Vol. 17, No. 8 August 1998

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Monitoring Times™

Vol. 17, No. 8 August 1998

Cover Story

The Art of Logging FM DX

By John Mayson

Here in the North Carolina mountains it's as though the fires of Mexico sent radio waves northward along with the smoky haze. FM reception has come in like locals from Mexico and Texas — but identifying the stations can be a real challenge!

John Mayson shows you step by step how to dig out a station identification based solely on clues buried in commercials, conversations, announcements, or the music you monitor. It's a detective challenge which only adds to the fun of skip reception! The article starts on page 8.

Our cover this month is from the Cypress Gardens museum, "When Radios were Radios" — a delightful collection of radios from the early days of broadcasting.

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Reviews:

Magne is first on the block to look at Japan Radio's long-awaited NRD-545 digital signal processing receiver (p.88). Bob Parnass has been eagerly waiting to get his hands on Sony's first scanning receiver, the ICF-SC1PC — and it was worth the wait (see p.86). Jock Elliott is impressed with Icom's potent IC-4008A FRS radio (p.71), and Catalano tries his hand at software encryption with Cyberlock (p.90).

MONITORING TIMES
(ISSN: 0889-5341; CPC IPN Sales Agreement #1253492) is published monthly by Grove Enterprises, Inc., Brasstown, North Carolina, USA.

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.net*
Editorial e-mail: *mteditor@grove.net*
Subscriptions: *order@grove.net*

Subscription Rates: $23.95 in US; $36.50 Canada; and $55.45 foreign elsewhere, US funds. Label indicates last issue of subscription. ***See page 95 for subscription information.***

Postmaster:
Send address changes to *Monitoring Times*, P.O. Box 98, Brasstown, NC 28902-0098.

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WASHINGTON WHISPERS

By Fred Maia, W5YI
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How to Participate in the FCC Process

Last month we talked about the Federal Communications Commission and what they do. This month we are going to discuss how you can participate.

Staying Informed

The best way to stay up to date on FCC activities is by reading the Daily Digest. Every rulemaking document the FCC releases (in addition to the speeches, reports, news releases, and public notices the FCC issues), is listed each day in the Daily Digest. Probably the best way to obtain the Daily Digest is to have it sent to your computer by e-mail. There is no charge for it. You may also download the Daily Digest from the FCC web site (**http://www.fcc.gov**).

By visiting the FCC site, you may obtain all FCC documents in their entirety, for free. Most documents of interest to scanning and ham radio enthusiasts will be found under the Wireless Telecommunications Bureau. The FCC also has a word-search feature to help you locate documents. If you cannot find the document, or have general questions or comments, e-mail *fccinfo@fcc.gov*

How Rules are Made

The Administrative Procedures Act and the Communications Act set forth the "Notice and Comment" procedures that the FCC must follow when adopting new regulations. The two major documents issued by the FCC are a Notice of Inquiry (NOI) and a Notice of Proposed Rulemaking (NPRM).

A **Notice of Inquiry** is designed primarily for fact gathering, a way to seek information about a broad subject or generate ideas. This document will generally ask questions and provide few conclusions. It describes where and when comments may be submitted, where and when you can review comments others have made and how to respond to those comments. After reviewing comments from the public, the FCC will issue either a Notice of Proposed Rulemaking or a Memorandum Opinion and Order (MO&O), concluding the NOI.

A **Notice of Proposed Rulemaking** is issued to detail proposed changes to FCC rules and to seek public comment on either focused, or specific proposals and/or to ask questions on an issue or set of issues. The NPRM describes where and when comments may be submitted, where and when you can review comments others have made, and how to respond to those comments.

After reviewing public comments to the NPRM, the FCC may also choose to issue a "**Further NPRM**" regarding issues raised in comments to provide an opportunity for the public to comment further on a related alternative proposal. Both the NOI and the NPRM contain "docket numbers" which are printed on the document's front page.

After considering comments and reply comments to a Notice of Proposed Rulemaking, the FCC may issue a **Report & Order** (R&O). The R&O amends the rules and tells you when the new rules are effective ...or makes a decision not to do so. This is usually the end of the line for the proceeding.

However, if people feel that certain issues were not really defined or resolved, a **Petition for Reconsideration** may be filed within 30-days from the date the R&O appears in the Federal Register. The Petition is acted upon by the Commission. The FCC may change or modify its initial decision or deny the Petition for Reconsideration. This is done by the issuance of a **Memorandum Opinion and Order** (MO&O).

Petitions for rule making may also be submitted by the public. They are normally assigned a rule making (RM-) number and a 30 day preliminary comment period assigned during which the public may support or oppose the petition going forward to a full proceeding.

Comments from the public are important!

The Federal Communications Commission seeks comments from the public on proceedings and proposed rule makings before the Commission. Everybody can get involved in the comment period. Comments are just that: you tell the FCC your feelings about the subject topic.

Reply comments also are what their name implies. You can review what others say, and then support or disagree and file a reply comment.

You *must* include the docket number, or rulemaking number, on your comments for the proceeding on which you are commenting. If you do not know the docket or rulemaking number, contact the Office of Public Affairs, Public Service Division at (202) 418-0260 or the Bureau/Office responsible for the item. This number is critical to make sure your comments are considered, no matter how you submit them.

There are two basic types of comments: **formal** and **informal comments**. The main difference between formal and informal comments is the number of copies that are filed with the Commission. In filing formal comments, an original plus four copies of your comments must be delivered, by mail or by hand, to the Office of the Secretary, 1919 M Street NW, Room 222, Washington, DC 20554. If you would like your formal comments to be circulated to the Commissioners, an original and nine copies must be submitted.

The Commission also accepts comments via e-mail or fax. If you file your comments via e-mail or fax or in the form of a letter without the extra four copies, they will be considered "informal" comments. That means that your comments will not be as widely distributed within the FCC for review.

In some instances, the FCC requests copies of comments to be filed on disk in addition to the paper copies. This enables the FCC to make comments available on the Internet. This makes it easier for others to review the record, provide reply comments and to better understand and evaluate the issues. More information on how to file comments can be found in 47 Code of Federal Regulations, Sec. 1.399-1.430 regarding FCC Rule making proceedings.

The heading of your Comments or Reply Comments should look like the following example. It can be on your letterhead or plain paper.

Before the
Federal Communications Commission
Washington, DC 20554

In the Matter of	)	
	)	VERY IMPORTANT
A brief description or summary	)	Place RM or Docket number here
of the issue you want to address.	)	(For example:) RM-1234
It can be a few words. The most	)	
important information is the	)	
Docket Number at right	)	

COMMENTS OF

(Place your name, organization/company name, if appropriate, and address here. You can also include the date you are submitting it in the comments.)

Start your comments here: *I (or your organization, association or company name) file these comments on August 1, 1998, in the FCC's (title of petition, inquiry or proposal and rule making or docket number)* ...

It is often best to start with a summary of your comments, then follow with the details, explanations and other pertinent information.

Tell the Commission who you are and your credentials (why you are qualified to comment on the document). Your comments should state your specific interest and clearly present your position and facts. The comments may be more than one page. Be sure your name and rule making or docket number you are referring to appear on *each* page.

Comments may be any length, but if they exceed ten pages, a *table of contents and a summary* at the beginning is required. Formal comments must be typed (double spaced) on 8.5" by 11" paper with 1" margins. You should include your conclusions at the end of your comments. Be sure to sign the document.

Submitted by:
(Signature)
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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.

This Summer, Visit a Museum

There are antique radio museums and private collections similar to our feature story tucked away all around the country. One of the larger ones is maintained by Jonathan Winter who displays around 800 sets in his Bellingham Antique Radio Museum near Seattle, Washington. Like the Cypress Gardens museum, visitors are encouraged to touch the radios and twist the dials. You can see some of his collection on the Web at **www.antique-radio.org**

A non-regenerative detector from the Bellingham collection.

Other museums brought to our attention by readers include the Marconi Museum, Bedford, New Hampshire; Museum of Broadcast Communications at the Chicago Cultural Center; and the Vintage Radio & Communications Museum of Connecticut in East Hartford.

Killer Radio

Now here's an under-represented group that really needs a radio voice: killer whales! 88.5 FM ORCA-FM airs the sounds of killer

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Aug 15-16: Location: Von Braun Center, South Hall, talk-in 146.34/.94. For more information call (205) 534-7175, write to Huntsville Hamfest, P.O. Box 12534, Huntsville, AL 35815, email Scotty Neustadter, W4WW, *scotty@advicom.net*, or go to **www.hamfest.org/hffest98.htm**

Aug 1-2: Jacksonville, FL
25th Annual Greater Jacksonville Amateur Radio & Computer Show at Osborn Convention Center, 1 mile north of I-95/I-10 junction. Contact Gtr Jax Hamfest Assoc, PO Box 27033, Jacksonville, FL 32207, **http://www.pobox.com/~w4ue/hamfest.html**. Free parking, prizes, exams, forums, indoor and air conditioned. Talk-in 146.76, rptr 146.88. $8 admission at door.

Aug 14-16: International Radio Club of America (IRCA)
International Radio Club of America (IRCA) convention. Location 4B's Inn South Missoula, Montana. $25 registration deadline Aug 3 to Larry Godwin, 2390 Clydes Dale Lane, Missoula, MT 59804. Email *lbg@selway.umt.edu* or call 406-721-5131

August 15: Brantford, ON
Brantford Hamfest/Fleamarket at Burford Fairgrounds, 15 km west of Brantford on Hwy 53, 9a.m., $5 adm. Contact Richard 519-752-2437 rlarose@bfree.on.ca

August 15: Longview, WA
Lower Columbia A.R.A. 7th Annual Swap Meet / LCARA, POB 906, Longview, WA, 98632. Bob Morehouse, KB7ADO, (360) 425-6076 eves. Location: Cowlitz Co. Fairgrounds, 9 a.m.-3 p.m. Admission $3. RV parking overnight $10. Talk-in on 147.26+, pl 114.8. Email to *KB7ADO@aol.com*

August 15-16: Special Event Station - Waseca, MN
The Viking Amateur Radio Society Special Event Station honors Edgar F. Johnson for his contributions to amateur radio. August 15th features hamfest along with a craftfair, 8am to 2pm.. Location: Waseca County Fairgrounds. Vintage E.F. Johnson AM, SSB, and CW equipment set up for hams to operate! General admission $1 or $3 for hams. Talk-in 146.94. For information on VE exams or booking vendor space contact Lloyd Schlaak, 507-465-8619 *n0vfv@smig.net*

Operating freqs: AM 3885 7290 14286 21400 29000; CW 3700 7125 14050 21150 28050; SSB 3900 7260 14250 21350 28400

August 22: Bridgewater, NJ
Somerset County ARS (SCARS) Hamfest. Contact Pat N2CQM 732-873-3394 or PO Box 742, Manville, NJ 08835. Location: Somerset County 4H Center, Milltown Road. Talk-in 448.175- PL 141.3, 174.135+ PL 151.4. Fax: 732-873-0052. Email scars@qsl.net or visit **http://www.qsl.net/scars**

August 22: Madison, WI
5th Annual Madison Area Get-Together for DXers and Radio Enthusiasts. Contact Bill Dvorak, 608-244-5497, DXERak@aol.com

August 23: Buffalo, NY
Greater Buffalo Hamfest and Computer Show at the Hearthstone Manor, 333 Dick Road, 8am - 3pm. Contact Luke at 716-634-4667 or *lcalianno@aol.com* or visit **http://hamgate1.sunyerie.edu/~larc/greaterbuffalohamfest.html** for details.

August 24-Sept 7: NY State Fair Special Event Station
The Liverpool Amateur Repeater Assoc will sponsor station W2CM, operating 10-80 SSB and SW 10am to 9pm from the railroad caboose near the grandstand. Send SASE and large envelope with report to AC1M-Dick Page, 2939 Lafayette Rd, Lafayette, NY 13084 for pictures and QSL.

August 27-30: Goteborg, Sweden
European DX Council conference (EDXC 1998) in Göteborg, Sweden, sponsored by TERACOM. See **http://hem1.passagen.se/sm6kri/edxc/edxc_98.html** for program, transportation, hospitality details.

Aug 30: Woodstock, IL
Woodstock '98 Hamfest & Computer Extravaganza Location: McHenry County Fairgrounds. Talk-in: 146.52 Simplex. Tickets: $5.00 - $6.00 8:00am-3:00 pm. Talk-in 146.52 simplex. E-Mail Bob Grosse: *N9KXG@quality-enterprises.com* or visit **http://quality-enterprises.com/TCRG**

Aug 30: Yonkers, NY
Westchester Emergency Comms Assoc outdoor radio and electronics hamfest, located at the Yonkers Raceway, 8am to 2pm. Talk-in 147.060 MHz, PL 114.8. or call 914-741-6606 or **www.weca.org**. Admission $6

whales in British Columbia's Johnstone Strait, according to the *National Geographic* magazine. The audio from an underwater microphone is piped into the Vancouver Aquarium. The calls will be interpreted for aquarium visitors.

A Match Made in Micronesia

Any radio station that registers its internet domain in the Federated States of Micronesia will receive a website address tailormade for them. Just imagine the appeal of a URL like www.KLIF.fm !

Actually, *anyone* who registers in the FSM gets .fm at the end of their domain name, because that's their country code. But the country has gone into partnership with BRS Media to market the money-making potential. At the spring National Association of Broadcasters convention FM domain names were available on the spot for a $100 registration fee.

FCC Tries to Slow Merger Madness

Since station ownership controls were relaxed two years ago, more than 4,400 radio stations have been sold, according to industry analyst BIA Research. That's about 40 percent of all commercial stations. Due to concern by the FCC and the Justice Department over the potential for monopolistic market practices, such major mergers must now be approved by the FCC before they can proceed. Rep. Billy Tauzin's office says such "micromanagement" by the FCC "strikes at the heart of the problem we have with the FCC today."

Payola all in the Past?

Not so, says syndicated columnist Bob Greene. In the payola scandal of the 1950s, disk jockeys were paid to play records so they would receive exposure, while the public thought the DJs were playing what they liked.

The only difference is today we'll be more honest about it. Record companies and radio stations are discussing the buying and selling of air time. No more free publicity! If a record company wants to present its recording artists, it may have to buy the time.

If it takes megabucks to buy a radio station, and it merges into a chain to make a mega-station, and if airtime on those stations is bought up by the mega-recording companies, the FCC had better look out for a microbroadcasting mega-explosion!

KC's $8 Million Bitter Pill

Kansas City officials are taking their medicine — and it's going to cost. After hiring consultant Nick Tusa to analyze the flawed system and recommend a solution, there may finally be an end to the finger-pointing that has gone on for nearly three years.

The conclusion? It is the city that bears the prime responsibility for rejecting the initial consultant's recommendations and writing specifications which under-powered the public safety system in order to meet the $19 million budgeted for the system. Tusa advised the city patch up their stand-off with Ericsson because any fix will have to involve the manufacturer.

Ericsson spokesman Bob Speidel said, "It's a good vindication... We are ready to sit down with the city to discuss the necessary enhancements."

Air Force One Retires

After 35 years of service, the first jet-powered Air Force One is being retired to Wright-Patterson Field in Dayton, Ohio. The Boeing 707 (Special Air Mission 26000) carried President Kennedy's body from Dallas and President Nixon to China, but has become too expensive to maintain. "If history had wings, it would probably be this aircraft," said Vice President Al Gore.

Capitalist Communications

Wheeling and dealing is a part of capitalism, but newcomers to the system sometimes forget the rules. Igor Zabolotskiy, a captain of the Ukraine Armed Forces in the Prikarpatskiy district, understood that communications systems were in high demand, so he began selling off army radio equipment piece by piece to radio amateurs. The military garrison court rewarded his success in business with six years in prison.

Virginia Towers over the Country

An amendment recently passed by the Virginia state legislature makes Virginia the only state in the U.S. to override local ordinances governing amateur radio towers. Though it allows local regulations regarding screening, setback, placement, and health and safety requirements, it says the ordinance "shall reasonably accommodate amateur radio antennas and shall impose the minimum regulation necessary to accomplish the locality's legitimate purpose."

Bottom line: it forbids antenna height restrictions lower than 200 feet in rural areas or 75 feet in populated areas.

Will amateurs have to file for permits within those guidelines? The courts will probably have to decide that interpretation.

"Communications" is compiled by Rachel Baughn with the help of the following folks who sent in clippings and email from their world of radio: Anonymous, NY; Bill Battles, NH; Dean Foster, VA; Jim Frimmel; Maryanne Kehoe, GA; Gerald Kercher, CT; Kevin Klein, WI; Sergey Kolesov, Ukraine; Tim Kridel, MO; Daniel MacDonald, NH; William Orrico, MO; Ed Schwartz, IL; Richard Sklar, WA; Peter Vieth, VA; Elmer Wallesen, IL.

The Art of Logging FM DX

By John Mayson

You're running late for work with still a couple of miles to go on your commute. Living dangerously as you always do, you're tuning around the FM dial as you weave and zip through traffic (the author does not advocate this). A strange voice on 104.5 MHz, an unused frequency in your area, comes through. All you hear is an ad for Conrad Chevrolet-Geo on Richmond Road. You also hear traffic is backed up on I-64 due to an earlier accident. Your name isn't Rand McNally, but you know I-64 is up in Virginia or Kentucky or somewhere up there.

Finally, you arrive at work. You sit in your company's parking lot hoping to hear a station identification, a city name, something. As the announcer gives the current time, you hear a knock at your window. It's your boss. You decide it's best to stop your search for distant stations, otherwise known as DXing, and get into the office.

That evening, still feeling frustrated from your interrupted morning DX session in your Honda, you flip on the home stereo. Being the veteran DXer you are, you aren't content to listen to your local stations. Instead you spin the dial and find yet another unidentified signal. The announcer has a really thick accent that you can't quite place. You listen to an ad for a bank you've never heard of. The music's good, so you keep on listening, anxiously waiting for the top of the hour when the station is required by the FCC to provide station identification. Finally you hear it. "We're the station that rocks all of sou..."

What happened? The lights are dead. You look out your window and see all of your neighbors still have power. You rummage through the junk drawer in the kitchen looking for another "D" cell for your flashlight. Instead you find your unpaid power bill with the notice about their new "zero tolerance policy" for late bill payers.

What did I hear?

Does this scenario sound familiar? I hope it's not *too* familiar and you've always had the benefit of electricity in your home (or at least a battery-powered radio). But too many times FM DXers sit glued to their sets waiting to hear a station identification or mention of a city that never arrives. There's nothing worse than hearing "We're at the top of another twenty in a row, commercial-free, uninterrupted set of hits on Q-103.3!" However, if you listen closely enough, radio broadcasts are full of clues. Coupled with a little knowledge and the power of the Internet, station identification can become a snap.

First let's cover some of the more widely accepted methods of identifying a radio station. Obviously, a simple station identification is the best thing to get. Once you've heard that, you're done. The next best thing is a city name, spoken either by the announcer or in a commercial. Other tidbits such as the current time, the current weather, or mention of sports teams can narrow down the possibilities to a region of the country. But what happens when you don't think you have enough information? Let me show you how!

As any good gumshoe knows, detective work requires the right tools. So what will you need? Obviously a good list of FM stations should be at the top of your list. Where can you find this? Luckily this information is easy to find, both in book form and on the Internet. An ever-popular book is *Radio on the Road* by William Hutchings that identifies virtually every FM station in the United States and Canada and lists them by format. Although station formats change like the weather, the information can be quite valuable for determining station identifications.

Another wonderful book is the *FM Atlas* by Bruce F. Elving. It's in its 17th edition and full of valuable information about your DX targets. Both of these books are available through Grove Enterprises.

Those of you more technically minded will want to check these Internet sites:

Broadcast Station Location Page	http://www5.jagunet.com/~kodis/station.html
The MIT List of Stations	http://wmbr.mit.edu/stations/
Elliott Broadcast Service	http://www.radiostation.com/
PRS Corporation	http://www.prs.net/

The PRS web site is a favorite of mine. They offer Windows software that contains frequency, call sign, and format information for every radio station in North America. The MIT site offers station formats, but lists only radio stations with a presence on the Internet.

What else do I need?

You have your radio, your super FM beam antenna, and your favorite FM radio guide. Don't power up that radio yet, I'm not finished giving you advice. The next book you should have in your

shack is a good road atlas. I'm talking about the large detailed kind you buy before going on a long trip across the country. They're available most anywhere.

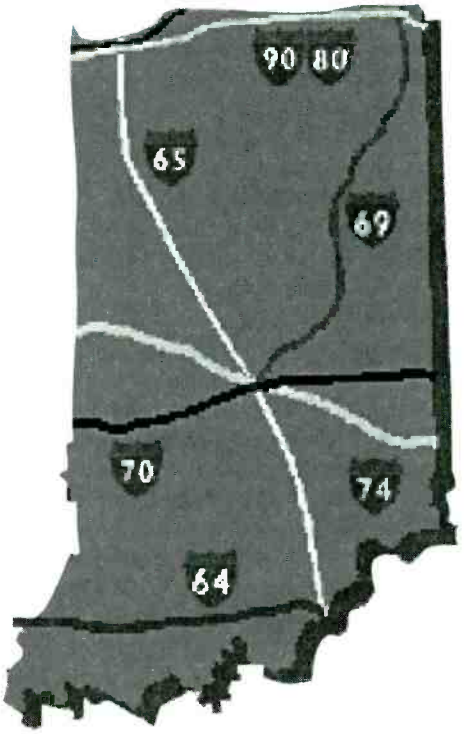
Somewhere in the opening pages of the atlas should be an interstate system map for the United States. Familiarize yourself with the Interstate and U. S. highway numbering. Why would you want to do this? Often rush hour traffic reports and sometimes advertisements mention interstate numbers. Knowledge of where these roads lie can help you narrow down your search. Note that odd-numbered interstates and highways run north-to-south. Even-numbered roads run east-to-west.

Unlike the U. S. highways, our nation's interstates have a pattern to their numbering. The farther north you go, the higher the numbers of the east-west interstates. Likewise, the farther east you go, the higher the numbers of the north-south Interstates. Consequently, San Diego, California, has the lowest numbered interstate junction in the country (I-5 and I-8), while Massachusetts has the highest (I-90 and I-95). Yes, Boston, I know I-93 and I-95 intersect, but they're both north-south highways.

You also want to note where time zone divisions run. This is usually indicated with a thin red line of lowercase "t's". You might want to trace these thin lines with a bright highlighter on your Interstate system map. If you happen to hear a time announcement, you can determine the time zone the station is in. Keep in mind that only parts of Indiana and none of Arizona observe Daylight Savings Time.

Using the information.

Let's go back to the station you heard this morning. You picked up several valuable pieces of information, but you just didn't know how to use it. The frequency was 104.5



MHz. The time announcement indicated the station was in the Eastern Time zone. I-64 runs through the area and there's a business called Conrad Chevrolet-Geo on Richmond Road. Let's look at our map. I-64 runs from the Tidewater area of Virginia to St. Louis. We can eliminate everything west of Evansville, Indiana, since it lies in the Central Time zone.

With our favorite FM guide and our atlas at hand, we determine the possibilities to be either **WNVZ Norfolk, Virginia**, or **WLKT Lexington, Kentucky**.

See, with vague clues we have narrowed this down to two possible stations. If you heard music — say, classic rock — on your mystery station and you saw in your *Radio on the Road* that one of these station was classic rock, the other classical, then you've solved it.

However, you won't always have it this easy. The stations could have the same or similar formats. It's quite easy to distinguish between Bach and Bachman Turner Overdrive, but a band like Genesis often pops up on just about every station in town. Also, possibly you never heard any music. How many times have you listened to endless generic commercials and disk jockey chatter? What would you do?

Remember that car ad you heard? You have a few options here: First, you could visit your local library. Most libraries keep telephone directories for all larger cities in their reference section. Go to the yellow pages for the Lexington and Norfolk areas respectively, look under automobile dealerships, and see which town has a Conrad Chevrolet-Geo on Richmond Road.

Your library doesn't have phone books? It's too far to drive? It's eleven o'clock at night and you can't wait until morning? Look no farther than your computer. There are several on-line telephone directories. Some of the more popular include:

http://yp.ameritech.net	Ameritech Yellow Pages
http://yp.bellsouth.com	BellSouth Yellow Pages
http://www.bigbook.com	Big Book
http://www.switchboard.com	Switchboard
http://www.worldpages.com/	Worldpages
http://yp.yahoo.com/yt.hm?FAM=yahoo&SEC=start&CMD=FILL	Yahoo! Yellow Pages
http://www.ypo.com/	Yellow Pages Online

There is one important item to remember when searching online for a business. The business will not necessarily be located in the station's city of license. If possible, search by the state or the area code so you include all major cities and suburbs in a given area.

You don't have a computer? You're still in luck. Use good old-fashioned directory assistance. It now costs a few cents to use, but your local telephone book should provide you with information and pricing for this service.

How else can I identify stations?

Nothing I've presented thus far is that novel. Many of you probably have gone through a similar exercise to identify a station. However, you may have heard more clues than you would ever imagine.

We all hate advertisements, right? We have sit through several minutes of commercials for car dealerships, banks, super markets, discount stores, while waiting for our three-in-a-row set from Hootie and the Blowfish or Clint Black. As a DXer I love commercials. I hang on every word of them. Why? They're loaded with great information. Here's how to use them.

I used a car ad as an example before. These are great. Car dealers love to advertise and they love to repeat their address over and over again. (I don't know why this is, but it can probably be blamed on El Niño.) Often hearing a car ad is a dead giveaway to the locale.

Banks? You betcha! Despite rapid consolidation, banks are still pretty much a regional business. You might hear a generic ad for a regional bank, but this could be enough information. Heard an ad for NationsBank? You probably heard a station in the southeast or Texas. Fleet Bank? New England. Wells Fargo? The West. I can't possibly list every financial institution in the nation. Many still incorporate a city or state in their name. That could be a dead giveaway.

If the name offers no clues, try your library. Look in the reference section for books such as *Standard & Poor*'s that offer financial analyses of banks and savings & loans. Do you fear books? Your goal in life is to avoid libraries? Well, you have the trusty ole Internet. Use any of the popular search engines to search the name of the bank. Banks love web sites. You can also search the Federal Deposit Insurance Corporation's web site **http://www.fdic.gov** for banking information. Still no luck? Ask your neighbor. Your uncle. The teller at your local bank. We're a highly mobile society and there's a chance someone has heard of the bank you are looking for.

You'll find McDonald's from coast-to-coast, but you won't find Krystal's. Likewise you won't find Shaw's, Publix, or Food Lion on both coasts, either. Restaurants and supermarkets are examples of regional businesses. I would look for these the same way you look for a bank. Go to a telephone directory or search engine and look from there.

This isn't helping.

Still no luck identifying your mystery station? Did you by chance hear a telephone number for the station or in an ad? If you did, you're in luck.

I'm willing to bet most of you have, or know someone who has had his or her area code changed recently. As Americans, we love our gadgets. We have a phone line, a modem line, a fax line, cell phones, pagers. This has eaten away at our supply of telephone numbers. New area codes are carved out of or overlayed on existing ones. Consequently these telephone area codes continue to get smaller and smaller. Why does this help the DXer? Once upon a time when a company bought an ad on a radio station, it was enough only to include the seven-digit telephone number. Not any more. Several area codes can lie under a station's signal, so it becomes necessary to give all ten digits.

To give you a couple of examples of how much a problem this has become, the 312 area code used to cover all of northeastern Illinois. It now covers only eight city blocks in downtown Chicago! When regulators in California couldn't decide on a fair way of assigning new area codes, several southern California communities experienced telephone number exhaustion. There simply were no more numbers to be had. The best that phone companies could do was offer a cell phone from a different southern California area not suffering a number depletion.

A ten-digit telephone number can be broken up into three components. The first three digits are the area code. The next three are the exchange. The last four digits are the line number. Pull out that atlas or your phone book and find the area code map. For the most part, area codes are now so small, only one station on a given frequency can exist in it.

You can't find the area code? You heard a western state that still has only one area code? You're not out of luck yet. Look at that second

grouping of numbers, the exchange. Your local or long distance telephone company should be able to tell you where a particular area code and exchange belong.

There is another way to find this information using a touch-tone phone. Pull out your wallet. Inside there find your ATM and credit cards. Flip them over. At least one of them will have an ATM locator toll-free number. These work by asking the caller to enter the area code and first three digits of a phone number in the area that they wish to find an ATM. Bingo, you have a city and state. And to top it off, you'll also have a bank name, so next time you hear a bank ad, you might be familiar with its location.

Who are these guys?

Syndicated radio shows are as popular as ever. One morning out-of-town stations were stomping on the locals: It was great DX except for the fact every other station was Howard Stern who usually talks a lot about New York and even more about material not appropriate in this magazine. I only identified one station that morning.

This one's a little harder and you almost have to use the Internet on this one. Go to a search engine, search for the name of the syndicated show and add "radio affiliates" to the search text. Example: "Howard Stern radio affiliates." I'll save you the trouble for three of the most popular shows. Keep in mind, many of these are unofficial lists.

Howard Stern	http://www.cis.ohio-state.edu/text/faq/usenet/howard-stern/faq/faq.html
John Boy & Billy Big Show	http://www.thebigshow.com/bsolsta1.htm
Rush Limbaugh	http://www.gvn.net/~creative/radio.htm

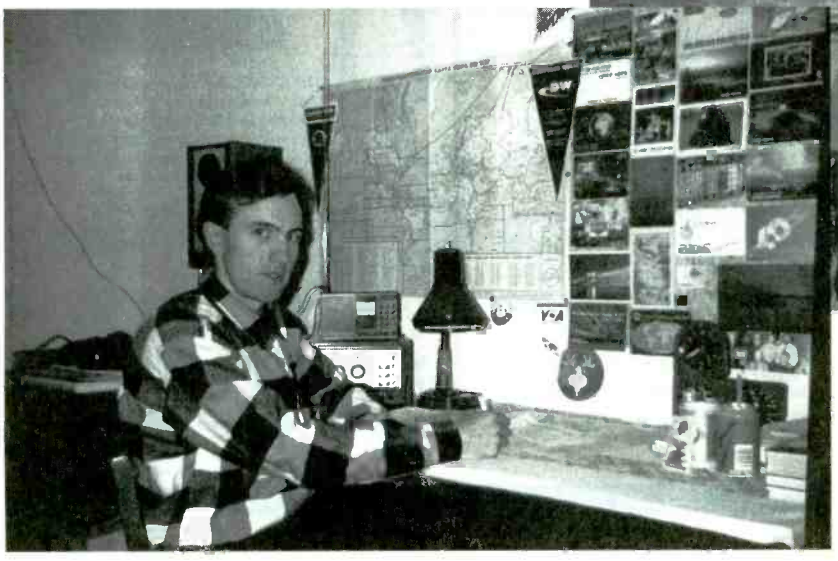
If you don't have Internet access but can determine the flagship station for the program, contact them and ask for an affiliate list.

I hope this article will help some of you with the identification of stations. Can these ideas be applied to mediumwave? Maybe. I find the AM band full of nationwide syndicated talk shows and sports programming. Typically these stations broadcast nationwide ads for things like life insurance and money management software. So unless you're lucky enough to hear a local ad or maybe a traffic report, you'll have to wait for the top of the hour station identification.

The only thing that changes more often than radio station formats is URLs for web sites. Please check **http://www.mindspring.com/~jmayson/mt/fmdx.html** for the latest list of links.

My Excellent DX Adventure

By Alexander Sidorov



Combined with an amplifier, this antenna, shown above, is used for FM DXing

Alexander Sidorov at his monitoring post

It all began in 1985 when my parents bought an "Elegia-102s" receiver for me. At the time the unit made in the USSR was the most prestigious in its class. It had a good shortwave band with frequencies from 3.95 to 12.1 MHz including mediumwave and FM bands and had sufficient sensitivity. Once you attached a piece of wire to the antenna you were immediately glued to the receiver.

I used to sit at the radio in the evening and listen to local musical stereo transmissions on FM from the Donates region radio stations. I liked pop music very much and often tuned in to West German MW stations, which played a lot of pop music which couldn't be heard in our country (then the USSR) and which wasn't available in recordings either.

I also listened to service, dispatching and meteorological stations on shortwave; using the reports heard there I made up my own weather forecast with good success.

I listed to "Pirates" on shortwave at 1600 kHz. I made some mischief myself on the air using a weak self-made FM transmitter at approximately 69 MHz, playing back cassettes of recorded pop-music for my pals.

In 1987 I met a good man, Nickolay Puchenko, who was a professional shortwave operator and who gave me the basic information to work on the air as an amateur. Half a year later I got a license of 4th category for work in the 160 MHz band. For two years I worked using a homebrew transceiver under the call sign UB5IVI, till I received a few diplomas and a small pack of cards.

In 1991 I seriously took up DXing. I started monitoring regularly and sending reception reports and began receiving QSL cards. Up to now I've received more than 80 cards and verification letters. My favorite stations are radio "Virgin-1215" from England, rock-music, 24 hours; and radio "Atlantic-252" from Ireland, pop-music. They can be heard constantly after midnight from 2400 UTC with a good signal. And WMR (world music radio) at 6290 kHz.

I began to construct receiving antennas, and found that the best one was a wire formed like an inverted L, 15 meters long. In 1996, with the help of some good people, I got an invaluable thing for a DXer: a Sony receiver. Of course, I started listening to stations in all existing bands.

Recently I've taken to TV DXing, but so far I haven't obtained many results. I hope in the future after I build a high mast, I'll have more chances for success.

My contact address: Alexander Sidorov, Zaporoshje Region, PO Box 1, Melitopol-12, Ukraine, 332312.

A Memorable Night

On the 4th of June 1997 approximately from 0300 until 0800 UTC, I noted a powerful distant propagation in the broadcasting band of FM nearly all over Europe and a part of the Near-East. The propagation was wave formed and went with the sunrise and the advancement of the sun from the east to the west. Based on an analysis of my logs, a map shows the event for easier orientation, and following is an explanation as it all took place.

I live in a not very populated rural area with a plain landscape. On the 4th of June towards the morning I didn't feel like sleeping, it was very stuffy, as in the afternoon the air tem-

perature had reached +43 C in the shade. Having nothing to do, I switched on my Sony ICF SW7600. It was 0300 UTC by the clock. After switching to FM, I heard stations from Donetsk: the first one — "Europe and Donbass" at 106.8 MHz and the second one "Mega-Radio" at 100.5 MHz. The distance to them is 230 km. The signal strength was 4 points according to the 5-point scale. I had received these stations before, though — perhaps because the transmitting antennas are at a height of more than 300 meters above sea level in that region of Donbass.

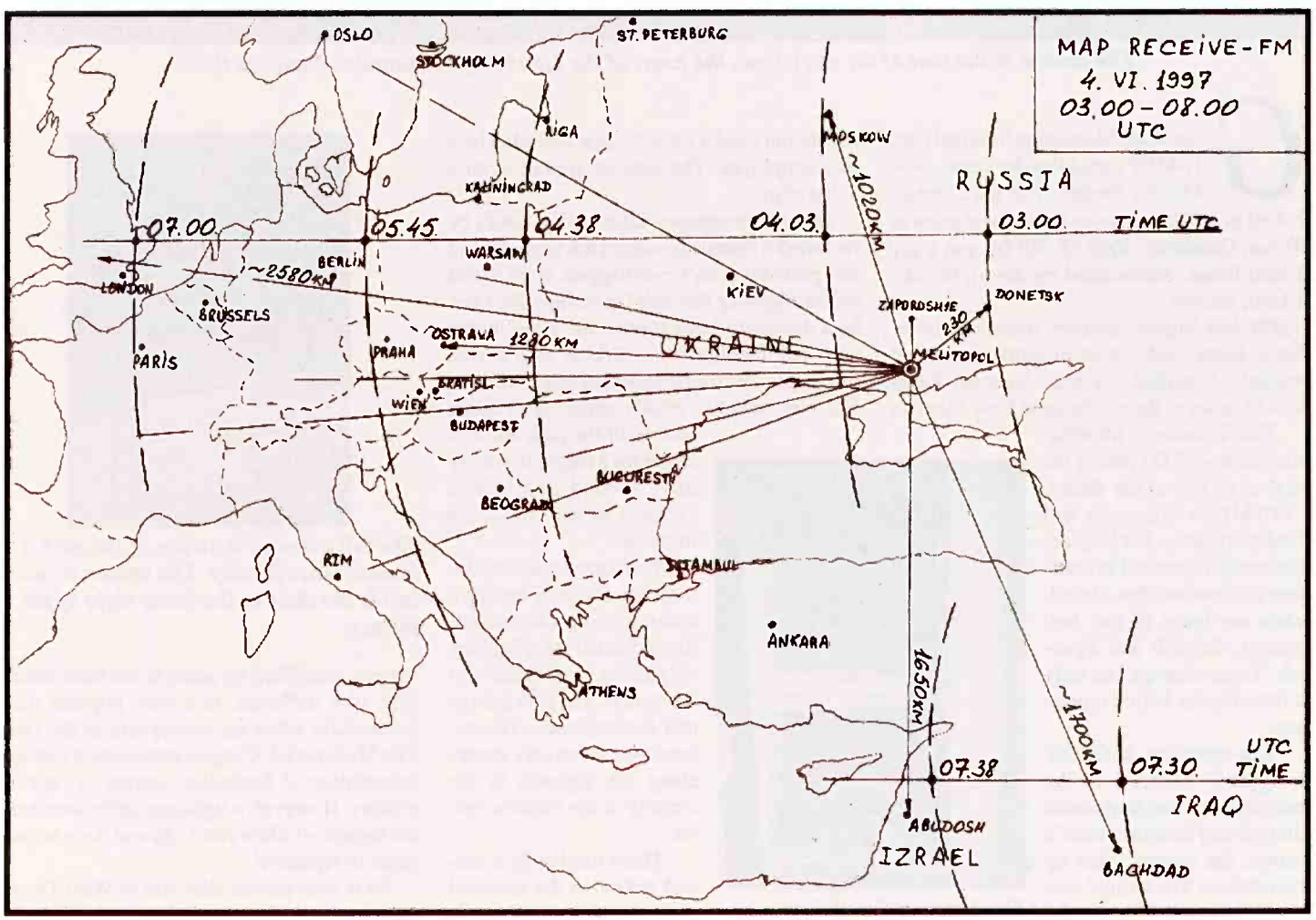
After a while I heard a Moscow station, "Radio-101" (Russia) at 101.2 MHz with 3 points force. From 0403 UTC there appeared a lot of stations in the band from 88 to 102 MHz from Poland, Romania, Chechnia and some Scandinavian ones, judging by the language. There were two or three stations on the same frequency. Some emerged out of the noise up to 3 points where they remained about 5 minutes and disappeared, and other stations appeared instead of them.

I didn't manage to identify each of them, but I did identify "Cesky Rozhlas," the 1st program, on 101.4 MHz, from the town of Ostrava at a distance of 1280 km. At 0438 UTC German stations appeared, the loudest ones up to 4 points on 98.4/97.6/100.1 MHz. One emerged on 98.5 MHz with a stable 5 point signal (sounding like a local) for more than 30 minutes, with the program "Antenne Bayern," playing pop-music and giving information in brief about the situation on the local highways in German.

I received "DAB" on 87.5 MHz, at a signal strength of 4 for more than 20 minutes. I'd like very much to know where that station comes from. Italian and French stations emerged at 0545 UTC with weak, unstable, 2 point force signals. About 0700 UTC I heard English stations at 88.8/98.8 and 98.5 MHz which retranslated BBC programs 1 and 2 from the town of Wrotham — a distance of approximately 2580 km, signal force 4. And suddenly at 0720 UTC all disappeared; there was only noise on the air. As before I could hear only the local stations of Melitopol town (Zaloroshje Region-South Scope on 102.2 MHz, antenna-50 M).

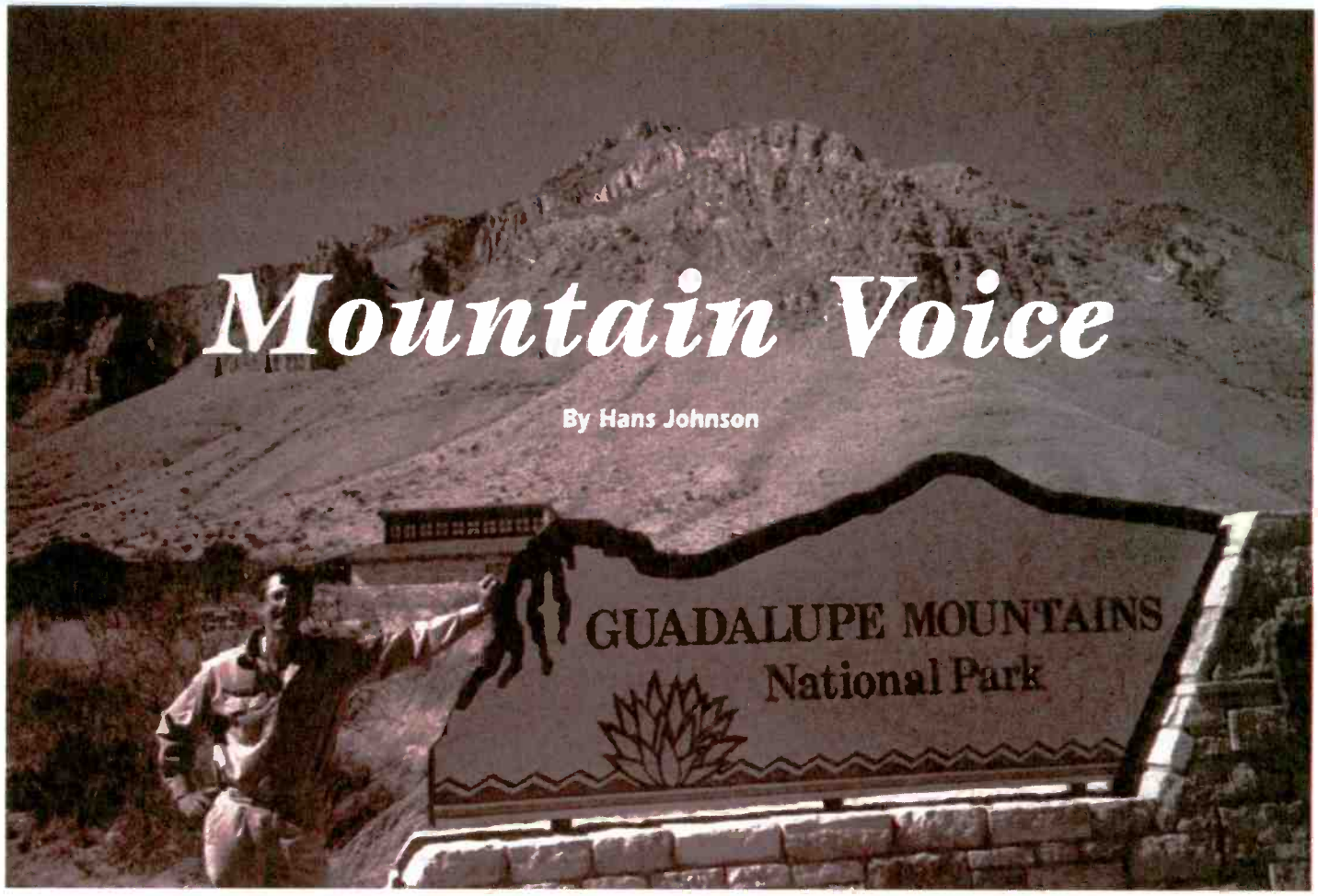
Nevertheless, I didn't dare to switch the radio off. What else might come out? And there came more of them. There emerged Arabic and Iranian stations: on 91.4 MHz there was Arabic music from Baghdad, at 3-4 signal strength, distance 1700 km. On 96.5, 101.5, 105.7 MHz Arabic was heard at 2-3 signal strength at 0730 UTC. Eight minutes later I managed to identify the Israeli station "Galei Zahal" from Abudosh in the central part of Israel, 96.6 MHz, signal force of 3-4 points — a distance 1650 km. There were a lot of other stations with very weak 1-2 point signal.

Thanks to the sensitive Sony portable receiver and to the AN-G1 antenna (which was *inside* the room), and to some very unusual propagation conditions, I experienced a night this radio monitor will always remember.



Mountain Voice

By Hans Johnson



The author at the foot of the sky island, the heart of the Guadalupe Mountains National Park.

Guadalupe Mountains National Park (GMNP) straddles the Texas-New Mexico border. The park, established in 1972, preserves the highest point in Texas, Guadalupe Peak (8,749 ft), and a sky island forest. Surrounded by desert, the sky island, located 3,000 feet higher, harbors mountain lions, black bears, and a host of other plants and animals. Carlsbad Caverns National Parks lies 35 miles to the northeast in New Mexico.

The Traveler's Information Station (TIS) part of the dial is as hot as the desert. 1610 kHz is where you will find both parks, but they are far enough apart not to interfere with one another. Broadcasts are loops in two languages, English and Spanish. Transmissions last only a few minutes before repeating.

The operation at GMNP is typical. Located in the maintenance building across the highway from the visitor's center, the station takes up two shelves. The station's antenna is located on the roof of the same building. The original station used a cassette tape recorded by a park employee. The present system is on a voice chip.

The Voice of Guadalupe Mountains National Park.

Special emergency information could be recorded if necessary using a microphone, but this probably won't ever happen. High winds on the highway through Guadalupe Pass can be a danger to large trailers traveling in this area, but the highway is already well posted with signs advising travelers of this condition. There are only two small campgrounds in this section of the park and it is easier for a ranger to simply drive around and inform campers of any conditions in person.

The loop broadcast introduces the park and provides camping information. Signs posted on Highway 62 passing alert visitors to the station. The park is large and mountainous. The automated station only covers along the highway in the vicinity of the visitors center.

There used to be a second station at the seasonal visitors center in McKitterick Canyon. The canyon, described by some as the most beautiful spot in Texas, is a very popular site, particularly when the leaves turn in the fall. The McKitterick Canyon station once carried information of particular interest to canyon visitors. However, a lightning strike knocked the station off a few years ago and there are no plans to replace it.

The tall antenna is on top of the park's maintenance facility. The station is just inside the door in the lower right of the picture.

So if your travels take you to West Texas — or to any popular tourist spot in the U.S. — stayed tuned to 1610 for the Voice of ....

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Why pay over $400 for separate audio components for your listening post—such as a speaker, adjustable notch/peak filter, audio amplifier, bass and treble equalizers, audio squelch, recorder activator and noise limiter—when you can have them all in one attractively styled solid oak cabinet! This quality accessory is guaranteed to improve reception on any receiver, scanner or transceiver.

Peak desired signals while reducing or even eliminating interference. Ideal for voice, music, CW or data. Equipped with stereo-mono headphone jack for privacy. Powered by 12VDC@800 mA. AC adapter not included (see below).

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Known for their luxury, high-performance receivers, Japan Radio company (JRC) offers a high quality, double conversion receiver at a low, competitive price! The **NRD-345** offers wide frequency coverage (100 kHz-30 MHz), multimode reception (AM, synch. AM, SSB), sharp selectivity (2/4 kHz), high sensitivity (0.3 microvolts), wide dynamic range (100 dB), strong audio (1 watt), dual VFOs, scannable memory (100 channels) with channel lockout, computer control (RS232C), dual clock timer (12/24 hour), precision tuning (5/100 Hz., 1/10 kHz steps), and adjustable noise blanker.

