitter on 158.1 MHz. The triple conver-

■ Simple, Effective

The PRO-91 Service Search omits many important police frequencies and censors trunking frequencies adjacent to the cellular phone bands. We like the fast scanning and simple AA battery scheme.

Our sample PRO-91 performs well and suits the person who wants basic trunk tracking and conventional scanning and who doesn't require many memory channels. The scanner lists at \$249.99 in the Radio Shack catalog.

MEASUREMENTS

RADIO SHACK PRO-91
PORTABLE SCANNER
S/N 85001218

Frequency coverage (MHz):
 29 - 54 (5 kHz steps)
 108 - 136.975 (AM, 12.5 kHz steps)
 137 - 174 (5 kHz steps)
 406 - 512 (12.5 kHz steps)
 806 - 823.9375, 851 - 868.9875,
 896.1125 - 956 (12.5 kHz steps)

Sensitivity: see graphs
FM modulation acceptance: 13.5 kHz
Image rejection due to 1st IF:
 64 dB at 155 MHz
 72 dB at 858 MHz

Practical memory scan speed: 80 channels/sec.

Current consumption at 6 Vdc:
 off - 0 mA
 manual - 67 mA
 scan - 70 mA
 full volume - 142 mA

Battery saver: after 5 seconds in Manual mode.
 Low battery warning at 4.57 Vdc or less.
 Shutdown at 4.36 Vdc or less.

Intermediate Frequencies:
 approx. 380.7, 10.85, 0.450 MHz

RadioMap™

Transmitter sites in your area are researched and marked on a beautiful 8-1/2 x 11 full color plot. See FCC licensed sites from VLF through microwave including police, fire, cellular phone sites, business, industrial, broadcasters and selected FAA transmitter sites. Call signs, frequency assignments, and names provided. Ham radio stations not included.

You choose the map center location—your neighborhood, near your office, around sports stadiums—anywhere within the United States. We adjust map coverage for best readability, depending on transmitter site density. Invaluable to radio professionals and hobbyists for identifying lowers, sources of radio interference etc. Send nearest street intersection and check for \$29.95 payable to Robert Parnass.

Robert Parnass, M.S.
 Radio Electronics Consulting
 2350 Douglas Road, Oswego, IL 60543

An Under \$300 Computer-based DSP Shortwave Receiver

Nobody loves a bargain more than yours truly. I can prove this by my basement and office. They have been designated as official disaster areas by the government and by my wife. But could anyone resist the temptation of a 100 kHz to 30 MHz computer controlled receiver, with five selectable digital signal processing (DSP) filters, 1Hz tuning capability and a price of \$295?! I think not. Ten-Tec, a name long associated with ham transceivers, has recently introduced their PC Radio Model RX-320 with all these features.

We have looked at some very fine computer-based receivers over the past years. Most recently, WinRadio's WR-1500e was an impressive performer. Retailing at \$495 and covering from longwave into the gigahertz, the WR-1500e was especially outstanding in the VHF/UHF spectrum. But what if you were just interested in a computer-based shortwave receiver or had a fixed budget around \$300? You would be out of luck — until now.