Additional features include selectable AGC timing, 20 dB attenuator, adjustable tone control, backlit S meter, large backlit LCD display, and dual-voltage (12 VDC / 120 VAC) power supply. See specifications below.

Frequency Range: 100 kHz-30 MHz
Keypad Entry: Yes
Tuning Steps: 5/100 Hz; 1/10 kHz
Display: Backlit LCD
Recommended use: General purpose SW and utilities
Receiving modes: AM, AM synch, USB, LSB
Memory: 100 channels
Scan: Yes
Clock: 12/24 hr. clock/timer
Audio Output Power 1 Watt
Record Audio Output: Yes
Signal Strength Indicator: LCD bargraph
Computer Interface: RS-232C
Conversion Scheme: Double up-conversion
Sensitivity: 0.3 uv
Selectable Attenuator 20 dB
IF Selectivity: (-6/-60 dB) 4/10 kHz wide, 2/6 kHz narrow
Image Rejection -70dB
Selectable AGC: Off/fast/slow
Dynamic Range: 100 dB
Noise Blanker/Limiter: Adjustable
Tone Control: Yes
Antenna Connector: SO-239 and 600 ohm
Dimensions: 10"W/4"H/9"D
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Power Requirements: 12 VDC/120 VAC
Warranty: One year
Accessories Included: AC adaptor

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Florida's Best Antique Radio Museum

By Hans Johnson

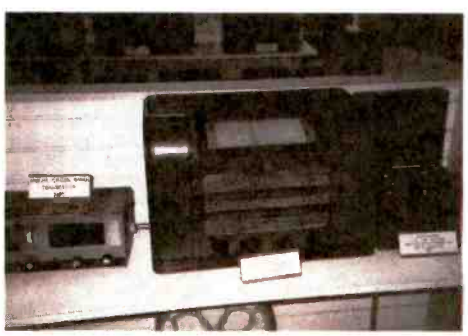
Florida's best antique radio museum is tucked away in an amusement park. That has both advantages and disadvantages. The family will have plenty to do while you look at and listen to the radios, but the amount of money that they spend as you browse might put a damper on your own future radio acquisitions.

You will find this outstanding radio collection at Cypress Gardens in Winter Haven, Florida. Cypress Gardens was established in 1936 and is Florida's oldest theme park. The radio museum is a relatively new addition to the park. The collection was donated to the park by Webber College of Babson Park, Florida. A general admission ticket will let you not only see the radios, but all the park's exhibits, shows, and attractions.

The museum is known as "When Radios were Radios." The collection is housed in its own building that looks like an old settler's cabin. You enter the small building and your eyes and ears are immediately drawn to one corner. A large console radio is playing big band music with an easy chair and a lamp stationed next to it. Boom! and you are right back in a living room from 60 years ago.

Sit down in the chair and try to take it all in. Dozens of tabletop radios are on the shelves, while console radios have their own space on the floor. Today, when so many museums have everything under glass or under the watchful eye of a guard, this collection seems to reflect its own time when guards and glass were unnecessary. Everything here is out in the open, allowing you to really admire the radios.

Anyone can enjoy these pieces not just as radios, but as beautiful pieces of furniture. Although there is nothing indicating whether the pieces have been restored or are original, each is in very fine shape. Each radio has a small placard that gives its make and year.



An undated Breville. Apparently an Australian receiver as the dial had many listings for Australian AM stations.

A Majestic Model 60 AM receiver from 1931 with a Western Electric horn speaker from 1927 sitting on top.

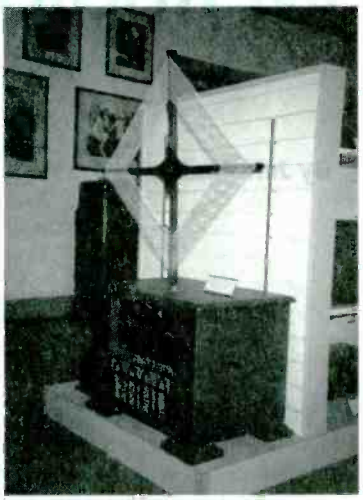
In addition to radios, pictures of radio personalities and ads are on the walls.

Some include information on who donated the radio and a few lines on what makes it so special. There are over 100 radios in the exhibit and most of them date from the 1920s to the 1950s. They include radios from American and overseas manufacturers. Accessories such as loop antennas and external speakers are also in the collection.

Other pieces of old electronic gear have been slipped in as well. These include some old televisions, a wire recorder, a reel-to-reel recorder with paper tape, and some tubes. The radios are enhanced by various memorabilia hanging on the wall such as old radio advertisements, pictures of radio personalities.

Virtually all of the radios reflect their origins as entertainment centers. These were not specialized communications receivers like we use today and one has to respect the folks who listened to weak and distant stations on these antique radios. Few have headphone jacks. Tuning is complicated, often requiring the turning of multiple knobs to tune in a single station. Old time radio listeners had plenty of radio stations to go after, but they sure were a lot harder to find and listen to. Looking at these radios gives one great insight into what had to be done to get that QSL we see in a scrapbook or station logging which we read about in an old radio magazine.

These radios are in a great home where they can be admired by thousands of people. One can easily see that this is a place where they are displayed and maintained in an environment that reflects their value. Stop by next time you are in the area; it's well worth the trip.



A Lee Deforest D12 from 1923 with a loop antenna on top.

Billed as the first FM radio, this is a Scott Model 800-B from 1946.

What radio museum could exist without one of these? This Transoceanic is the Model 8-G-005Y from 1946.

The Essentials:

Cypress Gardens is just off U.S. Highway 27, 22 miles south of I-4 and between Tampa and Orlando. The park opens at 9:30 a.m. and the museum an hour later. The museum remains open until the park closes. Closing time is seasonal, but you can call them at 1-800-282-2123 or find them on the web at: **http://www.cypressgardens.com**

Restoring That Old AM Radio

By Jeff Poulin, KF4JSV

The General Electric model 423 as it was when I brought it home. As you can see, it is nothing special or unusual.

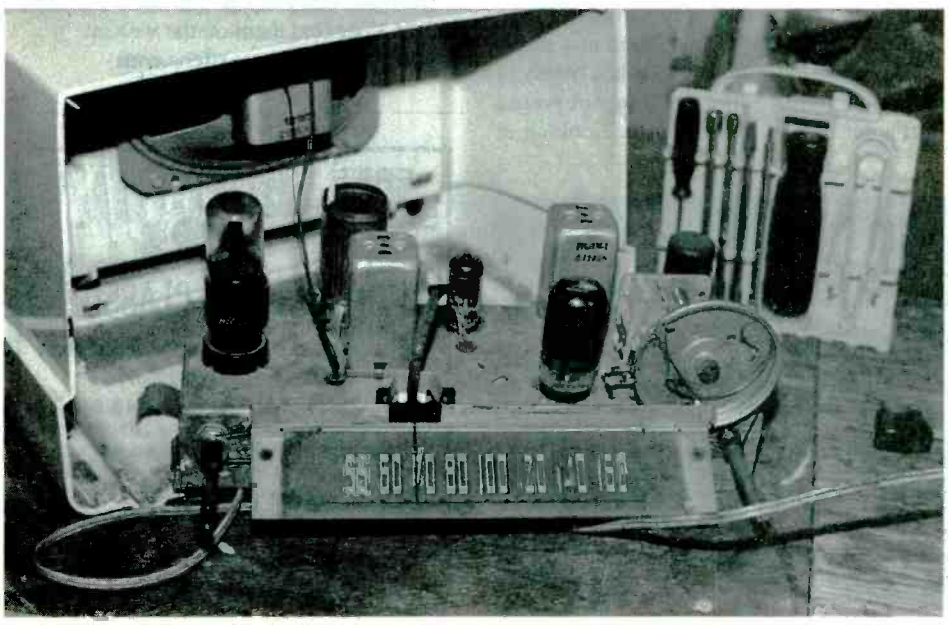
I was walking through the tailgate area of our local hamfest when an old AM radio caught my eye. It was the same model that sat on the kitchen counter when I was a kid. Nothing fancy or valuable. But I was suddenly deluged with memories of what we heard on that radio: following the track of hurricanes; waiting to find out if the snowstorm had canceled school for the day; learning that President Kennedy had been shot and following the latest Mercury space shot; hearing that the Cuban missile crisis had ended.

Of course, it wasn't all so portentous. That radio brought the latest hit songs, Red Sox scores, and a pre-pre-Limbaugh call-in talk show hosted by a local curmudgeon who liked to argue.

Sure, most homes had TV. It was one set in the living room, too big to move, and might get two channels. That kitchen radio played while we ate, did homework and pestered our folks. Every house had one. If you grew up in the 40's, 50's or 60's, you probably have similar memories.

I looked it over. The plastic case wasn't cracked and the dial still worked. Peering through the perforated fiberboard back, there was no sign of scorching or missing parts. For a few dollars I took it home.

The components on the top of the chassis are not exactly crowded. One tube, back left, is surrounded by a metal shield.



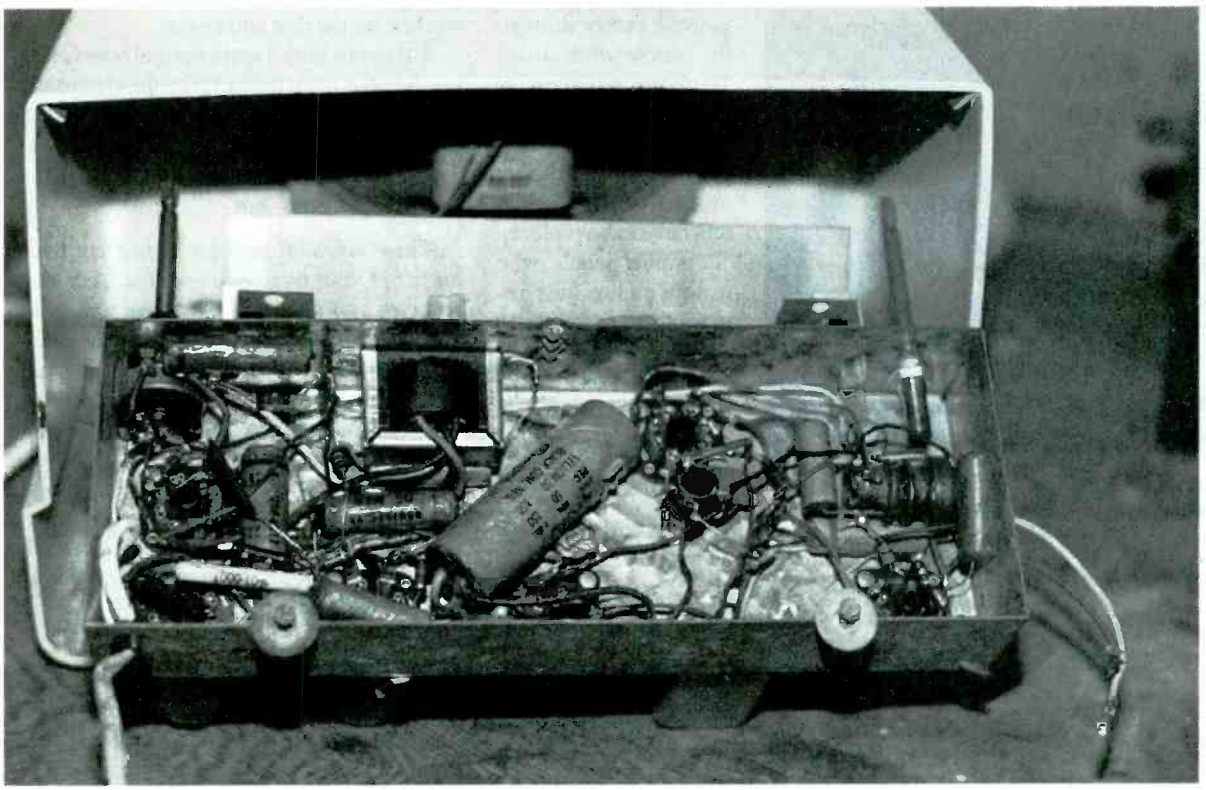
Why Bother?

I bought the radio on impulse. Certainly I didn't need it. For the price of a pizza these days you can get an AM/FM radio with stereo reception and bass boost that will fit in a shirt pocket, weighs nothing and will play for months on one AA battery. Next year's model will probably walk the dog as well.

Nostalgia was part of it. But fixing it up would teach me how a superhet radio works. My new acquisition, a General Electric model 423, belongs to a group called the American Five. These were simple, inexpensive, five-tube radios. The basic design was similar, no matter which company made them. I'm sure millions were sold over the years. Each tube and its associated components deals with one of the five stages needed for decent AM reception. By the time you've checked the schematics and traced and tested the components, you'll have a basic understanding of how radios function.

Danger! Lethal Voltages!

You are dealing with household power, not a 1.5 volt battery. Voltages on the underside



The underside of the chassis looks busier than the top. Compared to modern radios, this layout is straightforward and easy to trace.

of the components can reach 400 volts. In addition, these radios were usually AC/DC rigs, which means the chassis can be hot with voltage.

Never move or replace parts with the power on or even just plugged in. ***Always*** keep your hands dry and stand on a dry surface; moisture conducts electricity. ***Always*** short out or discharge electrolytic capacitors before working on the radio. Use a volt meter to check for any voltages present. ***Never*** use your finger to prod or adjust components; use an insulated rod of some kind. ***Never*** steady the chassis with one hand while working on the components. If there is any voltage present it will flow from one hand to the other with you in the middle acting as a resistor. As one old timer told me: work with one hand in your pocket.

The books that deal with radio repairs and restoration all stress safety. Awareness and common sense will keep you safe.

Getting Started

Your first impulse will be to plug in the radio to see if it works. Don't do it. This is a learning experience, so let's learn.

My radio was made in 1951. The insulation on the power cord was stiff and cracked. It had to be replaced. I removed the chassis from the plastic case and examined the components. Everything looked all right: the resistors didn't look charred or overheated; the capacitors hadn't leaked electrolytic fluids; and the internal insulation on connecting wires was still flexible and complete. There was a lot of dust that had settled inside over the years and I brushed it out gently. Now I could see everything. It was time to study.

My bible was *Antique Radio Restoration Guide* by David Johnson. The author assumes you know little or nothing about radio (a darn good assumption for me) and takes you through each step needed to make the radio work properly and look good. I also talked to some older members of our local ham radio club and received good advice and the loan of tools.

Besides the usual screwdrivers and pliers, my tools consisted of test equipment: a volt-ohm meter, tube tester and a variable power supply. The volt-ohm meter was a mid-range model from Radio Shack. A friend gave me a tube tester his father had used decades ago and lent me a variable power supply. These things can also be found, usually for a few bucks, at most hamfests.

After replacing the power cord, I plugged the set into the variable power supply. Over the course of two hours, I brought the power up to 120 volts. Bringing the power up slowly has many benefits. It allows you to check for smoke, short circuits and overheating components before serious damage can occur or a

An old Eico tube tester. The scroll at the bottom contains the settings needed to test individual tubes.

fire starts. The tubes may not have been used in decades and gradual heating won't overload weakened filaments. Also, it gives the electrolyte material in the capacitors a chance to regain function, to reform, without burning out the part.

After two hours there was no smoke or crackling and the tubes at least lit up. But there was no sound from the speaker.

Testing, Testing

I unplugged the radio and let the tubes cool down. Using insulated wire I discharged the capacitors to ground and used the volt meter to be sure everything was dead.

I used the volt-ohm meter to test the resistors for shorts and to be sure that they were still in the rated tolerance range. They were.

When removing tubes, grasp them from the base, not by the glass envelope. Use a light touch. If they don't come out easily, rock them back and forth gently. It took a couple of minutes to get one tube out of its socket. Don't remove all the tubes at once. Pull one, test it, then put it back. That way they won't get misplaced. If a tube is bad, write down the designation (12SK7, 35Z5GT, etc.).

Four of the tubes tested in the good range. The 12SA7 tube was completely dead. Aha! The Culprit! And it is the tube that accepts the signal from the antenna. No wonder there was no reception. I ordered a new tube. (See the resource guide at the end of the article.) One advantage to working on this type of radio is that the tubes and other components are readily available and inexpensive.

I tested the new tube, installed it and reassembled the radio. Plug it in, turn it on and wait. Hey! That was a news broadcast. I tuned up slowly and station after station came in. The dial lamp, which I had replaced earlier, glowed gently through the amber dial cover. There was no excessive hum which meant that the capacitors were okay. (This was luck on my part. Usually capacitors have to be replaced and some people who restore radios just replace them at the start.) There was some scratchiness as I tuned. A few shots of contact cleaner on the variable capacitor plates got rid of most of that.

The radio worked. Now to make it look better.

Cleaning Things Up

I pulled the chassis out and set it aside. The ivory colored plastic case was intact but showed the years with grime in the recesses, scratches, and a few flecks of paint. Nothing unusual. After all, the radio is 47 years old.

A moist cloth (*not* soaking wet) with some Bon Ami, a nonabrasive cleaner, removed most of the grime. Folded pipe cleaners, also moist, took care of the crevices. A friend had recommended Novus Polish and it worked well. This is a three stage abrasive liquid with Novus 1 as the lightest and 3 as the heaviest grit. Start with the lightest version and go to the others only as needed. The Novus also worked on the dial and cover.

Take your time. I spent several hours cleaning the case, more than I did on the electronics. The results were not museum quality but the radio looked a lot better.

Where to Find 'em

There are a lot of these radios out there, maybe in your own attic or cellar. Ask older relatives and friends if they have any stored away. These radios have no collector value as such and chances are they will just give them to you. Yard or estate sales are another source. Don't pay more than ten dollars for a complete radio. Just because it is "old" doesn't mean it is valuable. I've seen these radios in antique stores with cracked cases and missing parts for over $50 simply because they were tube radios. Just smile and head for the nearest yard sale or hamfest.

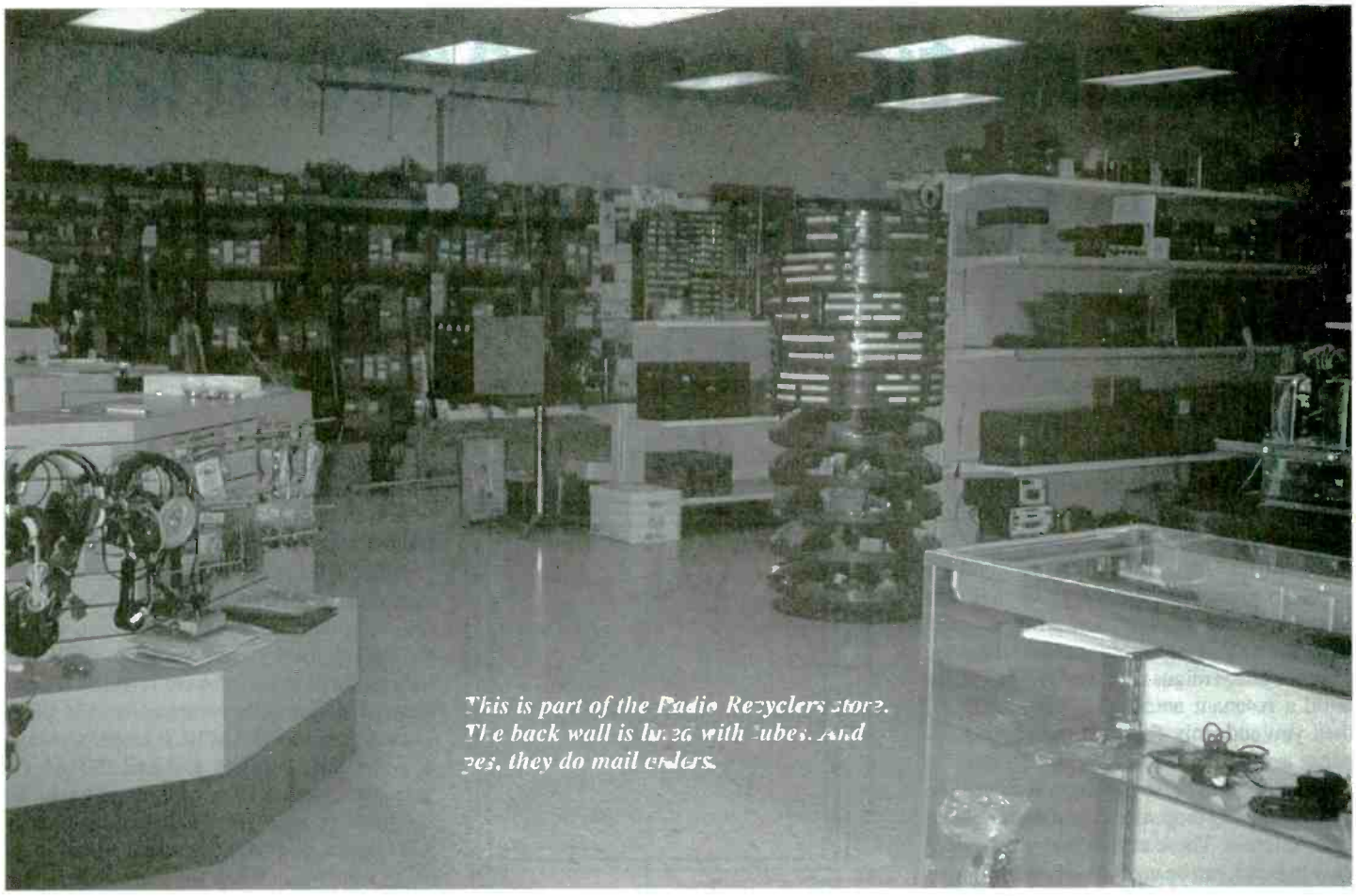
A Last Thought

The GE radio now works and looks decent. It's going to be a gift for my mother. The big, illuminated slide rule dial is easy to see and the speaker is large enough to provide a nice, rich tone. My parents had this model radio before they had me. It should provide some pleasant sounds and even nicer memories.

Resources

There are too many sources of parts and information to list them all. Those mentioned here are a good starting point. And remember

This is a small sample of the test equipment available at Radio Recyclers. There is also an entire wall of tubes and aisles full of various components.



This is part of the Radio Recyclers store. The back wall is lined with tubes. And yes, they do mail orders.

to talk to some long time hams in your area. They may provide hands on knowledge that can't be found anywhere else.

Antique Electronic Supply
6221 South Maple Avenue
Tempe, AZ 85283
602-820-5411
www.tubesandmore.com

Antique has absolutely everything you are likely to need to restore a radio except test equipment and the rigs themselves. The catalog is an education by itself.

Radio Recyclers
5702 W. Good Hope Road
Milwaukee, WI 53223
414-760-3000
http://www.execpc.com/~radiorec

Radio Recyclers has all the test gear and parts you might need and tubes, tubes, tubes.

Radio Netherlands has a wonderful web site for old radio topics including clubs, resources, etc. It is definitely worth a look.
http://www.rnw.nl/realradio/antique_index.html

Hamfests: Any good hamfest will have everything from the old radios to parts, schematics, books, and so forth.

Magnetic Loop Antennas for the AM BCB

By Joseph J. Carr, K4IPV

One of the realities of DXing the AM broadcast band (540-1700 kHz) is the huge number of stations present on the band. The QRM taxes any receiver to the limit, no matter how good the design. To make matters worse, there is skip to contend with at night, and when coupled with the fact that many stations share the same channel, chaos reigns supreme! If you want to build a resonant antenna on the AM BCB, then you suddenly find that the biggest expense is the farm required to build it on.

A solution to these problems is to use the small receiving loop, also called the magnetic loop antenna. These antennas are relatively easy to build, can be used inside, and improve AM BCB reception remarkably well.

Small Loops Defined

A small loop antenna is defined as one in which the overall wire length is less than about 0.15 wavelength (0.15λ). A quad loop does not qualify because it has an overall length of 1λ. Figure 1 shows the basic form of the small loop antenna. Although any regular geometric shape can be used, the square loop is easier to build with easily available materials.

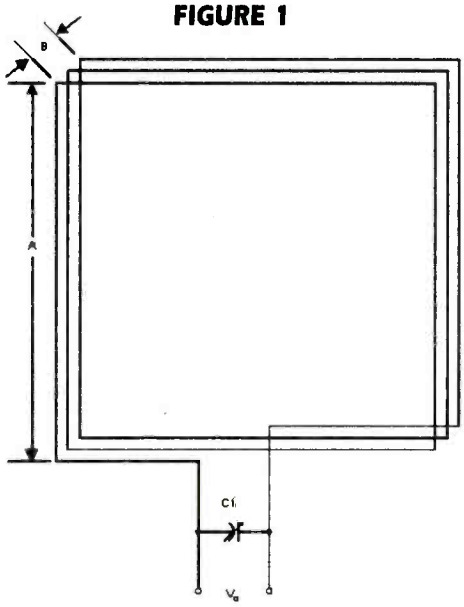
Two dimensions are shown in Fig. 1. The length of each side of the square loop is designated "A," while the depth of the loop is designated "B." Both dimensions are usually expressed in centimeters so that the equations work (1 in. = 2.54 cm).

The inductance of the loop is determined by the physical dimensions "A" and "B," and the number of turns of wire used to form the loop. The equation is a bit complex to reproduce here, so Fig. 2 is provided. This graph shows the inductance in microhenrys (μH) for a loop that is 24-inches (61-cm) on each side. The top curve shows the figures for a 1-cm deep loop, while the bottom curve is for 2.54-cm (1-inch). These dimensions are quite common for AM BCB loops. For practical AM BCB loops, we want an inductance between 150 and 250 μH, so would use around 10 to 14 turns of wire.

The wire used for the loop can be #25 AWG enameled wire (the usual situation in older antennas). Wrap the wire round and round in one continuous loop. Alternatively, you can use computer ribbon cable and cross connect adjacent turns to form a continuous loop.

The output voltage of an untuned loop is very small. By adding a tuning capacitor (C1 in Fig. 1) to resonate with the loop inductance, we can increase the output voltage by a factor of the loaded Q of the circuit (which can be up to 100 or so).

FIGURE 1



Small loop antenna schematic.

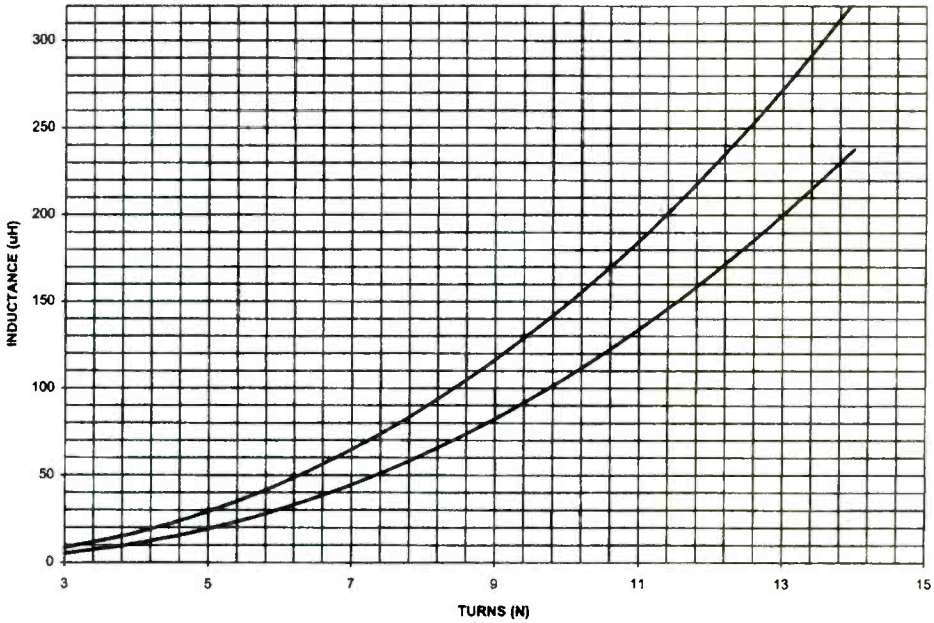


FIGURE 2. *Graph of inductance-vs-turns for 1-cm and 2.54-cm deep loops.*

Shielded Loops

There are a number of reasons why the plain, old fashioned small loop does not perform up to par. One of the problems is local interference from electrical power lines and electrical appliances. Another problem is that coupling between the loop and surrounding objects will cause problems.

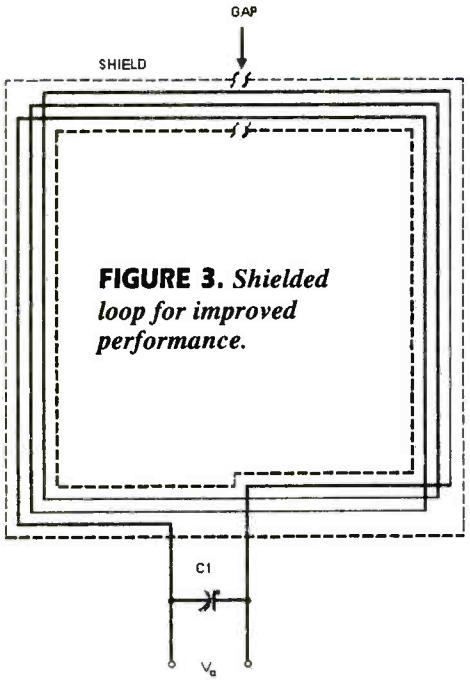


FIGURE 3. *Shielded loop for improved performance.*

The solution to both problems is to shield the loop (Fig. 3). The entire loop is surrounded by copper foil, except for a small 1-cm or so gap along one edge. The reason for the gap is that small loops respond to the magnetic field component of the radio signal more than the electrical field component. Fortunately, the interference from local appliances and power lines tends to be predominantly electrical, so the loop is less responsive. The gap keeps the loop from looking like a single-turn shorted loop. It allows the magnetic field to impinge the loop turns, while preventing the electrical field from affecting the antenna.

Loop Construction

There are a number of different methods for building a loop, but the method of Fig. 4 is well adapted to AM BCB loops. The overall scheme is shown in Fig. 4A. The sides are made using four 3/16 to 1/4-inch thick spruce wood strips that each measure 3 x 24-inches. This stock can be bought at hobby shops that cater to model builders, and are usually found stored with the balsa wood. Be careful to NOT get balsa, however, because it is not strong enough.

The corner detail is shown in Figs. 4B and 4C. In Fig. 4B we see the use of a gusset plate to strengthen the corners. These gusset plates can be built from a fifth 3 x 24-inches piece of wood stock. Small wood screws or tacks can be used to fasten the gusset plate to the main loop strips. In Fig. 4C we see the gusset plate removed to reveal the inside corner brace. This brace is made from 0.5 x 0.5-inch wood glued into place.

All wood surfaces that mate with each other should be smeared with a thin film of wood workers or carpenter's glue (or contact cement). While the glue is still wet, make sure the corners are square and then use C-clamps to hold the pieces together until the glue is dried. This may take several hours, depending on the type of glue used.

Shielding can be added by using thin copper foil to cover the entire loop, except for a small gap along the top surface. Very thin (36 to 44 gauge) foil should be used. I found the best to be the extremely thin form that is paper backed. This material can be bought from the type of hobby shops that cater to doll house builders. Those hobbyists use the foil to make simulated copper roofs for their doll houses. It can be glued or soldered as needed. You will need to patch together a number of separate pieces to completely cover the loop.

Resonating the Loop

A variable capacitor is used to resonate the loop to a desired frequency. You can find the approximate loop inductance using the graph in Fig. 2. Once that is known, you can find the capacitance required to resonate any given

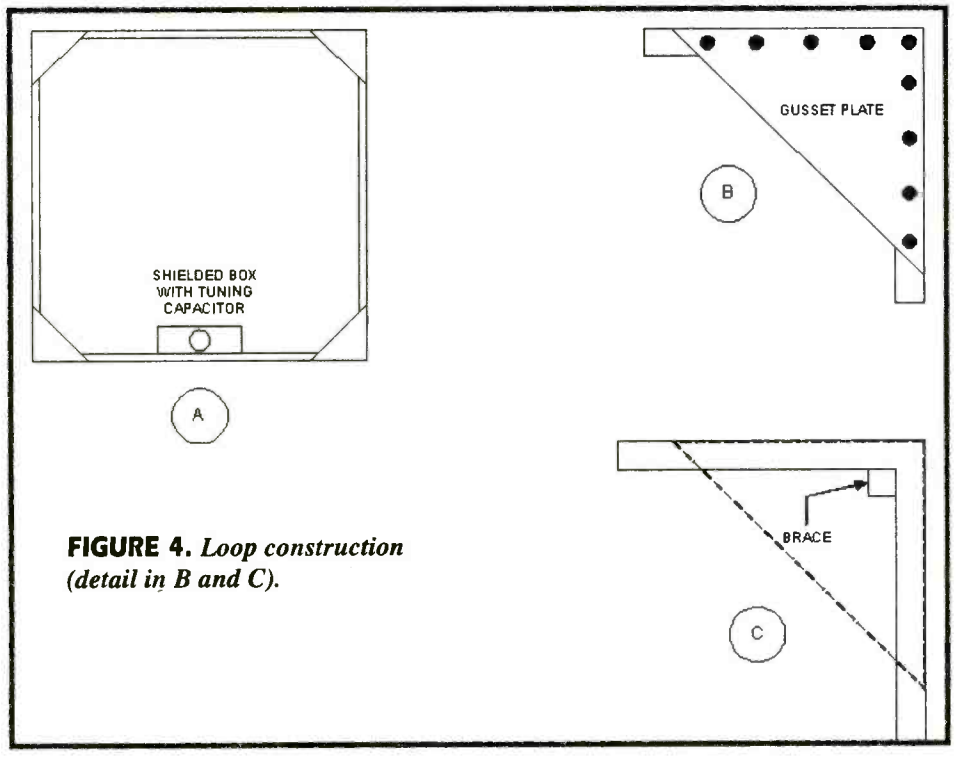


FIGURE 4. *Loop construction (detail in B and C).*

frequency by using the equation below.

$$C = \frac{10^{12}}{39.48\,F^2\,(L_{\mu H} \times 10^{-6})}$$

Where:

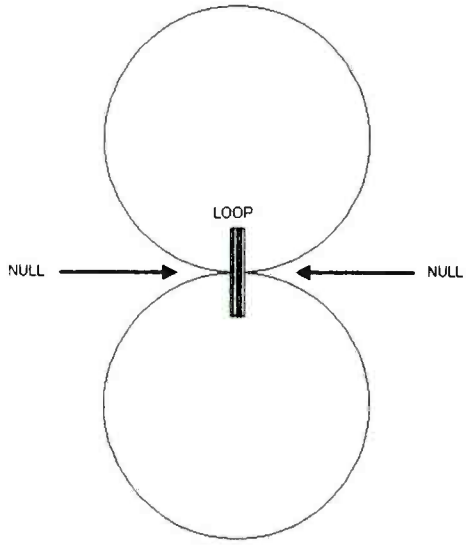
C is the capacitance in picofarads
F is the frequency in hertz (Hz)
LμH is the loop inductance in microhenrys (μH)

If you select an inductance around 200 μH, the standard 365 pF "broadcast variable" capacitor will serve to resonate the loop over the entire AM BCB.

Using the AM BCB Loop Antenna

The principal reason for using a small magnetic loop antenna on the AM BCB, instead of a random length wire antenna, is the ability of the loop to suppress unwanted signals. Figure 5 shows the azimuthal pattern of a typical small loop antenna. The pattern is basically a "figure-8" bi-directional pattern, with the nulls perpendicular to the plane of the loop. The maximum responses are found off the ends of the loop.

FIGURE 5. *Loop antenna azimuthal pattern.*



The use of the loop to suppress unwanted signal is shown in Figs. 6 and 7. In Fig. 6 we see a situation where three equal amplitude signals arrive at the receiving antenna on the same channel. Radio reception is basically a game of signal-to-noise ratio (SNR). In this case, the "noise" also includes unwanted signals. The goal is to reduce the noise and enhance the signal. Whatever it takes to make the SNR between the desired signal and the undesired signals as large as possible.

Suppose we want to receive Signal-1 in Fig. 6, but Signal-2 and Signal-3 are interfering with it. By positioning the loop as shown in Fig. 6 we can significantly improve the signal-to-noise ratio of the desired signal. This relationship is shown in Figs. 7A and 7B.

FIGURE 6. *Positioning a loop to receive Signal-1 while reducing Signal-2 and Signal-3.*

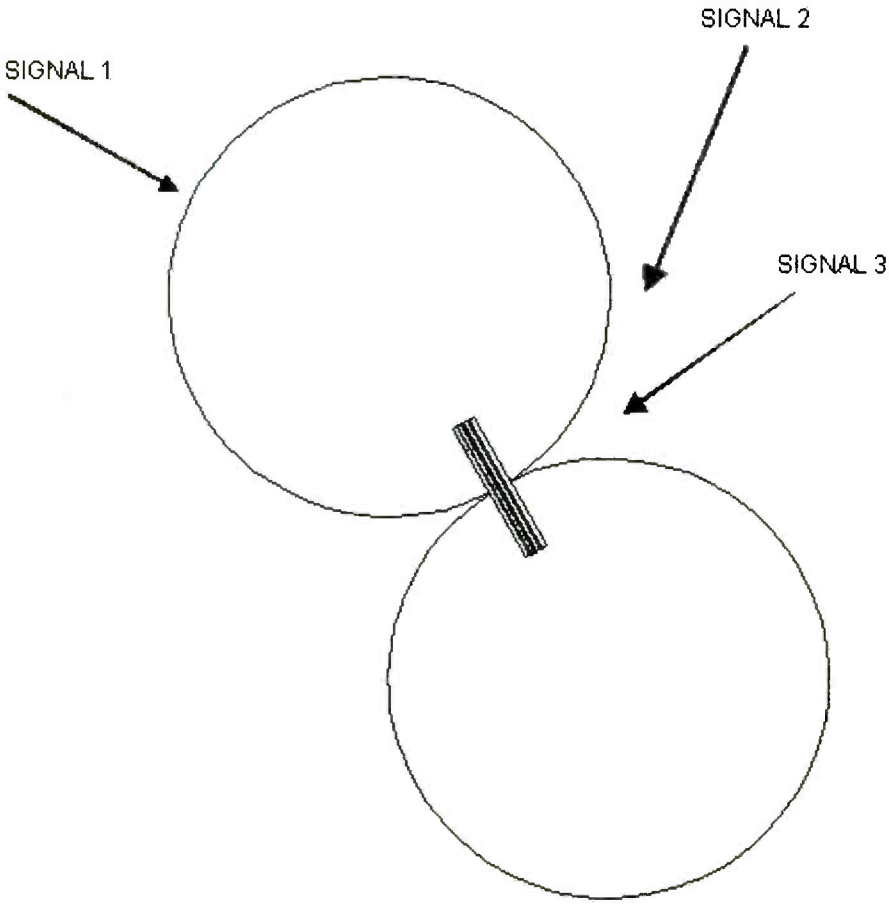
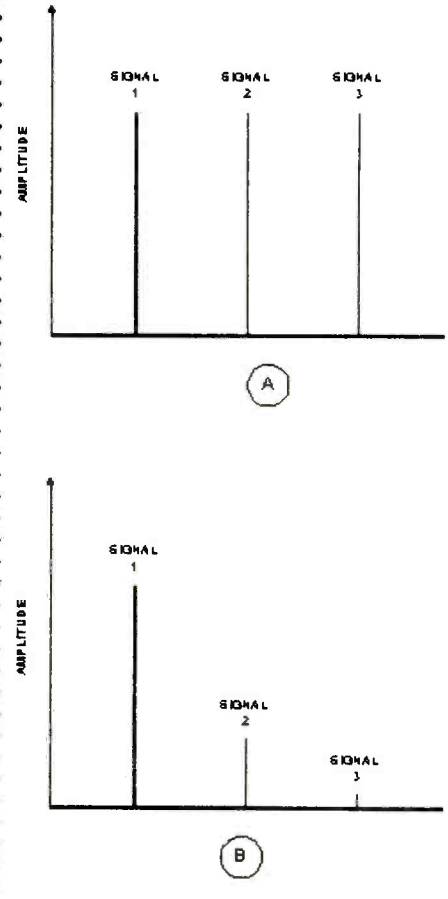


FIGURE 7. *Relative signal strengths: A) with omnidirectional antenna; B) with correctly positioned loop antenna.*



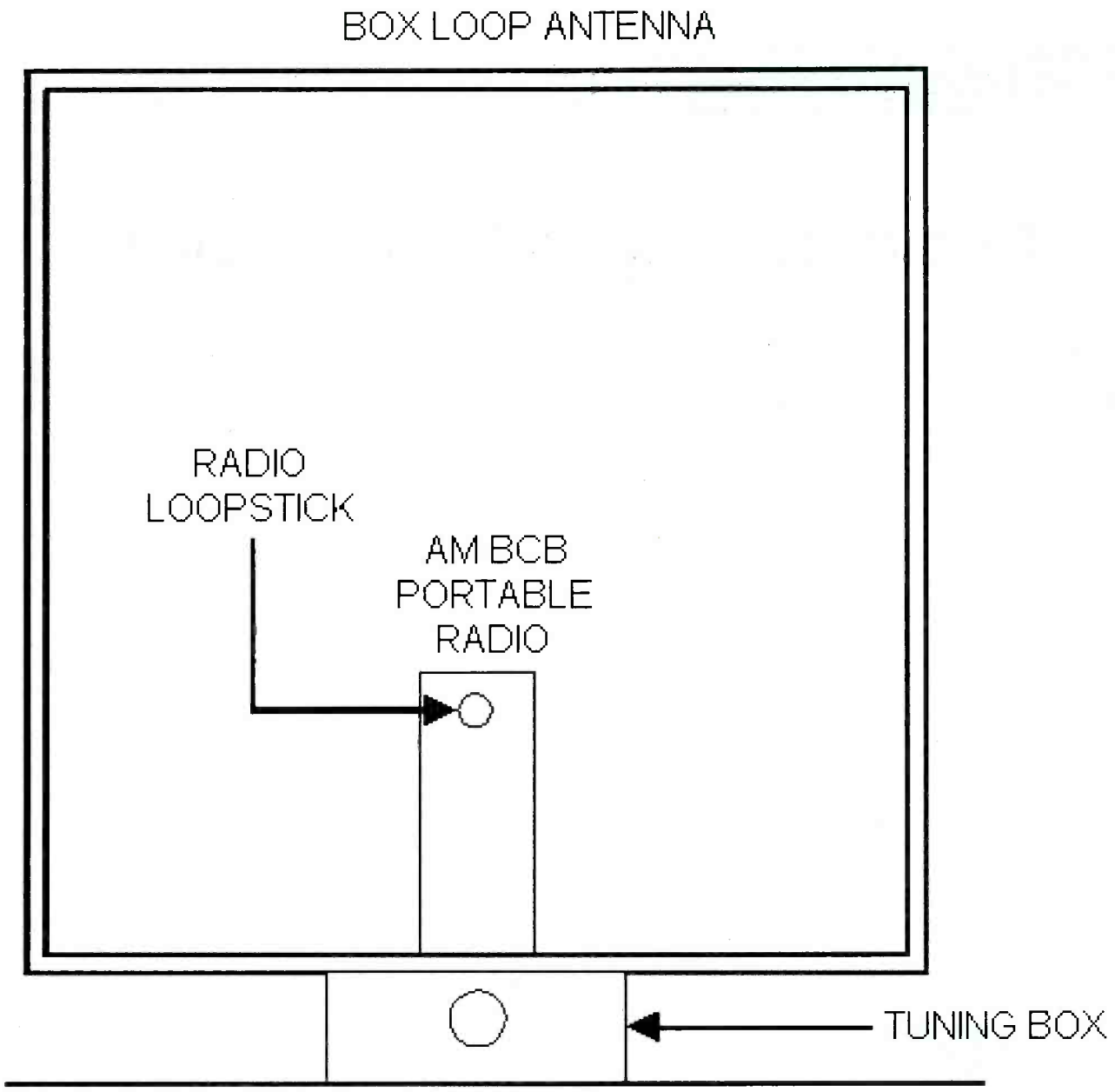


FIGURE 8. *Sports fan loop antenna enhances AM BCB portable radio performance.*

Let's assume that the three signals arrive at the receiver with the same strength (Fig. 7A). By correctly positioning the loop, the undesired signals reduce (Fig. 7B). Note that Signal-2 is not reduced as much as Signal-3, which reflects its relative direction of arrival as shown in Fig. 6.

Sports Fan's Loop

Figure 8 shows the "sports fan's loop" antenna that is used to enhance the performance of a portable AM BCB radio. The loop is a large 24-inch to 36-inch loop built according to the principals in this article. The radio is positioned in the loop such that the internal loopstick nulls are aligned with the box loop nulls. The nulls of the loopstick are found off the ends of the ferrite rod, while the maxima are perpendicular to the rod.

When the loop and radio receiver are tuned to the same station, the signal available to the receiver is significantly enhanced. This allows you to pick up distant stations much more effectively. I've seen people use the sports fan's loop to pick up special programming (bluegrass music, religious station, etc.) that is not easily found in their own locale, as well as blacked out sporting events.

Conclusion

The tuned resonant magnetic loop antenna is one of the most viable antennas for DXing the AM BCB. They are relatively easy to build, and work like a champ!

Richard Barnett
ScanMaster@aol.com

Tornado Chasing - A Scanning Utopia

Many communications writers, this editor included, have described at length the excitement of scanning during winter weather, forest fires, hurricanes, multiple-alarm conflagrations, and other man-made and natural disasters. Sure, these events, while often tragic, bring to life local frequencies and often spark use among little-used channels. Generally, though, you're listening to radio systems that you know about, but are suddenly more interesting.

Tornado chasing offers a completely different, and very unique, scanning opportunity. When you're out chasing tornadoes, you aren't aware of local frequencies. More than that, what you discover while searching for communications can make or break a day's chase, or even, in a rare instance, mean the difference between life and death. Tornado Chase scanning really tests the limits of your ability to operate a scanner to its fullest.

This was my third year chasing severe weather and tornadoes in the Southern Plains of the U.S. We covered the preparation for the chase in the last issue, and now we'll take you through some of the highlights of this year's chase.