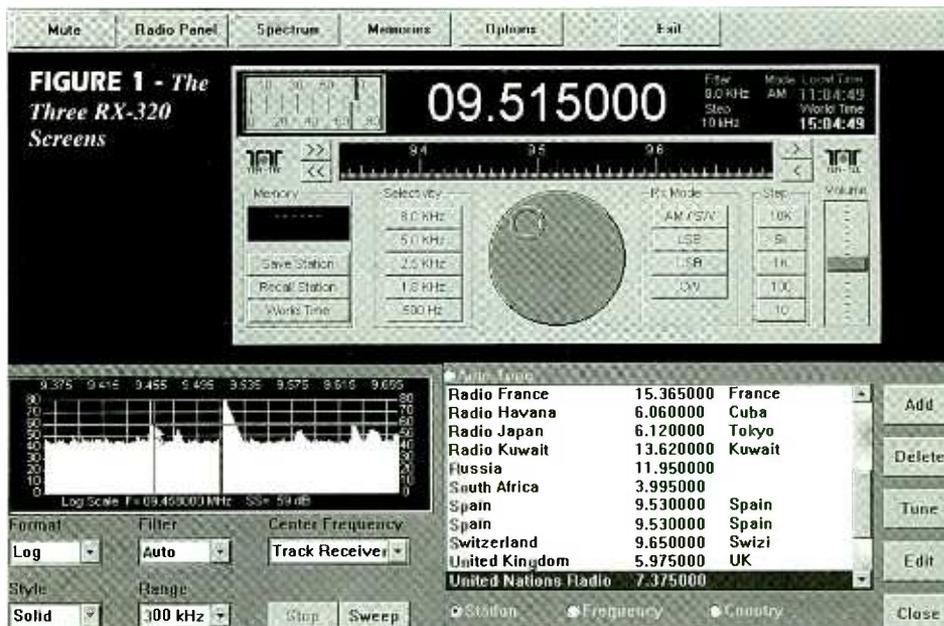
■ A True Black Box

The RX-320 is an external computer receiver, similar to the WR-1500e. Therefore, the user does not need to open his computer to use it. All connects are made via a cable to the computer's serial (coms) port. External computer-based receivers may add a bit to desk clutter. But, in my opinion, their ease of transportability between multiple computers far outweighs the clutter issue.

The RX-320 consists of a 3 x 6.25 x 6.5 (HWD) inch black metal box; a 3.5 inch, high density, floppy disk; a DB9 serial cable; a 120 volt AC "wall wart" power supply; a whip antenna, and a concise instruction manual.

The black box is quite basic, with nothing on the front face except a small Ten-Tec logo. The rear face is also not complicated, having only six items: external antenna input, the nine pin serial data port which provides the connection to the computer, speaker output, line out, a 13.5 to 15 volt (at 500ma) connection, and a lowly on/off toggle switch.

Ten-Tec says that "It operates on any PC running Windows 3.1 or Windows 95." So much for the need for expensive, state-of-the-art computer equipment. I ran it on a Pentium



133 MHz system using Windows 95. Hardware and software installation was completed in less than 5 minutes. The only information the software requests during setup is the number of the serial port used by the receiver's cable.

■ The User Interface

Some may say that the RX-320's software is very basic. I found it simple, adequate and to the point. It does most everything a shortwave listener needs to do and with a minimum of screen switching or confusing controls. Figure 1 shows all three screens. All important receiver commands are performed on a familiar-looking rectangular "receiver." Clicking on the desired "button" with your mouse activates that command.

Most commands are accessible via the keyboard. These are listed in the "Help" pulldown menu. For example, tuning is achieved by positioning the cursor on the large knob in the center of the receiver icon, pointing up or down and then pressing a mouse key. Alternatively, the user can enter the frequency numerically from the keyboard. Clicking on the arrows on either side of the tuning dial window, below the numeric display, is another tuning method.

The Step menu, on the right side of the receiver icon, is one method of choosing the tuning step. Notice the 10 Hz step: This is the first time I've seen that on a sub-\$300 receiver.

The receive modes are confined to the four most frequently used in the shortwave bands: AM, LSB, USB and CW.

A signal strength meter, which shows peak and instantaneous signal levels, can be selected for display to the left of the numeric display.

One of the RX-320's most unique features for the price, is the quality and quantity of signal filters it provides the user. How do they do it for the price and in that small size? Very good question.

■ Enter DSP

DSP, or Digital Signal Processing, is simple in concept. Consider the traditional method of designing and building electronic circuits. Functional blocks of hardware circuits, designed to perform a signal function, were fabricated from components such as transistors, capacitors and resistors. Now think about simulating the function of that hardware with a piece of software. For example, instead of soldering a resistor and capacitor together to

act as a frequency determining circuit, a mathematical formula (in this case an exponential function describing a specific charge/discharge characteristic) would simulate the circuit.