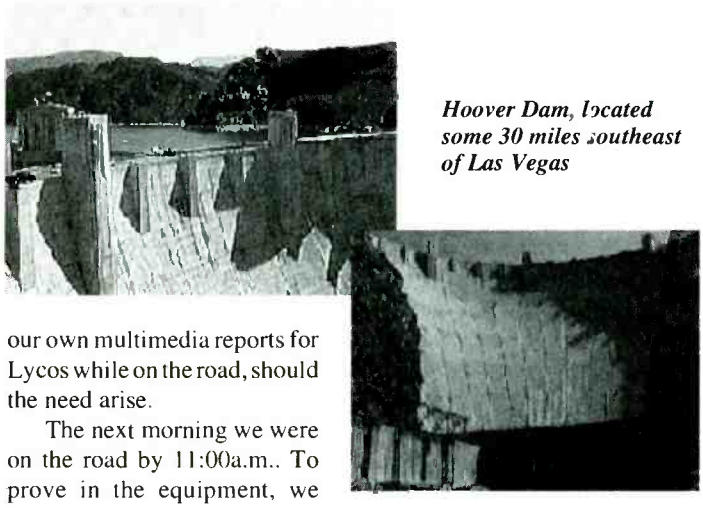
Tornado chasing never gets boring. Anyone who chases for even a single day yearns to come back for more. There's a lure to the adventure and the challenge that is incomparable. What makes the chase even more satisfying is when you can put your talents, and your knowledge, to the test. Communications monitoring is essential to a successful chase. Not only have I been lucky enough to travel with one of the nation's most experienced and well known storm chasers, I've been able to make a substantial contribution to the team's efforts.

The chase actually begins months before we actually leave for the event. A lot goes into the preparation and the preparation is all about the details. In our last Scanning Report column, we discussed the vehicles, the weather and radio equipment that we utilize during a storm chase. In this issue, we'll delve into how the equipment performed, as well as some of the things we heard during what was known on the Internet as the Lycos Twister Search '98. (The popular search engine company, Lycos, sponsored me and the event this year. You may still be able to read the reports which were filed with Lycos in mid-May at **www.lycos.com/twister**)

On Monday, May 11, 1998, my chase partner and technical manager for the event, Bill Cobb, met me at Boston Logan Airport for a 7a.m. flight to Las Vegas. Neither of us are gamblers, which is just as well, as there was no time for fun and games. Immediately upon landing at McCarren Field we joined two other members of the chase team, Phil and Kathy Henry, who met us and delivered us to our waiting "Chase 3 Communications Truck," a 1998 Ford Explorer XLT, which I had helped to outfit one month prior.

We still wanted to put a few finishing touches on the vehicle, though. A BC-895 had been installed in the glove compartment of the Explorer. We pulled it out and wired in a Connect Systems Communications Tone Decoder Unit (CDU). While the 895 has a very unique "tone-search" feature for determining CTCSS or PL (private line) subaudible tone codes, the CDU will read tones more quickly and it will also display DTMF (phone tones) and DPL/DCS (digital private line/digital coded squelch). We also mounted an AOR AR-8000 with an Optoelectronics Scout for reaction tuning capabilities.

We placed a simple, small, high-band whip antenna atop the Explorer and ran the coax to the Scout (because of tight roof constraints, we used the rubber-duck antenna for the AR-8000, which probably should have had its own rooftop antenna). Finally, we set up a 3-watt cellular bag phone, which was donated by Southwestern Bell, with a mag-mount pigtail antenna. We already had a cell phone for voice communications, but this phone would be utilized for data communications: receiving text and images from various weather-related Internet sites and transmitting



Hoover Dam, located some 30 miles southeast of Las Vegas

our own multimedia reports for Lycos while on the road, should the need arise.

The next morning we were on the road by 11:00a.m.. To prove in the equipment, we punched in the frequencies for Las Vegas on UHF and the Nevada Highway Patrol, which operates on low-band (although they are in the Las Vegas Metro PD on VHF high-band, they are in the process of switching to high-band repeater system). All these high-powered channels were received easily, both on the 895 and on the BCT-7 BearTracker. Finally, in the TrunkTracker, we punched in the frequencies of an in-house casino/hotel trunking system to insure that the 895 was working up to specs. It was a "go" and we were headed for the completion of our first leg, Hoover Dam, some 30 miles southeast of Las Vegas.

It was at the dam that we were able to prove-in our reaction-tune equipment — and it turned out to be a small radio coup for Bill Cobb and myself. As we drove through the Nevada switchback which leads up to the dam, we passed a tractor-trailer which was parked precariously aside the narrow road. The driver must have decided to take the dam tour (not the damn tour). Other truckers on CB channel 19 were not happy as they had great difficulty passing the parked truck. Then suddenly, we heard the Scout beep, and our eyes quickly turned to the AR-8000. Hoover Dam and Bureau of Reclamation operational units were alerting their security staff to find the truck driver on the federal channel of 163.250 MHz with a CTCSS tone of 156.7 Hz. Nice hit after only an hour of drive time!

The next leg was the short hop between the dam and Kingman, Arizona, where we would gas up. If you've ever driven this stretch, you know it is a very lonely highway! The 70-odd mile stretch of two-lane highway just east of the Cerbat mountains courses through high desert terrain. In a 50 mile radius of that road probably less than a few hundred people live. While we didn't expect to hear anything on that stretch, we were a bit surprised to hear a strong carrier on 418.225 MHz with a tone of 123.0 Hz in the Willow Beach area.

Then we heard discussion of maintenance and DMV (department of motor vehicle) operations on 418.100 MHz with a tone of 186.2 Hz. The DEA (Drug Enforcement Administration) was also active. It just goes to show you that between reaction-tuning equipment and an ultra-sensitive receiver, such as the BC-895, with an easy-to-operate search capability, there's no telling what you might find.

After filling up (on gas, subs and Cokes), we jumped on the road that would be our companion for the next two days, I-40, which runs directly from Kingman all the way to our base camp of Amarillo, Texas. We monitored high-band police communications in Kingman on frequencies such as 154.725, 154.815 and 155.790 MHz, all with tones of 173.8 Hz. Leave it to Bill — he found the Kingman Burger King drive-through frequency on 457.550 MHz and was quite pleased with himself. I knew it was going to be a long trip to Texas!

The balance of the day was spent driving east to our overnight stopping point, Gallup, New Mexico. We followed our progress using a DeLorme GPS (global positioning system) connected to my Gateway Solo 9100 laptop computer.

Here are some of the other frequencies we received on the way to New Mexico, in order of the intercept as traveled west to east. We did not have the time to identify users. If any of our readers could assist us, it would be appreciated.

Kingman to Amarillo

Freq (MHz)	Tone (Hz)	Area/Info
155.640	CSQ	Kingman Area
460.475	100.0	Kingman Area
160.935	CSQ	Union Pacific Railroad?
156.150	CSQ	East of Kingman
156.225	103.5	East of Kingman
155.625	141.3	Near Ash Fork
154.740	136.5	Near Ash Fork
154.980	146.2	Near Ash Fork
156.150	CSQ	Near Ash Fork
163.5375	88.5	"Charlie" Identifiers (also 107.2)
413.900	CSQ	Weather Service Link (Williams)
460.025	100.0	Arizona Highway Patrol (Flagstaff)
154.040	91.5	"Channel 7 Mutual Aid" (Flagstaff)
154.740		Flagstaff Area
156.210	CSQ	Flagstaff Area
156.030	CSQ	Flagstaff Area
153.950	110.9	Flagstaff Area
154.010	136.5	Flagstaff Area
153.995	141.3	Flagstaff Area
155.835	114.8	Flagstaff Area (repeater)
155.250	103.5	Flagstaff Area
156.090	103.5	Flagstaff Area
156.105	103.5	East of Flagstaff
154.415	136.5	East of Flagstaff (weak)
155.985	CSQ	East of Flagstaff
156.210	CSQ	East of Flagstaff (repeater)
153.650	123.0	Winona Area
155.790	131.8	Medical/Fire (Two Guns)
154.875	R 192.8	Winslow Area
155.250	103.5	Winslow Area
154.145	CSQ	Winslow Area
154.920	103.5	Winslow Area
154.950	CSQ	Winslow Area
156.135	103.5	Winslow Area
153.470	131.8	Power Plant Outside Winslow
155.580	162.2	Holbrook Area (also 186.2)
153.500	77.0	Holbrook Area
155.415	192.8	Holbrook Area
153.455	CSQ	Holbrook Area
154.935	CSQ	Holbrook Area

While there was not a great deal to monitor out in the open spaces of northern Arizona, we did put the BC-895 and the BCT-7 through its paces and they performed well. We had expected to hear more in the way of federal channels (such as Bureau of Indian Affairs, National Park Service, Forest Service, and the like). As shown above, we did hear activity on 163.5375 which we could not identify, although the transmissions may have been from a nearby National Guard base. All the other equipment, CB, 2-meter Ham radio (which was used to communicate with Chase 2), GPS, AM-FM radio, radar detector, AR-8000 with reaction tune, all performed well.

The only disappointment was the TV. The flat-panel LCD screen TV we were using was easily washed-out in the sunlight and the simple rabbit-ears that we mounted on the Explorer was insufficient. (We had used a disc-shaped pre-amplified antenna in past years, but

these are terribly prone to coming loose at high speeds.)

We'll have more highlights of the Lycos Twister Search in upcoming months, including a great story about a federal channel we monitored which proved invaluable during the storm chase.

Rubber Duckie You're the One

Edmund Leavitt, KA7UKN, after following numerous messages about the efficiency of rubber duck scanner antennas on the 'Net, passed on the following valuable report:

Recently a lot of the posts have been seeking advice about selecting a better flexible scanner antenna. The following are some generalities about "rubber duckie antennas" and a simple performance test worth trying.

1. The lower the desired frequency, the harder it is to make a "rubber duck antenna" appear resonant, and the bigger the compromise such an antenna constitutes. Conversely, the higher you go in frequency (within reason) the easier it is to manufacture a credible antenna and then cover it with rubber. A mentor of mine told me decades ago that "A rubber duck antenna is 3 dB better than a dead short." Another used to say "A rubber duck is a radiating dummy load." I certainly would not quibble with either until you get up to around 800 megahertz.

The point is that for VHF the difference in performance between a rubber duck and a real antenna can be quite substantial. However, in the lower and mid-UHF part of the band, a rubber duck may actually be a real antenna disguised by a coat of rubber.

2. Several generalizations worth considering when choosing an antenna:

a. Performance of any quarter wave antenna is dependent upon the ground plane to which it is referenced or attached. The chassis of a hand held radio is generally too small to make a good ground plane.

b. A vertical 5/8 wave-length antenna exhibits gain (relative to a quarter wave antenna and *toward the horizon*) when used with a proper ground plane. Without a good ground plane, a 5/8 wave antenna should be suspect.

c. A half wave antenna is generally able to perform well independent of a ground plane, making it desirable for use on hand held devices. (Another place this comes in handy is for mounting on fiberglass roofs of travel trailers and the like.) Typical designs include end fed coils matched "whips," and at higher frequencies, center fed "coaxial" or "sleeve" antennas.

(As an aside: Ever wonder how long is a half wave antenna? The math is simple...divide 150 by the frequency in MHz and you have the approximate length of a half wavelength *in meters*. If you are more comfortable with inches, you can approximate by multiplying meters times 39: for example, 150/900 MHz = 0.16 meters or about 6-1/2 inches. That says that if you are looking for a half wave antenna, expect it to be about one meter long for 150 MHz, 0.3 meters or 30 centimeters long at 450 MHz, around 18 centimeters for cellular/trunked frequencies, and around 16 centimeters for 900 MHz.)

3. "Coaxial" design antennas are quite common for UHF 800 and 900 systems and perform well. They are generally easy to recognize because they reduce diameter above the midpoint of the antenna body. (Some VHF flex antennas combine a helical wound base with a slimmer top element, and look similar. Usually the transition from thick to thin occurs in the bottom third of the antenna. If you find an 800 MHz antenna with the diameter change, it is almost certainly a coaxial or "sleeve" design, and should be a decent performer.)

Recommendations:

a. If you are receiving the stations in your area well with whatever you presently use, be happy...invest your money in the stock market. If you need better, buy better.

b. If you use the factory rubber duck a lot, recognize that it is designed to work fairly well in the 153 MHz range. Consider buying one(s) designed specifically for the frequency ranges you like. Same comment applies for mobile antennas. With either, it's probably reasonable to ignore the difference between a cellular (824-896 MHz) antenna, an "800" (806-866 MHz) antenna, and a "900" (865-965 MHz) antenna. The profusion of cellphones probably makes mobile cell antennas the easiest to find and the cheapest to afford.

c. Want to play around to see just how foul that fowl antenna is? Find a weak station in the 860 part of the band using your factory rubber duck antenna. Listen with the squelch open or just barely closed. Cut a paper clip to 3-3/4 inches in length (approximating a 1/4 wavelength antenna at 860 MHz). Make sure there are no jagged ends on the paper clip that could damage the radio's BNC contacts. While monitoring a weak conversation, carefully replace the duck with the paper clip, by inserting the end of the clip into the center contacts of the BNC connector. Let go of the paper clip. Also, be certain not to change the radio's position when you switch back and forth. If the duck works consistently as well or better, keep it.

If the 1/4 wavelength paper clip works consistently better, I would consider shopping for a UHF antenna. Splurge on a half wave 800 MHz rubber duck. It will probably be worth the bucks.

Does this procedure sound too simple and too crude to be meaningful? It is not. I'd be interested to hear from a few users how their factory ducks stand up against the 1/4 clip. Meanwhile, I'll shop for a factory 800 duck and fire up the spectrum analyzer.

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Latest U.S. Stratcom "Zulu" Update

Some more of the "Zulu" frequencies used by the United States Strategic Command (Stratcom) have been found by listeners. Stratcom, a joint operation, maintains the country's nuclear deterrent, using strategic assets from several services. The Air Force, which provides the HF radio frequencies, went to the Zulu designations a couple of years ago. These replaced several older band plans that never really caught up with all this restructuring. Zulu, as we know, is the radio phonetic for the letter Z. Since these designators are often used instead of frequency values on the air, it's really nice to know them.

Several listeners have independently confirmed Z-235 as 15094 kHz upper sideband (all frequencies are USB here). Utility World has gotten loggings of 17973 kHz being referred to as Z-255, and there have been several hits on this one, so we can confirm it as well. Listener Paul Bunyan, in Missouri, has heard 18046 kHz called Z-275. We're looking for some more confirmation here. Meanwhile, Z-275 is tentative.

This column has the latest Zulu list. Question marks show frequencies that are still to be found.

Zulu Designator Update

Z100	3068.0
Z105	3116.0
Z110	3134.0
Z115	3143.0
Z120	3295.0
Z124	?
Z125	4495.0
Z130	4472.0
Z135	4745.0
Z140	5026.0
Z145	5705.0
Z150	5800.0
Z155	5875.0
Z160	6715.0
Z165	6757.0
Z170	7831.0
Z174	?
Z175	9016.0
Z180	9057.0
Z185	9809.0
Z190	10204.0
Z195	11104.0?
Z200	11181.0
Z205	11494.0
Z210	11229.0
Z211	12070.0
Z215	13242.0
Z220	13245.0
Z225	13907.0
Z230	15046.0
Z235	15094.0
Z240	15097.0
Z250	15962.0
Z255	17973.0
Z270	18027.0
Z275	18046.0?
Z280	?
Z295	?
Z300	?
Z315	23872.0
Z330	?

War on Drugs

The U.S. drug interdiction program, better known in the press as the "War on Drugs," continues to use assets from all branches of the military. At least three joint task forces, East, West, and South, are known to exist. Aided by U.S. Customs, the U.S. Coast Guard, and sometimes by the Drug Enforcement Administration, they patrol the ocean approaches to the United States, attempting to stop drug smugglers. Since these smugglers are typically flying low in small planes, or driving small, very fast boats, this is no easy task. We're definitely dealing with "stealth" targets, or at least very small ones.

On the radio, the best listening is from the Caribbean net. This is usually known as Foxtrot Tango, believed to be the static identifier of its control station in Key West, Florida. The members of the net belong to Joint Task Force 4, formed in 1989. In 1994, JTF-4 was reorganized and made part of the Joint Interagency Task Force, East, with the jaw-breaking acronym of JIATFE. No wonder most people continue to call the unit by its original name.

JTF-4/JIATFE's stated mission is one of detection. The people heard on HF locate and track suspicious targets for handoff to enforcement authorities. They're data gatherers, working closely with the pursuers, who are sometimes also heard. To accomplish this task, JTF-4 maintains constant communications, both data and voice, on all bands including HF.

The currently hot frequency seems to be 8971 kHz USB, the former Navy "Kilo," with nightly tracking activity. Note that this used to be 8972 until the recent realignment of the offroute aero mobile band. Other Foxtrot Tango frequencies that have been logged over the years are 2410, 3203, 4738.5, 6735, 6750, 6788, 7467, 11191, and 13207 kHz, all USB. Recent US Customs hits have been on 11484 and 14686 kHz. Other customs frequencies are 7527, 8912, 10242, 11494, 13907, 15867, 18594, 20890, 23214, and 25350 kHz USB. This last group is a scanning system, distinctive for its regular databursts, though it's not nearly as busy as it once was.

You'll also hear on 8971 kHz a ground station believed to be in Puerto Rico, identifying with the static callwords of "Blue Star." This has led many to call this the Blue Star net.

Lately, a gentleman with a British accent has been identifying as "Hunter 02," as he reads off target positions. From traffic, I would guess this to be an aircraft as well. Another listener has frequently heard "Falcon 01," also speaking with an accent, and possibly Dutch Navy.

Most of the other players, presumably U.S. Navy, use the standard, trigraph, tactical callsigns of the North Atlantic Treaty Organization (NATO). These are the ones that are commonly written out as "Kilo-9-Bravo," or similar.

The radio procedures would also suggest U.S. Navy. All operators have this service's slow drawl. They use phonetic spellings for seemingly everything, plus "interrogative" for questions. The only Navy procedure that I haven't heard here is the use of the numerical code (NUCO).

NUCO confuses a lot of people. It has nothing to do with "nukes," nor with "NUKO," an older, group callsign once used in Morse code telegraphy. It's a numerical encryption code, where digits are replaced by two letters each. It's how the Navy nets often pass numbers without divulging them. Procedure is, "Plain language NUCO letters Un-NUCO plain language."

Foxtrot Tango/Blue Star is not doing this. Times of day and map coordinates are both passed as an undisclosed base amount with a positive or negative offset.

Stations sometimes ask to "go green." What follows is a buzzy data stream, from a secure voice unit called the ANDVT, Advanced Narrowband Digital Voice Terminal.

ANDVT, though, provides only a fraction of the ones and zeroes flying about. These far-flung nets have always used a number of tactical digital information links, TADILs, as their electronic eyes. They're usually referred to on-air as the "playground." If a station has connectivity and can see the tracking maps or other information, he's "in the playground."

This playground has an alligator. Any mention of these aquatic reptiles on joint task force nets is a reference to a data protocol known as Link-11. It's common on HF, giving two-way information sharing through what is apparently a 16-tone radio modem (the modulator/demodulator that turns logical ones and zeroes into audio that can be broadcast).

You've almost certainly heard plenty of Link-11 on your radio. It's that distinctive chirp-buzz chirp-buzz sound, with shifting, irregular repetitions. The buzz reminded someone of the sound made by a happy 'gator while procreating. Link-11 has been "Alligator," and its networks the "Alligator Playground," ever since.

Summer always brings fine listening from the Caribbean. Hope you have a great season.

Utility Loggings

Hugh Stegman

Abbreviations used in this column

AFB	Air Force Base	MAP	Maghreb Arab Presse
AM	Amplitude Modulation	MARS	Military Affiliate Radio System
ARQ	Error-correcting teleprinter system	MFA	Ministry of Foreign Affairs
ARQ-E3	Single channel ARQ teleprinter system	m/v	Motor Vessel
Baudot	Older, slower teleprinter system	NATO	North Atlantic Treaty Organization
Canforce	Canadian Forces	Rompress	Romanian Press Agency
CG	Coast Guard	RTTY	Radio Teletype
CP	Command Post	RYs	RTTY teststring RYRYRY...
CW	Morse code telegraphy	SAM	Special Air Mission
EAM	Emergency Action Message	STS	Space Transport System (space shuttle)
FEC	Forward error correction teleprinter system	UK	United Kingdom
FEMA	Federal Emergency Management Agency	UKADGE	UK Air Defense Ground Environment
FAPSI	Federal Agency for Government Communications & Information (Russian)	Unid	Unidentified
LSB	Lower sideband	US	United States
		USS	United States Ship
		VIP	Very Important Person
		VOLMET	"Flying Weather" broadcast

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

2474.0 PBC32-Dutch navy, Goeree, at 2330. (Ary Boender-Netherlands)

2477.0 SJPB-*m/v United Star* with situation report, at 2327. (Boender-Netherlands)

2607.0 FUO-French Navy, Toulon, France, with RYs in Baudot at 2315. (Boender-Netherlands)

2720.0 FDE14-French Air Force Contrexville, with CW marker at 2307. (Boender-Netherlands)

2789.0 FUE-French Navy, Brest, with RYs in Baudot at 2320. (Boender-Netherlands)

2815.0 IDR8-Italian Navy, Rome, at 2317. (Boender-Netherlands)

2965.0 Unid-CW station repeating "UT" at 1710, bad interference to Bangkok VOLMET, at 1710. (Takashi Yamaguchi-Japan) *Not listed anywhere. More CW aero band weirdness. -Hugh*

3059.0 Andrews-US Air Force, calling Offutt at 0600. (Paul Bunyan-MO)

3150.0 PCD-Mossad, Israel, CW at 2300. (Boender-Netherlands)

3216.5 Possible US Navy or Marine Corps exercise in San Diego, CA, area, heard for hours, starting 0330. (Bunyan-MO)

3270.0 KPA 3-Mossad, Israel, repeated callsign and 10-character message for over an hour, also on 4665 and 6370, at 1750. Regular KPA 2 back on frequency at this time on another day. (Yamaguchi-Japan)

4360.0 SYN 2-Mossad, Israel, repeated call only for half hour, also 5629, at 2045. (Yamaguchi-Japan)

4707.4 Cape Radio-US Air Force, Cape Canaveral, working USS Philippine Sea in shuttle mission #STS-90, at 0159. (Bunyan-MO)

5017.0 Unid numbers station, with end of month transmission 463., CW at 2000. (Boender-Netherlands)

5170.0 CIO 2-Mossad, Israel, AM numbers at 1947 and 2345. (Boender-Netherlands)

5205.0 SNJ30-Unknown station with 5-figure CW numbers at 1948. (Boender-Netherlands)

5211.0 NNNOWHT-Navy/Marine MARS, MA, net check in with WGY 912, FEMA Special Facility, Mt. Weather, VA, at 1845. (Gil Woodside-RI) *Sounds like the June drill. -Hugh*

5230.0 MIW 2-Mossad, Israel, AM numbers at 0017. (Boender-Netherlands) CIO 1-Mossad, Israel, repeated call and 4 characters for half hour, also on 7605, at 2245. (Yamaguchi-Japan)

5245.0 MRK83-Royal Navy Cadets, UK, working MRC01, at 1959. (Boender-Netherlands)

5256.0 Unid-FAPSI, Russian government, 5-number coded CW message to NOB, at 1942. Unid-Cyrillic 5-letter, then 5-figure numbers, with cut zero (T), CW at 2019. (Boender-Netherlands)

5289.0 Russian Lady, AM numbers, joined in progress, and ending at 1950. (Boender-Netherlands)

5474.0 Unid numbers station, with end of month transmission 463, CW, at 1800. (Boender-Netherlands)

5673.0 Beijing-VOLMET in accented English, with bad modulation, also on 3458, at 1110. (Yamaguchi-Japan)

5680.0 Gluecksburg Rescue, radio check with PC114at 1030. (Boender-Netherlands)

5696.0 CAMSLANT-US Coast Guard Communications Area Master Station, Atlantic, Chesapeake, VA, asking *CG Rescue 6004* for regular position and ops reports, at 1840. (Woodside-RI)

5700.0 Unid-sounded like US Navy, asked if station had secure voice capability. (Ron Perron-MD)

5709.0 VDE(?)-Numbers station, 5 figure, at 1900. (Boender-Netherlands)

5717.0 Halifax Military-Canadian Forces, working aircraft Canforce 2403, who was relaying for Canforce 2421, at 2202. (Perron-MD)

5745.0 Lincolnshire Poacher, numbers from Cyprus, also on 6959 kHz, at 2100. (Boender-Netherlands)

6550.0 *CG01-Dutch Coast Guard 01*, working CG Centre, left frequency due to pirate interference, at 1113. (Boender-Netherlands)

6693.0 5-Q-M, US Navy, with 1-H-O and 6-P-F, rogering messages at 2222. (Perron-MD)

6694.0 Halifax Military-Canadian Forces, telling Endeavor there was no traffic, at 2101. (Perron-MD)

6712.0 FDE-French Air Force, Villacoublay, France, with various aircraft, at 1412. (Boender-Netherlands)

6715.0 Halifax Military-Canadian Forces, working F-2-J, who asked for relay of on-station message to S-5-C, at 1157. (Perron-MD) CWL87-RAF aircraft, working BT8P at 10.00. Also CWL88 with coded messages on UKADGE PO-channel at 1407. (Boender-Netherlands)

6716.0 SAM 202-US Air Force VIP flight, patch with Andrews on Mystic Star Fox-090 frequency, at 0050. (Perron-MD)

6727.0 DHN66-NATO Germany, radio checks, then RTTY with Magic 55, at 1123. (Boender-Netherlands)

6730.0 DHJ59-German Navy, Wilhelmshaven, Baudot radio checks at 1329. (Boender-Netherlands)

6736.0 7ZQ-Royal Air Force, UK. on UKADGE CA-channel at 1019. (Boender-Netherlands)

6739.0 Nightwatch 01-US Air Force command post aircraft, asking Croughton for discrete channel, given 6989 at 0308. (Perron-MD) Architect-Royal Air Force, UK, with weather at 1020. (Boender-Netherlands)

6900.0 Russian Man, numbers in AM at 2000. (Boender-Netherlands)

6959.0 Lincolnshire Poacher, British in Cyprus, numbers at 2000. (Boender-Netherlands)

6983.0 Spanish female numbers, two different days at 1121 and 1144. (Perron-MD)

6989.0 Nightwatch 01-US Air Force airborne command post, telling National Military Command Center that the frequency is a "hotline," at 0309. (Perron-MD)

6993.0 Andrews-US Air Force Mystic Star network, working US VIP flight Navy 50515, at 1608. (Perron-MD)

7668.0 8BY-French Intelligence, France, with CW Vs and 3-figure message with slant bars for separation, also on 10248, 12075, and 14931, at 2040. (Yamaguchi-Japan)

7866.0 Unid-Chinese female 5-figure numbers at 0322. (Yamaguchi-Japan)

8026.0 SPAR 66-US Air Force VIP flight, information for Andrews on Mystic Star Fox-290, at 0150. (Perron-MD)

8968.0 EGY 1107-Egyptian Air Force C-130, with Reach 3291 (a U.S. Air Force transport), getting weather for Lajes at 0126. Aircraft was probably the one visually observed departing Baltimore at 1600. (Perron-MD)

8971.0 Cayenne 18-US joint drug task force, with Cayenne 11 on three different days at 0015, 0122, and 1333. S-4-J Golf-US Navy, clear and secure radio checks with Navy 8-Y-L at 0103. Top Rock told by Vista to go to "83 Alpha" in the clear; couldn't find them, at 0109. Falcon 01, German or Dutch accented English, asking Falcon 01 for relay to callsign "India" at 2231. *(Probably Dutch -Hugh)* Blue Star-working Wolf 01 and Shark 19, positions of contacts at 2350. (Perron-MD) Z1K-Royal Air Force, UKADGE PH-channel, at 1007. (Boender-Netherlands) Foxtrot Tango-US Navy joint task force, drug interdiction, working Blue Star, several others, in "gator" (data link) tracking of the baddies, at 0100. (Hugh-CA)

8980.0 Offutt-US Air Force, with EAM on Navy and Coast Guard freq, at 1909. (Bunyan-MO)

8992.0 Sentry 40-US Air Force E-3B, patch to Raymond 24 through MacDill, delayed due to maintenance. (Perron-MD) Offutt-US Air Force, with 20 character EAM, at 1841. (Woodside-RI)

9014.0 Jess 97?-US Air Force, calling Raymond 07 at 2102. (Bunyan-MO)

9031.0 Architect-Royal Air Force, UK, with NATO "colors" weather at 2331. (Perron-MD)

9143.0 English female synthesized numbers, repeating "532-00000" at 3221. (Perron-MD) *If AM, it's Cuban. If USB, reduced carrier, it's Cynthia (US CIA). -Hugh*

9422.5 AAR4TU-US Army MARS, in LSB, went to 9419.5 USB at 1620. (Bunyan-MO)

10090.0 Tashkent-Russian VOLMET, heavily accented English, at 1740. (Yamaguchi-Japan)

10426.0 Unid-Female English 5-figure numbers, at 2220. (Jack Dix-NY)

10493.0 WGY 912- FEMA Special Facility, net control with Sword Maker (US Air Force Reserve, MacDill), WGY 965 *(FEMA, Indianapolis, IN)*, and KAD 640. WGY 914-FEMA, Panama, taking check in from KHA 925 at Johnson Space Center, all at 1825. (Woodside-RI) *Sounds like the June drill. -Hugh*

10740.0 Whiskey Lima-German numbers, with electronic tune, then 3/2 figure groups, repeating each one, at 0400. (John Maky-CA)

11056.0 SAM 861-US Air Force VIP aircraft, from 11175 and working Andrews on Mystic Star Fox-354 after first discrete, 11053 (Fox-211) had poor copy, at 0120. (Perron-MD)

11059.5 SAM 60203-US Air Force VIP flight, patch to Andrews command post on Mystic Star "Fox-496." (Bunyan-MO)

11111.0 Pump Shed-US Air Force, with EAM, possibly a new "Zulu" channel, also on 15016, at 2110. (Bunyan-MO)

11153.0 SAM 60204-US Air Force with 2 VIPs, patch to SAM Command via Andrews on "Fox-227," at 1844. (Bunyan-MO)

11175.0 Nightwatch 01-US Air Force command post aircraft, patch through Andrews to Offutt, who told them, "The paper has turned yellow." NW 01 rogers and leaves net. Chill 11-US Air Force B-52, patch through Andrews, returning to base with bad #7 engine at 0129. SAM 683-US Air Force VIP flight, patch to SAM Command Post and VIP Control at 2040, later went to 11053 (Fox-354). Kato 57-US Air Force, patch through Andrews to Kato Ops, returning to base (Altus AFB) with landing gear stuck down, at 2112. Tuff 18-US Air Force B-52, returning to Barksdale AFB with bad #5 engine, at 2217. (Perron-MD) Philippine Air Force 78 working Anderson Global, at 1600. (Bunyan-MO)

11214.0 Dragnet Tango-Canadian Forces, with patch through Trenton Military to Northern Lights, at 1957. Later, DT working Nightwatch, US Air Force airborne CP, who was listening on Z190 *(10204)*, Z145 *(5705)*, Z175 *(9016)*, and Z200 *(11181)*. (Perron-MD)

11232.0 King 30-US Air Force, patch to Gunrunner through Trenton Military (Canadian Forces), departing Shearwater, Canada, enroute to home base at Patrick AFB, FL, at 1310. (Perron-MD)

11244.0 Reputable-US Air Force, asked Croughton for Nightwatch 01 frequencies, was instead patched to Nightwatch. NW gave phone number, patch went to STRATCOM (US Strategic Command) command center, which gave them yet another number. At this point station faded, all at 0445. (Haverlah-TX) Tin Cake-Possible US Navy, not using Air Force procedures, in patch through Offutt to Nightwatch, confirming frequencies as Z130 *(4472)* and Z170 *(7831)*, at 1222. Bandsaw Xray-US Air Force, patch through Thule to Raymond 24 (Tinker AFB), scheduling radar data transfer, also on 6739, 8968, and 11175, at 0150. (Perron-MD)

11291.7 Egyptian embassy, Belgrade, (ydqfkm) traffic for MFA, Cairo in ARQ at 1632 (Bob Hall-RSA)

11484.0 105 Alpha-US Customs, radio checks with Service Center, Customs scan tones also heard, at 1328. (Perron-MD)

11545.0 Lincolnshire Poacher, Cyprus, numbers at 1200, 1500, and 1700. (Boender-Netherlands)

12056.0 Cherry Ripe, British intelligence, weak numbers at 1200. (Boender-Netherlands)

12110.0 YOM 21-Rompress, Romania, news in English, Baudot RTTY, at 1103. (Dix-NY)

12603.5 SVS-Athens Radio, Greece, with powerful CW marker, covering Lincolnshire Poacher, at 1600. (Yamaguchi-Japan) *This one looks new. At least GKY Portishead is zero-beat to Poacher's 12603.0. Ouch. -Hugh*

12682.5 PRE-Amboina Radio, Indonesia, CW marker at 1044. (Dix-NY)

13242.0 Pump Shed-US Air Force, data with MacDill at 2212. (Bunyan-MO)

13440.0 SAM 203-US Air Force VIP flight, working Andrews, up from 11175, on Mystic Star "Fox-646" at 1921. (Perron-MD)

14487.0 Lincolnshire Poacher, Cyprus, numbers at 1200, 1600, and 1800. (Boender-Netherlands)

14686.0 Atlas-US Customs, taking ops-normal reports from five units at 0003 and 0030. (Perron-MD)

14776.0 WGY 906-FEMA control station, Texas, working WGY 912, FEMA Special Facility, VA, on "Foxtrot-42," at 1616. (Bunyan-MO)

14912.0 DFZG-MFA Belgrade, Serbia, RYs in Baudot RTTY, at 1402. (Dix-NY)

15016.0 Zapper 11-US Air Force, probable EC-130, phone patch at 1913. (Bunyan-MO)

15624.0 Cherry Ripe numbers, new frequency, also on 10452 and 17499, at 1000. No joy on old 15616 frequency for months. (Yamaguchi-Japan) Cherry Ripe, weak numbers at 1000. (Boender-Netherlands)

16301.5 DFZG-MFA, Belgrade, Serbia, RYs in Baudot RTTY, at 1401. (Dix-NY)

16314.0 Lincolnshire Poacher, numbers, also on 12603 and 14487, no joy on old 16084, at 1400. Reported as new frequency by other listeners. (Yamaguchi-Japan)

16328.5 Kinshasa, Zaire Bank Circuit, French messages in FEC. Usually ARQ, might be new equipment, at 1254. (Bob Hall-RSA)

16787.0 DZX-Manila Central Marine, Philippines, new callsign, with FEC traffic and then news, at 1320. (Hall-RSA)

17103.2 XSG-Shanghai Radio, China, CW marker at 1507. (Dix-NY)

17422.7 RFFVAEA-French Air Force, Dhahran, with 5-letter code groups in ARQ-E3 at 1634. (Hall-RSA)

17973.0 Nightwatch 01-US Air Force command post aircraft, called this frequency "Zulu-255," at 1953. (Bunyan-MO)

18046.0 Nightwatch 01- US Air Force command post aircraft, called this frequency "Zulu-275," at 1749. (Bunyan-MO) *[Another possible new one! -Hugh]*

18496.1 CNM 80X-MAP Rabat, news in English, Baudot at 1337. (Dix-NY)

18522.0 V5G-MFA, Bucharest, Romania, with news in FEC at 1120. (Hall-RSA)

18661.7 Egyptian embassy, Kinshasa, (wsgzkpk) with 5-letter code groups for MFA, Cairo at 1228. (Hall-RSA)

18757.8 SAM-MFA, Stockholm, coded message to Ambassaden New Delhi, in Swed-Arq at 1313. (Hall-RSA)

20048.0 C-Russian channel marker, Moscow, with numbers in CW at 0929. (Boender-Netherlands)

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Third Shift Cyrillic - Part 2

In last month's column we examined the Third Shift Cyrillic variant of Baudot Radioteletype as used by maritime vessels of the former Soviet Union. This column examines typical message content and composition of their traffic transmissions.

Soviet maritime traffic from vessels at sea generally follows a set transmission pattern with regards to message format and content. Since the majority of vessels one encounters on the shortwave bands are fishing-related in nature, we will confine our examination of message content to these vessel types.

1) RY Hailing Marker

The start of any transmission usually begins with a one or two minute RY marker from the calling vessel to the shore station.

RYRYRYRYRYRYRYRY UDK2 UDK2 DE ERBY ERBY

There is no guarantee that the vessel's call sign will be repeated once the hailing marker has terminated. The majority of vessel traffic is addressed to their home port.

2) Initial Header Line

Prior to the start of transmission, you usually will be able to hear the vessel idle on space for about 30 seconds while the radio operator removes the hailing tape.

The initial header line contains the vessel type and name, the three-letter designation for the shore station called and may optionally contain a message number, date and time. An example appears below.

FM BMRT GUEFEST MRM/MRH 155 5/20 1600=

FM	From (optional)
BMRT	Vessel Type (Stern Factory Fishing Trawler)
GUEFEST	Vessel Name
MRM	Three-letter shore station designation - Murmansk
/MRH	Addressee Code - Ministry of Fisheries
155	Number of characters in the message
5/20	Message Month/Day
1600	UTC Message time
=	End of message line

If the vessel is establishing contact with the shore station for the first time today, it usually will give details about its position, course and other details related to its voyage or route.

It may also provide the shore station with high seas weather condition reports. For vessels operating in Atlantic waters, many of these reports to Russian ports eventually filter their way back to CFH - Canadian Forces Halifax marine weather broadcasts. The key word to watch for is PAGODA (*weather* in Russian) and you will often see the words ZONA KANADY in the transmissions of fishing vessels operating in international waters off the coast of Canada. All too often the word WOLNENIE (*rough seas*) appears.

Fishing vessels may next transmit a whole series of lines with multiple number columns. These lines refer to fishing catches, hold weights, etc. If you missed the vessel call sign during the transmission of the RY hailing marker, it is usually repeated in the first line of the fishing catch numbers.

3) Personal Telegrams

Personal telegrams from the ship's crew to relatives and friends back in the former Soviet Union constitute the greatest amount of traffic transmitted on RTTY circuits. Many transmissions from Soviet vessels are limited to telegrams only, with none of the previously mentioned message content.

Telegrams always follow a set format. They begin with the vessel's header line, the address and the last name of the addressee, the actual message itself, the name of the sender and an end of message marker.

Addresses in the Soviet Union tend to be quite long as well as colorful. The following is a typical translated example: 232070 ODESSA, KOSMONAUT SQUARE 29, BUILDING 1, APARTMENT 34.

No less colorful is the actual content of the telegram itself. The Russian language is given to phrases of endearment. A telegram to Kapitan Peter Ivonovich Demko from a colleague or subordinate would refer to him as KAPITAN PETR DEMKO. If the telegram was from his mother, the salutation would probably still be MY LITTLE PETENKA.

Opening phases such as MENYA WSE NORMALXNO (*All is well with me*) are commonplace. Typical ending phases include KREPKO CELU (*I kiss you warmly*). The sender may use an endearing form of his first name for messages to loved ones, and you will often see the diminutive form for Papa - PAPOCHKA.

The letters NNNN (*HHHH* in Cyrillic) signify the end of each telegram.

4) End of Transmission Message

The message sent by the vessel's radio operator at the end of traffic transmission can be in Russian or more commonly may use standard English radioteletype codes and phrases. Consider the following example.

MNI TKS DE UTIH PLS QSL??
(*Many Thanks From UTIH Please Confirm Reception*)

Soviet coastal stations use both RTTY and SITOR. RTTY is normally sent at 50 Baud, 170 Shift. When communicating with individual vessels, they use SITOR A. SITOR B is used for traffic lists and weather reports. Fishing vessels normally only use RTTY, while cargo and merchant fleet vessels generally broadcast in SITOR-A.

If you haven't tried your hand at monitoring Soviet maritime traffic, don't you think it's time you started, Továrishch?

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Nigerian Clandestines Proliferate

Nigerian Advocacy Group for Democracy and Human Rights (NAG-DHR), which sponsored R. New Nigeria via Germany until early this year, started a new service shortly after the sudden death of Sanni Abacha—Radio S.N.B.S., the Save Nigeria Broadcasting Service, via WGTG 9400, Sat 1930-2000; HQ in Boston; see **http://www.nagdhr.com** (*World of Radio*)

Egbe Omo Yoruba (Association of Yoruba Descendants Worldwide) announces the debut of the Voice of Oduduwa, *Ijinle Ohun Oduduwa,* radio programs for the advancement of Yoruba autonomy. The radio will be the authentic voice of Yoruba people, to galvanize all Yorubas including those abroad. Consequently, the radio broadcast will not only be directed to Nigeria, it will be received in North America, Europe and all of Africa, Mondays 2100-2200 on 15460 [WHRA]. Egbe Omo Yoruba, Yoruba House, 7600 Georgia Avenue NW Suite 405, Washington DC 20012. 202 291-9471; 202 291-9473 fax; e-mail: *info@yorubanation.org* URL: **http://www.yorubanation.org** (Banji Ayiloge, National General Secretary, via Hans Johnson, *Cumbre DX*)

I made a point of monitoring the first broadcast of Voice of Oduduwa in mid-June, though I never heard any such ID, Mon at 2100 on WHRA 15460. Reception was very good, and probably has a good chance of getting into Nigeria, though one always wonders what fraction of the rated 500 kW is actually being used. Opened with talking drums, then mix of talk in presumed Yoruba (only?) and music, with speakerine sometimes breaking into song; only English were mentions of "shortwave 15.460"; 2113-2123 English segment, with someone actually bemoaning "appointment of a new dictator"; and various English speakers from a rally, poorly recorded and edited, invoking god. 2123 back to Yoruba; 2126 a bit more English with anti-Abacha comments, and the rest in Yoruba almost until 2200; no closing of program as WHRA went into frequency-change announcement to 13760 (gh)

Joe Brashier of WHR informs that complete sked is now 2100-2200 on 15460, Mon in Yoruba, Wed in Igbo, Fri in Ijaw (Hans Johnson, *Cumbre DX* Special)

R. Nadeco dropped its weekday broadcasts via WWCR at end of May, replaced by weekly Wed 1930-1945 on 15685, Sun 0800-0815 on 5070 (*Ask WWCR*) 0800 would not propagate to Nigeria (gh)

AFRICA [non] Radio Democracy for Africa, first announced by President Clinton on March 28 while in Botswana, is preparing to begin production soon. A USIA spokeswoman told *CRW* in early June that the agency was still waiting for Congress to approve legislation that will begin the service and that depends upon the congressional agenda. Nevertheless, USIA and VOA are ready to start and already have people in place to produce program ing in French, Amharic, and Arabic. Staff for other services will be pooled from personnel, which maintains a rolling resume index. "As soon as we get the green light," she says, "we will go." (*Clandestine Radio Watch*)

AUSTRALIA At the mid-May crisis in Indonesia, R. Australia expanded Indonesian at the expense of English, Vietnamese and Standard Chinese, since it had no additional funding, with a morning broadcast at 2130-2400 on 11695, 15415 (Nigel Holmes, RA)

BAHRAIN Wakh is an acronym of *Wakalat Anba al-Khalij* ("Gulf News Agency"), the agency's title in Arabic. In the past it was often referred to as GNA. Wakh/GNA was set up in 1976 by Arab Gulf states as a public corporation to report news concerning these countries. It began in 1978. Times and frequencies vary. The agency often does not start sending items until well after the nominal start of transmissions. Alternative frequency: 4043 kHz. Wakh still announces an English cast 1500-1700, and an Arabic cast 1700-2100; however these have not been heard since January 1997. Address: PO Box 5421, Manama, Bahrain. Tel: +973-682962/687007; Fax: +973-687008; Telex: 9030 URL: **http://www.gna.gov/bh/** Daily 0500-1500 in Arabic, radio-teletype, F1B, 75 baud to ME on 14764v, 9197v (BBC Monitoring)

CANADA Summer changes on CBC and RCI: *This Morning, The Sunday Edition* cut back to two hours, replaced at 1505-1600 on 11855, 13650 by *Peter Gzowski in Conversation with Remarkable Canadians;* comedy block UT Sun 0204-0259 on 13670, 9755 occupied by *The Vestibules* and *Summer Comedy Comedy Summary* (*Review of International Broadcasting*)

[non] R. Asia Canada, the Tamil service without a station of its own in Toronto, added a news hour in English at 2100 on 15560 (Jay Novello, NC) Also heard testing on 15625 during this hour, but not the next day. About the Tiger movement, goals, plans in the fight in Sri Lanka (André Schmidt, WI, *World of Radio*) 6-day test was via Merlin, UK (Dave Kenny, British DX Club) RAC via DTK Germany until Oct 25: Sa/Su 1800-1959 17530; daily 2000-2059 15560, 2200-2359 11975, 0000-0159 9560, 0200-0359 9700 (via Wolfgang Büschel) 9700 clashes with us (R. Bulgaria) RAC moved that to 9405 (Ivan Grishin, *Review of International Broadcasting*)

CHILE R. Voz Cristiana, 21550, tested demo tape of morning magazine show *En Compañía* at 1300, with segments faded out and repeated; including F-only sample temps for Asunción. Sounds ambitious, with lots of segments aimed at women, such as *La Mujer de Hoy en América Latina* (gh)

CUBA [non] Ex-R. Havana Cuba staffer Keith Perron now works for CBC domestic radio in Toronto (Maryanne Kehoe)

DOMINICAN REPUBLIC R. Cima Cien reactivated after four years, on 4960.1 around 0100 (Michael Schnitzer, Germany, *hard-core-dx*) 2232-2317* with enthusiastic announcer, merengues, much better audio than R. Cristal, 5018.3 at same time (Jay Novello, NC)

INDONESIA RRI, 15125, domestic service Programa Ibukota Satu had English on a Sunday at 0507-0600 as "Metropolitan English Service of RRI Jakarta," including 0530 news, 0540 *UN Calling Asia* (Juichi Yamada, Japan, *Jembatan DX*)
Indonesian president Dr B.J. Habibie lifted a law to allow private radio stations to produce and broadcast their own news and in doing so, may be signalling the end of a useful DX tool: RRI top-of-the-hour national news. Calls for autonomy are increasing among the outer islands, especially in Sulawesi, Sumatra, the Moluccas and Irian Jaya, which if realized may result in local competitive news broadcasts on all stations - including RRI (Nick Grace, *Cumbre DX*)

INTERNATIONAL VACUUM [and non] World Radio Network has started putting up our new *World of Radio* on the Sound Store a day earlier, Friday as early as 1000 UT; **http://www.wrn.org** (gh)

INTERNATIONAL WATERS [non] The *Electra* project was built for a preacher in Texas, who will probably have most of the airtime. In April the ship started down to the Caribbean from Boston, but some problems prevented it leaving U.S. waters for the high seas. No firm details on the power or frequency - I think it's at least 10,000+ watts. The ship has an SSB transmitter that can be used for other broadcasts once the ship has reached its destination (Anita McCormick, *NU* via BDXC *Communication*) Stopped in Savannah, GA, for some last-minute repairs, destination St. Kitts? (Chris Lobdell, NASWA *Journal*)

IRAQ On 9714.5, Mother of Battles Radio, 1710-

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.

1857*; ID 1715 by a woman in Arabic *Iza'at Um al-Ma'rik, Iza'at Kol al-Arab* (This is Mother of Battles Radio, The Voice of All Arabs). News at 1730 (Saladin K. Fathi, Egypt, *Cumbre DX*)

[non] Pres. Clinton put into force the new "1998 Supplemental Appropriations and Rescissions Act" in mid-May, containing $5 million for RFE/RL Radio Free Iraq broadcasts. Also a further $5 million for activities of various Iraqi "democratic opposition" movements in "dissemination of information." The whole text of the new law is at: **http://www.iraqfoundation.org/news/1998/May/13_HR3579.html** (Mathias Kropf, Germany, *BC-DX*)

ITALY A letter from E. Gysin-Ruf from AWR's listener mail department, says: "Now the first phase of the work for Argenta has started. AWR can get three transmitters as well as some other equipment from a Swiss shortwave station in Schwarzenburg. Unfortunately this had to close and so the installations are sold. For our technicians this means a huge job. The transmitters must be documented, dismantled and packed for transportation to their new home in Italy. The technicians gladly accept this challenge and are already looking forward to the day when they can install them in Argenta." (via Tony Vaughan, BDXC-UK)

KAZAKHSTAN R. Almaty International's strange schedule in English entirely as monitored: Tue 1140-1200, Wed 1120-1140, Fri and Sat 1100-1120 on 9505, and via Ukraine on 11720, 9620. Also IDs as "the international radio service Eurasia" (BBC Monitoring)

KURDISTAN Harim Radio, V. of the Regional Government of Iraqi Kurdistan, 1500-1600 daily in Kurdish, Arabic on 4085v. R. Freedom, V. of the Communist Party of Iraqi Kurdistan, daily 1500-1600 in Kurdish on 3905v. R. Kurdistan, V. of the Kurdish Socialist Democratic Party, daily 1500-1700 in Kurdish/Arabic on 4135v (BBC Monitoring)

MONGOLIA New station was set up in December in a very small village in the Gobi Desert, about 150 km south of Saynshand, the capital of Dornogov Province, or 109.5E 43.7N. Transportation through the desert was quite difficult since there is no real road to the village, but they successfully got the transmitter there, and installed it. A small production studio has been established, so the Hovsgol district has now local radio of its own on 4790. Time is uncertain, due to lack of fuel to the generator, but schedule calls for two hours of program every evening (Ludo Maes, Belgium, Transmitter Documentation Project, via *Cumbre DX*)

V. of Mongolia in English: 1210-1240 Au 12085; 1430-1500 As 12085, 9720; 1830-1900 Eu 12085, 9720 (BBCM)

MYANMAR R. Myanmar, English at 0200-0250 on 7185, 0700-0830 on 9730, 1430-1600 on 5986 is mostly inoffensive US pop music from the 1960s-1980s. Hope Diana Ross is getting the royalties. News at 0235, 0735, 1515 (Alan Davies, SE Asia, *BC-DX*)

NAMIBIA Joe Duwe, chief technician of NBC, says: Right now we use shortwave for the farmer community and other outlying areas not covered by FM. As we expand our FM network to cover 95% of the population, we will be closing down SW and MW. In fact, we have already started this on the latter, as we shut down 747 kHz at the beginning of May. As for shortwave, it probably has another five or ten years left. We have already operated our Harris shortwave transmitters for one sesquidecade, so they have already had a good life. Our current schedule is: 4965 0715-1700 and 3290 1700-2000 in German and Afrikaans; 4930 0715-1700 and 3270 1700-2000 in local languages. 3270 and 3290 both carry National Radio at 2000-0715. All transmissions are 100 kW (via Hans Johnson, *Cumbre DX*)

NEW ZEALAND RNZI announced briefly during news updates that RNZI's funding will be increased by $2 million a year. Looks like we won't have to worry about RNZI closing down, at least for the time being (Dave Jeffery, NY) Yes, indeed we seem to have a reprieve for a year at least, but funding reduced by 13% (Adrian Sainsbury, RNZI)

For an article I wrote about Arthur Cushen, see the April issue of the *Braille Monitor*, **http://www.nfb.org** (Tim Hendel, AL, *Review of International Broadcasting*)

NIGERIA Lawal Yusef Saulawa, Director of Programming for Voice of Nigeria, says: Voice of Nigeria has three operating transmitters right now, but we are only using two frequencies, 7255 and 15120. 7255 is for Africa and 15120 is for Europe and America. 15120 is a new transmitter from Thomcast that we have had for about a year (via Hans Johnson, *Cumbre DX*)

PERU R. Master, Moyobamba on new 5175 at 2210-2240, Mexican and Ecuadorian music (Rafael Rodríguez, Colombia, *World of Radio*) R. Norperuana, Chachapoyas, reactivated 9660, at 2200 and 1130 (Henrik Klemetz, Colombia, DSWCI *DX Window*)

RUSSIA Islamskaya Volna, Islamic Wave, Moscow, Tue-Fri 1500-1600 in Russian, and irregularly in Arabic and Tatar, on 11655, 9730, and after 1530 also on 7325, 6120. Same time and frequencies on Sat have V. of Assyria, Kala Aturaya; one hour later in winter (BBCM)

SA'UDI ARABIA BSKSA has English only on satellite at 1000-1300, but now has French on SW 0800-1000 15235 and 1400-1600 15290, 15170 (BBCM)

SERBIA See Hauser's Highlights in SW Guide

SINGAPORE The Singapore Minister for Information and the Arts recently announced that the R. Corporation of Singapore will unveil a new 24-hr news station in October this year. Plans have also been announced for a financial news station and an international station which would broadcast in French, German, and Japanese to serve the foreign communities in Singapore. The international station would depend on private sponsorship, as public funds are not considered appropriate. There is already a 24-hr newsroom, and the Minister was responding in parliament to a question on whether the government had plans to provide more radio services to enhance Singapore's position as an international financial centre. (*Straits Times* via Bob Padula, *Electronic DX Press*) Most of the existing services are also on SW, so perhaps this will be too (gh) See Hauser's Highlights in SW Guide for schedule.

SUDAN This radio station identifies itself as "the radio of the Voice of Liberty and Renewal, Voice of the Sudan Alliance Forces, Voice of the Popular Armed Uprising" (Arabic: *idha'at sawt al-hurriyah wa al-tajdid, sawt quwwat al-tahaluf al-sudaniyyah, sawt al-intifidah al-sha'biyyah al-musallahah*). It was first observed by BBC Monitoring on 7th May 1998. The Sudan Alliance Forces (SAF) are an opposition guerrilla army of ex-government northern soldiers, affiliated to the Asmara, Eritrea-based National Democratic Alliance (NDA), the main opposition umbrella group. URL (Sudan Alliance Forces): **http://www.safsudan.com**- 1600-1700 daily in Arabic on 7000v (BBC Monitoring)

SWITZERLAND At least part of the time, SRI is now carrying on SW a new service it has started primarily for domestic listeners, World Radio Switzerland, e.g. via Singapore 1100-1200 on 9810 (gh)

TIBET [non] According to Mr. Rimantas Pleikys, member of Lithuanian Parliament and member of the parliamentary group supporting Tibetan independence, People's Republic of China apparently started to jam broadcasts of Radio Free Tibet which are aired via Lithuania. Chinese programs of R. Free Tibet are broadcast since March 10th, 1998, via 50 kW SW station in Sitkunai, Lithuania, Mon-Thu 1300-1330 on 9710, beam 79 degrees.

Reports about audibility of this service (especially from DXers in Asia), as well as about level of interference caused by jamming are highly requested. Observations may be emailed to Rimantas Pleikys <riplei@lrs.lt>, or faxed to +370-2-224747. Rimantas Pleikys is a specialist in the field of jamming and is the author of the book *Jamming*, the first and only comprehensive book about the history of jamming. Check **http://www.is.lt/ratekona/jamming/** for further details about this book (Sigitas Zilionis, Lithuania)

Voice of Tibet was set up by the Oslo-based Worldview International Foundation in collaboration with the Norwegian Tibet Committee and other human rights groups. It commenced broadcasting on 14th May 1996. The broadcasts are aimed at Tibetan people both in Tibet and in neighbouring countries. In an interview, the editor-in-chief described the service as a "voice of the voiceless people." Voice of Tibet programs are produced in Oslo and Dharamasala (India) and were originally transmitted via FEBA Radio facilities in the Seychelles; however, more recently it has broadcast via hired transmitter facilities in Central Asia. Address: Voice of Tibet, Welhavensgt. 1, 0166 Oslo 1, Norway. Tel: + 47-2211-4980 Fax: + 47-2211-4988 URL: **http://www.vot.org** E-mail: *mail@vot.org* or *voti@online.no* Daily in Tibetan 0000-0030 on 9380, 1225-1300 on 15605 (BBCM)

TIMOR EAST [non] RDP International, Portugal, service to here keeps changing frequency: 17740 ex-17495 ex-17710 ex-17640 M-F 1105-1200 in Tetum, 1200-1300 Portuguese; and Sa/Su Port at 0700-0900 (Wolfgang Büschel, *BC-DX*)

UKOGBANI Merlin Network are soon to begin operations on a full time basis. Interviewed on Country Music Radio, Tom Woodford of Merlin mentioned launch of the full time service on August 14th - involving (amongst other things) a 'certain ship' and suggested people might like to avoid the Docklands area of London at that time as it will be 'somewhat packed' adding 'the best way to get to Docklands on that day will be by boat.' Merlin have, it is reported, numerous groups lined up wanting to air their programming via the network, which will appear all over the place: HF, Eutelsat, Sirius 2 (Astra ?) *and* MF [at times] (though it wasn't made clear whether MF would originate from the UK or elsewhere in the world).

There was also a mention of London RSL [restricted service licence, low-power FM for a month -gh] operations. It wasn't said whether the operation would be seven days or not. So, at long last the UK is about to get an official *independent* external voice in the world. Merlin are a facilities company, not a broadcaster in their own right. Any operation that is part of 'Merlin Network One' must already hold a current broadcast licence. It is *that* licence that controls such matters. To date, MNO1 has [in real terms] simply been a contract from Country Music Radio to relay their output on HF. So control over programme content was/is a matter for CMR and the terms of their licence. As to what happens when the service goes fulltime, I assume that Merlin will simply group several smalltime contracts under the same umbrella as 'MNO1' for ease of identity (Ray Woodward, British DX Club)

A 24-hour strike June 4 against BBC forced the World Service to substitue various feature programs for newscasts. A union was protesting plans to privatize its technical arm by transferring it to BBC Resources Ltd. (Reuters via David Alpert)

USA In a response to a reception report to World Radio Miami International of hearing *The Overcomer* program by Brother Stair from 0400 to after 0700 hours UT Sunday, WRMI sent this information. Brother Stair is using 77 hours per week of WRMI time (unless my math is wrong). I have not heard Brother Stair mention WRMI at all. His newspaper mentions WRNO, WWCR, the German station and several US broadcast stations (Thomas Dixon, *Review of International Broadcasting*)

Brother Stair's broadcasts via WRMI 9955 began in early May, now on the following schedule:

Monday-Friday	1300-2200
Monday-Friday	2300-0000
Tuesday-Saturday	0300-0400
Saturday	0500-1000
Saturday	1600-1900
Saturday	2000-2100
Saturday	2300-0000
Sunday	0300-1100
Sunday	1600-2000

(Jeff White, WRMI, via Dixon)

Bro. R. G. Stair hard on many new frequencies from Juelich transmitter site since mid-March: on 15625 at *1557-2059*; on 12050 at *2057-2359*; on 11910 from 0500; also on 7 or 8 others; he said his total airtime on all stations is now 68 transmitter hours daily; that was before he received a $1 million check from a listener (a young man in his 20s) on April 20, all of which will be used to buy more airtime. Stair says he has sent out more than 10,000 SW portables to listeners in the last 5 years (Ernie Behr, Ont., *World of Radio*) B.S. via Deutsche TeleKom to 25 Oct.:

kHz	UT on	UT off	Target	deg	days
15625	1500	2059	7-9	295	1234567
13810	0600	0959	55,59,60	260	1234567
15715	1000	1259	55,58,59	080	1234567
6130	1600	1759	27,28	ND	1234567
13810	1400	1759	29,38,39	115	1234567
9800	1800	1959	52,53,57	160	1234567
5900	1000	1159	27	ND	17
12050	2100	2359	12,13	260	1234567
11625	2100	2359	13,14	240	1234567
12055	1800	2059	39	120	1234567
15625	1300	1459	50	060	1234567
17505	1000	1159	50	240	1234567
15735	0600	1359	39,40	115	1234567
3945	2000	0659	27,28	ND	17
3945	1800	0659	27,28	ND	23456
9510	2100	2359	39,40	115	1234567
9500	0000	0359	39,40	115	1234567
11910	0400	0559	39,40	115	1234567

(DTK via Wolfgang Büschel)

KA2RAF, Chris, sent three e-mails to Brother Stair complaining about the use of 3945, and received the following responses, reproduced verbatim [and unedited! -gh]:

1st response: "The station is not a pirate station and it has been cleared to run from one of the most respected station in germany and the target is europe. That is the truth and it it is not illegal. Amazin but many of the ham operators tell me that this 3.945 has many that mocks god and they are happy that the Overcomer does come in. I will pray for you. The jamin does me no harm as as I say the target is europe and it comes in loud and clear there. The Overcomer. Jesus is coming and what a time to be caught messing with a ham radio."

2nd response: "We are broadcasting t Europe on that very good and cleared frequnciery. I am not nterfereing with any one. Let them hear or change. This is paid broadcast that is being done with and from a german station that uses that frequncery much. I am responding to you a a christin and a ham operator whay do you not want the word of God heard even among many on that band that reject God and truth."

3rd response: "Not tryingto save souls and The target is from Germany with a undirectional atn and the target is Europe and what is wrngwith you that you did not read you manuel on Ham radio requirments.. You are to move if the band is used by a commercial broadcaster. We are not trying to reach the US with this and do not expect any resutls but just this money recived a good letter from some one that sis hear and gave a offering. Glory to God. Did you say you were a christian? --- RG Stair overcomer@lowcountry.com"

As a ham, an SWL, and someone who thinks there are already WAY too may religious operations on shortwave, I have registered my objections to this operation with the German telecommunication authority. Should you wish to do the same, address and email follows (Al Quaglieri)

Regulatory Authority for Telecommunications and Posts (Reg TP) Office address: Heinrich-von-Stephan-Str. 1, 53175 Bonn, Federal Republic of Germany. Postal address: Postfach 80 01, 53105 Bonn, Federal Republic of Germany. Fax +49 228 14-8872; Telephone +49 228 14-0; E-mail: poststelle@regtp.de (via NASWA *Listeners Notebook*)

I was also surprised to hear Brother Stair on 3945. Deutsche Telekom has departed from its traditional conservatism in frequency selection. As was rightly pointed out, 3945 is not allocated to broadcasting in Region 1. 3945 is particularly touchy, because the nearby 3943.5 has been reserved for the French military, and NATO activity has also been noted close by. I recall that IRRS Milan tried using 3945 under a loophole in the ITU regulations (like BBC 9410 does) many years ago, but was jammed heavily as a not-too-subtle invitation to get off! So far, DTK has been getting away with it, so one assumes that some sort of understanding has been reached, no doubt helped by the substantial dollars/marks flowing in from Brother Stair! As for the ham radio protests, I'm afraid B.S. is technically right: the amateur service has no claim to 3945 in Region 1. On the bottom line, according to ITU agreements, DTK/Brother Stair may continue to occupy 3945 unless higher priority services officially complain within 30 days. I don't think this will happen (Bob Zanotti, Switzerland, *Review of International Broadcasting*) 3945 is officially allocated to the aeronautical service in Region 1 (Larry Van Horn, *MT)*

World of Radio on WWCR: Thu 2030 15685, Sat 0600 3210 and 5070, Sun 0630 and 0930 on 5070, Tue 1230 15685. For latest full schedule on all stations see **http://www.angelfire.com/ok/worldofradio**

The Estate of Joe Costello has been taking bids in the auction of WRNO. It got a $100K bid, but did not accept it. However, considering the state of the facility, they may not get much more for it. Brother Stair is reported to be interested (George Thurman, *World of Radio*)

The President of EWTN, Rev. Wm. Steltemeier, has demanded a retraction of four points made in the lead item in our April column, *More Catholic than the Pope?* Most of the material came from a dissident Catholic periodical, as attributed, and it is not for us to debate or retract those theological issues. Author of our item, Owen Williamson, however, does apologize for saying "[Mother Angelica] owns WEWN/EWTN in her own name." What he meant to say was, "the nun appears to act as though she owns WEWN/EWTN in her own name."

VOA *Communications World*, new schedule as part of *News Now* format, UT Sats, in three nine-minute parts, recommends these in the mornings: "A" segment (media news) at 0136 on 5995 6130 9455; at 0536 on 6035; at 1136 on 9770. "B" segment (longer reports and interviews) at 0336 on 9575; at 1336 on 9760; at 1936 on 15580; "C" segment (audience feedback or more reports) [none] (Kim Andrew Elliott, VOA *Communications World*) Catching "C" will be the challenge in NAm (gh) Hope to get the 2136 segment back on the Af service, and then it will be heard in NAm too (Elliott)

ZAMBIA Edward Mwanza, Radio Zambia's Director of Engineering, says: Our large cities are covered by FM, provincial towns by MW, and other districts by shortwave. We have stopped using 7220 and 7235 because with our new transmitters their skip zone was too large, some 300 km. We are also having problems of interference with a private station here, Christian Voice, so we cannot use lower frequencies for the moment. We have two transmitters, each 100 kW that are allocated as follows- 6165 English (Radio Four) 0300-2210; 6265 Local (Radio Two) 0300-2210. These are daytime frequencies and we are having problems providing good reception at night. We have appealed to the authorities to deal with the interference problem (via Hans Johnson, *Cumbre DX*)

ZIMBABWE Cloud Nyamundanda and Sam Barrbis, engineers with ZBC, say: We use shortwave to fill in pockets not covered by FM. We operate as follows for the moment: 4828 at 0300-2200 Radio Four (We got a directive from management to keep this fixed on this frequency); 3306 at 0300-0530, 5012 at 0530-1630, 3306 at 1630-2200 Radio Two. We use two 100 kW transmitters, but we are operating them at 50 kW so that they will last longer. These are the only transmitters we have. We may be making seasonal changes to improve reception, such as 5975, 6020, 6045. As for Radios One and Three, they are on FM only (via Hans Johnson, *Cumbre DX*)

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

Broadcast Loggings

GLOBAL FORUM

Gayle Van Horn

0000 UTC on 6010
ITALY: RAI. Italian. Program of easy-listening tunes, // 9575, 11800 kHz. (Bob Fraser, Cohasset, MA)

0020 UTC on 9900
EGYPT: Radio Cairo. English newscast for national and world topics. Swiss Radio's interval signal disrupting signal quality. (Howard Moser, Lincolnshire, IL) Egypt's **Voice of the Arabs** at 1900 on 15284.93. (Nikolai Pashkevich, Russia/*Cumbre DX*)

0030 UTC on 15395
THAILAND: Radio Thailand. Thai music and cultural program to world news and national business report to stock market and sports update. (Moser, IL)

0030 UTC on 3391.24
BOLIVIA: Radio Camargo. Spanish to 0125* with poor signal quality, making it to Florida almost every other day. Bolivia's **Radio Santa Ana** heard on 4649.07 at 0003; **Radio la Palabra** heard on 4732.22 at 0000-0018. (Robert Wilkner, FL/*Cumbre DX*)

0118 UTC on 15450
PHILIPPINES: FEBC. Weak and fluttery signal for English programming. Fair signal quality, not getting out as well as it should for an aerial transmitter. (Paul Ormandy, Oamaru, New Zealand) Religious text and music on 11634.97 at 1019. (Al Quaglieri, Albany, NY)

0139 UTC on 9925
GERMANY: Croatian Radio. News in English read by woman to 0142. Part of re-release transmission via Deutsche Telekom transmitter at Juelich. Otherwise unnoted, except English news read at the half-hour in addition to the usual one-hour segments to North America. Noted again at 0238. (Mark J. Fine, Remington, VA)

0230 UTC on 6726
PERU: Radio Satelite. Spanish. Clear signal though weak with plenty of IDs and Andean music to 0256*. Peru's **Radio Unión** 6115 at 0721. ID as "saludos a nuestros amables oyentes, gracias por su sintonía." (Ormandy, NZ/*HCDX*)

0320 UTC on 9655
TURKEY: Voice of. English news on Turkisk/Greek border relations. (Moser, IL) *Turkish Album* at 2215 on 7190. (Fraser, MA)

0332 UTC on 9475
SWEDEN: Radio Sweden. Volvo restructuring to news of Russia admitting to high radiation level at naval base. (Moser, IL)

0434 UTC on 6000
CUBA: Radio Habana. Frequency quotes to music bridge and discussion on national economy. Local folk tunes to chat on agriculture, to ID at 0447. (Giovanni Serra, Rome, Italy/*The Four Winds)*

0515 UTC on 9525
SOUTH AFRICA: Channel Africa. Discussion on national immigration problems. Report on malaria, economics and item on realignment of telephone service heard on 11900 at 0617. (Moser, IL)

0600 UTC on 7125
GUINEA: Radiodiffusion-Television Guineenne. French. Guitar interval signal to sign-on. Program line-up and brief commentary. Afro pops from 0615, no sign of // 6155. **BBC** dominated 6155 to 0615*. (Harold Frodge, Midland, MI)

0825 UTC on 17835.15
PAKISTAN: Radio Pakistan. Programming in Urdu to announcer's talk and identification with mentions of Islamabad. Asian music to continued Urdu programming. (Serra, Italy/*TFW*)

1030 UTC on 5965
CANADA: BBC World Service relay. *Omnibus* program featuring story on the Underground Railroad, the American slave escape route. (Fraser, MA; Tom Banks, Dallas, TX)

1118 UTC on 5020
SOLOMON ISLANDS: SIBC. Fair signal for BBC World Service news relay to 1130. Gospel music and programming. (Frodge, MI)

1159 UTC on 11939
CAMBODIA: Voice of Cambodia. Sign-on tone to music and station ID in English. Modulation was fair and nowhere near as strong as the carrier and tone would have suggested, no news this day. (Ormandy, NZ/*HCDX*)

1228 UTC on 15530
FRENCH GUYANA: Radio France Intl relay. *Club 9516* with David Page in Cannes. (Fraser, MA) **RFI** noted on 21765 at 2130-2150 in French. (Jim Evans, TN/*Cumbre DX*)

1303 UTC on 9945
CHINA: China Radio Intl. World news to 1310, to *News About China* and *Current Affairs* editorials on Asian financial crisis. (Frodge, MI)

1640 UTC on 7295
MALAYSIA: RTM-Radio 4 (tentative). Non-stop pop music to Celine Dion's *Titantic* theme song. Two tone time signal to English newscast, no ID noted. (Mark Veldhuis, Borne, Netherlands, *Hard Core DX*)

1718 UTC on 7295
MALAYSIA: RTM Radio 4. Tentative logging for lady announcer's English phone calls. Easy-listening tunes at 1725, tentative ID with fair signal. (Veldhuis, NLD/*HCDX*) **Radio Malaysia**-Kota Kinabalu on 5979.42 at 0928, with pipe music and regional language text. (David Norrie, New Zealand/*Cumbre DX*)

1734 UTC on 17655
BELGIUM: Radio Vlaanderen. *Brussels Calling* program covering the royal visit to Italy, business mergers update and the opening of a Japanese plant in Brussels. (Albert M. Byrnes, Hanahan, SC)

1745 UTC on 3306
ZIMBABWE: ZBC. Afro pops, male DJ in vernaculars at 1751, followed by lengthy talk about Harare. Instrumentals at 1800 to ID format. Best to monitor in LSB (lower sideband). English "Voice of Zimbabwe" at 1804 to sports and news to 1810. (Veldhuis, NLD/*HCDX*) ZBC on 5012 at 1534 with IDs and time check. (Piet Conradie, S. Africa/*Cumbre DX*)

1756 UTC on 5066.3
CONGO: La Voix du People. French. African pops to sign-off at 1800, no national anthem but ID audible. (J.B. Schlosberg, Stutgart, Germany)

1807 UTC on 4965
ZAMBIA: Christian Voice. English religious text to gospel tune. ID at recheck 1853. Reactivated frequency. (Veldhuis, NLD/HCDX; Liangas, GRC/*HCDX*)

1809 UTC on 21550
CHILE: Radio Vision Christiana. Religious pop tune to full Spanish ID at 1810. (Frodge, MI)

1813 UTC on 4885
KENYA: KBC. English ID to time check and *Sports Roundup* show. Station noted on 4914, 1829-1852 off frequency and slightly overmodulated. Nice Afro music to 1852 identification. (Veldhuis, NLD)

1818 UTC on 11954.7
ANGOLA: Radio Nacional de Angola. Tentative logging of Portuguese programming with good signal to 1830 when VOA signed on 11955. (Veldhuis, NLD)

1915 UTC on 15650
ISRAEL: Kol Israel. Feature on 50 years of Israel radio. (Fraser, MA)

1955 UTC on 11540
CLANDESTINE: (Nigeria) Radio Kudirat. English commentary on human rights to news of planned demonstration in Lagos, national anthem to 2001*. (Frodge, MI)

2049 on 6060
ITALY:RAI-Radio Uno. Home service programming in Italian with chat and lite music tunes. (Ormandy, NZ)

2129 UTC on 11775
ANGUILLA: Caribbean Beacon. Interference from Brazilian station on 11780; Dr. Gene Scott sermon with French interpreter to abrupt 2200*. (Frodge, MI)

2138 UTC on 5020
NIGER: LV du Sahel. Tentative logging for French phone calls and regional music. Drums/flutes signal at 2150 into news format, chants and choral anthem at 2154. (Frodge, MI)

2243 UTC on 15135
BRAZIL: Radio Record. Portuguese sports program to brief instrumental breaks. Much talk of Sao Paulo and soccer. // 9505.9 (Frank Hillton, Charleston, SC) Brazil's **Radio Educacao Rural** heard on 4755 at 0100 with IDs and national news. (Sam Wright, Biloxi, MS)

2250 UTC on 3270.06
NAMIBIA: NBC. Fine signal with nice pop music program to IDs. (Veldhuis, NLD)

2358 UTC on 9855
GERMANY: Radio Vilnius. Good signal in English to closedown just prior to 0100. No sign of Rainbow Radio. Thanks for Glenn Hauser's tip. (Ormandy, NZ/*HCDX*)

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.

Gayle Van Horn, gayle@grove.net

Where in the World Is...

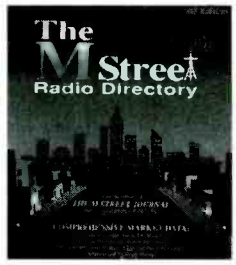
It is a typical hot and humid August afternoon. As you tune through the FM broadcast band (88.1-107.9 MHz) you hear a station playing adult contemporary music on 102.7 MHz.

Then it occurs to you that you aren't listening to the usual country station you hear locally when suddenly a commercial for Murphy's Main Street Burgers pops up! Next comes an announcement for an auction in Brasstown!

Brasstown certainly rings a bell, but where in the world is Murphy?

If you had the new eighth edition of *The M Street Directory* you could find out by checking the by-frequency section of station listings.

Within the book's 957 pages are feature articles, FM and AM stations by call letters, frequencies, and those all-important station addresses (indispensable if you want to get a QSL!).



Each broadcast station listing has detailed information on the station power, format, station personnel and other information that AM/FM broadcast bands listeners will find extremely useful. As a "plus" the book also has listings for Canadian stations by province, market, call letters and by frequency.

This excellent reference is available through Grove Enterprises. The new *M-Street* costs $48.95 plus shipping. Order BOK#53-97.

Oh, by the way, the station on 102.7 MHz is WCNG in Murphy, North Carolina ... a mere five miles from *MT* headquarters in Brasstown. The auction mentioned in the ad? Led by our own auctioneer, Bob Grove, of course!

FM

CBW-FM 98.3 MHz. Full data CBC/Radio Canada Winnipeg map card signed by J. Campbell-FM English Network. Received in two years for an FM report and mint stamps. Station address: CBC Regina, 2440 Broad St., Regina, SK Canada S4P 4A1. (Robert S. Ross, London ON Canada/*AmFmTvDx*)

CKWR-FM 98.5 MHz. Full data prepared QSL card signed by Scott, plus program schedule. Received in one month for an FM report and mint stamps. Station address: 56 Regina St. North, Waterloo, ON Canada N2J 3A3. (Ross, CAN)

KPLV-FM 93.3 MHz. Full data prepared QSL card signed by Bob Woodman, plus bumper stickers. Received in three weeks for an FM report and mint stamps. Station address: Box 3487, Victoria, TX 77903. (Ross, CAN)

WAYK-FM 88.3 MHz. Full data prepared QSL card confirmed, plus reply on station letterhead from Elliot Booker-Chief Engineer. Received in one month for an FM report and mint stamps. Station address: 161 East Michigan Ave., Suite 600, Kalamazoo, MI 49007. (Ross, CAN)

WDPR-FM 89.5 MHz. Full data prepared QSL card signed by William L. Combs- General Manager, plus program schedule. Received in one month for an FM report and mint stamps. Station address: Dayton Public Radio Inc., 126 North Main St., Suite 110, Dayton, OH 45402. (Ross, CAN)

WMBP-FM 91.9 MHz. Full data prepared QSL card signed by Jeanene Hunt and station stickers. Received in two weeks for an FM report and mint stamps. Station address: Christian Family Radio, 2411-1/2 Washington Blvd., Belpre, OH 45714. (Ross, CAN)

WQLB-FM 103.3 MHz. Full data prepared QSL card signed by John Carroll, plus a bumper sticker and keychain/bottle opener souvenir. Received in three weeks for an FM report and mint stamps. Station address: P.O. Box 549, Tawas City, MI 48764-0549. (Ross, CAN)

WXYV-FM 102.7 MHz. Full data verification on station letterhead signed by John Trimmer, plus station stickers. Received in 30 days for an English FM report. Station address: 1829 Reistertown Rd., Suite 420, Baltimore, MD 21208. (Jose Moura, Washington, DC)

MEDIUM WAVE

CJTN-AM 1270 kHz. No data verification on station letterhead signed by Bob Rowbotham-Station Manager. Received in twelve days for an AM report and a SASE. (self-addressed stamped envelope) Station address: 31 Quinte St., Box 9, Trenton, ON Canada K8V 5R1. (Harold Frodge, , Midland, MI)

CMQ/Radio Rebelde-AM 670 kHz. No data QSL folder and letter signed by Marisel Ramos Soca-Public Relations, plus a station 40th anniversary poster. Received in 133 days for a Spanish AM report and no return postage. Station address: Apartado 6277, 10600 Habana, Cuba. (Randy Stewart, Springfield, MO)

KGIL-AM 1650 kHz. Full data station QSL card unsigned. Received in three months for an AM report and mint stamps. Station address: P.O. Box 250028, 1500 Cotner Ave., Los Angeles, CA 90025. (Terry Jones, Plankinton, SD)

KGXL-AM 1650 kHz. Full data station card unsigned. Received in 81 days for an AM report and mint stamps. Station address: 1500 Cotner Ave., Costa Mesa, CA 90025. (Mike Hardester, Jacksonville, NC)

KRLD-AM 1080 kHz. Full data verification letter signed by Erik Disen-Director of Engineering and Facilities. Received in seven days for an AM report and mint stamps. Station address: 1080 Ballpark Way, Arlington, TX 76011. (Stewart, MO)

KTXA-1150 AM kHz. Verification letter signed by Mike Callaghan-Chief Engineer KXTA/KIIS-FM. Received in 8 days for a taped report. Station address: 3400 Riverside Dr., # 800, Burbank, CA 91505. (Patrick Martin, Seaside, OR) Medium wave QSL # 2481!

KYIZ-AM 1620 kHz. Confirmation letter on KRIZ/KZIZ letterhead signed by Frank P. Barrow-Program Director, plus bumper sticker. Received in 18 days for an AM report and one U.S. dollar. Station address: 2600 South Jackson, Seattle, WA 98144-2499. (Patrick Griffith, Denver, CO)

Radio Sport-729 AM kHz. Partial data letter signed by John Howson-General Manager. Received in 18 days for a taped report. Station address: P.O. Box 3526, 54 Cook St., Auckland, New Zealand. (Martin, OR)

Virgin Radio-1215 AM kHz. No data letter signed by Alex Lakey, stating they do not issue QSL cards; however, did include a station postcard. Received in three months for an AM report and currency (not returned). Station address: Virgin Radio Ltd., 120 Campbell Rd., London, England W87AR. (Ross, CAN)

WBCO-AM 1540 kHz. No data verification on station letterhead signed by Frank Telakowicz-Program Director. Received in five days for an AM report and an SASE. Station address: 403 East Rensselaer St., P.O. Box 1140, Bucyrus, OH 44820. (Frodge, MI)

WPHG-AM 1620 kHz. Oversized frequency only card with multiple signatures. Received in 21 days for an AM report, mint stamps and an address label (not used on reply). Station address: c/o Maranatha Ministries, 805 North Main St., Atmore, AL 36502. (Hardester, NC)

WTAM-AM 1100 kHz. Full data verification letter signed by K.M. Hagan-Programming Assistant. Received in seven days for an AM report and mint stamps. Station address: 1468 W. 9th St., # 805 Cleveland, OH 44113-1220. (Stewart, MO)

How to Use the Shortwave Guide

1: Convert your time to UTC.

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

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

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

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

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

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

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

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

The frequency listing uses the same day codes as the program listings; if a broadcast is not daily, those day codes will appear before the station name. Irregular broadcasts are indicated "tent" and programming which includes languages besides English are coded "vl" (various languages).

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

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

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

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

SWL Programs

Compiled by Jim Frimmel

Sundays

0023 Radio Exterior de Espana: "Distance Unknown"
0030 BBC (as): "Write On"
0109 HCJB (am): "DX Partyline"
0123 Radio Exterior de Espana: "Distance Unknown"
0130 Radio For Peace Intl: "Continent of Media"
0200 WWCR #3 (Tennessee): "Spectrum"
0200 Radio For Peace Intl: "World of Radio"
0234 Radio Havana Cuba: "DXers Unlimited"
0247 Radio Bulgaria: "Radio Bulgaria Calling"
0258 Vatican Radio: "On-the-Air"
0305 Australia, Radio: "Feedback"
0323 Voice of Turkey: "DX Corner (biweekly)"
0409 HCJB (am): "DX Partyline"
0430 WHRI (Angel 2 Indiana): "DXing with Cumbre"
0508 Vatican Radio: "On-the-Air"
0523 Radio Exterior de Espana: "Distance Unknown"
0530 Australia, Radio: "Media Report"
0600 KWHR (Angel 3 Hawaii): "DXing with Cumbre"
0630 WWCR #3 (Tennessee): "World of Radio"
0634 Radio Havana Cuba: "DXers Unlimited"
0730 KWHR (Angel 4 Hawaii): "DXing with Cumbre"
0730 WHRA (Angel 5 Maine): "DXing with Cumbre"
0735 Radio Vlaanderen Intl: "Radio World"
0830 Radio For Peace Intl: "Continent of Media"
0830 WHRI (Angel 2 Indiana): "DXing with Cumbre"
0836 Radio Korea: "Multiwave Feedback"
0900 Radio For Peace Intl: "World of Radio"
0905 BBC (am/eu): "Write On"
0905 BBC (af): "Write On"
0905 BBC (as): "Write On"
0930 WWCR #3 (Tennessee): "World of Radio"
1035 Radio Vlaanderen Intl: "Radio World"
1038 Radio Korea: "Multiwave Feedback"
1136 Radio Korea: "Multiwave Feedback"
1147 Radio Bulgaria: "Radio Bulgaria Calling"
1205 BBC (am/eu): "Write On"
1205 BBC (as): "Write On"
1207 Canada, R Canada Intl: "The Mailbag"
1230 WHRI (Angel 1 Indiana): "DXing with Cumbre"
1235 Radio Vlaanderen Intl: "Radio World"
1237 Radio Korea: "Multiwave Feedback"
1300 KWHR (Angel 4 Hawaii): "DXing with Cumbre"
1330 WHRI (Angel 1 Indiana): "DXing with Cumbre"
1335 Canada, R Canada Intl: "The Mailbag"
1337 Radio Canada IntlCanada, R Canada Intl: "The Mailbag"
1354 Vatican Radio: "On-the-Air"
1515 BBC (af): "Waveguide" (4)
1630 KWHR (Angel 3 Hawaii): "DXing with Cumbre"
1635 Radio Vlaanderen Intl: "Radio World"
1636 Radio Korea: "Multiwave Feedback"
1637 Canada, R Canada Intl: "The Mailbag"
1705 BBC (as): "Write On"
1730 WHRI (Angel 2 Indiana): "DXing with Cumbre"
1735 Radio Vlaanderen Intl: "Radio World"
1830 KWHR (Angel 3 Hawaii): "DXing with Cumbre"
1830 WHRA (Angel 5 Maine): "DXing with Cumbre"
1936 Radio Korea: "Multiwave Feedback"
2030 WRMI (Florida): "Wavescan"
2031 Canada, R Canada Intl: "The Mailbag"
2105 BBC (am/eu): "Write On"
2105 BBC (as): "Write On"
2108 Radio Korea: "Multiwave Feedback"
2130 WHRA (Angel 5 Maine): "DXing with Cumbre"
2135 BBC (af): "Write On"
2138 Radio Korea: "Multiwave Feedback"
2300 KSDA (Guam): "Wavescan"
2300 Radio For Peace Intl: "World of Radio"
2330 Australia, Radio: "Media Report"

Mondays

0000 AWR Latin America: "Wavescan"
0030 WRMI (Florida): "Wavescan"
0106 Deutsche Welle: "World DX Meeting" (4/5)
0131 Canada, R Canada Intl: "The Mailbag"
0230 Radio Korea: "Multiwave Feedback"
0305 BBC (am/eu): "Write On"
0305 BBC (af): "Write On"
0400 WWCR #3 (Tennessee): "World of Radio"
0407 Canada, R Canada Intl: "The Mailbag"
0430 WWCR #3 (Tennessee): "Ask WWCR"
0430 Radio New Zealand Intl: "Mailbox" (1/3)
0700 Radio For Peace Intl: "World of Radio"
1040 All India Radio: "DX-ers Corner (2/4)"
1130 Radio New Zealand Intl: "Mailbox" (1/3)
1615 KTWR (Guam): "Pacific DX Report"
1630 WWCR #1 (Tennessee): "Ask WWCR"
1840 All India Radio: "DX-ers Corner" (2/4)
2100 WWCR #1 (Tennessee): "Ask WWCR"
2130 All India Radio: "DX-ers Corner" (2/4)

Tuesdays

0030 BBC (as): "Waveguide" (4)
0900 KTWR (Guam): "Pacific DX Report"
1230 WWCR #1 (Tennessee): "World of Radio"
1246 Radio Sweden: "MediaScan" (1/3)
1346 Radio Sweden: "MediaScan" (1/3)
1355 FEBC (Philippines): "DX Dial"
1746 Radio Sweden: "MediaScan" (1/3)
1900 Radio For Peace Intl: "World of Radio"
2000 Polish Radio: "Polish Radio DX Club"
2111 Radio Havana Cuba: "DXers Unlimited"
2311 Radio Havana Cuba: "DXers Unlimited"
2340 All India Radio: "DX-ers Corner" (2/4)

Wednesdays

0140 Radio Havana Cuba: "DXers Unlimited"
0146 Radio Sweden: "MediaScan" (1/3)
0246 Radio Sweden: "MediaScan" (1/3)
0300 Radio For Peace Intl: "World of Radio"
0335 Radio Havana Cuba: "DXers Unlimited"
0346 Radio Sweden: "MediaScan" (1/3)
0535 Radio Havana Cuba: "DXers Unlimited"
0730 HCJB (eu): "Ham Radio Today"
0730 BBC (af): "Waveguide" (4)
0930 HCJB (pac): "Ham Radio Today"
1000 Radio For Peace Intl: "World of Radio"
1315 FEBC (Philippines): "DX Dial"
1720 Polish Radio: "Polish Radio DX Club"
1820 Argentina, RAE: "DX'ers Special"
1900 UK, Merlin Network One: "Media Zoo"
1930 HCJB (eu): "Ham Radio Today"
2000 UK, Merlin Network One: "Media Zoo"
2106 Radio Budapest Intl: "DX Blockbuster"

Thursdays

0130 HCJB (am): "Ham Radio Today"
0239 Argentina, RAE: "DX'ers Special"
0242 Radio Budapest Intl: "DX Blockbuster"
0430 HCJB (am): "Ham Radio Today"
0545 BBC (am/eu): "Waveguide" (4)
0730 BBC (as): "Waveguide" (4)
0754 Radio Netherlands Intl: "Media Network"
0800 KTWR (Guam): "Pacific DX Report"
0830 Radio New Zealand Intl: "Mailbox" (1/3)
0953 Radio Netherlands Intl: "Media Network"
1153 Radio Netherlands Intl: "Media Network"
1220 Polish Radio: "Polish Radio DX Club"
1352 Radio Netherlands Intl: "Media Network"
1753 Radio Netherlands Intl: "Media Network"
1954 Radio Netherlands Intl: "Media Network"
2030 WWCR #1 (Tennessee): "World of Radio"
2115 BBC (as): "Waveguide" (4)

Fridays

0053 Radio Netherlands Intl: "Media Network"
0054 Radio Netherlands Intl: "Media Network"
0253 Radio Netherlands Intl: "Media Network"
0345 BBC (as): "Waveguide" (4)
0453 Radio Netherlands Intl: "Media Network"
0730 Australia, Radio: "Media Report"
0915 BBC (am/eu): "Waveguide" (4)
1030 KTWR (Guam): "Pacific DX Report"
1930 Radio For Peace Intl: "Continent of Media"
1930 Radio New Zealand Intl: "Mailbox" (1/3)
1947 Radio Bulgaria: "Radio Bulgaria Calling"
2000 WWCR #1 (Tennessee): "Ask WWCR"
2000 Radio For Peace Intl: "World of Radio"
2105 Australia, Radio: "Feedback"
2238 Voice of Turkey: "DX Corner (biweekly)"
2344 Radio Bulgaria: "Radio Bulgaria Calling"

Saturdays

0010 Australia, Radio: "Feedback"
0136 Voice of America (as pac): "Communications World (A)"
0136 Voice of America (ca): "Communications World (A)"
0230 KWHR (Angel 3 Hawaii): "DXing with Cumbre"
0300 WRMI (Florida): "Wavescan"
0330 Radio For Peace Intl: "Continent of Media"
0330 WHRA (Angel 5 Maine): "DXing with Cumbre"
0336 Voice of America (af): "Communications World (B)"
0338 Voice of Turkey: "DX Corner (biweekly)"
0400 Radio For Peace Intl: "World of Radio"
0500 WHRI (Angel 1 Indiana): "DXing with Cumbre"
0500 WHRI (Angel 2 Indiana): "DXing with Cumbre"
0536 Voice of America (af): "Communications World (A)"
0536 Voice of America (eu/af): "Communications World (A)"
0600 WWCR #1 (Tennessee): "World of Radio"
0600 WWCR #3 (Tennessee): "World of Radio"
0605 Australia, Radio: "Feedback"
0700 KWHR (Angel 4 Hawaii): "DXing with Cumbre"
0709 HCJB (eu): "DX Partyline"

Continued on page 42

0000 UTC SHORTWAVE GUIDE 8:00 PM EDT 5:00 PM PDT

Frequencies

0000-0100	Anguilla,Caribbean Beacon	6090am			
0000-0100	Australia, Radio	9660pa	12080as	15240pa	17715pa
		17795pa	21740pa		
0000-0100 vl	Australia, VL8K Katherine	5025do			
0000-0100 vl	Australia, VL8T Tent Crk	4910do			
0000-0100	Canada, CBC N Quebec Svc	9625do			
0000-0100	Canada, CFRX Toronto	6070do			
0000-0100	Canada, CFVP Calgary	6030do			
0000-0100	Canada, CHNX Halifax	6130do			
0000-0100	Canada, CKZN St John's	6160do			
0000-0100	Canada, CKZU Vancouver	6160do			
0000-0100	Costa Rica, Adv World R	5030am	9725am	15460am	
0000-0100	Costa Rica,RF Peace Intl	7385am	15050am		
0000-0005	Croatia, Croatian Radio	9925am			
0000-0027	Czech Rep, Radio Prague	5930na	7345na		
0000-0100	Ecuador, HCJB	9745na	12015na	21455am	
0000-0030	Egypt, Radio Cairo	9900am			
0000-0100	Germany,Overcomer Ministr	3945eu	9500as		
0000-0015 vl	Ghana, Ghana Broadc Corp	3366do	4915do		
0000-0045	India, All India Radio	7410as	9705as	9950as	11620as
0000-0100	Ireland, Unt Christian BC	6200do			
0000-0015	Japan, R Japan/NHK World	6155eu	6180eu	9665af	11705na
		11815as	13650as		
0000-0100	Liberia,LCN/R Liberia Int	5100do			
0000-0100	Malaysia, Radio	7295do			
0000-0100 vl	Namibia, NBC	3270af	3289af		
0000-0030	Netherlands, Radio	6020na	6165na	9845na	
0000-0100	New Zealand, R NZ Intl	17675pa			
0000-0057	North Korea, R Pyongyang	11845ca	13650sa	15230na	
0000-0100 vl	Papua New Guinea, NBC	9675do			
0000-0100	Philippines, FEBC/R Intl	15450as			
0000-0030 mtwhfa	Serbia, Radio Yugoslavia	9580na	11870na		
0000-0100	Singapore,RCorp Singapore	6150do			
0000-0100	Spain, R Exterior Espana	6055am			
0000-0100	Thailand, Radio	9655as	11905as	15395na	
0000-0100	UK, BBC Asian Service	3915as	6195as	7110as	9410as
		11945as	11955as	15280as	15310as
		15360as	17790as		
0000-0100	UK, BBC World Service	5970sa	5975am	6175na	9590am
		9915sa	12095sa		
0000-0100 w	UK, Merlin Network One	9645eu	11985na	13690va	
0000-0100	Ukraine, R Ukraine Intl	5905eu	5915eu	6020eu	7180na
		7240eu	9445na	9550na	12040na
		12050na			
0000-0100	USA, KAIJ Dallas TX	5810am			
0000-0059	USA, KHBI N Mariana Is	15665as			
0000-0100	USA, KTBN Salt Lk City UT	15590am			
0000-0100	USA, KWHR Naalehu HI	17510as			
0000-0100	USA, Voice of America	7215as	9770as	11760as	15185as
		15290as	17735as	17820as	
0000-0030 twhfa	USA, Voice of America	5995am	6130ca	7405am	9455ca
		9775am	11695ca	13740am	
0000-0100	USA, WEWN Birmingham AL	5825eu			
0000-0100 twhfa	USA, WGTG McCaysville GA	5085am			
0000-0100	USA, WHRI Noblesville IN	5745am			
0000-0100	USA, WINB Red Lion PA	11950am			
0000-0100	USA, WJCR Upton KY	7490na	13595na		
0000-0100	USA, WRMI/R Miami Intl	9955ca			
0000-0100 mwf	USA, WSHB Cypress Crk SC	7535am	15285sa		
0000-0100 irreg	USA, WWBS Macon GA	11905na			
0000-0100	USA, WWCR Nashville TN	5070am	7435am	9475am	13845am
0000-0100	USA, WYFR Okeechobee FL	6085na	9505na		
0015-0100	Japan, R Japan/NHK World	6155eu	6180eu	9665af	11705na
0030-0100	Austria, R Austria Intl	9655na			
0030-0100	Iran, VOIRI	6055eu	9022eu	9685eu	
0030-0100	Lithuania, Radio Vilnius	9855am			
0030-0100	Netherlands, Radio	6020na	6165na	9845na	9855as
		11655as	12090as		
0030-0100	Sri Lanka, Sri Lanka BC	9730as	15425as		
0030-0100	Thailand, Radio	9655as	11905as	15395na	
0030-0100	UK, BBC Asian Service	9410as	11955as		
0045-0100	Albania, R Tirana Intl	6115na	7160na		
0050-0100	Italy, RAI Intl	6010na	9675na	11800na	

Selected Programs

Sundays

0000 USA, KTBN Salt Lk City UT: In Touch. The Atlanta Bible-teaching ministry of Charles Stanley.
0000 USA, WWCR #1 Nashville TN: What Does the Bible Say?. M. H. Reynolds exposes other religions.
0000 USA, WWCR #3 Nashville TN: World of Prophecy. Texe Marrs and a guest discuss the evils and pitfalls of today and the outlook for tomorrow.
0030 Lithuania, Radio Vilnius: News. World news summary.
0030 USA, WWCR #1 Nashville TN: Life's Railway to Heaven. WT English evangelizes from South Carolina.
0036 Lithuania, Radio Vilnius: Local Scene. A program of Lithuanian current affairs.
0044 Lithuania, Radio Vilnius: Feature Report. A background report on a subject of current interest.
0049 Lithuania, Radio Vilnius: Sunday Musical Feature. Focus on a Lithuanian composer or a Lithuanian music festival.