(Stay with me. We're almost there.) Now let's say the simulation could be done by a processor, very fast, in real time. The software would then react as quickly to an input signal as if it were a hard-wired component resistor and capacitor network. This mathematical manipulation of signals can be performed if the signal is in a digital form that can be processed by a fast computer. Digital Signal Processing: see, the initials really do make sense.

Once the required processing is performed, the signal can be used in its newly manipulated digital form or reconverted into an analog signal, allowing a human to hear the result.

The mandatory fast, inexpensive processors and analog-to-digital converters are now becoming available. The power of DSP is its flexibility, its agility, with which the signal can be manipulated (processed) without the need for cabinets of additional dedicated hardware components. This is how a relatively inexpensive and physically small receiver can still have five signal filters ranging from 6000 to 500 Hz with excellent selectivity properties.

■ Seeing is Believing

The second screen displays a spectrum of signals on either side of the frequency to which you are tuned. This is a very useful feature not previously found in any receiver in the \$200-300 price range. The frequency resolution is quite fine, another beneficial by-product of the DSP methodology. You can tune the receiver by clicking a frequency displayed on the spectrum graph.

■ A Simple-to-Use Memory Screen

The third RX-320 screen is a thankfully simple memory — almost a database. Storing a frequency is as simple as tuning to the frequency and clicking the add button on the top right. The frequency is added to the list and the user is asked to type in the station name and country. The memory list can be displayed (sorted) in alphabetical order based on the station name or the country. Or the list can be displayed in order of frequency. Double clicking an entry tunes the receiver to that frequency.

■ How Well Does It Work?

The telescoping whip was about as useful as the last half of the manual: i.e., not very, except for the very, very basic user. Once a coaxially fed multiband dipole was connected

to the rear panel antenna connector, the RX-320 became a real shortwave receiver. It appeared to live up to all of its operating specifications of sensitivity and selectivity, especially in the sideband modes. The filters allowed clean copy of voice and digital signals in the most crowded QRM conditions I've heard on shortwave in a number of years.

Ten-Tec has done a very nice job in radio frequency (RF) shielding of the RX-320. I found RX-320-generated digital noise to be at a very, very low level. In fact it was ranked with the quietest — a real necessity for the long, medium, and shortwave spectrums.

The operation is intuitive, simple, and as close to a desktop shortwave receiver as I've seen in a computer-based receiver.

After using it for an hour, was I was ready to trade in my old trusty R-71? We-e-ll, even a product as impressive as a sub-\$300 DSP receiver cannot escape the *Computers & Radio* "I wish it had..."

■ I Wish It Had

The RX-320 does not have an internal speaker. Connecting the Line Out to the sound card in my Fujitsu Lifebook 735DX produced an annoying computer noise. Though such results are admittedly unique to each computer and its connections, the best audio can be guaranteed by using headphones or an external speaker. All the same, for the times when convenience, not fidelity, is the issue, even a transistor radio internal speaker would be convenient.

I appreciate the very fine job Ten-Tec has done in bringing this receiver to market under \$300. But I think it would be worth a few more cents to add light-emitting diodes (LED) as power on and on-line indicators.

And what about that so-called external antenna connector? An RCA jack? Hello, Ten-Tec guys! Very few people terminate their high quality coax feedlines in an audio RCA (tulip) plug.

The overall sensitivity was very good; however, in the AM mode I wish it had a bit more.

And lastly, before you're taken off the hook, a word about the manual. Yes, the RX-320's software is well designed and very simple to use. The pulldown Help menu is very complete and easy to use. But the written Manual is a severe misnomer. It's more of a quick set-up sheet. Great features such as the spectrum graph and filters get a single paragraph on their operation and advantages, while the absolute beginner radio listener information gets 17 pages! ... Guys, need I say more?

■ Did I Box Away My R-71?