Mondays

0000 USA, KTBN Salt Lk City UT: The Living Way (from 2330). See S 2330.
0000 USA, WWCR #1 Nashville TN: The Jesus Time Network. Walter Balls evangelizes from Gatlinburg, Tennessee.
0000 USA, WWCR #3 Nashville TN: Discoveries in Health (hour 2) (live). The second hour of the health and herbs show from the American Freedom Network.
0030 Lithuania, Radio Vilnius: News. See S 0030.
0030 USA, KTBN Salt Lk City UT: Taking Authority. Bishop Eddie Long preaches from the New Birth Missionary Baptist Church in Decatur, Georgia.
0030 USA, WWCR #1 Nashville TN: Harvest Time. Gospel music and inspiration from the United Pentecostal Church International.
0042 Lithuania, Radio Vilnius: Local Scene. See S 0036.
0045 USA, WWCR #1 Nashville TN: Faithful Teaching Ministry. Jeffrey Hayes.
0049 Lithuania, Radio Vilnius: Folklore. The customs, traditions, and folk music of Lithuania.

Tuesdays

0000 USA, KTBN Salt Lk City UT: Behind the Scenes. TBN news, letters, and reports with Paul Krause.
0000 USA, WWCR #1 Nashville TN: Newswatch Magazine. See NAm 0400.
0000 USA, WWCR #3 Nashville TN: The Intelligence Report (live). A patriot radio program with Ted Gunderson.
0015 USA, KTBN Salt Lk City UT: Principles of Biblical Economics. John Avanzini teaches prosperity.
0030 Lithuania, Radio Vilnius: News. See S 0030.
0030 USA, KTBN Salt Lk City UT: The Voice of Power. RW Schambach preaches from Tyler, Texas.
0040 Lithuania, Radio Vilnius: Local Scene. See S 0036.

Wednesdays

0000 Costa Rica, R Peace Intl: Alternative Radio. See T 0400.
0000 USA, KTBN Salt Lk City UT: Behind the Scenes. See T 0000.
0000 USA, WWCR #1 Nashville TN: Newswatch Magazine. See NAm 0400.
0000 USA, WWCR #3 Nashville TN: The Intelligence Report (live). See NAm 0000.
0015 USA, KTBN Salt Lk City UT: Principles of Biblical Economics. See T 0015.
0025 USA, KTBN Salt Lk City UT: The Word. Efrem Zimbalist Jr. reads from scripture.
0030 Lithuania, Radio Vilnius: News. See S 0030.
0030 USA, KTBN Salt Lk City UT: Up on Melody Mountain. Betty Jean Robinson sings in Brentwood, Tennessee.
0045 Lithuania, Radio Vilnius: Local Scene. See S 0036.

Thursdays

0000 USA, KTBN Salt Lk City UT: Behind the Scenes. See T 0000.
0000 USA, WWCR #1 Nashville TN: Newswatch Magazine. See NAm 0400.
0000 USA, WWCR #3 Nashville TN: The Intelligence Report (live). See NAm 0000.
0015 USA, KTBN Salt Lk City UT: Principles of Biblical Economics. See T 0015.
0025 USA, KTBN Salt Lk City UT: The Word. See W 0025.
0030 Lithuania, Radio Vilnius: News. See S 0030.
0030 USA, KTBN Salt Lk City UT: International Intelligence Briefing. Hal Lindsey and Cliff Ford with 30 minutes of late-breaking news and commentary.
0039 Lithuania, Radio Vilnius: Local Scene. See S 0036.
0046 Lithuania, Radio Vilnius: Feature Report. See S 0044.
0052 Lithuania, Radio Vilnius: Lithuanian Arts. A report on festivals and performing arts.
0054 Radio Netherlands: Documentary. Who Makes the Wine? (27th). See A 0154.

Fridays

0000 Costa Rica, R Peace Intl: The Healing Century. Robert Theobald.
0000 USA, KTBN Salt Lk City UT: Behind the Scenes. See T 0000.
0000 USA, WWCR #1 Nashville TN: Newswatch Magazine. See NAm 0400.
0000 USA, WWCR #3 Nashville TN: The Intelligence Report (live). See NAm 0000.
0030 Lithuania, Radio Vilnius: News. See S 0030.
0030 USA, KTBN Salt Lk City UT: Bob Larson in Action. See S 0600.
0039 Lithuania, Radio Vilnius: Local Scene. See S 0036.

Saturdays

0000 Costa Rica, R Peace Intl: Every Living Thing. See M 0230.
0000 USA, KTBN Salt Lk City UT: Behind the Scenes. See T 0000.
0000 USA, WWCR #1 Nashville TN: Newswatch Magazine. See NAm 0400.
0000 USA, WWCR #3 Nashville TN: American Sovereign (live). Brett Johnson.
0015 USA, KTBN Salt Lk City UT: Principles of Biblical Economics. See T 0015.
0025 USA, KTBN Salt Lk City UT: The Word. See W 0025.
0030 Lithuania, Radio Vilnius: News. See S 0030.
0030 USA, KTBN Salt Lk City UT: Lakewood Church. See F 0130.
0038 Lithuania, Radio Vilnius: Local Scene. See S 0036.

Hauser's Highlights
SERBIA: R. Yugoslavia

English:

0000-0030	Am	11870, 9580 (exc Sun)
0430-0500	Am	11870 9580
1830-1900	Eu/Af	9720 6100
1900-1930	Au	7230
2100-2130	Eu	6185 6100

(BBCM)

GROVE
Complete Buyer's Guide

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August 1998

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NEW! THE AR8200 HANDHELD

Be the first to own this revolutionary scanner!

Offering wide 500 kHz-2040 MHz frequency coverage (less cellular; usable down to 100 kHz) and all-mode (AM, FM, SSB/CW) reception, the new AR8200 sports 50 Hz fine tuning steps, 0.35 microvolt VHF-FM sensitivity, band scope (100 kHz-10 MHz visual signal display), signal strength bargraph, large alphanumeric display, 1000 memory channels in 20 banks (4000 channel option), 37 ch/sec search/scan speed, and computer control port.

And check these additional features:

- Selectable wide/narrow AM and FM bandwidth
- Noise limiter
- Strong signal attenuator
- VHF preselector to reduce images
- Detachable medium-wave ferrite antenna
- Programmable tuning steps
- Drift-cancelling AFC circuitry
- Adjustable diplay illumination and contrast
- Multiple scan/search configurations
- Battery save facility
- Optional memory, CTCSS, 20-second record, tone eliminator cards

Weighing 12 ounces and measuring 2-1/2"W x 5-1/2"H x 1-1/2"D, the new AR8200 is powered by four AA cells or 12 VDC from an external supply. It comes equipped with rechargeable NiCd batteries, AC charger, flex whip, belt clip, and complete manual.

ORDER WBR 7

For more information on the new AR8200, e-mail us at aor@grove.net

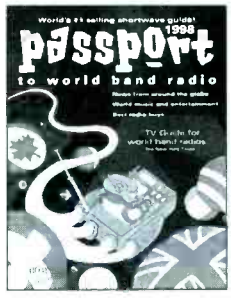
Availability pending FCC approval.

See the New Magellan GPS Color Trak Satellite Navigator on page "L"!!

Time to Update your Passport!

This is a "must have" if you are a shortwave listener.

Edited by Lawrence Magne, *Passport* features a listener's program guide, arranged both by frequency (2-26 MHz) and easy-to-follow time chart. Listings show transmitter output power, language, favored listening times for North America, and program contents. Reviews of the most popular shortwave receivers and listening accessories. Special alphabetized section of station addresses, contact personnel, phone/fax numbers.



'98 cover shown – '99 cover photo not yet available.

Order before September 30, 1998 and the 1999 edition of Passport (BOK18-99) will be yours for only

$16.95

with FREE SHIPPING in US. (After September 30, the price will be $19.95 plus $5.50 shipping. Books will ship around mid-October. For foreign shipping, please add $4.50 for foreign surface printed mail, $6 for Air Mail in Canada, and $15 for Air Mail elsewhere.

Trade In, Trade Up!

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

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

U.S. Priority Mail or UPS Second Day Air shipping on ALL PRODUCTS! Order Line and Product Support Info.: **1-800-438-8155**

ICOM R-10!

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

Wide-dynamic-range triple conversion, and sharp selectivity assure dramatic improvement in interference-free reception.

Eight alphanumeric characters can be entered to identify any channel, and ten characters can be used to identify banks. Voice scan control skips unmodulated carriers. Scan memory channels by bank, mode, or program. High-contrast display and powerful, dual-function keyboard provide incredible options to suit your listening requirements. Noise blanker and automatic noise limiter provide double noise reduction. Sleep timer and programmable attenuator are additional advantages. See specifications on page "H". **Accessories: ACC 3, ACC 4, ADPK 4, CAS 1-N, DCC 5 on page "N"; ANT 19 and ANT 14 on p. "F"; SFT 2 on p. "G".**

ORDER WBR 6 only **$429.95**

ICOM R8500

One of the World's Very Best Scanning Receivers!

Here is your best chance ever to get one of the world's best tabletop receivers with continuous 100 kHz - 1999.99 MHz frequency coverage (less cellular), tunable in precise 10 Hz steps -- longwave, shortwave, VHF/UHF, all services and modes (wide and narrow FM and AM, USB, LSB, CW). Add high sensitivity, IF shift, selectable AGC timing, audio peak filter to automatically enhance modes, built-in RS232C and CI-V for direct computer control, 1000 memory channels in 20 banks, multiple scanning selections with priority function and selectable delay, S-meter settable squelch, noise blanker, and 12 VDC / 120 VAC operation.

High stability crystal oscillators combine with automatic frequency control circuitry for outstanding stability. Multiple tuning speeds optimize signal hunting. Alphanumeric display aids in identifying memorized frequencies. Automatic memorizing of search-discovered active frequencies, skipping of unwanted channels, three antenna connectors for optimal choices for frequency ranges, even voice scan to ignore noisy channels, and even optional voice synthesizer -- an incredible array of advanced features! See specifications on page "H". **Accessories: ACC 6, ACC 7, ACC 8, ACC 72, ACC 74, BRK 4, BRK 5, MAN 1 beginning on page "N"; ANT 2, ANT 3 on p. "K"; ANT 7 on p. "E".**

ORDER WBR 1 only **$1799.95**

AR-5000 PLUS 3

PLUS PERFORMANCE

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

This triple-conversion luxury receiver offers outstanding sensitivity (0.15 microvolt SSB, 0.3 microvolt VHF/UHF FM, 0.6 microvolt AM), rapid 50-channel-per-second scan/search speed, 1 Hz to 1 MHz programmable tuning steps, all mode reception (AM/FM/LSB/USB/CW), selectable IF bandwidths (3/6/15/40/110/220 kHz), superb frequency stability (+/-1 ppm,0-50 deg. C.), mobile or fixed power (12 VDC / 120 VAC), and much, much more. See specifications on page "H". **Accessories: ANT 2, p. "K"; ANT 7, p. "E"; SDU 5000, p. "B"; SFT 2, p. "G", and SFT 8, p. "O".**

ORDER WBR 12-P only **$2095.95**

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

FCC DATABASE

1998 ENHANCED FCC DATABASE ON CD-ROM!

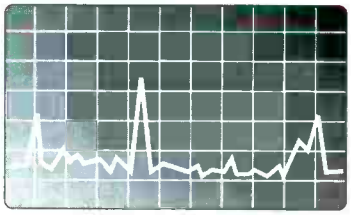
Imagine owning a U.S. frequency database so comprehensive, and so accurate, that it makes all other frequency databases obsolete! And suppose all that information could be placed on one convenient CD-ROM. This is the new Grove FCC Database.

Listings include virtually everything on the FCC U.S. Master File up to at least 10 GHz (10,000 MHz!)--police, fire, medical emergency, disaster relief, press, business, industrial, railroad, buses, taxis, broadcasting (AM, FM, TV, even shortwave!), conservation, coastal marine, power, utility, experimental and much more!

You can arrange the fields in the order of your choice: frequency, callsign, licensee name, city, county, state, service, class, power, emission code, mode, latitude and longitude, even your own comments, and sort target frequencies and licensees by field as well. And it's friendly to other databases, so you can add and delete custom entries for your area.

ORDER FCC-98CD only **$39.95**

Superb SDU5000 Spectrum Display



An ideal companion for your AOR AR5000 or ICOM R7100, R7000, or R9000, this colorful 3.1" spectrum display unit plugs into any receiver with a 10.7 MHz IF output jack. Imagine seeing a visual panorama of real-time signals up to 10 megahertz wide! Tune in those signals immediately as they appear--don't wait for chance during scanning, searching, or manual dialing. Provides NTSC, PAL, and composite video to an optional monitor. **Accessory: MAN 4, p. "O".**

ORDER SDU 5000 only **$934.00**

U.S. Priority Mail or UPS Second Day Air shipping on ALL PRODUCTS!

GROVE

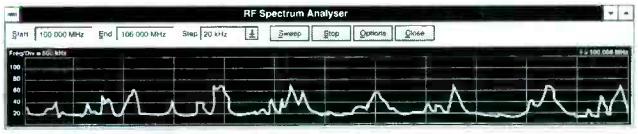
WiNRADiO WR-1000i

The receiver of your dreams on your computer screen!

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

Turn your PC into a potent, wide-coverage monitoring station! User-friendly software allows all the usual receiver controls, plus much more. Rugged shielding resists interference from the host computer. Enjoy continuous 500 kHz through 1300 MHz (less cellular) frequency coverage; multimode reception of AM, wide and narrow FM, and SSB/CW; up to 16 memory banks with a virtually limitless number of channels; display records in memory by frequency, callsign, or comments field; scan by bank, grouping, or mode; and automatically search for activity by entering your choice of frequency limits.

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



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

ORDER WBR 16-I only **$499.95** ORDER WBR 16-E Availability pending FCC approval.

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

WiNRADiO World Station Database Manager!

The WiNRADiO World Station Database Manager comes with a collection of over 300,000 stations world-wide. These include broadcast stations, aeronautical and maritime stations, navigational beacons, and many other types of radio transmitters.

You can add, edit or delete stations, or create your own databases of frequencies to suit your particular interest. You'll never lose that interesting frequency again!

ORDER SFT 16 only **$49.95**

WR-1500 COMPUTER RECEIVER!

With continuous 150 kHz-1500 MHz frequency coverage (less cellular), multimode detection (AM, NFM, WFM, USB, LSB, CW), IF shift (+/-2 kHz), sharp selectivity (2.5, 6, 17, 230 kHz), high sensitivity (0.3 uV SSB and NFM), built-in spectrum display, and triple superheterodyne conversion, this is the computer-hosted receiver that sets the standards!

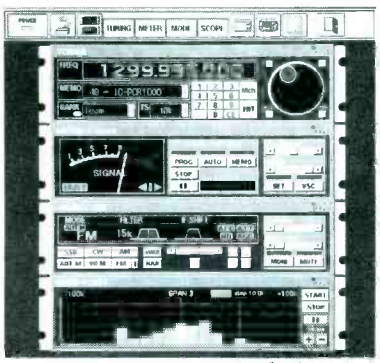
Choose from two models: the WR1500i (internal PC card) plugs into an unused ISA port in your desktop computer, while the tiny WR1500e (external) module attaches to a portable computer via the RS232 port, or through an optional PCMCIA interface. High level documentation and source codes available free on line for third-party developmental support.

For more information on the new WR1500, e-mail us at winradio@grove.net

Availability pending FCC approval.

ICOM PCR1000 Wide-Coverage Computer Receiver Module!

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



Computer screen simulation.

Requires Windows 3.1 or 95, 486 or better, 10 MB hard disk, 16 MB RAM, serial interface, 640 x 480 pixel resolution or better. Accessories provided include program disk, telescopic antenna, RS232 interface cable, AC adaptor, and full instructions. See specifications on page "H". **Accessories: ACC 16, DCC 2, DCC 4, and DCC 5 on page "N".**

ORDER WBR 21 only **$529.95**

Digital Suite

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

Loaded with advanced capabilities... *All elements of the Digital Suite appear as a new menu entry in the WiNRADiO receiver software after installation!*

ORDER SFT 15 only **$99.95**

TrunkTracker BC895XLT

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

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

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

ORDER SCN 09 only **$299.95**

Uniden BC3000XLT

Featuring continuous 25-550, 760-1300 MHz (less cellular) frequency range, 400 memory channels, 10 priority channels, 100-channel-per-second TurboScan, automatic storage of search-discovered frequencies, selectable-channel overload attenuator, mode and step selection, data skip, and reduced-intermod design.

Strong audio guarantees crisp reception in noisy environments; up to 50 frequencies may be locked out of the search function to eliminate unwanted interruptions; battery save circuit extends charge life during inactive reception periods; handsome, rugged styling makes this handheld scanner an outstanding choice. Battery and charger included. See specifications on page "H". **Accessories: BAT 15, CAS 6, DCC 7, and PWR 2 beginning on page "N".**

ORDER SCN 29 only **$369.95**

Wow—Lowest Price on TrunkTracker BC235XLT

Uniden's new BC-235 XLT will follow elusive conversations on your local 800 MHz Motorola trunking system from law enforcement dispatch and tactical channels, fire and rescue calls, ambulances, government agencies, and many other services. You can also listen to conventional scanner communications in the 29-54, 108-174, 406-512, and 806-956 MHz bands (less cellular). Pre-programmed service search.

The BC-235XLT is designed to track the Motorola Type I, II, IIi, Hybrid, Smartnet, and Privacy Plus analog trunking, which are extensively used in 800 MHz communications systems. (Note: trunking frequencies must be entered before they can be monitored.) Conventional scanner mode operation is similiar to the BC-230XLT. See specifications on page "H". **Accessories: ANT19, ANT 14, ANT 22 on p. "F"; BAT 5, CAS 3 and DCC 7 on page "N".**

ORDER SCN 10 only **$244.95**

Uniden BC9000XLT

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

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

ORDER SCN 30 only **$399.95**

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

Other Grove Scanners

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

Model	Order Code	Description	Price	Recommended Accessories
Radio Shack				
PRO-90	SCN-11	Handheld trunk tracking scanner; does not include extra battery pack and drop-in charger	$219.95	ANT-14, ANT 19
PRO-2050	SCN-16	Same as BC895; does not include CTCSS or computer control; see specification chart on page "H"	$279.95	ACC-15, BRK-2, DCC-3
Relm				
MS200	SCN-15	200 channel mobile-base	$239.95	ANT-20, ANT-30, ANT-13, SPK-15
HS200	SCN-8	200 channel handheld; see specification chart on page "H"	$209.95	ANT-19, ANT-14, BAT-1, BAT-13, CAS-11, DCC-3
Sony				
SC1	SCN-17	(Basic Model); 200 channel handheld; see specification chart on page "H"	$269.95	BAT-1, BAT-11, BAT-13
SC1-PC	SCN-18	(Bi-directional PC interface model); 200 channel handheld; see specification chart on page "H"	$329.95	BAT-1, BAT-11, BAT-13
Uniden				
BCT-7	SCN-21	Mobile 26.9-27.4 (CB),29.7-54, 108-174, 406-512, 806-956 MHz factory-programmed plus 100 ch	$179.95	ANT-20, ANT-30, SPK-15

U.S. Priority Mail or UPS Second Day Air shipping on ALL PRODUCTS!

GROVE

StreetPilot

The Garmin StreetPilot provides automatic mapping within seconds--anywhere in the U.S., Canada, and Mexico--as you are satellite-tracked in your journey! The Garmin utilizes up to 12 GPS satellites for unsurpassed accuracy--as close as 3-15 feet with optional GBR21. NMEA183 and RS232 ports provided.

Just set this tiny satellite receiver on your dash and press a button to find out where you are. With an optional data card you can enjoy street-map detail, including business names, addresses, and phone numbers! Main streets and roads flash on screen immediately, even telling you how far and where to turn for your destination! Display may be switched horizontally or vertically for any mounting requirement.

Allows up to 100 waypoints (updated every second for nearest waypoint), and 20 reversible routes; has high contrast and large characters for easy viewing. Includes dash mount, quick reference card, and user's manual. Runs on optional AA cells or cigarette lighter cord. **Accessories: BAT 1, CAS 18, and DCC 9 on page "N".**

ORDER GPS-GSP only **$549.95**

GPS III: ROAD MAP IN A POCKET!

Great value—the GPS for all your recreational needs!

Lightweight (9 oz.), compact (2-1/3" x 5"), and affordable ($379.95), the Garmin III is the perfect answer for hikers, hunters, RVers, boaters, campers, bikers!

Mount it on your dash (horizontally or vertically) or stick it in your pocket; within seconds you can access millions of miles of highways, railroads, rivers, inland lakes, and shorelines--all at the touch of a button! As you proceed, the GPS III records your waypoints and comments with text and icons, even providing a trip odometer with speed indication. The sharp, contrasty display is clearly readable in any lighting conditions.

Comes with wrist strap, Velcro mount, quick reference card, and user's manual. **Accessories: BAT 1, BRK 8, CAS 5, and DCC 9 on p. "N".**

ORDER GPS-III only **$379.95**

The Outdoorsman's Companion!

With tough construction and a water-tight case, the GPS 12XL locks on to as many as 12 navigational satellites to provide accurate bearings, 500 waypoints, 20 reversible routes, local features, and even custom mapping. High sensitivity antenna locks on through rain or tree cover.

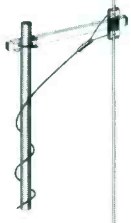
Select your coordinates from lat/long, 7 user grids, UTM, UPS, and Maidenhead. Updates every second for computed accuracy as close as 3 feet; interface with NEA 0183 and RTCM 104 for DGPS correction. Includes wrist strap, quick reference guide, and user's manual. **Accessories: BAT 1 and DCC 8 on page "N".**

GPS-12 also available. All the features of the GPS-12XL, less external antenna capability. Order GPS 12, only **$159.95.**

ORDER GPS-12XL only **$249.95**

REACH OUT TO THE WORLD WITH GROVE SCANNER ANTENNAS

Grove OMNI II



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

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

ORDER ANT 05 only **$19.95**

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

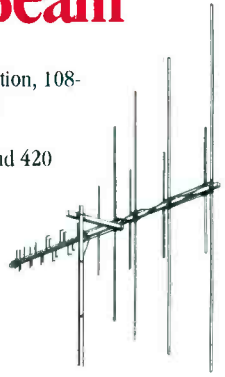
THE OMNIDIRECTIONAL *SCANTENNA*

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

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

ORDER ANT 07 only **$39.95**

Famous Grove Scanner Beam



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

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

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

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

ORDER ANT 01 only **$59.95**

Professional Wideband Discone

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

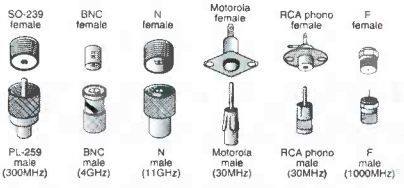
ORDER ANT 09 only **$87.95**

RG6-U Cable/Adaptors

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

CABLE

CBL 25	**25' RG 59U**	**$9.95**
CBL 50	**50'RG-6U**	**$14.95**
CBL 100	**100'RG-6U**	**$19.95**



ADAPTORS AVAILABLE-$3.99 each

ADP 1	SO-239 Female to F male
ADP 2	F Female to PL259 Male
ADP 3	F Female to N Male
ADP 4	F Female to Male 1/8" Mini-Plug
ADP 5	N Female to BNC Male
ADP 6	SO-239 Female to Male 1/8" Mini-Plug
ADP 7	SO-239 Female to N Male
ADP 8	N Female to PL259 Male
ADP 9	F Female to BNC Male
ADP 10	SO-239 Female to BNC Male
ADP 11	SO-239 Female to RCA Male
ADP 12	BNC Female to N Male
ADP 13	BNC/BNC (right angle elbow)
ADP 14	F Female to RCA Male
ADP 15	N Female to F Male
ADP 17	BNC Female to F Male
ADP 18	F Female to 2 wires
ADP 19	SO-239 Female to 2 wires
ADP 20	BNC Male to BNC Male
ADP 22	Motorola Female to BNC Male
ADP 23	UHF Female barrel
ADP 24	BNC Female to PL259 Male
ADP 25	RCA Female to Male miniplug
ADP 26	F Female to F Female barrel (qnty.2)
ADP 27	Banana Plug (qnty.4)
ADP 28	F Female to PAL Fem. Satellite700
ADP 29	3.5mm Female to 2.5mm Male mini plug (qnty.2)
ADP 31	BNC Female to Motorola Male
ADP 32	RCA Female to PL-259 Male
ADPK 10	F Female to Motorola Male
ADPK 13	F Male to F Male 3ft.cable (qnty.3)
ADPK 14	F/Motorola cable, 3ft.(qnty.2)
ADPK 15	PL259 Male to PL259 Male 3ft.
ADPK 16	BNC Male/ BNC Male 3ft cable

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

Grove PRE-5A VHF/UHF Signal Booster

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

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

ORDER PRE 5A only **$89.95**

Universal Telescoping Scanner Antennas!

Extendable to 21 inches, the ANT 19 is made of chrome-plated brass and equipped with a standard BNC base. Receives from 108-1300 MHz. ANT 19B has right-angle BNC adaptor. ANT 19N has right-angle N adaptor.

Order ANT 19 (21")	**$14.95**
ANT 19B	**$19.95**
ANT 19N	**$21.95**

STEALTH *Our Best-Selling Mobile Antenna*

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

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

ORDER ANT 30 only **$29.95**

High Gain Flex Antenna

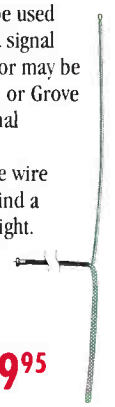
This "rubber duckie" really makes a difference on handheld scanners. The 12" Austin Condor is guaranteed to improve weak signal scanner reception—on all frequency ranges—over the original scanner antenna.

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

HIDDEN ANTENNA

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

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



ORDER ANT 06 only **$19.95**

High Gain 800 MHz Portable Antenna

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

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

ORDER ANT 22 only **$29.95**
With straight connector for handhelds

ORDER ANT 23 only **$34.95**
With right-angle connector for desktop use (right)

U.S. Priority Mail or UPS Second Day Air shipping on ALL PRODUCTS!

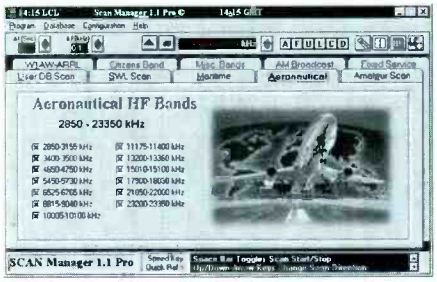
GROVE

SOFTWARE FOR SCANNERS/SHORTWAVE RECEIVERS

High tech scanning at an unbelievable low price!

Scan Manager Pro v.1.1

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



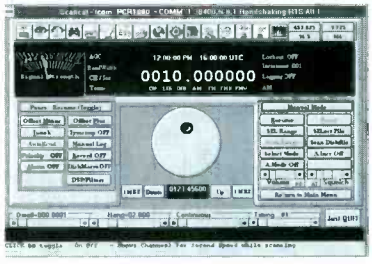
Order SFT 13, only $68.95

Scancat-Gold for DOS

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

Order SFT02, only $94.95

Scancat-Gold for Windows®



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

Order SFT 02W, only $99.95

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

Scancat-Gold for Windows® SE Upgrade

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

1. Unlimited capabilities for "Spectrum Analysis." "SE" will examine your logging database, plot each frequency, and "paint" the entire analysis on your screen, displaying it from lowest to highest frequency. Even tunes or scans your radio with a click of the mouse!

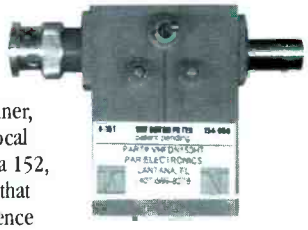
2. Record **individual** sound transmissions databased by frequency, time stamp and airtime. Point and shoot on any record for instant "playback" of all the action as it happened. Works with any Windows compatible sound card!

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

Order SFT 02-SE, only $59.95

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

SCANNER INTERMOD FILTERS REDUCE INTERFERENCE BY 35dB!



That's right--now you can restore quiet monitoring on your scanner, drastically reducing that incessant "bleep bleep" interference from local paging transmitters. Simply specify whether the interference is from a 152, 158, or 462 MHz pager, and we'll send you a unit that knocks down that interference by 35 dB! Units may be cascaded for additional interference reduction. Equipped with BNC connectors. **Accessory: ADPK 16, p. "F".**

ORDER FTR152, FTR158, or FTR 462 only **$59.95**

Optoelectronics Cub Frequency Counter

The Optoelectronics Cub is ideal for surveillance countermeasures, frequency hunting, ham, and CB. Wide frequency coverage (1 MHz - 2.8 Ghz) and advanced features (digital filtering, high-visibility LCD, frequency autocapture and hold, selectable gate times, 10 hour battery charge life. Rechargeable battery/AC charger inc. Antenna sold separately. **Accessories: ANT 14, ANT 19, p. "F"; ANT 18 on page "N".**

ORDER CRT 9

$144.95

Global E-Mail Capability is Right in Your Hand!

The world's first hand-held global satellite communicator, the GSC 100 gives you the ability to **send and receive e-mail messages to and from anywhere on Earth.** And, with its **integrated GPS receiver**, the GSC 100 not only lets you know where you are, it guides you anywhere you want to go.

ORDER GPS-100

$999.95

Never be out of touch again!

SP-200B Sound Enhancer

An effective, multi-functional accessory to increase the intelligibility and sound quality of voice, music, and data **on any scanner or shortwave receiver.**

Using all-analog circuitry to avoid the distortion contributed by many digital signal processors (DSP), the SP-200B combines a powerful audio amplifier and four inch speaker along with separate bass and treble equalizers, a variable passband notch/peak filter to reject interfering tones or boost desirable audio, an adjustable noise limiter to reduce irritating pulse interference, a variable-hang 0-45 second squelch control to remove background noise between sound transmissions, and a tape recorder activator. Powered by 12 VDC, the SP-200B may be operated in a mobile environment or from an optional 12 VDC supply.

Housed in a stylish, handcrafted, oak cabinet, and constructed of sturdy, black finished aluminum with white legends. **Accessory: PWR 4 on page "O".**

ORDER SPK 13 only **$199.95**

NOTE: Cellular-Capable Scanners are available only to government agencies and cellular service providers by direct inquiry. These scanners include special versions of the WBR 27 (p. "B"), WBR 12 (p. "B"), WBR 16 (p. "C"), WBR 6 (p. "B"), and WBR 1 (p. "B").

Wide Band-Receiver Specification Guide

Prices subject to change without notice

Scanner	AR 5000 PLUS III	AR 8200	ICOM R10	ICOM R8500	ICOM PCR 1000	WINRADIO
Grove Order #	WBR 12-P	WBR 7	WBR 6	WBR 1	WBR 21	WBR 16
Grove Price	$2,095.95	e-mail aor@grove.net	$429.95	$1,799.95	$529.95	$499.95
Frequency Range	10kHz-2600 MHz (less cellular)	500kHz-2040 MHz (less cellular)	500 kHz-1300 MHz. (less cellular)	100 kHz-1999.99999 MHz (less cellular)	500 kHz-1300 MHz. (less cellular)	100 Hz minimum
Keypad Entry?	Yes, plus tuning dial	Yes	Alphanumeric	Yes	Yes	Yes
Tuning Steps	Programmable, 10 kHz-1 MHz	50 Hz-999.995 kHz	100 Hz-999.99 kHz	10 Hz,1 MHz custom	1 Hz minimum	50 kHz-1 kHz
Display	Backlit LCD	Backlit LCD	Backlit LCD	Backlit LCD, alphanumeric display	Your monitor, 640 x 480 pixels or better	On screen (PC)
Dimmer	Yes	On/Off	On/Off	Yes	Your monitor	N/A
Receiving Modes	AM/NFM/WFM/USB/ LSB/CW	AM/NFM/WFM/USB/ LSB/CW	AM/NFM/WFM/USB/ LSB/CW	AM/FM (w/ AFC)/ USB/LSB/CW/RTTY	AM/NFM/WFM/USB/ LSB/CW	AM/NFM/WFM/SSB
Memory	2000 channels	1000 channels	1000 channels	1000 channels	Unlimited, determined by computer	Unlimited, determined by computer
Scan	45 channels/sec. w/ priority	37 channels/sec.	6 ch./sec.	40 chan./sec.	6 ch./sec.	50 ch./sec. FM modes
Banks	20/40	20	18	20		16
Channel Lockout	Yes	Yes	Yes	Yes	Yes	Yes
Priority	Any channel	Any channel	Yes	Yes	Yes	Yes
Search	50 channels/sec.	37 channels/sec.	17 ch./sec.	40 channels/sec.	Yes	Yes
Delay	Programmable	Programmable	Programmable time, channel	Yes	Programmable	Programmable
Clock	Yes	No	No	No, sleep timer		Yes
Audio Output (typical)	1 W	180 mW	120 mW	2W	200 mW	200 mW
Record Audio Output	Yes	No	No	Yes	No	No
Recorder Activator	Yes	No	No	Yes	No	
Signal Strength Ind.	Analog S-meter	LCD bargraph	LCD bargraph	Analog S meter	Yes	Yes
Computer Interface	RS232	RS232	CI-V	RS232C and CI-V	RS232C	Expansion slot
Conversion Scheme	Triple up-conversion (622.2/10.7 MHz, 455 kHz)	Triple up/quad. on WFM	Triple up-conversion (429/266, 10.7 MHz, 455 kHz)	Triple conv.	Triple up-conversion (266.7/10.7 MHz, 450 kHz)	Triple up-conversion
Sensitivity (NFM)	.0.6 uV	.0.3 uV	0.45 uV	0.5 uV	0.3 uV	0.35 uV
Selectable Atten.	Yes	Yes, chan. selectable	Programmable, 20 dB	-10/-20 dB	Yes	Yes
IF Selectivity (-6/-60 dB)	3/6/15/40/110/220 kHz	SSB (-6/-50 dB): 4/15 kHz; AM/NFM: 12/25 kHz; WFM 180/800 kHz	(-6 dB) SSB 4 kHz, AM/NFM 15 kHz, WFM 150 kHz	5.5/12/150 kHz FM, 2.2/5.5/12 kHz AM, 2.2 kHz SSB/CW	2.8/6/15/50/230 kHz	AM/SSB 6 kHz, NFM 17 kHz, WFM 280 kHz
Antenna Connector	BNC	BNC	BNC	SO-239	BNC	BNC
Dimensions (W"xH"xD")	8.5x3.5x10	2.5x5.5x1.5	2.25x5x1.25	11.25x4.5x8.25	5x1.25x7.75	PC expansion slot
Weight	7 lb. 10.5 oz.	12 oz.	11 oz	18 lbs.	2.2 oz	N/A
Power Requirement(s)	13.8 VDC @ 1 A or 120 VAC @ 60 Hz	4AA cells (NiCds supplied)	4.8-16 VDC; AC adaptor included	12 VDC/120 VAC	12 VDC @ 700 mA, AC adaptor included	PC bus powered
Accessories Incl.	AC adaptor	AC adaptor/ flex antenna/ DC cord/ carrying strap/belt clip, AA bat. (4)	Belt clip, AC adaptor, flex whip, rechargeable batteries, manual	AC acaptor	Whip antenna, computer cable, program disk, AC adaptor.	3-1/2" disk, wire antenna

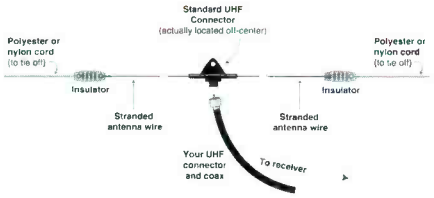
Grove's Scanner Specification Guide

Prices subject to change without notice

Scanner	Radio Shack PRO-2050	Relm HS-200	Sony SC-1	Uniden BC-235XLT	Uniden BC-895XLT	Uniden BC-3000XLT	Uniden BC-9000XLT	Uniden BCT-7
Grove Order #	SCN 16	SCN 8	SCN 17	SCN 10	SCN 9	SCN 29	SCN 30	SCN 21
Grove Price	$279.95	$209.95	$269.95	$244.95	$299.95	$369.95	$399.95	$179.95
Frequency Range	29-54, 108-174, 406-512, 806-956 MHz (less cellular)	26-54, 118-174, 406-520, 806-960 MHz (less cellular)	25-1300 MHz (less cellular)	29-54, 108-174, 406-512, 806-956 MHz (less cellular)	29-54, 108-174, 216-512, 806-956 MHz (less cellular)	25-550, 760-1300 MHz (less cellular)	25-550, 760-1300 MHz (less cellular)	CB/29.7-54/108-174/-406-512/806-956 MHz (less cellular)
Keypad Entry?	Yes	Yes	Yes	Yes	Yes	Yes	Alphanumeric	No
Tuning Steps	5/12.5/25	5/12.5/25 kHz	N/A	5/12.5 kHz	5/12.5/25 KHz	5/12.5/25/50 kHz	5/12.5/25/50 kHz	5/12.5 kHz
Display	Backlit LCD	Backlit LCD	Backlit LCD	Backlit LCD	Backlit LCD	Edgelit LCD alphanumeric	Backlit LCD	Backlit LCD
Dimmer	No	No	No	On/off	No	On/off	High/low/off	No
Receiving Modes	AM/NFM	AM/NFM	AM/NFM/WFM	AM/NFM	AM, NFM	WFM, NFM, AM (selectable)	WFM, NFM, AM	AM (air), NFM
Memory	300 channels	200 channels	300 channels	300 channels	300 channels	400 channels	500 channels	Pre-programmed by service plus user-selected frequencies
Scan	50 channels/sec.	100 ch./sec.	N/A	100 channels/sec.	100-300 channels/sec.	100 channels/sec.	100 channels/sec.	100 channels/sec.
Banks	10	10	10	10	10	20	20	12 service bands
Channel Lockout	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Priority	10 channels	10 channels	Yes	10 channels	10 channels	10 channels	10 channels	No
Search	Yes	Yes, with lockouts	Yes	Yes	Yes	300 ch./sec.	300 ch.sec.	Yes
Delay	2.5 sec., selectable channel	2 sec. any chan.	N/A	2 sec. any chan.	2.5 sec., selectable channel	2/4 sec., any ch.	2 sec., any ch.	2 sec., all channels
Clock	No	No	No	No	No	No	No	No
Audio Output (typical)	1.1 W	400 mW nom.	180 mW	180 mW	2.7 W	320 mW	2.2 W	3 W
Record Audio Output	Yes	No	Earphone jack	No	Yes	Spkr. & earph. jacks	Yes	No
Recorder Activator	No	No	No	No	3.5 mm (1/8") earphone jack	No	Yes	No
Signal Strength Ind.	No	LCD bargraph	N/A	No	LCD bargraph	No	No	No
Computer Interface	No	No	SC1PC only	No	RS232C	No	No	No
Conversion Scheme	Triple conversion	Double conversion	Triple conversion	Triple conversion	Triple up-conversion	Triple-up conversion	Triple-up conversion	Double conversion
Sensitivity (NFM)	0.5 uV	0.5 uV	N/A	0.3 uV	Unspecified	0.5 uV	0.5 uV	0.5 uV
Selectable Atten.	No	No	No	No	No	No	Yes, chan. selectable	No
IF Selectivity (-6/-60 dB)	N/A	-50 dB adjacent channel	N/A	N/A	Unspecified	N/A	N/A	N/A
Antenna Connector	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC
Dimensions (W"xH"xD")	2.75x8.0625x7.5875	2.5x6x1.5	7x2.625x1.75	2.5x6.5x1.75	10.875x3.375x7.5	7.4x2.7x1.5	10.5x3.38x7.5	5.25x1.62x7
Weight	1 lb. 10.5 oz.	15 oz.	13.5 oz.	12.6 oz.	3lbs. 8 oz.	13 oz..	4lbs.	1lb. 11 oz
Power Requirement(s)	12 VDC	4 AA cells or 12 VDC (adaptor/charger incl.)	4 AA cells or 6 VDC	Rechargeable battery, 12VDC	12 VDC (AC adaptor included)	6.5 VDC	12 VDC (AC adapt. incl.)	12 VDC
Accessories Incl.	Telescopic whip/ AC adaptor/manual	Flex antenna/ AC charger-adaptor/ belt clip/earphone/ carrying strap	Antenna/earphone/ AC adaptor/ belt clip/manual	Flex antenna/ belt clip/earphone/ extra battery/ AC charger-adaptor	Telescopic whip/ AC adaptor/manual	Rechargeable bat. pack/AC wall adaptor-charger/ belt clip/flex antenna/earphone	AC adaptor/ telescopic whip	Mobile bracket/ DC cord/cigarette lighter cord/AC adaptor/telescopic whip/mobile whip

GROVE

GROVE SKYWIRE



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

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

ORDER ANT 2 only **$39.95**

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

Limited Space? Try Grove's new *Mini-Skywire*

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

ORDER ANT 3 only **$29.95**

STONER-DYMEK

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

ORDER ANT 24 only **$179.95**

Select-A-Tenna

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

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

ORDER ANT 21 only **$59.95**

KIWA Medium Wave Air-Core Loop Antenna

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

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

ORDER ANT 31 only **$349.95**

JPS Noise Canceller/Active Antenna

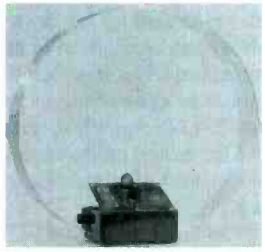
Enjoy Crystal Clear Sound!

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

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

ORDER ACC-21 only **$194.95**

Exciting New KIWA Pocket-Loop Antenna

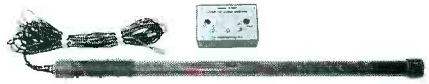


This highly efficient signal grabber is 12" across when deployed, yet collapses to a tiny pocket size for transport! Designed to receive and amplify signals from 530 kHz through 20 MHz in four bands, no antenna jack on your portable radio is needed; it space-couples to your radio's existing whip and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

ORDER ANT 32 only **$119.95**

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

H800 Skymatch



Compact Active Antenna

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

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

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

ORDER ANT 15 only **$99.95**

Measure Electrostatic Discharge and RF Fields

Instruments normally used by the electronics industry for measuring electrostatic discharge (ESD) and RF environmental fields can cost between $2,000 and $3,000. But these great Trifield meters have been shown to accomplish the same tasks for under $200!

These meters were recently demonstrated to industrial, government and military officials in preparation for an important missile launch at Vandenburg AFB. The TST-2 (right) detects electric and magnetic fields and is so sensitive it will respond to the electric disturbance produced by someone—or something—moving in an adjacent room! A built-in tone provides audible indication of these phenomena. It can operate as an excellent field strength meter in the radio/microwave mode.

The TST-1 (left) takes readings of home appliances, computers, microwave ovens, TV sets, electric blankets, fluorescent lights,and other sources of electromagnetic energy.

ORDER TST 1 only **$119.95**

or

ORDER TST 2 only **$199.95**

NEW! Magellan GPS ColorTRAK

Magellan has just released its new GPS ColorTRAK Satellite Navigator! Features include: ultra sharp display–25% larger than other handheld units–lets you color code critical symbols and markers for instant recognition and unmatched visibility; EL backlit keypad for easy viewing; powerful 12-channel receiver with detachable quadrifilar antenna for outstanding tracking in any environment; 500 user-entered waypoints; Backtrack; best fist and game time calculator; auto position averaging; and even a built-in thermometer and altimeter! Easy to use pop-up windows access waypoints, route, setup, sun/moon, and alarm functions. Wrap-around rubber grip and water-sealed battery compartment. 30 hours of battery life with a 10-year internal lithium battery backup. Accessories include wrist strap, nylon carrying case, 4 AA batteries, and manual.

ORDER GPS-CT only **$289.95**

FRS WALKIE-TALKIES!

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

75-510 Midland

Hand-size powerhouse has large, backlit LCD display for night viewing; four AA rechargeable batteries and AC charger included at no extra cost. **Accessories: BAT 1, BAT 11, BAT 13, MIC 1 beginning on page "N".**

ORDER TR 1 only **$109.95**

FR-465 Cherokee

Shirt-pocket size, offers "ring alert" for incoming calls, removable SMA-base rubber duckie, operates on five AAA alkaline or rechargeable cells (optional). **Accessories: BAT 6, CAS 4, MIC 1, PWR 6 beginning on page "N".**

ORDER TR 2 only **$119.95**

NEW FRS HANDIE-TALKIE FROM ICOM!

A world leader in radio communications has just released their Family Radio Service (FRS) 4008A, a ruggedized 462 MHz transceiver ideal for camping, business, car caravans, and other applications requiring reliable, interference-free, short range communications.

Operating on all 14 FRS channels, and running full half-watt maximum allowable power, the ICOM FRS does not require a license, and anyone can easily operate it. The sharp, contrasty, LCD screen assists the simple, multifunction, pushbutton operation: selecting channels, assigning any of 38 sub-audible (CTCSS) group codes, choosing among 10 ringing tones, activating the automatic transponder system, turning on the backlight for night operation, switching keyboard beep, and more

The ICOM FRS has excellent sensitivity (0.2 microvolts) affording up to two mile range under ideal conditions! Sharp selectivity (8.5 kHz @-6 dB) resists adjacent channel interference! Swing-up flex antenna allows convenient storage and immediate use! Measures only 2-1/8"W x 4"H x 1"D. Requires three alkaline AA cells. **Accessories: BAT 1 on p. "N"; MIC 1 on p. "O".**

ORDER TR 4 only **$119.95**

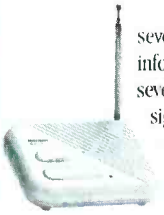
UNIDEN HH955 HAND-HELD MARINE RADIO!