Remember the RX-320 is a 0.1 to 30 MHz-

only receiver. In my opinion the WR1500e, which also covers these frequencies, is the best VHF/UHF and beyond, sub-\$700, computer-based receiver on the market today.

But the Ten-Tec's RX-320 blows away the shortwave receiver competition in the under \$500 range, in both the computer-based and desktop markets for price/performance ratio. At its price, which is not much more than top end portable radios, it should be seriously considered as either a primary or back-up shortwave receiver. The RX-320 is available at \$295 (plus shipping and handling) from Ten-Tec at 1185 Dolly Parton Parkway, Sevierville, TN 37862, (423) 453-7172. Their Website is at www.tentec.com.

When it comes to shortwave receivers, no longer is inexpensive synonymous with poor performance and outdated features.

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 MAR Nextel forces digital switch; fed trunked systems; using the Opto Scout
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 JUL Executive Branch Travels; "Big Hole" Chatham NC; Black Mt CA; Nextel IDEN
 AUG DC goes trunked; Miami news; notes from Motorola tour, Fascinator radios
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 NOV Heathkit GR-64 Restoration

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NOV Learning to Love Satellites
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(Reprints of these reviews are not available.)
 JAN Sony SW-12/ Sony AN-LP1
 FEB Lowe HF-250E
 MAR International R-110; Improve Lowe SRX-100 selectivity

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APR International WR-689
 MAY Drake R8B - Part I
 JUN Drake R8B - Part II
 JUL Grundig Yacht Boy 400PE
 AUG First look at JRC NRD-545
 SEP AOR's AR5000+3 Receiver
 OCT Sangean ATS404 Economy Portable
 NOV Kneisner + Doering KWZ30
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 Opto Trakker Jun
 Palomar Loop Antenna System Apr
 RS Weather Alert radio Dec

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WHAT'S NEW?

TELL THEM YOU SAW IT IN MONITORING TIMES

Everhardt Trucker's Cellular/AM/FM/Weather Band Antenna

If you're a trucker with one of those short, rooftop, AM/FM antennas, you may wish to consider Everhardt's new FM/CEL-1. This collinear antenna boasts a gain of 6 dB over a reference cellular quarter-wavelength antenna, and receives AM/FM and weather band to boot.

The single-hole-mount antenna measures roughly 30 inches in height; about eight feet of RG58/U coax connects it to an aluminum-minibox duplexer which separates



the AM/FM function from the cellular.

Two three-foot cables lead from the duplexer to the respective radios; a standard Motorola plug is affixed to the AM/FM cable, and a cellular phone TNC plug is on the other. A center trap for weather band monitoring, according to a spokesman from the factory, is in anticipation of future automotive radios equipped for weather band reception.

We would suspect that the antenna could be unplugged from the duplexer and used for a scanner or weather band radio; however, since it has an automotive Motorola plug, a BNC adaptor would have to be purchased separately.

The Everhardt FM/CEL-1 retails for \$89.90 and is available from Marvel Communications Co., 6000-D Old Hemphill Rd., Ft. Worth, TX 76134.

Customized Weather Alert

Multi-Technical Services, Inc. of Clayton, NC, has just introduced a product of interest to those who monitor the National Weather Radio network. The new Emergency Alert Radio (EAR) is available in two models: one receives standard FM broadcast stations; the other receives NOAA weather radio in the 162.400 - 162.550 MHz band.

Most weather radios are activated by the 1050 Hz public alarm tone for every warning, watch, and test; those able to discriminate based on Specific Area Message Encoder (SAME) signals still activate for every event within the selected area.



EAR includes the unique ability to filter received messages by both FIPS code (the Federal Information Processing Code for each county) and event code. EAR responds to as many as four FIPS codes and 80 event codes (encoded by the user or by the manufacturer at no additional cost).

Once programmed, the EAR memory is not affected by power failure, so programming the unit is usually a one-time operation.

EAR has automatic changeover from primary to a backup frequency in the event of loss of signal from the primary transmitter. All SAME data messages can be logged using a serial data connection.



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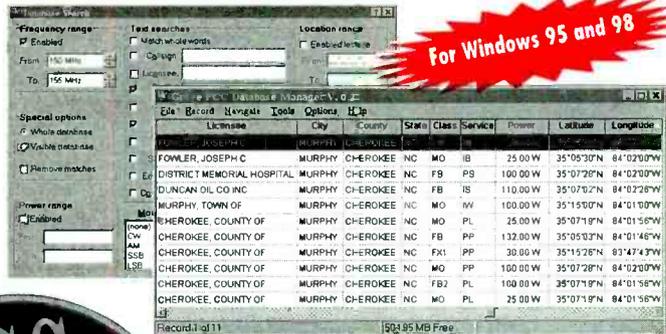
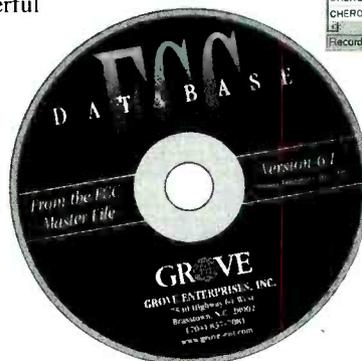
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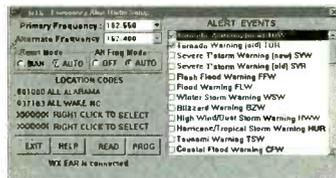
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Because software is easily copied, it is not refundable. Defective copies will be replaced at no charge.

During reception of a pre-selected FIPS and event code, EAR can activate a control output which may be used to control a tape recorder, activate a warning alarm such as a flashing strobe light or a bed shaker, etc.

EAR has just one button and one indicator lamp, making it impossible for the end user to inadvertently change the programming of the unit. EAR's radio receiver is very sensitive and completely stable.

EAR retails for \$139.95 from MTS, Inc., 150 Clayton Commerce Center, Clayton, NC 27520; 919-553-2995 or visit the EAR website at www.EmergencyAlertRadio.com



Customized Television



Replay TV is both a product and a service — a one-time purchase that answers those common complaints about recording television shows using a VCR. With a capacity to digitally record from seven to 40 hours, Replay TV can: record favorite shows, search for and record specific types of shows, record from the beginning of a show after it has already started, rewind to play the beginning of a live broadcast that is being recorded, skip commercials while recording, provide VCR-type control of a live broadcast (pause, rewind, fast forward), and more!

Although the pioneering product retails for \$995, there is no monthly fee for basic services, which include a free lifetime subscription to the latest channel guide information, downloaded nightly via a phone connection — plus it resets the clock.

For more information, contact the Palo Alto, California, company at 877-REPLAYTV (877-737-5298) or visit www.replaytv.com

Stereo Reception by Satellite

Sony's new digital DSS system, SAS-AD4, passes 5.1 channel surround sound through an A/V receiver to produce the latest in multichannel satellite programming — Dolby Digital produces six channels to provide home theater at its



most sophisticated. The system also possesses a Dual Output LNB for additional receivers and an RF controller to control the receiver from anywhere in the house.

The SAS-AD4 with Dolby will sell for about \$500; Sony's digital SAT-A4 receiver without Dolby will be available at about \$379.

Trifield Broadband Signal Meter

Alphalab has combined the best features of their earlier TriField detectors into one potent, affordable instrument. The new broadband signal detector can be used for measuring radio and other electromagnetic signals in a continuous spectrum from 50 Hz through 2500 MHz.