This low-cost, high-performance marine radio can be a lifesaver during emergencies, and receiver NOAA weather broadcasts for your safety and planning! Powerful 600 milliwatt audio can be heard over deck noise; earphone and mike jacks are provided for external accessories.

All U.S. and international VHF marine channels; select 1 watt power for squadron intercom, or a full 5 watts for distant communications. Use alkaline or rechargeable AA cells (optional). Survives -4 to +122 degree temperatures; compact size (6.6"H x 2.2"W x 1.8"D) and light weight (19.5 oz) assures easy stowage. Includes AC adaptor/charger, removable rubber antenna, belt clip, wrist strap, and complete manual. **Accessories: BAT 1, BAT 11, BAT 13, DCC 7 on p. "N."**

ORDER TR 3 only **$179.95**

THIS IS A WARNING – without the WEATHER ALERT MONITOR you may be in jeopardy of not knowing when the next storm will hit!



Crystal controlled for superb stability, this tiny receiver allows you to select any of the seven nationwide NOAA National Weather Service channels for immediate weather information. Listen to 24 hour voice weather broadcasts, or select flashing light or siren for severe weather alerts. Sits on your desk or nightstand, or mounts on a wall. For strong signal areas, use the adjustable antenna, and in fringe areas, plug in your outdoor antenna for reliable reception. Comes with AC adaptor, or may be operated from internal 9-volt battery (optional) during power outages.

ORDER RCV 25 only **$39.95**

U.S. Priority Mail or UPS Second Day Air shipping on ALL PRODUCTS!

Grove's Shortwave Receiver Specification Guide

Prices and specifications subject to change without notice

Receiver	AR 7030 "Plus"	Drake R8B	Drake SW2	Drake SW8	Grundig Yt. By. 400	JRC NRD-345	Sangean ATS-808	Sangean ATS-818CS	Sangean ATS-909	Sony ICF-SW77	Sony ICF-SW100	Sony ICF-SW2010	Sony ICF-SW7600GS
Grove Order #	RCV 17	RCV 3	RCV 18	RCV 19	RCV 22	RCV 20	RCV 13	RCV 9	RCV 8	RCV 10	RCV 24	RCV 2	RCV 11
Grove Price	$1269.95	$1159.95	$489.95	$779.95	$199.95	$799.95	$129.95	$219.95	$259.95	$469.95	$359.95	$349.95	$249.95
Frequency Range	0-32 MHz	100kHz-30MHz (35-55/108-174MHz with optional converter)	100 Hz-30 MHz	100 kHz-30 MHz, 87-108.118-137MHz	160kHz-30MHz 87.5-108MHz	100 kHz-30 MHz	150kHz-30 MHz, 87.5-108 MHz	150kHz-30MHz 87.5-108MHz	150kHz-30MHz 87.5-108 MHz	150kHz-29.99MHz 87.5-108 MHz	150kHz-30MHz 76-108 MHz	150kHz-30MHz 76-108, 116-136MHz	150kHz-29.995MHz, 87.6-108MHz
Keypad Entry?	Remote control (incl.)	Yes, plus tuning dial	Yes	Yes, plus tuning dial	Yes	Yes	Yes	Yes	Yes	Yes, plus tuning dial	Yes, plus tuning dial	Yes, plus tuning dial	Yes
Tuning Steps	2.665 Hz SSB, 20.62 Hz AM/FM	10/100Hz 1 kHz	50 Hz-5 kHz	50 kHz FM 100 Hz AM	1/5 kHz	5/100 Hz:1/10 kHz	50/100 kHz FM, 10/9/5/1 kHz AM	1kHz	40 Hz USB/LSB	50Hz/1kHz	100Hz/1/5kHz, 9/10kHz MW, 50kHz FM	100Hz/1kHz	1kHz
Display	Backlit LCD	Backlit LCD	Backlit LCD	Backlit LCD	Backlit LCD	Backlit LCD	LCD	Backlit LCD	Backlit LCD	Backlit LCD	Backlit LCD	Backlit LCD	Backlit LCD
Dimmer		Yes	Yes	On/Off	On/Off	No	No	Yes		On/off	On/Off	On/off	No
Receiving Modes	AM/synchronous AM/ USB/LSB/CW, data, NFM	AM, NFM, USB, LSB, CW, RTTY	AM, AM Synch, USB, LSB	AM, AM synch., WFM, LSB, USB	AM, LSB, FM, CW, USB	AM, AM synch, USB, LSB	AM, FM	AM, LSB, WFM, USB	AM, FM broadcast, USB, LSB	AM, AM synch., LSB, WFM, USB	AM, AM synch., USB, LSB, CW, WFM	AM, USB, LSB, WFM, synch. det.	AM, WFM, USB, LSB, synch. det.
Memory	400 channels	1000 channels	100 channels	70 channels	40 channels	100 channels	45 channels	45 presets	307 channels	162 channels	50 channels	32 channels	22 channels
Scan	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Banks		10	No	7	No	No	No	No	29	20	10	No	No
Search		No	No	No	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Delay		Yes	No	5 sec. per step	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	No
Clock	Clock timer	Dual time zone	No	Dual mode	12/24 hr./sleep	12/24 hour clock/timer	24 hour UTC/local, alarm/timer	Dual time with record	3 separate timers with alarm	12/24 hr.	24 hr./sleep	12/24 hr./alarm/sleep	w/ timer and sleep
Audio Output (Typical)	2 W @ 8 ohms	2.5 W @ 4 ohms		2 W @ 4 ohms	700 mW	1 Watt	440 mW @ 10 @ THD	800 mW		400 mW	250 mW	380 mW	
Record Audio Output	Yes	Yes	No	Yes	No	Yes	No	No	Yes	138 mV	245 mV	.775 mV @ 1000 ohms	Yes
Recorder Activator	Yes	No	No	No	No	No	No	Internal prog. cassette	No	Yes	No	No	No
Signal Strength Ind.	LCD Bargraph	Analog S-meter	Analog S-meter	Analog S-meter	LCD bargraph	LCD bargraph	No	Yes	LCD bargraph	LCD bargraph	No	LED bargraph	Single "tune" LED
Computer Interface	RS232	RS232C	No	No	No	RS-232C	No	No	No	No	No	No	No
Conversion Scheme	Double up-conversion (45 MHz/455 kHz)	Double up-conversion	Double up-conversion (55 MHz/455 kHz	Double up-conversion	Double up-conversion	Double up-conversion	Double up-conversion	Double up-conversion	Double up-conversion	Double up-conversion	Double up-conversion	Double up-conversion	Double up-conversion
Sensitivity (typical)	0.5 uV	0.5 uV	0.5 uV	0.5 uV		0.3 uV							
Selectable Atten.	5 level	Yes	No	Yes	Yes	20 dB	Yes	RF gain control	RF gain control	Yes	Yes	Yes	Yes
IF Selectivity (-6/-60dB)	2.2/4/5.3/9.5 kHz	6/4/2.3/1.8 kHz, 500 Hz	6/12 kHz AM, 2.3/5 kHz SSB	(-6/-50 dB): AM Narrow 4/6 kHz SSB 2.3/4.5 kHz		4/10 kHz wide, 2/6 kHz narrow	Wide/narrow AM	Wide/narrow switch 6.5 kHz AM	Wide/narrow AM			Wide 9/18 kHz Narrow 4/18 kHz	
Passband Tuning	±4.2 kHz, all modes	+/-3 kHz	No	No	No	No	No	No	No	No	No	No	No
Adjustable Notch Filter	No	500-5000 Hz, 40 dB	No	No	No	No	No	No	No		No	No	No
Antenna Connector	SO-239 and 600 ohm	Dual, switched SO 239	SO-239 and screw terminal	SO-239, Push terminals, Integral whip	1/8" mini whip	SO-239 and 600 ohm	1/8" miniplug	1/8" miniplug	1/8" miniplug	1/8" miniplug	1/8" miniplug	1/8" miniplug	1/8" miniplug
Dimensions (W"xH"xD")	9.5x3.5x9	13.5x5.25x13	11x4.5x7.5	11.5x5.25x13	7.75x4.62x1.75	10x4x9"D	7.5x5x1.5"D	11.25x7.37x2.75	8.5x5x1.5	10.87x6.87x1.87	4.37z2.87z93	11.37x6.25x2.16	7.27x4.72x1.25
Weight	4 lbs. 13 oz.	13 lbs.	5.8 lbs.	10 lbs.	1 lb. 5 oz.	7.7 lbs.	1 lb. 5 oz.	3 lbs. 13 oz	1 lb. 12 oz.	3.25 lbs.	8 oz.	3.75 lbs.	1.25 lbs.
Power Requirement(s)	120 VAC (supply included) or 15 VDC @ 1 A (12 VDC w/ less perf.)	100/120/200/2450VAC; 11:16VDC @ 2A	12 VDC/120 VAC	6-9VDC/6 cells	6AA cells/9VDC	12 VDC/120 VAC	6 VDC @ 300 mA or 6 AA cells	120VAC/int.cells 4D cells	4AA batteries or optional AC adaptor, 6 VDC	6VDC or 4C cells	120VAC or 2AA cells	120VAC or 3D/2AA cells	120VAC or 4AA cells
Warranty	One year	One year	One year	One year	One year	One year	One year	One year	One Year	One year	One year	One year	One year
Accessories Incl.	Manual, AC adaptor	Manual, AC adaptor	AC adaptor, wire antenna, manual	Tele. whip/AC adaptor, manual	Reel ant./case/ earphone/SW Guide/ 6AA batteries/AC adaptor	AC adaptor, manual	Soft pouch/stereo earphones/external antenna adaptor	AC adapt./ ext. ant adaptor/ SW Guide	AC adapt./ carrying pouch, earphones, external antenna connection.	Stereo earphones/ AC adapt./tele. ant/soft pouch/SW Guide	Stereo earphones/AC adapt./tele. ant/soft pouch/SW Guide	Earphone/ AC adapt./wire ant./tele. ant/strap/ext. ant. adapt./SW Gd.	Carrying case/LPI active antenna/AC adaptor

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

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

ACCESSORIES		
ACC-1	REGENERATION MODULE FOR ANT-32	$47.95
ACC-2	NIGHTLOGGER II TAPE RECORDER ACTIVATOR	$69.95
ACC-3	OPC-478 COMPUTER INTERFACE CABLE, ICOM R10	$44.95
ACC-4	OPC-474 CLONING CABLE, ICOM R10	$17.95
ACC-6	CR-293 HIGH STABILITY CRYSTAL, ICOM R8500	$299.95
ACC-7	FL-52A CW NARROW FILTER, ICOM R8500	$199.95
ACC-8	UT-102 VOICE SYNTHESIZER, ICOM R8500	$59.95
ACC-9	DRAKE SW-2 REMOTE CONTROL	$48.95
ACC-12	SWIVEL MOUNTING BRACKET, MAGELLAN GPS 2000/3000/4000	$19.95
ACC-13	INSTRUCTIONAL VIDEO, MAGELLAN GPS-2000	$14.95
ACC-15	COMPUTER INTERFACE CABLE FOR BC-895	$29.95
ACC-16	DSP UPGRADE, PCR1000	$139.95
ACC-43	VHF CONVERTER, DRAKE R8A/B (33-55, 108-174 MHZ)	$219.95
ACC-72	TV-R7100 TV/FM ADAPTER, ICOM R7100/8500	$349.95
ACC-74	CT-17 LEVEL CONVERTER, ICOM R7000/7100/8500	$139.95
ACC-79	AUDIO CASSETTE ADAPTER, SCANNERS/SW RECEIVERS	$9.95
ACC-94	ADHESIVE REPLACEMENT KIT, ANT-13	$4.95
ACC-96	CTCSS SQUELCH DECODER, BC-890	$59.95
ACC-101	BUDWIG CH-239 SW DIPOLE CONNECTOR	$9.95
ACC-130	CTCSS TONE BOARD, UNIDEN BC-9000&PRO-2045	$46.95
ACC-156	SAC-8000 INTERFACE CABLE, AR-8000/OPTO SCOUT	$34.95
ACC-157	OPTO'S LYNX COMPUTER INTERFACE, AR-8000	$129.95
ACC-168	WEATHER-PROOF FLEX TAPE, 22 FT ROLL	$1.95

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

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

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

BATTERIES		
BAT-1	ENERGIZER INDUSTRIAL "AA"	$.79
BAT-2	ENERGIZER INDUSTRIAL "D"	$1.19
BAT-3	ENERGIZER INDUSTRIAL "C"	$1.09
BAT-4	ENERGIZER INDUSTRIAL "9V"	$2.25
BAT-5	BP-180 800 mAH CHARGEABLE, UNIDEN BC-230/235, PRO-90	$29.95
BAT-6	"AAA" ALKALINE BATTERIES	$.75
BAT-7	"AAA" RECHARGEABLE BATTERIES (2)	$5.97
BAT-9	METROWEST LONG LIFE PACK, UNIDEN BC-200/205	$79.95
BAT-11	SAFT RECHARGEABLE "AA" NICAD, 600 MAH	$1.95
BAT-13	RECHARGEABLE "AA"NICAD BATTERIES, RADIO SHACK	$2.75
BAT-14	RECHARGEABLE PACK, UNIDEN BC-200/205	$39.95
BAT-15	RECHARGEABLE PACK, UNIDEN BC-2500/3000	$31.95
BAT-16	POWER POCKET RECHARGEABLE LEAD/ACID 12 V, 2 AH	$59.95

BOOKS (See listing on following page)

BRACKETS		
BRK-1	HAND-HELD RADIO MOBILE MOUNT, SINGLE	$9.95
BRK-2	MOBILE MOUNTING BRACKET FOR BC-895/9000XLT	$15.95
BRK-3	UNIVERSAL BELT CLIP CAN BE USED WITH BRK-6	$4.95
BRK-4	MB12 MOBILE MOUNTING BRACKET, ICOM R8500	$35.95

BRACKETS (Continued)		
BRK-5	MB-23 CARRYING HANDLE, ICOM R7100/8500	$12.95
BRK-6	MOBILE HANGER FOR BELT CLIPS UP TO 1"W	$4.95
BRK-7	HAND-HELD RADIO MOBILE MOUNT, DOUBLE	$12.95
BRK-8	DASH MOUNT BRACKET FOR GARMIN III	$31.80
BRK-9	WINDOW ANTENNA MOUNT KIT BNC CONNECTOR	$28.95
BRK-12	DRAKE SW-1,2 CARRYING/TILT HANDLE	$6.95
BRK-13	DRAKE SW-1,2 MOBILE MOUNTING BRACKET	$14.95
BRK-14	AOR-5000 DOUBLE RACK MOUNT	$149.95

CARRYING CASES		
CAS-1-N	ICOM R10 HEAVY-DUTY DURAS NYLON CASE	$29.95
CAS-3	LEATHER CASE FOR UNIDEN BC-230/235, PRO-90	$29.95
CAS-4	FR-465 CHEROKEE LEATHERETTE CARRYING CASE	$19.95
CAS-5	GARMIN III CARRYING CASE	$12.69
CAS-6	LEATHER CASE FOR UNIDEN BC-3000XLT	$29.95
CAS-7	MAGELLAN GPS-2000 CARRYING CASE	$9.95
CAS-10	DRAKE SW-8 CARRYING CASE	$49.95
CAS-11-L	RELM HS-200 LEATHER CASE	$29.95
CAS-18	GARMIN STREET PILOT CARRYING CASE	$19.99

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

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

CLOCKS		
CLK-1	24 HOUR SETH THOMAS 13" WALL CLOCK	24.95
CLK-4	MFJ-112 WORLD MAP DESK CLOCK	$24.95

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

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

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

CONVERTERS		
DCC-2	3-SOCKET CIGARETTE LIGHTER ADAPTOR	$12.95
DCC-3	MOBILE DC ADAPTOR (1.5,3,4.5,6,7.5,9.12 V, 800 mA)	$12.95
DCC-4	OPC-131 DC POWER CABLE FOR ICOM PCR1000	$14.95
DCC-5	CP-12 DC ADAPTOR W/ NOISE FILTER FOR ICOM R10/PCR 1000	$29.95
DCC-7	MOBILE DC ADAPTOR FOR UNIDEN BC-3000/230/235/HH955	$15.95
DCC-8	CIGARETTE LIGHTER ADAPTOR FOR GARMIN GPS-12	$39.98
DCC-9	CIGARETTE LIGHTER ADAPTOR FOR GARMIN III/STREETPILOT	$23.30

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

GPS SATELLITE EQUIPMENT		
GPS-100	MAGELLAN GCS-100 GLOBAL E-MAIL/GPS RECEIVER	$1499.95

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

U.S. Priority Mail or UPS Second Day Air shipping on ALL PRODUCTS!

NEWLY UPDATED SONY ICF-SW7600GS

Now includes an LPI Shortwave Active Antenna and AC adaptor!

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

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

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

ORDER RCV 11 only **$249.95**

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

ORDER ANT 26 only **$89.95**

Sangean ATS909 Multiband Radio

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

ORDER RCV 8 only **$259.95**

Versatile Sangeans

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

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

ATS-818CS w/cassette recorder
ORDER RCV 9 only **$219.95**

ATS-818 w/o cassette recorder
ORDER RCV 7 only **$149.95**

Other Grove Shortwave Receivers

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

GE Superadio III for AM/FM DXing

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

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

ORDER RCV 5 only **$59.95**

GROVE TUN-4A MINITUNER PLUS

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

Continuous 400 kHz-30 MHz coverage, -20 to +20 dB gain/attenuation control, dual antenna switch, dual receiver output, amplified/unamplified preselection, band switch, fine tuning, and built-in lightning protection. Full instructions included. Requires 12VDC power (sold separately). **Accessories: ADP 6, ADP11, ADP 27, ADPK 15, ANT 25, and PWR 19 beginning on page "N"; ANT 2, ANT 3, p. "K".**

ORDER TUN 4A only **$99.95**

U.S. Priority Mail or UPS Second Day Air shipping on ALL PRODUCTS!

GROVE

Improved Drake R8-B

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

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

ORDER RCV 3 only **$1159.95**

AR7030 PLUS

The AR7030 "PLUS" offers 105 dB dynamic range, +35 dBm third-order intermod rating, and razor-sharp selectivity, yet its 0.3 microvolt SSB sensitivity snags even the weakest signals. Selectivity of 2.2, 4.0, 5.3, or 9.5 kHz; 400 memory slots complete with alphanumeric tags and clock/timer.

Continuous 0-32 MHz frequency coverage, all-mode reception, synchronous detection, superb audio quality, 2.6 Hz tuning increments, passband tuning, noise compressor, dual VFOs, enhanced AGC, programmable attenuator, and much more! See complete specifications on page "M". **Accessories: ANT 2, ANT 24, p. "K"; SPK 13, p. "G".**

ORDER RCV 17 only **$1269.95**

Drake SW8

Take one with you wherever you go!

This combination desktop/portable world band receiver from R.L. Drake—with improved sensitivity, selectivity, and noise reduction—is an excellent value for all-around DXing. Not only continuous coverage 100 kHz-30 MHz, 87-108 MHz FM broadcast (stereo at headphone jack), and 116-136 MHz aircraft as well! Standard and synchronous detection AM, upper and lower sideband on medium and shortwave, direct frequency entry keypad, 0.5 microvolt sensitivity, dual 6/4 kHz selectivity on AM, sharp 2.3 kHz selectivity on SSB. Up-conversion eliminates images, while +10 dB intercept point suppresses intermod. Includes a signal matched whip antenna on all frequencies.

A compact 11" wide by 5-1/4" high and weighing a scant 10 pounds, the SW8 runs on optional internal batteries or its supplied AC adaptor. See complete specifications on page "M". **Accessories: CAS 10, p. "N"; ANT 2, ANT 24, and TUN 4A, pp. "J" and "K"; SPK 13, p. "G".**

ORDER RCV 19 only **$779.95**

Bargain-Priced JRC NRD-345

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

ORDER RCV 20 only **$799.95**

The Popular SONY ICF-2010

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

Frequency range includes150 kHz-30MHz, 76-108, and 116-136 MHz. Requires 3D/2AA cells. See specificationson page "M". **Accessories: BAT 1 and BAT 2 on page "N"; ANT 3, ANT 32, ANT 21 and TUN 4A, pp. "J" and "K"; SPK 13, p. "G".**

ORDER RCV 2 only **$349.95**

Need something smaller? *Carry one in your shirt pocket as you travel the world.*

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

ORDER RCV 24 only **$359.95**

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

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

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Foreign Shipments: Place your order as described above, contacting us for shipping costs. (ANT 1, 5, and 7 must ship UPS International Air.) Payment is expected by International Money Order or a bank draft drawn in U.S. currency drawn on a U.S. bank. Post Office insurance does not apply to some countries and we do not assume any responsibility for losses beyond proof of shipment. No CODs accepted from APOs, FPOs or addresses outside the U.S.A.

Return Policy: Items may be returned within 30 days of original shipment for credit against future purchases or a refund (less shipping charges).

IMPORTANT: To return an item, call toll-free 1-800-438-8155 and ask the customer service representative for a **return authorization number** which must be printed on the returned package. Items returned without an RA number will be assessed a restocking fee based on the invoice value. Returned items not in original condition will be assessed a refurbishing charge.

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■ ACCESSORIES/OTHER GROVE PRODUCTS

GROVE

LIGHTNING PROTECTORS		
LAR-1B	GAS DISCHARGE LIGHTNING/SURGE PROTECTOR (BNC)	$19.95
LAR-1F	GAS DISCHARGE LIGHTNING/SURGE PROTECTOR (F)	$19.95
LAR-1M	GAS DISCHARGE LIGHTNING/SURGE PROTECTOR (MOTO)	$19.95
LAR-1P	GAS DISCHARGE LIGHTNING/SURGE PROTECTOR (PL-259)	$19.95
LAR-2	SINGLE OUTLET-SURGE PROTECTOR (120 VAC)	$3.95
MANUALS		
MAN-1	SERVICE MANUAL, ICOM R-8500	$57.95
MAN-2	SERVICE MANUAL, DRAKE R8B	$39.95
MAN-4	SERVICE MANUAL, AOR SDU 5000	$34.95
MAN-6	SERVICE MANUAL, AR-5000	$89.95
MICROPHONES		
MIC-1	MINI LAPEL SPEAKER/MICROPHONE FOR FRS RADIOS	$19.95
MIC-3	CLIP-ON MICROPHONE, 1/8" PLUG, 10' CORD	$2.95 EACH OR 3 FOR $5.00
PHONES		
PHN-4	CALLER ID AD100	$69.95
PREAMPLIFIERS		
PRE-1	GRE SUPER PREAMPLIFIER (100-1000 MHz) HANDHELD	$49.95
POWER SUPPLIES		
PWR 1	PORTABLE POWER STATION	$59.95
PWR-2	PSU-101,DESKTOP STAND/CHARGER, +12VDC	$59.95
PWR-4	+12 VDC ADAPTOR, 800 MA,2.1 mm PLUG	$14.95
PWR-10	AC ADAPTOR FOR SANGEAN ATS808A	$14.95
PWR-12	AC ADAPTOR, 500mA +/- 3/4.5/6/7.5/9/12V, 5 PLUGS	$4.95
PWR-13	SAME AS PWR12 BUT UL APPROVED	$9.95
PWR-15	METRO WEST PRO-CHARGE FOR BAT-9	$49.95
PWR-19	+12VDC APAPTOR ,200mA, 2.1 mm PLUG	$7.95
PWR-21	+12VDC ADAPTOR, 500 mA, 2.1 mm PLUG	$9.95
ROTATORS/ANTENNA		
ROT-1	ANTENNA ROTATOR	$59.95
SOFTWARE		
SFT-1	ICOM CS-R10 CLONING ONLY	$12.50
SFT-3	KLINGENFUSS GUIDE TO UTILITIES CD-ROM	$34.95
SFT-8	HAWK 5000 FOR USE WITH AR5000 AND SDU5000	$169.95
SPEAKERS		
SPK-2	DRAKE EXTERNAL, DRAKE R8/8A/8B	$48.95
SPK-4	RADIO SHACK PRO-X5 OPTIMUS, 30W MAX.	$45.95
SPK-6	VALOR'S CLASSIC NOISE CANCELLER	$16.95
SPK-8	RADIO SHACK PILLOW SPEAKER	$5.95
SPK-9	RADIO SHACK CLIP-ON MINI SPEAKER	$10.95
SPK-11	NAVAL HTS-3 AMPLIFIED SPEAKER	$29.95
SPK 13	GROVE SOUND ENHANCER	$199.95
SPK-15	VALOR'S SUN VISOR EXTENTION SPEAKER	$16.95
SPLITTERS		
SPL-1	TV/FM TWO WAY SPLITTER BOX, F FEMALE	$2.95
SPL-2	UNIVERSAL SATELLITE SCPC, ICOM R7100/8500	$64.95
SWITCHES		
SWC-1	DAIWA COAXIAL TWO-WAY SWITCH	$25.95
TRIFIELD METERS		
TST-1	TRIFIELD ELECTRIC/MAGNETIC METER	$119.95
TST-2	TRIFIELD NATURAL EM METER	$199.95
TOOLS		
TOL-1	LEATHERMAN POCKET TOOL W/LEATHER BELT CASE	$34.95
TOL-2	LEATHERMAN TOOL ADAPTOR FOR TOL-1	$24.95

BOOKS (ALL LATEST EDITIONS)		
BOK-30	ANTIQUE RADIOS, MARTY & SUE BUNIS (COL)	$18.95
BOK-87-18	ARRL ANTENNA HANDBOOK (ANT-A)	$29.95
BOK58-98	1998 ARRL HANDBOOK (GEN-A)	$32.00
BOK-32	ARRL RADIO FREQUENCY INTERFERENCE HANDBOOK (GEN-A)	$17.95
BOK-103	1998/99 ARRL REPEATER DIRECTORY (FRQ-SCN)	$8.00
BOK-35	COLLECTOR'S GUIDE TRANSISTOR RADIOS, M. & S. BUNIS (COL)	$15.95
BOK-72	COMMUNICATIONS RCVRS VACUUM TUBE ERA, E. RHOADS (COL)	$19.95
BOK-37	CRUISER'S RADIO GUIDE. ROGER KRAUTKREMER, KOYY (FRQ)	$19.95
BOK-38	CRYSTAL SET BUILDING AND MORE, VOLUME 6 AND 7 (GEN-B)	$14.95
BOK-88	CRYSTAL SETS (VOLUME V), PHILLIP N. ANDERSON (GEN-B)	$9.95
BOK-1	FEDERAL FREQUENCY ASSIGNMENT MASTERFILE (FRQ)	$24.95
BOK-64	FM ATLAS, BRUCE ELVING (FRQ)	$14.95
BOK-81	FREQ & INTELLIGENCE DIRECTORY. JAY HARRIS (FRQ-GEN)	$19.95
BOK-36	GPS MANUAL, PRINC & APPS ,S. DYE & F. BAYLIN (SAT-A)	$39.95
BOK-13	GUIDE TO SURVIVAL COMMUNICATIONS (GEN)	$19.95
BOK-54	GUIDE TO UTILITIES, JOERG KLINGENFUSS (SWL/FRQ)	$39.95
BOK-95	INSTALL AIM & REPAIR YOUR SAT. SYST., F. BAYLIN (SAT-A)	$9.95
BOK-34	KLINGENFUSS 97 SW FREQ. DIR., JOERG KLINGENFUSS (SWL/FRQ)	$36.95
BOK-53-97	M-STREET JOURNAL, ROBERT UNMACHT, ED. (FRQ-AM/FM)	$48.95
BOK-78	MASTER FREQUENCY FILE, J. TUNNELL & R. KELTY (SCN/FRQ)	$29.95
BOK-96	MINIATURE SATELLITE DISHES, FRANK BAYLIN (SAT-GEN)	$19.95
BOK-63	MONITOR AMERICA, RICHARD BARNETT (SCN/FRQ)	$29.95
BOK-6	3D OFFICIAL AERONAUT. FREQ DIR, ROBERT A. COBURN (FRQ)	$21.95
BOK-18-99	1999 PASSPORT TO WORLD BAND RADIO, LARRY MAGNE SWL	$16.95
BOK71	PHILCO RADIO'S 1928 - 1942, MICHAEL PROSISE (COL)	$29.95
BOK-47	PIRATE RADIO, ANDREW YODER (SWL)	$29.95
BOK-21-29	POLICE CALL PLUS (SPECIFY STATE), GENE HUGHES, 1998 (FRQ)	$12.95
BOK-50	RADIO MONITORING, J. (SKIP) AREY (GEN-B)	$19.95
BOK-33	RADIO ON THE ROAD, WILLIAM HUTCHINGS (FRQ)	$14.95
BOK-17	RADIO SCIENCE OBSERVING VOL. I, JOSEPH J. CARR (GEN-B)	$29.95
BOK-65	RADIOS BY HALLICRAFTERS, CHUCK DACHIS (COL)	$29.95
BOK-31	RADIO'S FIRST 75 YEARS, B. ERIC RHOADS (COL)	$39.95
BOK-48	RAILROAD RADIO FREQUENCIES, STURM & LANDGRAF (SCN)	$16.95
BOK-85	1998 SATELLITE EXPERIMENTER'S HDBK, M. DAVIDOFF (SAT-A)	$21.95
BOK-2	SCANNER MOD. HANDBOOK VOLUME I, BILL CHEEK (SCN-A)	$17.95
BOK-2V	SCANNER MOD. HANDBOOK, VOLUME II, BILL CHEEK (SCN-A)	$17.95
BOK-77	SCANNERS & SECRET FREQUENCIES, HENRY L. EISENSON (SCN-B)	$19.95
BOK-46	SHORTWAVE LISTENER'S HANDBOOK, ANDREW YODER (GEN-B)	$29.95
BOK-69	SW RADIO LISTENER'S GUIDE, ANITA LOUISE MC CORMICK (SWL)	$11.95
BOK-59	SHORTWAVE RECEIVERS PAST & PRESENT, FRED OSTERMAN (COL)	$24.95
BOK-97	SPECTRUM GUIDE, BENNETT Z. KOBB (FRQ-GEN)	$29.95
BOK-8	TOP SECRET REGISTRY OF U.S. GOVT. RADIO FREQUENCIES (FRQ)	$21.95
BOK-83	ULTIMATE SCANNER (MODIFICATIONS), BILL CHEEK (SCN-A)	$29.95
BOK-62	ULTIMATE SPY BOOK, KEITH MELTON (COL)	$29.95
BOK-108	VISUAL DICTIONARY OF SPECIAL MILITARY FORCES (COL)	$16.95
BOK-56	WEATHER SATELLITE HANDBOOK,RALPH TAGGART (SAT-A)	$19.95
BOK-3	1998 WORLD RADIO TV HANDBOOK (SWL/FRQ)	$24.95
BOK-86	WORLDWIDE AERONAUTICAL COM., R. EVANS (FRQ/SWL)	$19.95
BOK-102B	ZENITH RADIO, THE EARLY YEARS, H. CONES & J. BRYANT (COL)	$29.95
BOK-102	ZENITH TRANSOCEANIC ROYALTY, H. CONES & J. BRYANT (COL)	$24.95

Subject Codes for Books:
SWL—Shortwave
SCN—Scanners
ANT—Antennas
COL—Collectors
FRQ—Frequency Directory
GEN—General Interest
SAT—Satellite

Intended Readership Levels:
A—Advanced
B—Basic

Grove's simplified shipping/handling charges

Please add the appropriate shipping charge shown below to your product total on the order form (next page). We ship by U.S. Priority Mail or UPS 2nd Day Air unless otherwise requested. Non-US orders, please call for shipping costs.

Total Order	$1-$99	$100-$499	$500-$999	$1000 and up
Shipping Charges	$5.50	$10.00	$16.00	$20.00

NOTE: **Due to their bulk, some antennas cost more to ship than other products. After you have calculated your total order including shipping charge, please add the following additional shipping cost for any antenna listed below:**

ANT 4, 5, 9, 13, 15, 24 and 30 ..... add $5.50
ANT 1, 7 and 31 (shipped UPS Ground) ..... add $11.00
ANT 1, 7 and 31 (shipped UPS 2nd Day Air) ..... add $14.00

Order Line and Product Support Info.: 1-800-438-8155

Frequencies

1500-1600	Anguilla,Caribbean Beacon	11775am			
1500-1600	Australia, Radio	5995pa	6020pa	6080as	9500as
		9580pa	11660as		
1500-1600 vl	Australia, VL8A Alice Spg	2310do			
1500-1600 vl	Australia, VL8K Katherine	2485do			
1500-1600 vl	Australia, VL8T Tent Crk	2325do			
1500-1600 vl	Canada, CBC N Quebec Svc	9625do			
1500-1600	Canada, CFRX Toronto	6070do			
1500-1600	Canada, CFVP Calgary	6030do			
1500-1600	Canada, CHNX Halifax	6130do			
1500-1600	Canada, CKZN St John's	6160do			
1500-1600	Canada, CKZU Vancouver	6160do			
1500-1559 s	Canada, R Canada Intl	11855am	13650am		
1500-1600	China, China Radio Intl	7160as	9785as		
1500-1600	Costa Rica,RF Peace Intl	7385am	15050am	21460am	
1500-1600	Ecuador, HCJB	12005ca	15115am	21455am	
1500-1600 as	Eqt Guinea, R East Africa	15186af			
1500-1530	Georgia, Voice of Hope	15715as			
1500-1600	Germany, Sunrise Radio	5850va			
1500-1600	Germany,Overcomer Ministr	13810me	15625na		
1500-1600	Guam, TWR/KTWR	15330as			
1500-1600	Ireland, Unt Christian BC	6200do			
1500-1600 as/vl	Italy, IRRS	7120va			
1500-1600	Japan, R Japan/NHK World	7200as	9505na	9750as	11730as
1500-1600	Jordan, Radio	11690eu			
1500-1600	Kenya, Kenya Broadc Corp	4935do			
1500-1510	Liberia,LCN/R Liberia Int	5100do			
1500-1600	Malaysia, Radio	7295do			
1500-1600 irreg	Malaysia,RTM KotaKinabalu	5980do			
1500-1530	Mexico, Radio Mexico Intl	5985na	9705na		
1500-1600	Myanmar, Radio	5986do			
1500-1600 vl	Namibia, NBC	4930af	4965af		
1500-1525	Netherlands, Radio	9890as	15585as		
1500-1600 occsnal	New Zealand, R NZ Intl	6100pa			
1500-1600	Nigeria, Voice of	7255af	15120af		
1500-1557	North Korea, R Pyongyang	3560ca	9640af	9975me	11735sa
		13650va			
1500-1530 s	Norway, Radio Norway Intl	13800va			
1500-1530 as	Palau, KHBN/Voice of Hope	9985as			
1500-1600 vl	Papua New Guinea, NBC	4890do			
1500-1600	Russia,Voice of Russia WS	4730me	4940me	4975me	7325me
		9975me	11500me	11775me	15470me
		15560me	17570me	17580me	
1500-1530	S Africa, Channel Africa	9445af			
1500-1530 twhfa	Seychelles, FEBA Radio	11600as			
1500-1545 sm	Seychelles, FEBA Radio	11600as			
1500-1600	Singapore,RCorp Singapore	6150do			
1500-1600	Sri Lanka, Sri Lanka BC	9730as	15425as		
1500-1600	Taiwan, Voice of Asia	7445as			
1500-1600 vl	Tanzania, Radio	5050do			
1500-1600	UK, BBC African Service	6190af	11860af	11940af	15400af
		15420af	17830af	21470af	21490af
		21660af			
1500-1600	UK, BBC Asian Service	5975as	5990as	6195as	7135as
		9740as	11750as	15310as	
1500-1600	UK, BBC World Service	9410eu	9515na	11865na	12040eu
		12095eu	15220na	15485eu	15575eu
		17705eu	17840am		
1500-1600	USA, KAIJ Dallas TX	13815am			
1500-1600	USA, KTBN Salt Lk City UT	15590am			
1500-1600	USA, KWHR Naalehu HI	9930as	11565pa		
1500-1600	USA, Voice of America	6110as	6160as	7125as	7215as
		9645as	9700me	9760as	15205va
		15255va	15395as		
1500-1600	USA, WEWN Birmingham AL	9455na	11875na	15745eu	
1500-1600 mtwhfa	USA, WGTG McCaysville GA	9400am			
1500-1600	USA, WHRI Noblesville IN	13760am	15105am		
1500-1600	USA, WJCR Upton KY	7490na	13595na		
1500-1600 as	USA, WRMI/R Miami Intl	9955ca			
1500-1600	USA, WWCR Nashville TN	9475am	12160am	13845am	15685am
1500-1600	USA, WYFR Okeechobee FL	11830na	17750na		
1500-1502	USA, WYFR Okeechobee FL	11550as			
1500-1600	Zambia, Christian Voice	6065af			
1500-1600 vl	Zambia, R Zambia/ZNBC 1	4910do			
1500-1600 vl	Zambia, R Zambia/ZNBC 2	6165do			
1500-1600 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
1530-1540	Bangladesh, Bangla Betar	4880as	15520as		
1530-1600	Guam, AWR/KSDA	9385as			
1530-1600	Iran, VOIRI	7215as	9780as	13605me	
1535-1550	Vatican State, Vatican R	13765au	15500au		
1545-1600	Albania, R Tirana Intl	11734eu	12084eu		
1545-1600 s h	Bangladesh, Bangla Betar	4880as	15520as		
1545-1600	Israel, Kol Israel	11605eu	15650na	17515na	
1550-1600 a	Vatican State, Vatican R	13765va	15500va		

Selected Programs

Sundays

1500 Guam, TWR/KTWR: Unshackled. Pacific Garden Mission's radio drama.
1500 USA, KTBN Salt Lk City UT: The Coral Ridge Hour. Dr. James Kennedy preaches from the Coral Ridge Presbyterian Church of Fort Lauderdale, Florida.
1500 USA, WWCR #1 Nashville TN: Prophetic Word Program. A message of salvation from Dan Kubish of the House of Yaweh.
1500 USA, WWCR #3 Nashville TN: The Whole Truth. Anthonee Patterson conducts services from Pennsylvania.
1530 Guam, TWR/KTWR: Family Bible Hour. A bible study program.
1530 USA, WWCR #1 Nashville TN: Cross Roads Baptist Church. Lloyd Ferguson preaches from Lawrenceville, Georgia.

Mondays

1500 Guam, TWR/KTWR: Hour of Freedom. See S 1600.
1500 USA, KTBN Salt Lk City UT: The Believer's Voice of Victory. See M 0100.
1500 USA, WWCR #1 Nashville TN: The Old Time Religion Hour. See NAm 0515.
1500 USA, WWCR #3 Nashville TN: USA Radio News. See NAm 0500.
1506 USA, WWCR #3 Nashville TN: Freedom's Call (live). See NAm 0605.
1515 USA, WWCR #1 Nashville TN: The Living Waters Broadcast. Father Bob Guste evangelizes from Louisiana.
1530 Guam, TWR/KTWR: Thru the Bible. J. Vernon McGee presents a book-by-book study of the Bible.
1530 USA, KTBN Salt Lk City UT: Our Town. See S 0500.
1530 USA, WWCR #1 Nashville TN: The Time of Deliverance. Benjamin Smith preaches from the Time of Deliverance Evangelistic Church in Philadelphia.
1545 USA, WWCR #1 Nashville TN: Wisdom from the Word. C. Milton Grannum preaches from the New Covenant Church in Philadelphia.

Tuesdays

1500 Guam, TWR/KTWR: Leading the Way. A biblical approach to better living.
1500 USA, KTBN Salt Lk City UT: The Believer's Voice of Victory. See M 0100.
1500 USA, WWCR #1 Nashville TN: The Old Time Religion Hour. See NAm 0515.
1500 USA, WWCR #3 Nashville TN: USA Radio News. See NAm 0500.
1506 USA, WWCR #3 Nashville TN: Freedom's Call (live). See NAm 0605.
1515 USA, WWCR #1 Nashville TN: The Living Waters Broadcast. See NAm 1515.
1530 Guam, TWR/KTWR: Thru the Bible. See M 1530.
1530 USA, KTBN Salt Lk City UT: Calling Dr. Whitaker. See T 0630.
1530 USA, WWCR #1 Nashville TN: The Time of Deliverance. See NAm 1530.
1545 USA, WWCR #1 Nashville TN: Wisdom from the Word. See NAm 1545.

Wednesdays

1500 Guam, TWR/KTWR: Good Tidings Hour. See S 1600.
1500 USA, KTBN Salt Lk City UT: The Believer's Voice of Victory. See M 0100.
1500 USA, WWCR #1 Nashville TN: The Old Time Religion Hour. See NAm 0515.
1500 USA, WWCR #3 Nashville TN: USA Radio News. See NAm 0500.
1506 USA, WWCR #3 Nashville TN: Freedom's Call (live). See NAm 0605.
1515 USA, WWCR #1 Nashville TN: The Living Waters Broadcast. See NAm 1515.
1530 Guam, TWR/KTWR: Thru the Bible. See M 1530.
1530 USA, KTBN Salt Lk City UT: Lifestyle Magazine. See M 2300.
1530 USA, WWCR #1 Nashville TN: The Time of Deliverance. See NAm 1530.
1545 USA, WWCR #1 Nashville TN: Wisdom from the Word. See NAm 1545.

Thursdays

1500 Guam, TWR/KTWR: Hour of Decision. Evangelist Billy Graham's radio program.
1500 USA, KTBN Salt Lk City UT: The Believer's Voice of Victory. See M 0100.
1500 USA, WWCR #1 Nashville TN: The Old Time Religion Hour. See NAm 0515.
1500 USA, WWCR #3 Nashville TN: USA Radio News. See NAm 0500.
1506 USA, WWCR #3 Nashville TN: Freedom's Call (live). See NAm 0605.
1515 USA, WWCR #1 Nashville TN: The Living Waters Broadcast.
1530 Guam, TWR/KTWR: Thru the Bible. See M 1530.
1530 USA, KTBN Salt Lk City UT: Steve Brock. Steve sings songs of praise.
1530 USA, WWCR #1 Nashville TN: The Time of Deliverance. See NAm 1530.
1545 USA, WWCR #1 Nashville TN: Wisdom from the Word. See NAm 1545.

Fridays

1500 Guam, TWR/KTWR: Words of Hope. David Bass provides the message.
1500 USA, KTBN Salt Lk City UT: The Believer's Voice of Victory.
1500 USA, WWCR #1 Nashville TN: The Old Time Religion Hour.
1500 USA, WWCR #3 Nashville TN: USA Radio News.
1506 USA, WWCR #3 Nashville TN: Freedom's Call (live).
1515 USA, WWCR #1 Nashville TN: The Living Waters Broadcast. See NAm 1515.
1530 Guam, TWR/KTWR: Thru the Bible. See M 1530.
1530 USA, KTBN Salt Lk City UT: Back on Course. See W 1130.
1530 USA, WWCR #1 Nashville TN: The Time of Deliverance. See NAm 1530.
1545 USA, WWCR #1 Nashville TN: Wisdom from the Word. See NAm 1545.

Saturdays

1500 Guam, TWR/KTWR: Kid's Club. A program for children.
1500 USA, KTBN Salt Lk City UT: Quigley's Village. Mr. Quigley and his puppet friends offer wholesome entertainment for children.
1500 USA, WWCR #1 Nashville TN: Let the Bible Speak. James Hickey with a program from New Testament Christianity in Oklahoma.
1500 USA, WWCR #3 Nashville TN: Foundation of Truth (live). David Wolfe.
1515 Guam, TWR/KTWR: Adventures in Odyssey. Lively childrens' dramas from the "Focus on the Family" team.
1515 USA, WWCR #1 Nashville TN: Eternal Good News. Germaine Lockwood of the Congregation of Messiah in Oklahoma teaches from the Old Testament.
1530 USA, KTBN Salt Lk City UT: Kids Against Crime.
1530 USA, WWCR #1 Nashville TN: The Showers of Blessings Broadcast. Ed McAbee sermonizes before a live congregation.
1545 Guam, TWR/KTWR: Search for Truth. See T 1600.
1545 USA, WWCR #1 Nashville TN: Words of Hope. See NAm 1230.

1600 UTC SHORTWAVE GUIDE 12:00 AM EST 9:00 AM PDT

Frequencies

1600-1700	Algeria, R Algiers Intl	11715af	15160me		
1600-1700	Anguilla,Caribbean Beacon	11775am			
1600-1700	Australia, Radio	5995pa	6020pa	6080as	9500as
		9580pa	11660as		
1600-1700 vl	Australia, VL8A Alice Spg	2310do			
1600-1700 vl	Australia, VL8K Katherine	2485do			
1600-1700 vl	Australia, VL8T Tent Crk	2325do			
1600-1700 vl	Canada, CBC N Quebec Svc	9625do			
1600-1700	Canada, CFRX Toronto	6070do			
1600-1700	Canada, CFVP Calgary	6030do			
1600-1700	Canada, CHNX Halifax	6130do			
1600-1700	Canada, CKZN St John's	6160do			
1600-1700	Canada, CKZU Vancouver	6160do			
1600-1700	China, China Radio Intl	9565af	9620af		
1600-1700 as	Costa Rica, Adv World R	9725na			
1600-1627	Czech Rep, Radio Prague	5930eu	17485af		
1600-1700	Ethiopia, Radio	7165af			
1600-1700	France, Radio France Intl	11615af	11705af	12015af	15210af
		15640af	17850af		
1600-1650	Germany, Deutsche Welle	6170as	7130af	7225as	9735af
		9875as	11810af	15145as	21695af
1600-1700	Germany, Sunrise Radio	5850va			
1600-1700	Germany,Overcomer Ministr	6130eu	13810me	15625na	
1600-1700	Guam, AWR/KSDA	9355as			
1600-1630	Guam, TWR/KTWR	15330as			
1600-1630	Iran, VOIRI	7215as	9780as	13605me	
1600-1700	Ireland, Unt Christian BC	6200do			
1600-1700 as/vl	Italy, IRRS	3985va			
1600-1630	Jordan, Radio	11690eu			
1600-1700	Kenya, Kenya Broadc Corp	4935do			
1600-1700	Lebanon, Voice of Hope	9960me			
1600-1700	Malaysia, Radio	7295do			
1600-1700 vl	Namibia, NBC	4930af	4965af		
1600-1650 occsnal	New Zealand, R NZ Intl	6100pa			
1600-1700	Nigeria, Voice of	7255af	15120af		
1600-1630 s	Norway, Radio Norway Intl	13800va	15340na	18950va	
1600-1630	Pakistan, Radio	9650as	11570me	15170af	17720af
1600-1700 vl	Papua New Guinea, NBC	4890do			
1600-1700	Russia,Voice of Russia WS	11775me	11850me	15490me	15515me
		17570me			
1600-1625	S Africa, Channel Africa	6000af			
1600-1700	Singapore,RCorp Singapore	6150do			
1600-1700	South Korea, R Korea Intl	5975am	9515af	9870af	
1600-1700 as	Sri Lanka, Sri Lanka BC	9730as	15425as		
1600-1700	Swaziland, Trans World R	9500af			
1600-1615	Switzerland, Swiss R Intl	9575as	15265as		
1600-1700 vl	Tanzania, Radio	5050do			
1600-1645	UAE, Radio Dubai	13630eu	13675eu	15395eu	21605eu
1600-1700	UK, BBC African Service	3255af	6190af	15400af	17830af
		21470af	21660af		
1600-1606	UK, BBC Asian Service	3915as	5975as	5990as	6195as
		7160as	9740as	11750as	15310as
1600-1700	UK, BBC World Service	9410eu	9515na	12095eu	15485eu
		15575eu	17840am		
1600-1700	USA, KAIJ Dallas TX	13815am			
1600-1700	USA, KTBN Salt Lk City UT	15590am			
1600-1700	USA, KWHR Naalehu HI	9930as			
1600-1700	USA, Voice of America	6035af	6110as	7125as	7215as
		9645as	9700me	9760as	13600af
		13710af	15205va	15225af	15255va
		15395as	15410af	15445af	17895af
1600-1700	USA, WEWN Birmingham AL	11875na	13615na	15745eu	
1600-1700 mtwhfa	USA, WGTG McCaysville GA	9400am			
1600-1700	USA, WHRI Noblesville IN	13760am	15105am		
1600-1700	USA, WJCR Upton KY	7490na	13595na		
1600-1700	USA, WMLK Bethel PA	9465am			
1600-1700 mtwhf	USA, WRNO New Orleans LA	15420am			
1600-1700 smtwha	USA, WSHB Cypress Crk SC	18930af			
1600-1700	USA, WWCR Nashville TN	9475am	12160am	13845am	15685am
1600-1700	USA, WYFR Okeechobee FL	11830na	15695va	17555va	17705na
		17750na	21525va		
1600-1610 a	Vatican State, Vatican R	13765va	15500va		
1600-1630	Vietnam, Voice of	9840eu	12010eu	15010eu	
1600-1700	Zambia, Christian Voice	3330af	4965af		
1600-1700 vl	Zambia, R Zambia/ZNBC 1	4910do			
1600-1700 vl	Zambia, R Zambia/ZNBC 2	6165do			
1600-1630 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
1606-1615	UK, BBC Asian Service	3915as	5975as	7160as	9740as
		11750as			
1606-1615 mtwhf	UK, BBC Asian Service	5990as	6195as	15310as	
1615-1645 as	UK, BBC African Service	11860af			
1615-1645	UK, BBC African Service	15420af			
1615-1700	UK, BBC Asian Service	3915as	5975as	7160as	9510as
		9740as	11750as		
1615-1700 as	UK, BBC World Service	9515na			
1615-1630	Vatican State, Vatican R	4005eu	5883eu	7250eu	9645eu
		11810eu			
1630-1700	Austria, R Austria Intl	6155eu	11855me	13710as	13730va
1630-1655	Belgium, R Vlaanderen Int	5910eu	7290eu		
1630-1657	Canada, R Canada Intl	6140as	7150as		
1630-1645	Egypt, Radio Cairo	11875af	15255af		
1630-1700	Georgia, Voice of Hope	6285eu	12125eu		
1630-1700 a	Germany, Universal Life	12015af			
1630-1700	Slovakia, R Slovakia Intl	5920eu	6055eu	7345eu	
1630-1700 vl	Zimbabwe, Zimbabwe BC	3306do	4828do		
1645-1700	Egypt, Radio Cairo	15225af			
1645-1700	UK, BBC African Service	11860af	15420af		
1650-1700	Eqt Guinea, Radio Africa	15186af			
1650-1700 mtwhf	New Zealand, R NZ Intl	6145pa			

Selected Programs

Sundays

1600 Guam, TWR/KTWR: Verse by Verse. No info available.
1600 USA, KTBN Salt Lk City UT: Love Worth Finding. Dr. Adrian Rogers of Memphis, Tennessee delivers biblical teaching and loving encouragement to people all over the world.
1600 USA, WWCR #1 Nashville TN: Latin Catholic Mass. Father Gommar De Pauw conducts the traditional Latin Mass.
1600 USA, WWCR #3 Nashville TN: Apostolic Assembly. Lonnie Wollard preaches from Milltown, Connecticut.
1630 USA, WWCR #1 Nashville TN: Blessed Assurance Ministry. Edward Maloof.

Mondays

1600 Guam, TWR/KTWR: Abundant Life. Walter Holland evangelizes from Texas.
1600 USA, KTBN Salt Lk City UT: The Music of Praise. Ray Jones plays contemporary christian music in this hour of alternate programming.
1600 USA, WWCR #1 Nashville TN: USA Radio News.
1600 USA, WWCR #3 Nashville TN: Scriptures for America. Peter J. Peters hosts this outreach ministry of the LaPorte Church of Christ in Colorado.
1605 USA, WWCR #1 Nashville TN: Pro Life Perspective. Anti-abortion message from the National Right-to-Life Committee.
1610 USA, WWCR #1 Nashville TN: The Spoken Word of God. Alexander Scourby narrates the King James version of The New Testament.
1615 Guam, TWR/KTWR: Pacific DX Report. The latest shortwave news and listening tips for Pacific shortwave listeners.
1615 USA, WWCR #1 Nashville TN: Evangelistic Hour. Vincent Williams.
1630 USA, WWCR #1 Nashville TN: Ask WWCR. See NAm 0430.

Tuesdays

1600 Guam, TWR/KTWR: Search for Truth. Greg Neely evangelizes from Ontario, Canada.
1600 USA, KTBN Salt Lk City UT: The Music of Praise. See M 1600.
1600 USA, WWCR #1 Nashville TN: USA Radio News.
1600 USA, WWCR #3 Nashville TN: Scriptures for America.
1605 USA, WWCR #1 Nashville TN: Pro Life Perspective.
1610 USA, WWCR #1 Nashville TN: The Spoken Word of God.
1615 Guam, TWR/KTWR: Shortwave Bible School. See S 1530.
1615 USA, WWCR #1 Nashville TN: Evangelistic Hour.
1630 USA, WWCR #1 Nashville TN: Religion or Life. Ed Garrett evangelizes from Texas.

Wednesdays

1600 Guam, TWR/KTWR: Bread of Life. Brother Jack Meeks with music and teaching.
1600 USA, KTBN Salt Lk City UT: The Music of Praise. See M 1600.
1600 USA, WWCR #1 Nashville TN: USA Radio News.
1600 USA, WWCR #3 Nashville TN: Scriptures for America.
1605 USA, WWCR #1 Nashville TN: Pro Life Perspective.
1610 USA, WWCR #1 Nashville TN: The Spoken Word of God.
1615 Guam, TWR/KTWR: Tempo. See S 1600.
1615 USA, WWCR #1 Nashville TN: Evangelistic Hour.
1630 USA, WWCR #1 Nashville TN: Word of Life. Gerald Pentecost.

Thursdays

1600 Guam, TWR/KTWR: The Macedonian Call. See S 1600.
1600 USA, KTBN Salt Lk City UT: The Music of Praise. See M 1600.
1600 USA, WWCR #1 Nashville TN: USA Radio News.
1600 USA, WWCR #3 Nashville TN: Scriptures for America.
1605 USA, WWCR #1 Nashville TN: Pro Life Perspective.
1610 USA, WWCR #1 Nashville TN: The Spoken Word of God.
1615 Guam, TWR/KTWR: Friends in Focus. See S 1600.
1615 USA, WWCR #1 Nashville TN: First Hand. See NAm 0445.

Fridays

1600 Guam, TWR/KTWR: The Macedonian Call. See S 1600.
1600 USA, KTBN Salt Lk City UT: The Music of Praise. See M 1600.
1600 USA, WWCR #1 Nashville TN: USA Radio News.
1600 USA, WWCR #3 Nashville TN: Nutrition. Scott Frieb.
1605 USA, WWCR #1 Nashville TN: Pro Life Perspective. See NAm 1605.
1610 USA, WWCR #1 Nashville TN: The Spoken Word of God. See NAm 1610.
1615 Guam, TWR/KTWR: Praise!. See S 1600.
1615 USA, WWCR #1 Nashville TN: The American Catholic. John Powell speaks from Chicago.
1630 USA, WWCR #1 Nashville TN: Bible Gems. Jim Kristoff evangelizes from Indiana.

Saturdays

1600 Guam, TWR/KTWR: The Word Today. A discussion of Biblical themes.
1600 USA, KTBN Salt Lk City UT: Kids Like You. Miss Cathie hosts this program for children.
1600 USA, WWCR #1 Nashville TN: A Brighter Day.
1600 USA, WWCR #3 Nashville TN: Eddie Smalling Gospel Hour. Eddie Smalling.
1615 Guam, TWR/KTWR: Wonderful Words of Life. Messages from the Salvation Army.
1615 USA, WWCR #1 Nashville TN: The End Day Prophecy Broadcast. Brother Sharpe evangelizes from Georgia.
1630 USA, KTBN Salt Lk City UT: Colby's Clubhouse. See A 1130.
1630 USA, WWCR #1 Nashville TN: The Word of Victory. Joyce Corbitt preaches.
1630 USA, WWCR #3 Nashville TN: The Old Record Shop.
1645 USA, WWCR #1 Nashville TN: Hope for Today. J. Otis Yoder of Pennsylvania with a spiritual message.

FREQUENCIES

1700-1800	Anguilla,Caribbean Beacon	11775am			
1700-1800	Australia, Radio	5995pa	6080as	9500as	9580pa
		11880pa			
1700-1800 vl	Australia, VL8A Alice Spg	2310do			
1700-1800 vl	Australia, VL8K Katherine	2485do			
1700-1800 vl	Australia, VL8T Tent Crk	2325do			
1700-1800 vl	Canada, CBC N Quebec Svc	9625do			
1700-1800	Canada, CFRX Toronto	6070do			
1700-1800	Canada, CFVP Calgary	6030do			
1700-1800	Canada, CHNX Halifax	6130do			
1700-1800	Canada, CKZN St John's	6160do			
1700-1800	Canada, CKZU Vancouver	6160do			
1700-1800	China, China Radio Intl	7405af	9570af	9745af	11910af
1700-1800	Costa Rica,RF Peace Intl	7385am	15050am	21460am	
1700-1727	Czech Rep, Radio Prague	5930eu	17485af		
1700-1800	Egypt, Radio Cairo	15255af			
1700-1800	Eqt Guinea, Radio Africa	15186af			
1700-1730	France, Radio France Intl	11615af	15210af	15460af	
1700-1800	Georgia, Voice of Hope	6285eu	12125eu		
1700-1800	Germany, Sunrise Radio	5850va			
1700-1800	Germany,Overcomer Ministr	6130eu	13810me	15625na	
1700-1800	Ireland, Unt Christian BC	6200do			
1700-1800 vl	Italy, IRRS	3985va			
1700-1800	Japan, R Japan/NHK World	6090as	7110eu	9535na	9825as
		15355af			
1700-1800	Kenya, Kenya Broadc Corp	4935do			
1700-1800	Lebanon, Voice of Hope	9960me			
1700-1800	Liberia, Star Radio	5880do			
1700-1800	Malaysia, Radio	7295do			
1700-1800 mtwhf	New Zealand, R NZ Intl	6145pa			
1700-1715 vl	Palau, KHBN/Voice of Hope	9965as			
1700-1800 vl	Papua New Guinea, NBC	4890do			
1700-1755	Poland, Polish R Warsaw	6095eu	7285eu		
1700-1800	Romania, R Romania Intl	9510eu	11940eu	15250eu	
1700-1800	Russia,Voice of Russia WS	9765eu	9775eu	11655eu	11775af
		12070eu	15350af	17570af	
1700-1730	S Africa, Channel Africa	15240af			
1700-1800	Singapore,RCorp Singapore	6150do			
1700-1800 a	Swaziland, Commercial R	6155do			
1700-1715 mtwh	Swaziland, Trans World R	3200af			
1700-1800	Swaziland, Trans World R	9500af			
1700-1800 vl	Tanzania, Radio	5050do			
1700-1800	UK, BBC African Service	3255af	6005af	6190af	9630af
		11860af	15400af	17830af	
1700-1745	UK, BBC Asian Service	3915as	5975as	7160as	9510as
		9740as			
1700-1800	UK, BBC World Service	6095me	6180eu	6195eu	9410eu
		12095eu	15485eu	15575eu	17840na
1700-1800 w	UK, Merlin Network One	15200eu			
1700-1800	USA, KAIJ Dallas TX	13815am			
1700-1800	USA, KTBN Salt Lk City UT	15590am			
1700-1800	USA, KWHR Naalehu HI	9930as			
1700-1800	USA, Voice of America	6110as	6160as	7125as	7215as
		9645as	9700me	9760af	15135eu
		15255va	15395as	15410af	15445af
		17895af			
1700-1800 mtwhf	USA, Voice of America	5990as	6045as	7150as	9550as
		9770as	11870as	12005as	12050as
		15255as			
1700-1800	USA, WEWN Birmingham AL	11875na	13615na	15745eu	
1700-1800 mtwhfa	USA, WGTG McCaysville GA	9400am			
1700-1800	USA, WHRI Noblesville IN	9495am	13760am		
1700-1800	USA, WJCR Upton KY	7490na	13595na		
1700-1800	USA, WMLK Bethel PA	9465am			
1700-1800 mtwhf	USA, WRNO New Orleans LA	15420am			
1700-1800 tha	USA, WSHB Cypress Crk SC	18930af			
1700-1800	USA, WWCR Nashville TN	9475am	12160am	13845am	15685am
1700-1800	USA, WYFR Okeechobee FL	15695eu	17555af		
1700-1800	Zambia, Christian Voice	3330af	4965af		
1700-1800 vl	Zambia, R Zambia/ZNBC 1	4910do			
1700-1800 vl	Zambia, R Zambia/ZNBC 2	6165do			
1700-1800 vl	Zimbabwe, Zimbabwe BC	3306do	4828do		
1715-1745 vl	Palau, KHBN/Voice of Hope	9965as			
1715-1800	Swaziland, Trans World R	3200af	9500af		
1730-1755	Belgium, R Vlaanderen Int	11810me	17655af		
1730-1800	Guam, AWR/KSDA	9355as	13660me		
1730-1800	Netherlands, Radio	6020af	7120af	11655af	
1730-1800	Philippines, R Pilipinas	11720as	11890as	15190as	
1730-1800	S Africa, AWR Africa	12130af			
1730-1800 s	Sweden, Radio	13855va	15735va		
1730-1800 mtwhfa	Sweden, Radio	6065va	15735va		
1730-1800 s	UK, BBC Asian Service	9750as	12045as	15565as	
1730-1800	Vatican State, Vatican R	13765af	15570af	17550af	
1745-1800	Bangladesh, Bangla Betar	7462eu	9548eu	15520eu	
1745-1800	India, All India Radio	7410eu	9650af	9950eu	11620eu
		11935af	13780af	15075af	
1745-1800 vl	Palau, KHBN/Voice of Hope	9965as			
1745-1800	UK, BBC Asian Service	5975as	9510as	9740as	

1800 UTC

1800-1900	Anguilla,Caribbean Beacon	11775am			
1800-1900 mtwhf	Argentina, RAE	15345eu			
1800-1900	Australia, Radio	6080as	7240pa	9500as	9580pa
		9660as	11880pa		
1800-1900 vl	Australia, VL8A Alice Spg	2310do			
1800-1900 vl	Australia, VL8K Katherine	2485do			
1800-1900 vl	Australia, VL8T Tent Crk	2325do			
1800-1900	Bangladesh, Bangla Betar	7462eu	9548eu	15520eu	
1800-1900	Brazil, Radio Bras	15265eu			
1800-1900	Canada, CFRX Toronto	6070do			
1800-1900	Canada, CFVP Calgary	6030do			
1800-1900	Canada, CHNX Halifax	6130do			
1800-1900	Canada, CKZN St John's	6160do			
1800-1900	Canada, CKZU Vancouver	6160do			
1800-1900	Costa Rica,RF Peace Intl	15050am	21460am		
1800-1830	Egypt, Radio Cairo	15255af			
1800-1900	Eqt Guinea, Radio Africa	15186af			
1800-1900	Georgia, Voice of Hope	6285eu	12125eu		
1800-1900	Germany, Sunrise Radio	5850va			
1800-1830 s	Germany, Universal Life	11785af			
1800-1900	Germany,Overcomer Ministr	3945eu	9800af	12055me	15625na
1800-1815	Greece, Voice of	7450eu	9425eu	17705sa	17765na
1800-1900	India, All India Radio	7410eu	9650af	9950eu	11620eu
		11935af	13770af	15075af	
1800-1900	Ireland, Unt Christian BC	6200do			
1800-1900 vl	Italy, IRRS	3985va			
1800-1900	Kenya, Kenya Broadc Corp	4935do			
1800-1900	Kuwait, Radio	11990na			
1800-1900	Lebanon, Voice of Hope	9960me			
1800-1900	Liberia, Radio Veritas	3450do			
1800-1900	Liberia, Star Radio	5880do			
1800-1815	Liberia,LCN/R Liberia Int	5100do			
1800-1900	Malaysia, Radio	7295do			
1800-1900 s	Morocco, RTVM Marocaine	17815af			
1800-1830	Netherlands, Radio	6020af	7120af	11655af	
1800-1850 mtwhf	New Zealand, R NZ Intl	6145pa			
1800-1857	North Korea, R Pyongyang	4405eu	6575eu	9335eu	11700na
		13760na			
1800-1830 s	Norway, Radio Norway Intl	7485eu	15705na	15735va	18950af
1800-1900 vl	Papua New Guinea, NBC	4890do			
1800-1900	Philippines, R Pilipinas	11720as	11890as	15190as	
1800-1900	Russia,Voice of Russia WS	7290eu	7425af	9765eu	9775eu
		11655eu	11675eu	11775af	12045af
		12070eu	15350af		
1800-1830	S Africa, AWR Africa	3345af	3390af		
1800-1830	S Africa, Channel Africa	15240af			
1800-1900	Singapore,RCorp Singapore	6150do			
1800-1900 irreg	Sudan, Radio Omdurman	7200af	9200af		
1800-1900 a	Swaziland, Commercial R	6155do			
1800-1830	Swaziland, Trans World R	3200af	9500af		
1800-1900 vl	Tanzania, Radio	5050do			
1800-1900	UK, BBC African Service	3255af	6190af	11860af	15400af
		17830af			
1800-1830	UK, BBC Asian Service	5975as	9510as	9740as	
1800-1900	UK, BBC World Service	6095me	6180eu	6195eu	9410eu
		12095eu	15485eu	15575eu	
1800-1900 w	UK, Merlin Network One	15200eu			
1800-1900	USA, KAIJ Dallas TX	13815am			
1800-1900	USA, KHBI N Mariana Is	9385af	11945eu		
1800-1900	USA, KJES Mesquite NM	15385am			
1800-1900	USA, KTBN Salt Lk City UT	15590am			
1800-1900	USA, KWHR Naalehu HI	13625as			
1800-1900	USA, Voice of America	6035af	7415af	9760af	11975af
		15410af	15580af	17895af	
1800-1900	USA, WEWN Birmingham AL	11875na	13615na	15745eu	
1800-1900 mtwhfa	USA, WGTG McCaysville GA	9400am			
1800-1900	USA, WHRA Greenbush ME	17655af			
1800-1900	USA, WHRI Noblesville IN	9495am	13760am		
1800-1900	USA, WJCR Upton KY	7490na	13595na		
1800-1900	USA, WMLK Bethel PA	9465am			
1800-1900 mtwhf	USA, WRNO New Orleans LA	15420am			
1800-1900	USA, WWCR Nashville TN	9475am	12160am	13845am	15685am
1800-1900	USA, WYFR Okeechobee FL	15695va			
1800-1830	Vietnam, Voice of	7440eu	9840eu	12020eu	15010eu
1800-1900	Yemen, Radio Aden	9780do			
1800-1900	Zambia, Christian Voice	3330af	4965af		
1800-1900 vl	Zambia, R Zambia/ZNBC 1	4910do			
1800-1900 vl	Zambia, R Zambia/ZNBC 2	6165do			
1800-1900 vl	Zimbabwe, Zimbabwe BC	3306do	4828do		
1805-1810	Croatia, Croatian Radio	5900eu			
1830-1900	Georgia, Radio	6230eu			
1830-1900 s	Germany, Universal Life	9490af			
1830-1900	Mongolia, Voice of	9720eu	12085eu		
1830-1900	Netherlands, Radio	6020af	7120af	9895af	11655af
		15315af	17605af		
1830-1900	Serbia, Radio Yugoslavia	6100eu	9720af		
1830-1900	Slovakia, R Slovakia Intl	5920eu	6055eu	7345eu	
1830-1900	Swaziland, Trans World R	3200af			
1830-1900	Turkey, Voice of	9445eu	11765na		
1830-1900	UK, BBC African Service	6005af	9630af		
1830-1900	UK, BBC Asian Service	9740pa			
1830-1900 w	USA, FEBC N Mariana Is	9465as			
1830-1900 as	USA, Voice of America	7170af	7330af	9860af	
1840-1850	Greece, Voice of	11645af	15150af		
1850-1900 smtwhf	New Zealand, R NZ Intl	9875pa			

FREQUENCIES

1900-2000	Anguilla,Caribbean Beacon	11775am			
1900-2000	Australia, Radio	6080as	7240pa	9500as	9580pa
		9660as	11880pa		
1900-2100 vl	Australia, VL8A Alice Spg	2310do	VL8K Katherine		2485do
1900 vl	Australia, VL8T Tent Crk	2325do			
1900-1920	Brazil, Radio Bras	15265eu			
1900-2000	Bulgaria, Radio	9700eu	11720eu		
1900-2100	Canada, CFRX Toronto	6070do	CFVP Calgary		6030do
1900-2100	Canada, CHNX Halifax	6130do	CKZN St John's		6160do
1900-2100	Canada, CKZU Vancouver	6160do			
1900-2000	China, China Radio Intl	9440af	9600af	11515af	11840af
1900-2000	Costa Rica,RF Peace Intl	15050am	21460am		
1900-2000	Ecuador, HCJB	17735eu	21455am		
1900-2000	Eqt Guinea, Radio Africa	15186af			
1900-2000	Georgia, Voice of Hope	6285eu	12125eu		
1900-1950	Germany, Deutsche Welle	9640af	9670af	11785af	11810af
		13790af	15245af	15390af	
1900-2000	Germany, Sunrise Radio	5850va			
1900-2000	Germany,Overcomer Ministr	3945eu	9800af	12055me	15625ne
1900-1910	Greece, Voice of	7415eu	9375eu		
1900-2000	Guatemala, Adv World R	5980am			
1900-1930	Hungary, Radio Budapest	3975eu	7170eu		
1900-1945	India, All India Radio	7410eu	9650af	9950eu	11620eu
		11935af	13780af	15075af	
1900-2000	Ireland, Unt Christian BC	6200do			
1900-1925	Israel, Kol Israel	9435eu	11605na	15640na	15650eu
1900-2000 vl	Italy, IRRS	3985va			
1900-2000	Kenya, Kenya Broadc Corp	4885do	4935do		
1900-2000	Kuwait, Radio	11990na			
1900-1930 a	Latvia, Radio Latvia Intl	5935eu			
1900-2000	Lebanon, Voice of Hope	9960me			
1900-2000	Liberia, Radio Veritas	3450do			
1900-2000	Liberia, Star Radio	5880do			
1900-1915	Liberia,LCN/R Liberia Int	5100do			
1900-2000	Malaysia, Radio	7295do			
1900-2000 s	Malta, VO Mediterranean	12060eu			
1900-1930	Mexico, Radio Mexico Intl	5985na	9705na		
1900-2000	Netherlands, Radio	6020af	7120af	9895af	11655af
		15315af	17605af		
1900-1950 smtwhf	New Zealand, R NZ Intl	9875pa			
1900-2000	Nigeria, Voice of	7255af	15120af		
1900-1957	North Korea, R Pyongyang	6520af	9600af	9975me	
1900-2000 vl	Papua New Guinea, NBC	4890do			
1900-1930	Philippines, R Pilipinas	11720me	11890as	15190as	
1900-2000	Russia,Voice of Russia WS	7290eu	7425af	9440af	9450eu
	9765eu	9775eu	9820eu	11655eu	11675eu
	11775af	11850af	12045af	12070eu	15350af
1900-1930	Serbia, Radio Yugoslavia	7230au			
1900-2000	Singapore,RCorp Singapore	6150do			
1900-2000	South Korea, R Korea Intl	5975as	7275as		
1900-2000 a	Sri Lanka, Sri Lanka BC	5975eu			
1900-2000	Swaziland, Trans World R	3200af			
1900-1930	Switzerland, Swiss R Intl	6165eu	9885eu		
1900-2000 vl	Tanzania, Radio	5050do			
1900-2000	Thailand, Radio	7210eu	9655eu	11905eu	
1900-1930	Turkey, Voice of	9445eu	11765na		
1900-2000	UK, BBC African Service	3255af	6005af	6190af	9630af
		11835af	15400af	17830af	
1900-1930	UK, BBC Asian Service	5975as	9740pa		
1900-2000	Uk, BBC World Service	6180eu	6195eu	9410eu	12095eu
		15485eu			
1900-2000 w	UK, Merlin Network One	13690na	15590va		
1900-2000	USA, KAIJ Dallas TX	13815am			
1900-2000	USA, KHBI N Mariana Is	9385af	11945eu		
1900-2000	USA, KTBN Salt Lk City UT	15590am			
1900-2000	USA, KWHR Naalehu HI	13625as			
1900-2000	USA, Voice of America	6035af	7375af	7415af	9525pa
		9760af	11870pa	11975af	15180pa
		15410af	15445af	15580af	4950af-s
1900-2000	USA, WEWN Birmingham AL	11875na	13615na	15745eu	
1900-2000 mtwhfa	USA, WGTG McCaysville GA	9400am			
1900-2000	USA, WHRA Greenbush ME	17655af			
1900-2000	USA, WHRI Noblesville IN	9495am	13760am		
1900-2000	USA, WJCR Upton KY	7490na	13595na		
1900-2000	USA, WMLK Bethel PA	9465am			
1900-2000 a	USA, WRMI/R Miami Intl	9955ca			
1900-2000 mtwhf	USA, WRNO New Orleans LA	15420am			
1900-2000 sth	USA, WSHB Cypress Crk SC	15665eu	17510af		
1900-2000	USA, WWCR Nashville TN	9475am	12160am	13845am	15685am
1900-2000	USA, WYFR Okeechobee FL	15695eu			
1900-1930	Vietnam, Voice of	9840eu	12020eu	15010eu	
1900-2000	Zambia, Christian Voice	3330af	4965af		
1900-2000 vl	Zambia, R Zambia/ZNBC 1	4910do			
1900-2000 vl	Zambia, R Zambia/ZNBC 2	6165do			
1900-2000 vl	Zimbabwe, Zimbabwe BC	3306do	4828do		
1930-2000 t	Belarus, R Belarus Intl	7210eu	11960eu		
1930-2000	Georgia, Radio	6230eu			
1930-2000	Iran, VOIRI	7160eu	7260eu	9022eu	
1930-2000	Poland, Polish R Warsaw	6035eu	6095eu	7285eu	9525eu
1930-2000 mtwfha	Sweden, Radio	6065eu			
1930-2000	Uganda, Radio	4976af			
1930-2000	UK, BBC Asian Service	9740pa			
1930-2000 mtwhfa	UK, BBC World Service	5975me			
1935-1955	Italy, RAI Intl	5970eu	7145eu	9760eu	
1945-2000 smthf	Germany, Universal Life	5890eu			
1950-2000 smtwh	New Zealand, R NZ Intl	11735pa			
1950-2000 fa	New Zealand, R NZ Intl	9875pa			
1950-2000	Vatican State, Vatican R	4005eu	5883eu	7250eu	9645eu
1956-2000	S Africa, Voice of Hope	6290af			
2000-2100	Algeria, R Algiers Intl	11715af	11750af		
2000-2100	Anguilla,Caribbean Beacon	11775am			
2000-2100	Australia, Radio	7240pa	9500as	9580pa	9660as
		11880pa	12080as		
2000-2059	Canada, R Canada Intl	5995va	7235va	11690va	13650va
	13670va	15150va	15325va	17820va	17870va
2000-2100	China, China Radio Intl	6590eu	7160af	7170af	9440af
		9920eu	11840af		
2000-2100	Costa Rica,RF Peace Intl	15050am	21460am		
2000-2027	Czech Rep, Radio Prague	5930eu	11600as		
2000-2100	Ecuador, HCJB	17735eu	21455am		
2000-2100	Eqt Guinea, Radio Africa	15186af			
2000-2030	Finland, YLE/R Finland	6135va			
2000-2100	Georgia, Voice of Hope	6285eu	12125eu		
2000-2050	Germany, Deutsche Welle	9615eu			
2000-2015 smthf	Germany, Universal Life	5890eu			
2000-2100	Germany,Overcomer Ministr	3945eu	12055me	15625na	
2000-2030	Ghana, Ghana Broadc Corp	3366do	4915do		
2000-2100	Guatemala, Adv World R	5980am			
2000-2100	Indonesia, Voice of	9525as	15150as		
2000-2100	Ireland, Unt Christian BC	6200do			
2000-2100 as/vl	Italy, IRRS	3955va			
2000-2100	Kenya, Kenya Broadc Corp	4885do	4935do		
2000-2100	Kuwait, Radio	11990eu			
2000-2100	Lebanon, Voice of Hope	9960me			
2000-2100	Liberia, Radio Veritas	3450do			
2000-2015	Liberia,LCN/R Liberia Int	5100do			
2000-2100	Malaysia, Radio	7295do			
2000-2030	Mexico, Radio Mexico Intl	5985na	9705na		
2000-2100 vl	Namibia, NBC	3270af	3289af		
2000-2025	Netherlands, Radio	6020af	7120af	9895af	11655af
		15315af	17605af		
2000-2050	New Zealand, R NZ Intl	11735pa			
2000-2015 vl	Niger, Voice du Sahel	5019do			
2000-2005	Nigeria, FRCN/Radio	3326do	4770do	4990do	
2000-2100	Nigeria, Voice of	7255af	15120af		
2000-2030 s	Norway, Radio Norway Intl	15220au			
2000-2100 vl	Papua New Guinea, NBC	4890do			
2000-2025	Poland, Polish R Warsaw	6035eu	6095eu	7285eu	9525eu
2000-2100	Russia,Voice of Russia WS	7425af	9440af	9470af	9710eu
		9765eu	9775eu	9820eu	11675eu
		11850af	11930eu	12070eu	15485eu
2000-2005	S Africa, Voice of Hope	6290af			
2000-2015	Sierra Leone, SLBS	3316do			
2000-2100	Singapore,RCorp Singapore	6150do			
2000-2100 mtwhf	Spain, R Exterior Espana	9855eu	11830af		
2000-2015	Swaziland, Trans World R	3200af			
2000-2030	Switzerland, Swiss R Intl	9840af	9885af	9905af	11725af
2000-2100 vl	Tanzania, Radio	5050do			
2000-2015	Uganda, Radio	4976do			
2000-2100	UK, BBC African Service	3255af	6005af	6190af	9630af
		11835af	15400af	17830af	
2000-2100	UK, BBC Asian Service	5975pa	9740pa		
2000-2100	UK, BBC World Service	6180eu	6195eu	7325eu	9410eu
		12095sa			
2000-2100 w	UK, Merlin Network One	13690na	15590va		
2000-2100	USA, KAIJ Dallas TX	13815am			
2000-2100	USA, KHBI N Marianas Is	9385au			
2000-2100	USA, KJES Mesquite NM	15385am			
2000-2100	USA, KTBN Salt Lk City UT	15590am			
2000-2100	USA, KWHR Naalehu HI	15405as			
2000-2100	USA, Voice of America	6035af	6095me	7375af	7415af
		9760af	9770af	11975af	15410af
		15445af	15580af	17725af	17755af
2000-2030	USA, Voice of America	4950af	11855af		
2000-2100	USA, WHRA Greenbush ME	15460af			
2000-2100	USA, WINB Red Lion PA	13790am			
2000-2100	USA, WJCR Upton KY	7490na	13595na		
2000-2100	USA, WMLK Bethel PA	9465am			
2000-2100 s	USA, WRMI/R Miami Intl	9955ca			
2000-2100 h	USA, WSHB Cypress Crk SC	15665eu			
2000-2100	USA, WWCR Nashville TN	9475am	12160am	13845am	15685am
2000-2100	USA, WYFR Okeechobee FL	11855na	15645va	15695eu	17555va
		17845va			
2000-2010	Vatican State, Vatican R	4005eu	5883eu	7250eu	9645eu
2000-2100	Zambia, Christian Voice	3330af	4965af		
2000-2100 vl	Zambia, R Zambia/ZNBC 2	6165do			
2000-2100 vl	Zimbabwe, Zimbabwe BC	3306do	4828do		
2005-2100	Syria, Radio Damascus	12085eu	13610na		
2010-2030	Vatican State, Vatican R	9660af	11625af	13765af	
2015-2045 mtwhfa	Armenia, Voice of	4810eu	9965eu		
2025-2045	Italy, RAI Intl	7170af	9710af	11800af	
2030-2100 th	Belarus, R Belarus Intl	7210eu	11960eu		
2030-2100	Cuba, Radio Havana	13720eu	13750eu		
2030-2100	Egypt, Radio Cairo	15375af			
2030-2100	Germany, AWR Europe	9835af			
2030-2100 irreg	Iraq, Radio Iraq Intl	11785eu			
2030-2035 mtwhf	Latvia, Radio Latvia Intl	5935eu			
2030-2055	Moldova, R Moldova Intl	7520eu			
2030-2100	S Africa, AWR Africa	9745af			
2030-2100 as	Sweden, Radio	6065eu	13830af		
2030-2045	Thailand, Radio	9655eu	9680eu	11905eu	
2030-2100	Turkey, Voice of	7210as			
2030-2100 as	USA, Voice of America	4950af			
2030-2100	Uzbekistan, R Tashkent	9540eu	9545eu		
2030-2100	Vietnam, Voice of	9840eu	12020eu	15010eu	
2045-2100	India, All India Radio	7150au	7410eu	9910au	9950eu
		11620eu	11715au		
2050-2100 smtwh	New Zealand, R NZ Intl	17675pa			
2050-2100 fa	New Zealand, R NZ Intl	11735pa			

Frequencies

0100-0200	Anguilla,Caribbean Beacon	6090am			
0100-0200	Australia, Radio	9660pa	12080as	15240pa	15415as
		17715pa	17750as	17795pa	21740pa
0100-0200 vl	Australia, VL8K Katherine	5025do			
0100-0200 vl	Australia, VL8T Tent Crk	4910do			
0100-0200	Canada, CBC N Quebec Svc	9625do			
0100-0200	Canada, CFRX Toronto	6070do			
0100-0200	Canada, CFVP Calgary	6030do			
0100-0200	Canada, CHNX Halifax	6130do			
0100-0200	Canada, CKZN St John's	6160do			
0100-0200	Canada, CKZU Vancouver	6160do			
0100-0129	Canada, R Canada Intl	5960am	9535am	9755am	11715am
		13670am			
0100-0200	Costa Rica,RF Peace Intl	7385am	15050am		
0100-0105	Croatia, Croatian Radio	9925am			
0100-0200	Cuba, Radio Havana	6000na	9820na	13605na	
0100-0127	Czech Rep, Radio Prague	6200na	7345na		
0100-0200	Ecuador, HCJB	9745na	12015na	21455am	
0100-0150	Germany, Deutsche Welle	6040na	6085na	6145na	9640na
		11810am			
0100-0200	Germany,Overcomer Ministr	3945eu	9500as		
0100-0115	Ghana, Ghana Broadc Corp	3366do	4915do		
0100-0130	Hungary, Radio Budapest	6120na	9580na		
0100-0200	Indonesia, Voice of	9525as	11785as		
0100-0130	Iran, VOIRI	6055eu	9022eu	9685eu	
0100-0200	Ireland, Unt Christian BC	6200do			
0100-0110	Italy, RAI Intl	6010na	9675na	11800na	
0100-0200	Japan, R Japan/NHK World	6150af	11860as	11870af	15570as
		15590as	17810as	17835sa	21610pa
		21670pa			
0100-0200	Liberia,LCN/R Liberia Int	5100do			
0100-0130	Lithuania, Radio Vilnius	9855am			
0100-0200	Malaysia, Radio	7295do			
0100-0200 vl	Namibia, NBC	3270af	3289af		
0100-0125	Netherlands, Radio	6020na	6165na	9845na	9855as
		11655as	12090as		
0100-0200	New Zealand, R NZ Intl	17675pa			
0100-0200 vl	Papua New Guinea, NBC	9675do			
0100-0200	Philippines, FEBC/R Intl	15450as			
0100-0200	Russia,Voice of Russia WS	9665na	12050na	15425na	15520na
0100-0200	Singapore,RCorp Singapore	6150do			
0100-0130	Slovakia, R Slovakia Intl	5930na	7300af	9440sa	
0100-0200	Spain, R Exterior Espana	6055am			
0100-0200	Sri Lanka, Sri Lanka BC	9730as	15425as		
0100-0130	Switzerland, Swiss R Intl	9885na	9905ca		
0100-0200	UK, BBC Asian Service	5965as	6195as	9410as	9605as
		11955as	15280as	15310as	15360as
0100-0200	UK, BBC World Service	5970sa	5975am	6175na	9590am
		9915sa	12095sa		
0100-0200	USA, KAIJ Dallas TX	5810am			
0100-0200	USA, KJES Mesquite NM	7555am			
0100-0200	USA, KTBN Salt Lk City UT	7510am			
0100-0200	USA, KWHR Naalehu HI	17510as			
0100-0200	USA, Voice of America	7115as	7200as	9635as	11705as
		11725as	11820as	15250as	17740as
		17820as			
0100-0200 twhfa	USA, Voice of America	5995am	6130am	7405am	9445am
		9775am	13740am		
0100-0200	USA, WEWN Birmingham AL	5825eu			
0100-0200 twhfa	USA, WGTG McCaysville GA	5085am			
0100-0200	USA, WHRI Noblesville IN	5745am	7315am		
0100-0200	USA, WINB Red Lion PA	11950am			
0100-0200	USA, WJCR Upton KY	7490na	13595na		
0100-0200	USA, WRMI/R Miami Intl	9955ca			
0100-0200 smwfa	USA, WSHB Cypress Crk SC	7535am	13845am	15285sa	
0100-0200 irreg	USA, WWBS Macon GA	11905na			
0100-0200	USA, WWCR Nashville TN	5070am	5935am	7435am	13845am
0100-0200	USA, WYFR Okeechobee FL	6065na	9505na	11550as	
0100-0130	Uzbekistan, R Tashkent	7190as	9375as	9530as	9715as
0100-0127	Vietnam, Voice of	5940am	7250am		
0125-0200	Netherlands, Radio	9855as	11655as	12090as	
0129-0159	Canada, R Canada Intl	5960am	9755am		
0129-0159 sm	Canada, R Canada Intl	9535am	11715am	13670am	
0130-0200	Albania, R Tirana Intl	6220na	7160na		
0130-0150	Greece, Voice of	7450na	9375na	9420na	11645na
0130-0200	Sweden, Radio	9435as	11985au		
0138-0143	Croatia, Croatian Radio	9925na			
0140-0200	Vatican State, Vatican R	5980as	7335as	9650as	

Selected Programs

Sundays

0100 USA, KTBN Salt Lk City UT: The Hour of Power. Robert Schuller conducts services from the Crystal Cathedral.
0100 USA, WWCR #1 Nashville TN: Faith Holiness Church. Larry Cain evangelizes from South Carolina.
0100 USA, WWCR #3 Nashville TN: Tomorrow's News Today. George Hyatt is the not the presenter, he's the evangelist.
0130 Albania, R Tirana Intl: News.
0130 Costa Rica, R Peace Intl: Continent of Media. Glenn Hauser's monthly look at domestic media developments in the U.S.
0130 USA, WWCR #1 Nashville TN: The Lights of Spiritual Guidance. Gospel and song with J. Harold Lowman.
0130 USA, WWCR #3 Nashville TN: Dixie Rising. Dan Meredith wants the South to rise again.
0137 Albania, R Tirana Intl: Press Review.
0140 Albania, R Tirana Intl: Reality.

Mondays

0100 Costa Rica, R Peace Intl: FIRE (Feminist Int'l Radio Endeavour). Featuring women's voices on every imaginable topic.
0100 USA, KTBN Salt Lk City UT: The Believer's Voice of Victory. Kenneth and Gloria Copeland come into your listening room from Fort Worth, Texas.
0100 USA, WWCR #1 Nashville TN: Holy Ghost Outreach Ministry. Mary McCracken.
0100 USA, WWCR #3 Nashville TN: Exotic Research Radio. NEW! Discussion of new developments in science, technology and things in everyday living.
0130 Albania, R Tirana Intl: News.
0130 USA, KTBN Salt Lk City UT: Changing Your World. Creflo A. Dollar, Jr. evangelizes.
0145 USA, WWCR #1 Nashville TN: The Last Day Message. Rick Long's message is garnished with fire and brimstone.
0146 Albania, R Tirana Intl: Music at Your Request.

Tuesdays

0100 Costa Rica, R Peace Intl: Our Americas. See S 0400.
0100 USA, KTBN Salt Lk City UT: Charisma Now. A magazine program from Stephen Strang of Charisma Magazine.
0100 USA, WWCR #1 Nashville TN: Live Fire (live). L. Pratt.
0100 USA, WWCR #3 Nashville TN: The Stan Solomon Show (live). A newstalk radio program.
0130 Albania, R Tirana Intl: News.
0146 Albania, R Tirana Intl: Feature Program.

Wednesdays

0100 Costa Rica, R Peace Intl: RFPI's Mailbag. See S 0230.
0100 USA, KTBN Salt Lk City UT: Cornerstone. See S 1200.
0100 USA, WWCR #1 Nashville TN: Perspective on America (live). Jeff Bennett talks about preparedness issues.
0100 USA, WWCR #3 Nashville TN: The Stan Solomon Show (live). See NAm 0100.
0130 Albania, R Tirana Intl: News.
0130 Costa Rica, R Peace Intl: Making Contact. See S 0330.
0137 Albania, R Tirana Intl: PO Box Radio Tirana.
0143 Albania, R Tirana Intl: Music.
0153 Albania, R Tirana Intl: Press Review.

Thursdays

0100 Costa Rica, R Peace Intl: RFPI's Mailbag. See S 0230.
0100 USA, KTBN Salt Lk City UT: Get Ready. See M 2330.
0100 USA, WWCR #1 Nashville TN: Perspective on America (live). See NAm 0100.
0100 USA, WWCR #3 Nashville TN: The Stan Solomon Show (live). See NAm 0100.
0130 Albania, R Tirana Intl: News.
0130 Costa Rica, R Peace Intl: Making Contact. See S 0330.
0130 USA, KTBN Salt Lk City UT: This is Your Day!. See T 0530.
0140 Albania, R Tirana Intl: Current Affairs.
0145 Albania, R Tirana Intl: Albanian Music.

Fridays

0100 Costa Rica, R Peace Intl: FIRE (Feminist Int'l Radio Endeavour). See M 0100.
0100 USA, KTBN Salt Lk City UT: Get Ready. See M 2330.
0100 USA, WWCR #1 Nashville TN: Perspective on America (live). See NAm 0100.
0100 USA, WWCR #3 Nashville TN: The Stan Solomon Show (live). See NAm 0100.
0130 Albania, R Tirana Intl: News.
0130 USA, KTBN Salt Lk City UT: Lakewood Church. John Osteen preaches from Houston, Texas.
0137 Albania, R Tirana Intl: Press Review.
0145 Albania, R Tirana Intl: Current Affairs.
0148 Albania, R Tirana Intl: Music.

Saturdays

0100 Costa Rica, R Peace Intl: Disability Radio Worldwide. See S 0600.
0100 USA, KTBN Salt Lk City UT: Ever Increasing Faith. Dr. Frederick K.C. Price evangelizes.
0100 USA, WWCR #1 Nashville TN: American Sovereign (live). See NAm 0000.
0100 USA, WWCR #3 Nashville TN: The Stan Solomon Show (live). See NAm 0100.
0130 Albania, R Tirana Intl: News.
0130 Costa Rica, R Peace Intl: Indigenous Voices. A pilot program leading to the creation of Indigenous Voices Communication Project.
0144 Albania, R Tirana Intl: Horizon.
0154 Radio Netherlands: Documentary. Who Makes the Wine? (29th). Helen Barrington explores the lives of farm workers in one of California's wine-producing regions.