Equipped with a large, analog meter for easy reading, the detector has four ranges: 0-100 milligauss magnetic, 0-3 milligauss magnetic, 0-100 kilo-

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SCANCAT GOLD FOR WINDOWS "SE" FEATURES

- Selective Sound Recording using PC-compatible sound card.
- "Point & Shoot" playback by individual hits.
- Demographic search for frequency co-ordination and 2-way Usage Analysis.
- Detailed logging to ASCII type files with DATE, TIME, Sig Str, Air Time.
- UNLIMITED file sizes with our exclusive SCANCAT filing method.
- Exclusive "MACRO" control by frequency of Dwell, Hang, Resume, Sig. Threshold and even 6 separate programmable, audible alarms.
- Command line options for TIMED ON/OFF (Unattended) logging/searches.
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Winter Reading

1998/1999 Guide To Worldwide Weather Services, 18th Edition

by Joerg Klingenfuss

Of all the digital services regularly monitored over the radio spectrum, weather is the leader. Its messages are available over the Internet, Navtex, radiofax, radiotelex, and more. Klingenfuss



has listed hundreds of these radio and Internet sites, along with abbreviations, charts and graphics, satellite images, forecasts, all verified within the last few months!

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Ferrell's Confidential Frequency List, 11th Edition (1999)

by Geoff Halligey

This original reference for shortwave utilities monitors is bigger than ever (450 pages), and covers 1.6-30 MHz, all modes. Listings are by frequency or callsign, making it extremely easy

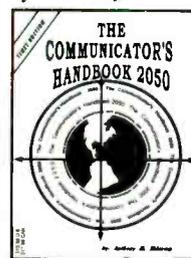
to use. Typical entries list frequency, callsign, location, service, mode, and agency.

Available from selected shortwave dealers, or direct from the publisher: PW Publishing, Arrowsmith Court, Station Approach, Broadstone, Dorset, BH18 8PW, UK.



The Communicator's Handbook 2050

by Anthony M. Shiwram



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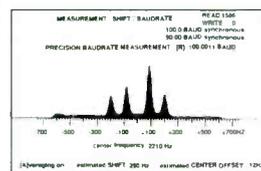
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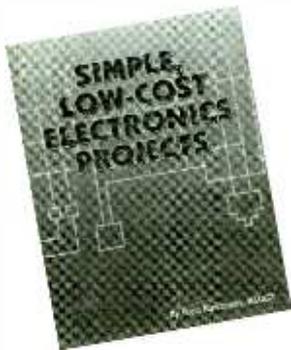


siast? *Handbook 2050* includes lists of radio clubs, dealers, manufacturers, computer hardware and software support numbers, antennas, books and videos, tools, security equipment, TV manufacturers, accessories and parts, professional audio/video sources, and even lists of select AM, FM, TV, and shortwave broadcasting stations.

Available from some *MT* advertisers, or from the publisher for \$12.98 (\$17.98 Canada): AM's International, PO Box 83, Riverdale, NY 10463-0083.

Simple, Low-Cost Electronic Projects

by Fred Blechman, K6UGT



With the plug-and-play society, home-brew projects are a disappearing art, and those who build them are a vanishing breed. Nonetheless, there are still many folks who take great pleasure in putting together basic circuits they can call their own.

Blechman's new book answers this call by presenting 22 useful, easy projects, including a low-power FM transmitter, variable frequency audio oscillator, voltmeter and multimeter, inductance/capacitance/semiconductor testers, telephone recording beeper, telephone line analyzer, electronics siren, and more using the most readily available parts from hobby electronics outlets, catalog houses, distributors, and often your own junkbox.

\$19.95 from LLH Technology Publishing, 3578 Old Rail Road, Eagle Rock, VA 24085; ph. (800) 247-6553.

Radio Data Code Manual, 16 Edition

by Joerg Klingenfuss

At a bulging 788 pages, this new reference is a detailed breakdown of virtually every digital code encountered in the HF spectrum, including meteo, aero, Baudot, unicode, ARQ, TOR, Piccolo, SELCAL, cryptology and intelligence codes, and dozens more used worldwide.

Station and circuit identifiers, abbreviations, definitions, and other explanatory pages abound in this mammoth library of digital information for the complete monitoring post.

\$50 from some *MT* advertisers, or postpaid from Klingenfuss Publications, Hagenloher Str. 14, D-72070, Tuebingen, Germany.

Haruteq Scanner Book for Quebec and Atlantic Canada

by Bart Veerman

Canadian scanner listeners in the Provinces of Quebec, New Brunswick, Newfoundland, Nova Scotia, and Prince Edward Island will delight in this new frequency directory. Arranged by province and cross-referenced by frequency and city, the listings also include the name of the licensee and type of service.



The bilingual book includes virtually every VHF/UHF licensee from public safety and government through aircraft and business, and lists amateur repeaters and even AM, FM, and TV broadcasters. Listening tips, charts, and tables or provided as well.

\$26.95 Canadian, from Haruteq, Fennell PO Box 61508, Hamilton, Ont. L8T 5A1 Canada.

The ARRL Repeater Directory (1998-1999 Edition)

Each year, the American Radio Relay League (ARRL) publishes an updated pocket book of VHF/UHF amateur repeaters across North and South America as well as other countries worldwide. Callsigns, input/output pairs, sponsoring organizations, and technical notes are included.

An excellent listing of bandplans is included for 28-29.7, 50-54, 144-148, 222-225, 420-450, 902-928, 1240-1300, and 2300-2310/2390-2450MHz. Text notes inform readers of repeater protocol, CTCSS (subaudible) tones, and names and addresses of repeater coordinators.

Order BOK-103 from Grove Enterprises for only \$8 plus shipping (800-438-8155 or www.grove-ent.com).

Space: A Visual History of Manned Spaceflight, 2nd edition

by Anthony R. Curtis, K3RXX.

This multimedia publication on CD-ROM (compact disc, read-only memory) has 650 megabytes of data which include the book-length text written by Curtis and more than 100 video "movies."

Curtis' text includes overviews of Project Mercury from 1959-63, Project Gemini from 1964-66, Project Apollo 1967-75, Skylab space station in 1973, and

space shuttles from 1981 to the present. The author describes space science and technology, the difficulty of living in zero gravity, conducting science experiments in space, space suits and spacwalking, satellite deployment from shuttles and space station operations.

The disc can be read both by Macintosh computers and by IBM PC compatibles with Windows. The action videos are seen on the computer screen like ordinary television.

"This electronic book has history time lines, movie indexes and text search," Curtis notes. "Along with the fun of learning, those should make this electronic book a good resource for reports, presentations and multimedia applications."

Space: A Visual History Of Manned Spaceflight is available from retailers or directly from Sumeria Inc., 329 Bryant Street, Suite 3D, San Francisco, California 94107, telephone (415) 904-0800, fax (415) 904-0888.

Curtis has written 72 books on space, astronomy, computers and electronics, in addition to hundreds of articles for magazines and newspapers. His conventional books *Space Almanac* and *Space Satellite Handbook* are found in most public libraries.

Books and equipment for announcement or review should be sent to "What's New?"

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First Look at the AOR AR7000

By Bob Grove

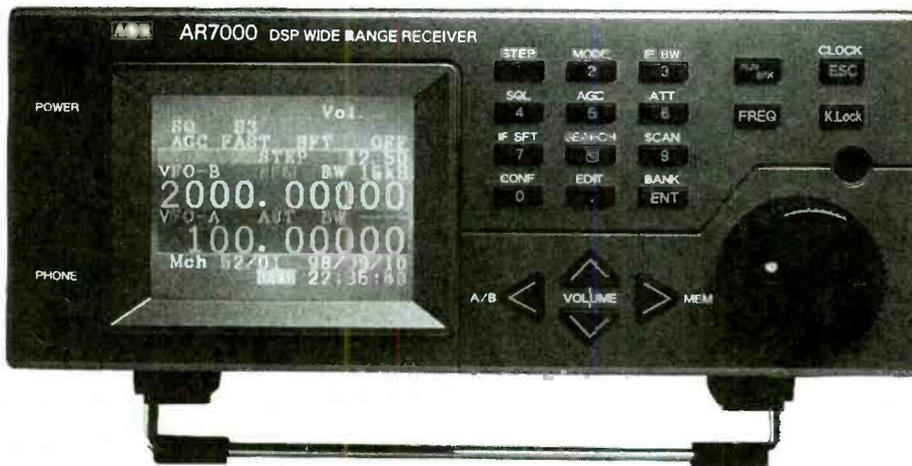
With little fanfare, AOR has released a new, digital signal processing (DSP), wideband receiver to the U.S. market. The AR7000 (designated AR7000B in AOR's product announcement, but not indicated on the receiver) is a complex little package with specifications and performance, according to the manufacturer, falling between their models AR3000A and AR5000 plus.

While the AR5000 has an assortment of front panel controls, the AR7000 is quite spartan. With only one knob and a few pushbuttons, the new receiver is operated almost entirely by its companion remote control unit (or via computer using an interface and free software). When new functions are required, a menu must be brought up and step-selected for desired characteristics. While the SDU5000 allows up to 10 MHz span, the AR7000 allows only 80 channels to be slowly swept at its 20-channel-per-second scanning speed.

Barring these limitations, the receiver does have a lot going for it, including 100 kHz-2000 MHz frequency coverage (less cellular except on government orders), all-mode detection, triple conversion, excellent sensitivity, multiple selectivity options, 1500 memory channels in 15 banks, and a built-in, 3.1 inch diagonal, multi-purpose, color LCD which can be alternated between frequency/function display and spectrum display.

The entire frequency range is accommodated by one BNC antenna connector. Since 10 kHz-2000 MHz antennas don't exist on the commercial market, the user will have to externally select appropriate antennas for the desired bands.

Tuning steps can be selected from 10 Hz to 1 MHz, and an IF shift of +/-8.5 kHz (in 100 Hz increments) allows rejection of adjacent channel interference. Rear-apron jacks provide video (PAL or NTSC) and audio outputs, tape recorder activation, headphone and external



speaker feed, and RS232C computer control capability.

The AR7000 has a factory recommended retail price of \$1459.95 and is available from Grove Enterprises and other MT advertisers. Watch an upcoming "Scanner Equipment" column for a further assessment by Bob Parnass.

■ Severe Weather Alert Radio

Radio Shack has released a seven-channel weather radio with a twist: NWR-SAME (National Weather Radio Specific Area Message Encoding). Allowing normal weather broadcast reception, the owner of the low-profile radio can also custom-encode the receiver to be activated by NOAA/NWS warnings for his specified area.

An LCD panel indicates the weather channel being monitored, but during a storm reads out the text of any alert directed toward your area, while the speaker gives an audible (and volume-adjustable) siren or beep warning. Color indicators notify the observer whether the notification is a statement, a watch, or a warning.

The weather radio can store as many as three different alerts, user-retrievable, in case one or more were missed.

The radio possesses excellent sensitiv-

ity, with the attached whip adequate for most metropolitan applications; for fringe reception areas, an RCA phono jack is provided for an external antenna, such as a conventional scanner antenna.

The unit operates on 120 Vac, but an optional 9 volt battery keeps the unit failsafe during power outages.

The new NWR-SAME weather alert radio is available for \$79.95 from Grove Enterprises and from Radio Shack outlets.



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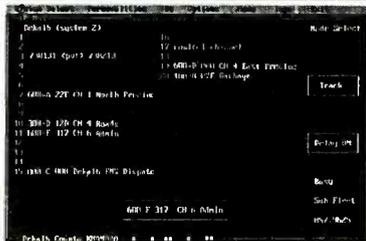
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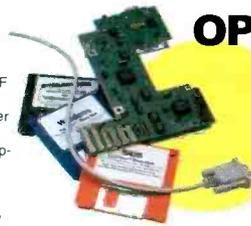
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