FREQUENCIES

0200-0300	Anguilla,Caribbean Beacon	6090am			
0200-0300 twhfa	Argentina, RAE	11710am			
0200-0300	Australia, Radio	9660pa	12080as	15240pa	15415as
		15510pa	17715pa	17750as	21820pa
0200-0300 vl	Australia, VL8K Katherine	5025do			
0200-0300 vl	Australia, VL8T Tent Crk	4910do			
0200-0210	Bangladesh, Bangla Betar	4880as			
0200-0300	Bulgaria, Radio	9485na	11720na		
0200-0300	Canada, CBC N Quebec Svc	9625do			
0200-0300	Canada, CFRX Toronto	6070do			
0200-0300	Canada, CFVP Calgary	6030do			
0200-0300	Canada, CHNX Halifax	6130do			
0200-0300	Canada, CKZN St John's	6160do			
0200-0300	Canada, CKZU Vancouver	6160do			
0200-0229	Canada, R Canada Intl	9535am	9755am	11715am	13670am
0200-0300	Costa Rica,RF Peace Intl	7385am	15050am	21460am	
0200-0205	Croatia, Croatian Radio	9925na			
0200-0300	Cuba, Radio Havana	6000na	9820na	13605na	
0200-0300	Ecuador, HCJB	9745na	12015na	21455am	
0200-0300	Egypt, Radio Cairo	9475na			
0200-0230	Finland, YLE/R Finland	9780eu	11900am		
0200-0250	Germany, Deutsche Welle	7285as	9615as	9690as	11945as
		11965as	12045as		
0200-0300	Germany,Overcomer Ministr	3945eu	9500as		
0200-0300	Ireland, Unt Christian BC	6200do			
0200-0300 as/vl	Italy, IRRS	7120va			
0200-0300	Kenya, Kenya Broadc Corp	4885do	4935do		
0200-0300	Malaysia, Radio	7295do			
0200-0250	Myanmar, Radio	7185do			
0200-0300 vl	Namibia, NBC	3270af	3289af		
0200-0225	Netherlands, Radio	9855as	11655as	12090as	
0200-0300	New Zealand, R NZ Intl	17675pa			
0200-0230 m	Norway, Radio Norway Intl	11600as	11990na		
0200-0300 vl	Papua New Guinea, NBC	9675do			
0200-0300	Romania, R Romania Intl	6155na	9570na	9690as	11740as
		11940as	15380as		
0200-0300	Russia,Voice of Russia WS	9665na	12050na	15425na	15520na
0200-0300	Singapore,RCorp Singapore	6150do			
0200-0300	South Korea, R Korea Intl	11715sa	11810sa	15575na	
0200-0300	Sri Lanka, Sri Lanka BC	9730as	15425as		
0200-0300	Taiwan, Radio Taipei Intl	5950na	7130as	9680na	11740am
		11825pa	15345as		
0200-0300 vl	Tanzania, Radio	5050do			
0200-0300	UK, BBC African Service	6135af			
0200-0300	UK, BBC Asian Service	9605as	11955as	15280as	15310as
		15360as			
0200-0300	UK, BBC World Service	5970sa	5975am	6175na	6195eu
		9410eu	9590am	9915sa	
0200-0300	USA, KAIJ Dallas TX	5810am			
0200-0230	USA, KJES Mesquite NM	7555am			
0200-0300	USA, KTBN Salt Lk City UT	7510am			
0200-0300	USA, KWHR Naalehu HI	17510as			
0200-0300	USA, Voice of America	7115as	7200as	11705as	11725as
		11820as	15250as	17740as	17820as
0200-0300	USA, WEWN Birmingham AL	5825eu			
0200-0300 twhfa	USA, WGTG McCaysville GA	5085am			
0200-0300	USA, WHRI Noblesville IN	5745am	7315am		
0200-0300	USA, WINB Red Lion PA	11950am			
0200-0300	USA, WJCR Upton KY	7490na	13595na		
0200-0300	USA, WRMI/R Miami Intl	9955ca			
0200-0300 mh	USA, WSHB Cypress Crk SC	5850na	7535am		
0200-0300 irreg	USA, WWBS Macon GA	11905na			
0200-0300	USA, WWCR Nashville TN	3215am	5070am	5935am	7435am
0200-0300	USA, WYFR Okeechobee FL	6065na	9505na		
0215-0225	Nepal, Radio	5005do	7165do		
0225-0300	Netherlands, Radio	9855as	11655as		
0229-0259 sm	Canada, R Canada Intl	9535am	9755am	11715am	13670am
0230-0300	Austria, R Austria Intl	9655na	9870sa	13730sa	
0230-0257	Czech Rep, Radio Prague	9480me	11600as		
0230-0300	Hungary, Radio Budapest	9840na	11910na		
0230-0245	Pakistan, Radio	7485as	13610as	15485as	
0230-0300 vl	Philippines, R Pilipinas	11885as	15120as	15270as	
0230-0300	Sweden, Radio	7135am	9495am		
0230-0300	UK, BBC World Service	9895am			
0230-0300	Vietnam, Voice of	5940am			
0240-0300 vl	Zambia, R Zambia/ZNBC 2	6165do			
0245-0300 vl	Zambia, R Zambia/ZNBC 1	4910do			
0250-0300 sf	Greece, Voice of	7450na	9375na	9420na	11645na
0250-0300	Vatican State, Vatican R	7305ca	9605am		

SELECTED PROGRAMS

Sundays

0200 Costa Rica, R Peace Intl: World of Radio. Glenn Hauser's essential program for the shortwave listener.
0200 USA, KTBN Salt Lk City UT: Carman. Helping youth to think through problems and find positive answers.
0200 USA, WWCR #1 Nashville TN: Open Bible Dialogue. Joseph Chambers preaches Bible prophecy from North Carolina.
0200 USA, WWCR #3 Nashville TN: Spectrum (live). SWLs and Hams call 1-800-774-7435 with technical questions and comments.
0230 Costa Rica, R Peace Intl: RFPI's Mailbag. The latest news and happenings at RFPI and responses to listener letters.
0230 USA, KTBN Salt Lk City UT: Power Connection. John Jacobs and the power team perform feats of strength.

Mondays

0200 Costa Rica, R Peace Intl: My Green Earth. An environment program for children that explores the world of animals, plants, and cultures. Check www.ptlalaska.net/~kmxt/mge.htm for weekly topics.
0200 USA, KTBN Salt Lk City UT: Praise the Lord. Music, talk, and guest evangelists from the PTL Network.
0200 USA, WWCR #1 Nashville TN: World of Prophecy. See NAm 0000.
0200 USA, WWCR #3 Nashville TN: The Mike Jarmus Show (hour 1) (live). Mike, his guests, and callers discuss UFOs and other far out topics.
0230 Costa Rica, R Peace Intl: Every Living Thing. An hour of environmental and ecology topics for young listeners.

Tuesdays

0200 USA, KTBN Salt Lk City UT: Praise the Lord (live). See M 0200.
0200 USA, WWCR #1 Nashville TN: Truth House. Evangelistic teachings by E.C. Fultcher plus his global shortwave club.
0200 USA, WWCR #3 Nashville TN: The Stan Solomon Show (live). See NAm 0100.
0230 Costa Rica, R Peace Intl: Hightower Radio. See S 2345.
0235 Costa Rica, R Peace Intl: Earthwatch Radio. See S 2355.
0240 Costa Rica, R Peace Intl: Earth and Sky. See S 2357.
0244 Costa Rica, R Peace Intl: Tropical Conservation Newsbureau Report. A report on ecology in the western hemisphere.

Wednesdays

0200 Costa Rica, R Peace Intl: RadioNation. See S 0500.
0200 USA, KTBN Salt Lk City UT: Praise the Lord (live). See M 0200.
0200 USA, WWCR #1 Nashville TN: Truth House. See NAm 0200.
0200 USA, WWCR #3 Nashville TN: The Stan Solomon Show (live). See NAm 0100.

Thursdays

0200 Costa Rica, R Peace Intl: Second Opinion. See S 0100.
0200 USA, KTBN Salt Lk City UT: Praise the Lord (live). See M 0200.
0200 USA, WWCR #1 Nashville TN: Truth House. See NAm 0200.
0200 USA, WWCR #3 Nashville TN: The Stan Solomon Show (live). See NAm 0100.
0230 Costa Rica, R Peace Intl: Hightower Radio. See S 2345.
0235 Costa Rica, R Peace Intl: Earthwatch Radio. See S 2355.
0240 Costa Rica, R Peace Intl: Earth and Sky. See S 2357.
0245 Costa Rica, R Peace Intl: Along the Color Line. Commentaries relevant to contemporary African-American issues featuring Dr. Manning Marable.
0254 Radio Netherlands: Documentary. Who Makes the Wine? (27th). See A 0154.

Fridays

0200 Costa Rica, R Peace Intl: The Far Right Radio Review. See M 0630.
0200 USA, KTBN Salt Lk City UT: Praise the Lord (live). See M 0200.
0200 USA, WWCR #1 Nashville TN: Truth House. See NAm 0200.
0200 USA, WWCR #3 Nashville TN: The Stan Solomon Show (live). See NAm 0100.

Saturdays

0200 Costa Rica, R Peace Intl: Making Contact. See S 0330.
0200 USA, KTBN Salt Lk City UT: Praise the Lord (live). See M 0200.
0200 USA, WWCR #1 Nashville TN: Truth House. See NAm 0200.
0200 USA, WWCR #3 Nashville TN: The Stan Solomon Show (live). See NAm 0100.
0230 Costa Rica, R Peace Intl: Hightower Radio. See S 2345.
0235 Costa Rica, R Peace Intl: Earthwatch Radio. See S 2355.
0240 Costa Rica, R Peace Intl: Earth and Sky. See S 2357.
0245 Costa Rica, R Peace Intl: UN Perspective. See T 2330.

SWL PROGRAMS

Continued from page 39

0800 WHRA (Angel 5 Maine): "DXing with Cumbre"
0910 HCJB (pac): "DX Partyline"
0915 WWCR #3 (Tennessee): "Ask WWCR"
0940 FEBC (Philippines): "DX Dial"
1030 Radio For Peace Intl: "Continent of Media"
1100 Radio For Peace Intl: "World of Radio"
1136 Voice of America (as pac): "Communications World (A)"
1147 Radio Bulgaria: "Radio Bulgaria Calling"
1245 Voice of Turkey: "DX Corner (biweekly)"
1336 Voice of America (as pac): "Communications World (B)"
1342 Radio Tashkent: "Radio Tashkent DX Program"
1430 WHRI (Angel 2 Indiana): "DXing with Cumbre"
1455 FEBC (Philippines): "DX Dial"
1536 Voice of America (as pac): "Communications World (C)"
1536 Voice of America (eu/af): "Communications World (C)"
1730 Radio For Peace Intl: "Continent of Media"
1730 WHRI (Angel 1 Indiana): "DXing with Cumbre"
1736 Voice of America (af): "Communications World (A)"
1736 Voice of America (as pac): "Communications World (A)"
1736 Voice of America (eu/af): "Communications World (A)"
1800 Radio For Peace Intl: "World of Radio"
1909 HCJB (eu): "DX Partyline"
1915 Voice of Turkey: "DX Corner (biweekly)"
1936 Voice of America (af): "Communications World (B)"
1936 Voice of America (as pac): "Communications World (B)"
1936 Voice of America (eu/af): "Communications World (B)"
1958 Vatican Radio: "On-the-Air"
2030 WWCR #3 (Tennessee): "Ask WWCR"
2114 Radio Havana Cuba: "DXers Unlimited"
2130 WHRA (Angel 5 Maine): "DXing with Cumbre"
2130 WRMI (Florida): "Wavescan"
2136 Voice of America (as pac): "Communications World (C)"
2136 Voice of America (eu/af): "Communications World (C)"
2143 Radio Bulgaria: "Radio Bulgaria Calling"
2200 WHRI (Angel 2 Indiana): "DXing with Cumbre"
2223 Voice of Turkey: "DX Corner (biweekly)"
2230 WHRI (Angel 1 Indiana): "DXing with Cumbre"
2231 Radio Exterior de Espana: "Distance Unknown"
2300 Vatican Radio: "On-the-Air"
2300 KSDA (Guam): "Wavescan"
2306 Radio Havana Cuba. "DXers Unlimited"

Frequencies

0300-0400	Anguilla,Caribbean Beacon	6090am			
0300-0400	Australia, Radio	9660pa	12080as	15240pa	15415as
		15510pa	17715pa	17750as	21820pa
0300-0400 vl	Australia, VL8K Katherine	5025do			
0300-0400 vl	Australia, VL8T Tent Crk	4910do			
0300-0400	Australia,DefenseForces R	15635as			
0300-0400 vl	Canada, CBC N Quebec Svc	9625do			
0300-0400	Canada, CFRX Toronto	6070do			
0300-0400	Canada, CFVP Calgary	6030do			
0300-0400	Canada, CHNX Halifax	6130do			
0300-0400	Canada, CKZN St John's	6160do			
0300-0400	Canada, CKZU Vancouver	6160do			
0300-0400	China, China Radio Intl	9690na			
0300-0400	Costa Rica,RF Peace Intl	7385am	15050am		
0300-0305	Croatia, Croatian Radio	9925na			
0300-0400	Cuba, Radio Havana	6000na	9820na	13605na	
0300-0327	Czech Rep, Radio Prague	7345na	9435na		
0300-0400	Ecuador, HCJB	9745am	12015na	21455am	
0300-0330	Egypt, Radio Cairo	9475am			
0300-0350	Germany, Deutsche Welle	6085na	6145na	6185na	9535na
		9640na			
0300-0400	Germany,Overcomer Ministr	3945eu	9500as		
0300-0400	Guatemala, Radio Cultural	3300do			
0300-0400 irreg	Iraq, Radio Iraq Intl	11785eu			
0300-0400	Ireland, Unt Christian BC	6200do			
0300-0400 as/vl	Italy, IRRS	7120va			
0300-0400	Japan, R Japan/NHK World	17685pa	17825ca	17855as	
0300-0400	Kenya, Kenya Broadc Corp	4885do	4935do		
0300-0400 vl	Lesotho, Radio Lesotho	4800do			
0300-0400	Malaysia, Radio	7295do			
0300-0330 mtwhfa	Mexico, Radio Mexico Intl	5985na	9705na		
0300-0325	Moldova, R Moldova Intl	9665na			
0300-0400 vl	Namibia, NBC	3270af	3289af		
0300-0325	Netherlands, Radio	9855as	11655as		
0300-0400	New Zealand, R NZ Intl	17675pa			
0300-0400 vl	Papua New Guinea, NBC	9675do			
0300-0330 vl	Philippines, R Pilipinas	11885as	15120as	15270as	
0300-0400	Russia,Voice of Russia WS	9665na	12000na	12050na	13640na
		13665na	15180na	15425na	15455na
		15595na			
0300-0330	S Africa, Channel Africa	5955af			
0300-0400	Singapore,RCorp Singapore	6150do			
0300-0400	Sri Lanka, Sri Lanka BC	9730as	15425as		
0300-0400	Taiwan, Radio Taipei Intl	5950na	9680na	11745as	11825as
		15345as			
0300-0400 vl	Tanzania, Radio	5050do			
0300-0330	Thailand, Radio	9655am	11905am	15395na	
0300-0400	Turkey, Voice of	7270as	9655va	17705as	
0300-0315 mtwhf	Uganda, Radio	4976do			
0300-0400	UK, BBC African Service	3255af	6005af	6190af	9600af
		11730af			
0300-0400	UK, BBC Asian Service	9605as	15310as	15360as	17790as
		21660as			
0300-0330	UK, BBC World Service	5970sa	5975am	6175na	6195eu
		9410eu	9895am	9915sa	11760me
		12095me			
0300-0400	Ukraine, R Ukraine Intl	6020eu	6080eu	7410eu	9550na
		12040na	13590na		
0300-0400	USA, KAIJ Dallas TX	5810am			
0300-0400	USA, KTBN Salt Lk City UT	7510am			
0300-0400	USA, KVOH Los Angeles CA	9975am			
0300-0400	USA, KWHR Naalehu HI	17510as			
0300-0400	USA, Voice of America	6080af	6115af	7105af	7280af
		7290af	7340af	9575af	9885af
		11695af			
0300-0330 smtwh	USA, Voice of America	4960af			
0300-0400	USA, WEWN Birmingham AL	5825eu			
0300-0400 twhfa	USA, WGTG McCaysville GA	5085am			
0300-0400	USA, WHRA Greenbush ME	9400me			
0300-0400	USA, WHRI Noblesville IN	5745am	7315am		
0300-0400	USA, WINB Red Lion PA	11950am			
0300-0400	USA, WJCR Upton KY	7490na	13595na		
0300-0400	USA, WMLK Bethel PA	9465am			
0300-0400 m	USA, WRMI/R Miami Intl	9955ca			
0300-0400	USA, WSHB Cypress Crk SC	5850na			
0300-0400 irreg	USA, WWBS Macon GA	11905na			
0300-0400	USA, WWCR Nashville TN	3215am	5070am	5935am	7435am
0300-0400	USA, WYFR Okeechobee FL	6065na	9505na		
0300-0310	Vatican State, Vatican R	7305ca	9605am		
0300-0400 vl	Zambia, R Zambia/ZNBC 1	4910do			
0300-0400 vl	Zambia, R Zambia/ZNBC 2	6165do			
0300-0400 vl	Zimbabwe, Zimbabwe BC	3306do	4828do		
0310-0340	Vatican State, Vatican R	7360af	9660af		
0330-0357	Czech Rep, Radio Prague	9480va	11600as		
0330-0400 vl	Philippines, R Pilipinas	13770as	15330as	17730as	
0330-0400	Sweden, Radio	9475am	11665am		
0330-0355	UAE, Radio Dubai	12005na	13675na	15400na	
0330-0400	UK, BBC African Service	9610af			
0330-0400	UK, BBC Asian Service	11955as	15280as	15310as	
0330-0400	UK, BBC World Service	5975am	6175na	9895am	11760me
		12095me			
0330-0400 s	UK, BBC World Service	6180eu	6195eu	9410eu	
0330-0400	Vietnam, Voice of	5905am	7260am		
0340-0350	Greece, Voice of	7450na	9375na	9420na	11645na
0345-0400	Burundi, Radio Nationale	6140do			
0345-0400	Tajikistan,Radio	7245as			
0345-0400 as	Uganda, Radio	4976do			
0356-0400	Zambia, Christian Voice	3330af	6065af		

Selected Programs

Sundays

0300 Costa Rica, R Peace Intl: CounterSpin. Fairness and Accuracy in Media (FAIR) examines how the media reports key stories.
0300 USA, KTBN Salt Lk City UT: Eastman Curtis Live. A youth-oriented program.
0300 USA, WWCR #1 Nashville TN: Faith Mountain Ministries. Henry Vanderbush.
0330 Costa Rica, R Peace Intl: Making Contact. Fresh perspectives on social and political dynamics in the US and around the world.
0330 USA, KTBN Salt Lk City UT: Gospel America. Pat Boone and his guests perform.
0330 USA, WWCR #1 Nashville TN: Weekly Pres dential Radio Address. Bill Clinton's weekly report to the nation.
0338 USA, WWCR #1 Nashville TN: The Republican Response. A noted Republican rebuts the President's weekly radio message.
0345 USA, WWCR #1 Nashville TN: A Study in God's Word. From North Carolina, Hezakiah Smith reads Scripture.

Mondays

0300 Costa Rica, R Peace Intl: Every Living Thing. See M 0230.
0300 USA, KTBN Salt Lk City UT: Praise the Lord. See M 0200.
0300 USA, WWCR #1 Nashville TN: Christ Kingcom Ministries. William Smith.
0300 USA, WWCR #3 Nashville TN: The Mike Jarmus Show (hour 2) (live). See NAm 0200.
0330 Costa Rica, R Peace Intl: New Dimensions Radio. Conversations with Innovative thinkers whose ideas are on the leading edge of change.
0330 USA, WWCR #1 Nashville TN: Truth for These Last Days. Nathan Quick.

Tuesdays

0300 Costa Rica, R Peace Intl: Disability Radio Worldwide. See S 0600.
0300 USA, KTBN Salt Lk City UT: Praise the Lord (live). See M 0200.
0300 USA, WWCR #1 Nashville TN: Total Wellness Show (live). Grant Gerondale.
0300 USA, WWCR #3 Nashville TN: Scriptures for America (live). See NAm 1600.
0330 Costa Rica, R Peace Intl: Insight and Outlook. Scott London conducts this interview program that probes ideas which shape our future.
0330 USA, WWCR #1 Nashville TN: The Prophecy Club. Stan Johnson discusses bible prophecy from Topeka, Kansas.

Wednesdays

0300 Costa Rica, R Peace Intl: World of Radio. See S 0200.
0300 USA, KTBN Salt Lk City UT: Praise the Lord (live). See M 0200.
0300 USA, WWCR #1 Nashville TN: Total Wellness Show (live). See NAm 0300.
0300 USA, WWCR #3 Nashville TN: Scriptures for America (live). See NAm 1600.
0330 Costa Rica, R Peace Intl: RFPI's Mailbag. See S 0230.
0330 USA, WWCR #1 Nashville TN: The Prophecy Club. See NAm 0330.

Thursdays

0300 Costa Rica, R Peace Intl: Every Living Thing. See M 0230.
0300 USA, KTBN Salt Lk City UT: Praise the Lord (live). See M 0200.
0300 USA, WWCR #1 Nashville TN: Total Wellness Show (live). See NAm 0300.
0300 USA, WWCR #3 Nashville TN: Scriptures for America (live). See NAm 1600.
0330 USA, WWCR #1 Nashville TN: The Prophecy Club. See NAm 0330.

Fridays

0300 Costa Rica, R Peace Intl: Alternative Radio. See T 0400.
0300 USA, KTBN Salt Lk City UT: Praise the Lord (live). See M 0200.
0300 USA, WWCR #1 Nashville TN: Total Wellness Show (live). See NAm 0300.
0300 USA, WWCR #3 Nashville TN: Scriptures for America (live). See NAm 1600.
0330 USA, WWCR #1 Nashville TN: The Prophecy Club. See NAm 0330.

Saturdays

0300 Costa Rica, R Peace Intl: RFPI Reports. Daily news program of Latin American and Caribbean topics not generally heard in the mainstream media.
0300 USA, KTBN Salt Lk City UT: Praise the Lord (live). See M 0200.
0300 USA, WWCR #1 Nashville TN: Total Wellness Show (live). See NAm 0300.
0300 USA, WWCR #3 Nashville TN: God's Plan-Good Health (live). Ken Anderson.
0330 Costa Rica, R Peace Intl: Continent of Media. See S 0130.
0330 USA, WWCR #1 Nashville TN: The Prophecy Club. See NAm 0330.

0400 UTC SHORTWAVE GUIDE 12:00 M EDT 9:00 PM PDT

Frequencies

0400-0500	Anguilla,Caribbean Beacon	6090am			
0400-0500	Australia, Radio	9660pa	12080as	15240pa	15415as
		15510pa	17715pa	17750as	21820pa
0400-0500 vl	Australia, VL8K Katherine	5025do			
0400-0500 vl	Australia, VL8T Tent Crk	4910do			
0400-0500	Australia,DefenseForces R	15635as			
0400-0430 a	Belarus, R Belarus Intl	7210eu	11960eu		
0400-0500	Canada, CBC N Quebec Svc	9625do			
0400-0500	Canada, CFRX Toronto	6070do			
0400-0500	Canada, CFVP Calgary	6030do			
0400-0500	Canada, CHNX Halifax	6130do			
0400-0500	Canada, CKZN St John's	6160do			
0400-0500	Canada, CKZU Vancouver	6160do			
0400-0429	Canada, R Canada Intl	9715me	11835me	11975me	
0400-0500	China, China Radio Intl	9560na	9730am		
0400-0500	Costa Rica,RF Peace Intl	7385am	15050am		
0400-0500	Cuba, Radio Havana	6000na	9820na	13605na	
0400-0500	Ecuador, HCJB	9745na	12015am	21455am	
0400-0450	Germany, Deutsche Welle	5990af	6015af	7225af	9565af
		11765af			
0400-0500	Germany,Overcomer Ministr	3945eu	11910as		
0400-0500 vl	Guatemala, Radio Cultural	3300do			
0400-0500	Ireland, Unt Christian BC	6200do			
0400-0415	Israel, Kol Israel	9435eu	11605eu	17535na	
0400-0500 as/vl	Italy, IRRS	7120va			
0400-0500	Kenya, Kenya Broadc Corp	4885do	4935do		
0400-0410 vl/m-f	Malawi, MBC	5993do			
0400-0500	Malaysia, Radio	7295do			
0400-0500 vl	Malaysia, RTM Kuching	7160do			
0400-0430 mtwhf	Mexico, Radio Mexico Intl	5985na	9705na		
0400-0425	Moldova, R Moldova Intl	7520na			
0400-0500	New Zealand, R NZ Intl	17675pa			
0400-0430 m	Norway, Radio Norway Intl	9445na			
0400-0500 vl	Papua New Guinea, NBC	9675do			
0400-0500	Romania, R Romania Intl	9570na	11940na	15335as	17720as
0400-0500	Russia,Voice of Russia WS	9665na	12000na	12050na	13645na
		13665na	15180na	15425na	15455na
		15595na			
0400-0430	S Africa, Channel Africa	5955af			
0400-0500	Singapore,RCorp Singapore	6150do			
0400-0430	Sri Lanka, Sri Lanka BC	9730as	15425as		
0400-0430	Switzerland, Swiss R Intl	5840eu	6165eu	9885am	9905am
0400-0500 vl	Tanzania, Radio	5050do			
0400-0415	Uganda, Radio	4976do			
0400-0500	UK, BBC African Service	3255af	6005af	6190af	7160af
		9600af	15420af		
0400-0500	UK, BBC Asian Service	9605as	11955as	15280as	15310as
		17790as	21660as		
0400-0430	UK, BBC World Service	3955eu	5975am	6175na	6180eu
		6195eu	9410eu	9895am	11760me
		12095eu	15575as	17640eu	
0400-0500	USA, KAIJ Dallas TX	5810am			
0400-0500	USA, KTBN Salt Lk City UT	7510am			
0400-0500	USA, KVOH Los Angeles CA	9975am			
0400-0500	USA, KWHR Naalehu HI	17780as			
0400-0500	USA, Voice of America	6080af	7170af	7265af	7275af
		7280af	7290af	9575af	9885af
		11965me	15205va		
0400-0500	USA, WEWN Birmingham AL	5825eu			
0400-0500 twhfa	USA, WGTG McCaysville GA	5085am			
0400-0500	USA, WHRA Greenbush ME	9400me			
0400-0500	USA, WHRI Noblesville IN	5745am	7315am		
0400-0500	USA, WINB Red Lion PA	11950am			
0400-0500	USA, WJCR Upton KY	7490na	13595na		
0400-0500	USA, WMLK Bethel PA	9465am			
0400-0500 mtwhfa	USA, WRMI/R Miami Intl	9955ca			
0400-0500 mw	USA, WSHB Cypress Crk SC	7535eu	9840af		
0400-0500	USA, WWCR Nashville TN	3210am	5070am	5935na	7435am
0400-0500	USA, WYFR Okeechobee FL	6065na	9505na	9985va	
0400-0500	Zambia, Christian Voice	3330af	6065af		
0400-0500 vl	Zambia, R Zambia/ZNBC 1	4910do			
0400-0500 vl	Zambia, R Zambia/ZNBC 2	6165do			
0400-0500 vl	Zimbabwe, Zimbabwe BC	3306do	4828do		
0425-0440 vl	Italy, RAI Intl	5975af	7270af		
0425-0500	Nigeria, FRCN/Radio	3326do	4770do	4990do	6025do
0430-0500	Austria, R Austria Intl	6155eu	13730eu		
0430-0500 wf	Belarus, R Belarus Intl	7210eu	11960eu		
0430-0500 vl	Lesotho, Radio Lesotho	4800do			
0430-0500	Netherlands, Radio	6165na	9590na		
0430-0500	Serbia, Radio Yugoslavia	9580na	11870na		
0430-0500	Swaziland, Trans World R	3200af	4775af		
0430-0500	Switzerland, Swiss R Intl	9885na	9905na		
0430-0500	UK, BBC World Service	5975am	6175am	11760me	15575as
		17640me			
0430-0500 as	UK, BBC World Service	3955eu	6180eu	6195eu	9410eu
		12095eu			
0455-0500	Malaysia, Voice of	6175as	9750as	15295au	
0455-0500	Nigeria, Voice of	7255af	15120af		

Selected Programs

Sundays

0400 Costa Rica, R Peace Intl: Our Americas. The weekly report on Latin America and the Caribbean with Mario Murillo.
0400 USA, KTBN Salt Lk City UT: Real Videos. Music videos with a Christian theme.
0400 USA, WWCR #1 Nashville TN: The Old Land Mark Church. R. L. Mitchell presents the Holy Way Hour from Chicago.
0400 USA, WWCR #3 Nashville TN: Newswatch Magazine. David Smith compares world news to bible prophecy.
0430 USA, KTBN Salt Lk City UT: G-Rock. Rock music and sports television.

Mondays

0400 Costa Rica, R Peace Intl: New Dimensions Radio. See M 0330.
0400 USA, KTBN Salt Lk City UT: Praise the Lord. See M 0200.
0400 USA, WWCR #1 Nashville TN: Truth Shall Make You Free. Otis Bonds.
0400 USA, WWCR #3 Nashville TN: World of Radio. See NAm 0630.
0430 Costa Rica, R Peace Intl: Living Enrichment Center. Mary Mannin Morrissey lectures on practical suggestions for everyday living.
0430 USA, WWCR #1 Nashville TN: The Old Record Shop. Ken Berryhill with thirty minutes of selections of music from the days of the 78 rpm record. Recommended.
0430 USA, WWCR #3 Nashville TN: Ask WWCR. A mailbag program that answers listener questions about the business of shortwave and radio propagation.
0445 USA, WWCR #3 Nashville TN: First Hand. Rick Livingood with a world evangelism update.

Tuesdays

0400 Costa Rica, R Peace Intl: Alternative Radio. Featured speakers critique on multiculturalism, environment, racism,US foreign policy, media, and indigenous rights.
0400 USA, KTBN Salt Lk City UT: The Voice of Power. See T 0030.
0400 USA, WWCR #1 Nashville TN: Scriptures for America (live). See NAm 1600.
0400 USA, WWCR #3 Nashville TN: Scriptures for America (live). See NAm 1600.
0430 USA, KTBN Salt Lk City UT: Doctor to Doctor. Helen Pensanti, M.D. hosts a lively discussion-oriented show with doctors from across the U.S.

Wednesdays

0400 Costa Rica, R Peace Intl: My Green Earth. See M 0200.
0400 USA, KTBN Salt Lk City UT: Praise the Lord (live). See M 0200.
0400 USA, WWCR #1/3 Nashville TN: Scriptures for America (live). See NAm 1600.
0430 Costa Rica, R Peace Intl: Living Enrichment Center. See M 0430.

Thursdays

0400 Costa Rica, R Peace Intl: New Dimensions Radio. See M 0330.
0400 USA, KTBN Salt Lk City UT: Praise the Lord (live). See M 0200.
0400 USA, WWCR #1/3 Nashville TN: Scriptures for America (live). See NAm 1600.
0454 Radio Netherlands: Documentary. Who Makes the Wine? (27th). See A 0154.

Fridays

0400 Costa Rica, R Peace Intl: Voices of Our World. See W 0600.
0400 USA, KTBN Salt Lk City UT: Praise the Lord (live). See M 0200.
0400 USA, WWCR #1/3 Nashville TN: Scriptures for America (live). See NAm 1600.
0430 Costa Rica, R Peace Intl: WINGS. See W 0530.

Saturdays

0400 Costa Rica, R Peace Intl: World of Radio. See S 0200.
0400 USA, KTBN Salt Lk City UT: Today with Marilyn. See M 1430.
0400 USA, WWCR #1 Nashville TN: God's Plan-Good Health (live). See NAm 0300.
0400 USA, WWCR #3 Nashville TN: God's Plan-Good Health (live). See NAm 0300.
0430 Costa Rica, R Peace Intl: RFPI's Mailbag. See S 0230.
0430 USA, KTBN Salt Lk City UT: Carman. See S 0200.

Thank You...

Additional contributors to this month's Shortwave Guide:

Gordon Bell, USA; Joe Brashier/*WHRI*; Bob Fraser, Cohasset, MA; Olav M. Grimdalen/R Norwal Intl; Glenn Hauser, Enid, OK/*World of Radio & DX Report*; Nigel Holmes/*R Australia*; ; Frank Hillton, Charleston, SC; Al Quaglieri, Albany, NY; George Woods/*R Sweden*; Sam Wright, Biloxi, MS; BBCMS/World Media; *Cumbre DX*; Usenet newsgroups.

Frequencies

0500-0600	Anguilla,Caribbean Beacon	6090am			
0500-0600	Australia, Radio	9660pa	12080as	15240pa	15510pa
		17715pa	21890pa		
0500-0600 vl	Australia, VL8K Katherine	5025do			
0500-0600 vl	Australia, VL8T Tent Crk	4910do			
0500-0600	Australia,DefenseForces R	15635as			
0500-0600 vl	Cameroon, Radio Cameroon	4850do			
0500-0600	Canada, CBC N Quebec Svc	9625do			
0500-0600	Canada, CFRX Toronto	6070do			
0500-0600	Canada, CFVP Calgary	6030do			
0500-0600	Canada, CHNX Halifax	6130do			
0500-0600	Canada, CKZU Vancouver	6160do			
0500-0529 mtwhf	Canada, R Canada Intl	7295eu	9595eu	11835af	15430af
0500-0600	Costa Rica,RF Peace Intl	7385am			
0500-0600	Cuba, Radio Havana	9550na	9820na	9830na	
0500-0600	Ecuador, HCJB	9745na	12015na	21455am	
0500-0550	Germany, Deutsche Welle	6045na	6185na	9615am	11810na
0500-0600	Germany,Overcomer Ministr	3945eu	11910as		
0500-0600	Ireland, Unt Christian BC	6200do			
0500-0600 vl	Italy, IRRS	3985va			
0500-0600	Japan, R Japan/NHK World	6110na	7230eu	9835na	11715as
		11760as	11840as	11850pa	15230pa
		17810as			
0500-0600	Kenya, Kenya Broadc Corp	4885do	4935do		
0500-0530 vl	Lesotho, Radio Lesotho	4800do			
0500-0600	Liberia, Star Radio	3400do			
0500-0600	Liberia,LCN/R Liberia Int	5100do			
0500-0510 vl/m-f	Malawi, MBC	5993do			
0500-0600	Malaysia, Radio	7295do			
0500-0600 vl	Malaysia, RTM Kuching	4895do	7160do		
0500-0600	Malaysia, Voice of	6175as	9750as	15295au	
0500-0600 vl	Namibia, NBC	3270af	3289af		
0500-0525	Netherlands, Radio	6165na	9590na		
0500-0600	New Zealand, R NZ Intl	11690pa			
0500-0505	Nigeria, FRCN/Radio	3326do	4770do	4990do	
0500-0600	Nigeria, Voice of	7255af	15120af		
0500-0557	North Korea, R Pyongyang	3560eu	11710eu	13790eu	
0500-0600 vl	Papua New Guinea, NBC	9675do			
0500-0600	Russia,Voice of Russia WS	9450au	17495au	17665au	21760au
		21790au			
0500-0530	S Africa, AWR Africa	6000af	6100af		
0500-0530	S Africa, Channel Africa	9525af			
0500-0600	Singapore,RCorp Singapore	6150do			
0500-0600	Spain, R Exterior Espana	6055am			
0500-0600 vl	Tanzania, Radio	5050do			
0500-0515	Uganda, Radio	4976do			
0500-0600	UK, BBC African Service	3255af	6005af	6190af	7160af
		9600af	15420af	17885af	
0500-0600	UK, BBC Asian Service	9740as	11955as	15280as	15310as
		15360as	17760as	17790as	21660as
0500-0600	UK, BBC World Service	3955eu	5975am	6175am	6180eu
		6195eu	9410eu	11760me	12095eu
		15575eu	17640me		
0500-0600	USA, KAIJ Dallas TX	5810am			
0500-0600	USA, KTBN Salt Lk City UT	7510am			
0500-0600	USA, KVOH Los Angeles CA	9975ca			
0500-0600	USA, KWHR Naalehu HI	17780as			
0500-0600	USA, Voice of America	5970af	6035af	6080af	7170eu
		7195af	9630af	11965me	12080af
		15205eu			
0500-0600	USA, WHRA Greenbush ME	11565af			
0500-0600	USA, WHRI Noblesville IN	5745am	7315am		
0500-0600	USA, WINB Red Lion PA	11950am			
0500-0600	USA, WJCR Upton KY	7490na	13595na		
0500-0600	USA, WMLK Bethel PA	9465am			
0500-0600 mtwhf	USA, WRMI/R Miami Intl	9955ca			
0500-0600 mw	USA, WSHB Cypress Crk SC	7535eu	9835af		
0500-0600	USA, WWCR Nashville TN	2390am	3210am	5070am	5935am
0500-0600	USA, WYFR Okeechobee FL	5985na	9985eu	11580af	
0500-0530	Vatican State, Vatican R	4005eu	5883eu	7250eu	9660af
		11625af	15570af		
0500-0600	Zambia, Christian Voice	3330af	6065af		
0500-0530 vl	Zambia, R Zambia/ZNBC 1	4910do			
0500-0600 vl	Zambia, R Zambia/ZNBC 2	6165do			
0500-0530 vl	Zimbabwe, Zimbabwe BC	3306do	4828do		
0505-0600	Swaziland, Trans World R	3200af	4775af	9500af	
0520-0530	Vatican State, Vatican R	9660af	11625af	15570af	
0525-0600	Ghana, Ghana Broadc Corp	3366do	4915do		
0530-0600	Austria, R Austria Intl	6015na			
0530-0600	Switzerland, Swiss R Intl	5840eu	6165eu		
0530-0600	Thailand, Radio	9655eu	11905eu	15115eu	
0530-0600	UAE, Radio Dubai	17830eu	21700eu		
0530-0600 vl	Zambia, R Zambia/ZNBC 1	4910do			
0530-0600 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		

Selected Programs

Sundays

0500 Costa Rica, R Peace Intl: RadioNation. Marc Cooper with a review of news, politics and culture from The Nation Magazine.

0500 USA, KTBN Salt Lk City UT: Fire by Nite. No information available.

0500 USA, WWCR #3 Nashville TN: USA Radio News. News summary from the USA Radio News Network.

0505 USA, WWCR #3 Nashville TN: Prescription for Health (live). A program about natural health foods and diet supplements.

0530 USA, WWCR #1 Nashville TN: The Lutheran Reformation Hour. Richard Shekner preaches from Chicago Heights, Illinois.

Mondays

0500 USA, KTBN Salt Lk City UT: Jesse Duplantis. Evangelizing from New Orleans.

0500 USA, WWCR #1 Nashville TN: Rock the Universe. Rich Adcock's selections of rock recordings includes some rare treats.

0500 USA, WWCR #3 Nashville TN: Radio Nadeco. Ralph Obiohf with news about Nigeria.

0505 Costa Rica, R Peace Intl: Spiritual Awakening. Readings and book reviews on a broad range of spiritually-oriented writings from around the world.

0515 USA, WWCR #3 Nashville TN: The Old Time Religion Hour. Brother Hogan will send you a Bible from Athens, Tennessee.

0530 Costa Rica, R Peace Intl: Peace Talks. Focus on topics such as peace education, development and peace, and women and peace.

0530 USA, KTBN Salt Lk City UT: Changing Your World. See M 0130.

0530 USA, WWCR #3 Nashville TN: The Hour of Courage. Ron Wilson talks politics and the precious metals market.

Tuesdays

0500 Costa Rica, R Peace Intl: UN Caribbean Echo. Produced for the Caribbean with news about United Nations activities in the area and internationally .

0500 USA, KTBN Salt Lk City UT: Jack Van Impe Presents. Reporting and interpreting international news in bible prophecy.

0500 USA, WWCR #3 Nashville TN: Radio Nadeco. See NAm 0500.

0515 USA, WWCR #3 Nashville TN: The Old Time Religion Hour. See NAm 0515.

0517 Costa Rica, R Peace Intl: UN Daily News. See M 2345.

0525 Costa Rica, R Peace Intl: Hightower Radio. See S 2345.

0530 Costa Rica, R Peace Intl: Rebel Radio. A broad look at the micro-radio movement and how these micro-broadcasters struggle for freedom of speech.

0530 Costa Rica, R Peace Intl: Steppin' Out of Babylon. Sue Supriano interviews people who speak out against injustice and stand up for freedom and liberty.

0530 USA, KTBN Salt Lk City UT: This is Your Day!. Evangelizing and healing by Benny Hinn from the Orlando Christian Center.

0530 USA, WWCR #3 Nashville TN: The Hour of Courage. See NAm 0530.

Wednesdays

0500 Costa Rica, R Peace Intl: UNESCO. See M 0600.

0500 USA, KTBN Salt Lk City UT: Jerusalem Mosaic. See S 0500.

0500 USA, WWCR #3 Nashville TN: Radio Nadeco. See NAm 0500.

0515 Costa Rica, R Peace Intl: UN Daily News. See M 2345.

0515 USA, WWCR #3 Nashville TN: The Old Time Religion Hour. See NAm 0515.

0525 Costa Rica, R Peace Intl: Hightower Radio. See S 2345.

0530 Costa Rica, R Peace Intl: WINGS. Women's news and current affairs by the Women's International News Gathering Service.

0530 USA, KTBN Salt Lk City UT: This is Your Day!. See T 0530.

0530 USA, WWCR #3 Nashville TN: The Hour of Courage. See NAm 0530.

Thursdays

0500 USA, KTBN Salt Lk City UT: Networking. Richard Shakarian hosts this program from the Full Gospel Business Men's International organization.

0500 USA, WWCR #1 Nashville TN: Financial Survival in the 90's. Jim Ceaderstrom.

0500 USA, WWCR #3 Nashville TN: Radio Nadeco. See NAm 0500.

0515 Costa Rica, R Peace Intl: UN Daily News. See M 2345.

0515 USA, WWCR #3 Nashville TN: The Old Time Religion Hour. See NAm 0515.

0525 Costa Rica, R Peace Intl: Hightower Radio. See S 2345.

0530 USA, KTBN Salt Lk City UT: This is Your Day!. See T 0530.

0530 USA, WWCR #3 Nashville TN: The Hour of Courage. See NAm 0530.

Fridays

0500 Costa Rica, R Peace Intl: Tropical Conservation Newsbureau Report. See T 0244.

0500 USA, KTBN Salt Lk City UT: Precious Memories. Bill Gaither.

0500 USA, WWCR #1 Nashville TN: USA Radio News. See NAm 0500.

0500 USA, WWCR #3 Nashville TN: Radio Nadeco. See NAm 0500.

0507 USA, WWCR #1 Nashville TN: For the People (hour 1). Chuck Harder is back with his old talk radio show.

0515 Costa Rica, R Peace Intl: UN Daily News. See M 2345.

0515 USA, WWCR #3 Nashville TN: The Old Time Religion Hour. See NAm 0515.

0525 Costa Rica, R Peace Intl: Hightower Radio. See S 2345.

0530 Costa Rica, R Peace Intl: Vietnam Veterans Radio Network. See S 0630.

0530 USA, KTBN Salt Lk City UT: This is Your Day!. See T 0530.

0530 USA, WWCR #3 Nashville TN: The Hour of Courage. See NAm 0530.

Saturdays

0500 Costa Rica, R Peace Intl: The Neumaier Report. See M 2330.

0500 Costa Rica, R Peace Intl: The Tico Times Report. See M 2330.

0500 USA, KTBN Salt Lk City UT: Tommy Barnett and Matthew Barnett. See S 0500.

0500 USA, WWCR #1 Nashville TN: Financial Survival in the 90's. See NAm 0500.

0500 USA, WWCR #3 Nashville TN: Missing Links. Joseph Krill.

0515 Costa Rica, R Peace Intl: UN Daily News. See M 2345.

0515 USA, WWCR #3 Nashville TN: Bible Prophecy for Today. Tom Benvenutti analyzes the news and its application to Bible prophecy.

0525 Costa Rica, R Peace Intl: Hightower Radio. See S 2345.

0530 Costa Rica, R Peace Intl: Second Opinion. See S 0100.

0530 USA, KTBN Salt Lk City UT: This is Your Day!. See T 0530.

0530 USA, WWCR #3 Nashville TN: Battle Cry Sounding. See NAm 1230.

0600 UTC SHORTWAVE GUIDE 2:00 AM EDT 11:00 PM PDT

Frequencies

0600-0700	Anguilla,Caribbean Beacon	6090am			
0600-0700	Australia, Radio	9660pa	12080as	15240pa	15415as
		15510pa	17715pa	17750as	21820pa
		21890pa			
0600-0700 vl	Australia, VL8K Katherine	5025do			
0600-0700 vl	Australia, VL8T Tent Crk	4910do			
0600-0700 vl	Canada, CBC N Quebec Svc	9625do			
0600-0700	Canada, CFRX Toronto	6070do			
0600-0700	Canada, CFVP Calgary	6030do			
0600-0700	Canada, CHNX Halifax	6130do			
0600-0700	Canada, CKZU Vancouver	6160do			
0600-0700	Costa Rica,RF Peace Intl	7385am	15050am		
0600-0610 mtwhfa	Croatia, Croatian Radio	5945eu	9830eu	13820au	
0600-0700	Cuba, Radio Havana	9550na	9820na	9830na	
0600-0700	Ecuador, HCJB	9745na	12015na	21455am	
0600-0650	Germany, Deutsche Welle	11915af	13790af	15185af	17820as
		17860af	21680me		
0600-0700 vl	Germany, Sunrise Radio	5850va			
0600-0700	Germany,Overcomer Ministr	3945eu	13810au	15735as	
0600-0615	Ghana, Ghana Broadc Corp	3366do	4915do		
0600-0700	Ireland, Unt Christian BC	6200do			
0600-0630 vl	Italy, IRRS	3985va			
0600-0700	Japan, R Japan/NHK World	5975eu	7230eu	9835na	11740as
		11840as	11850pa	17810as	
0600-0700	Kenya, Kenya Broadc Corp	4885do	4935do		
0600-0700 vl	Kiribati, Radio	9810do			
0600-0700	Liberia, Radio Veritas	5470do			
0600-0700	Liberia, Star Radio	3400do			
0600-0700	Liberia,LCN/R Liberia Int	5100do			
0600-0700	Malaysia, Radio	7295do			
0600-0700 vl	Malaysia, RTM Kuching	4895do	7160do		
0600-0700	Malaysia, Voice of	6175as	9750as	15295au	
0600-0700 vl	Namibia, NBC	3270af	3289af		
0600-0700	New Zealand, R NZ Intl	11690pa			
0600-0630	Nigeria, FRCN/Radio	3326do	4770do	4990do	
0600-0700	Nigeria, Voice of	7255af	15120af		
0600-0630 m	Norway, Radio Norway Intl	7180eu	9590eu		
0600-0700 vl	Papua New Guinea, NBC	9675do			
0600-0700	Romania, R Romania Intl	9510na	11940na		
0600-0700	Russia,Voice of Russia WS	9450au	15490au	17495au	17665au
		21760au	21790au		
0600-0630	S Africa, Channel Africa	11900af			
0600-0630	S Africa, Trans World R	11735af			
0600-0610	Sierra Leone, SLBS	3316do			
0600-0700	Singapore,RCorp Singapore	6150do			
0600-0700 vl	Solomon Islands, SIBC	5020do			
0600-0605	Swaziland, Trans World R	4775af	9500af		
0600-0700 vl	Tanzania, Radio	5050do			
0600-0700	UK, BBC African Service	6005af	6190af	7160af	9600af
		11835af	11940af	15420af	17885af
0600-0700	UK, BBC Asian Service	7145pa	9740as	11955pa	15310as
		15360as	17760as	17790as	21660as
0600-0700	UK, BBC World Service	5975am	6175am	6180eu	6195eu
		7325eu	9410eu	11760me	12095eu
		15565eu	15575eu	17640me	
0600-0700	USA, KAIJ Dallas TX	5810am			
0600-0700	USA, KTBN Salt Lk City UT	7510am			
0600-0700	USA, KWHR Naalehu HI	17780as			
0600-0630	USA, Voice of America	5970af	6035af	6080af	7170eu
		7195af	9630af	9680af	11805af
		11965me	11995af	12080af	15205va
0600-0700	USA, WEWN Birmingham AL	5825eu			
0600-0700	USA, WHRA Greenbush ME	11565af			
0600-0700	USA, WHRI Noblesville IN	5745am	7315am		
0600-0700	USA, WJCR Upton KY	7490na	13595na		
0600-0700	USA, WMLK Bethel PA	9465am			
0600-0700 mtwhf	USA, WRMI/R Miami Intl	9955ca			
0600-0700 tf	USA, WSHB Cypress Crk SC	7535eu	9835af		
0600-0700	USA, WWCR Nashville TN	2390am	3210am	5070am	5935am
0600-0700	USA, WYFR Okeechobee FL	5985am	7355va		
0600-0700	Yemen, Radio Aden	9780do			
0600-0700	Zambia, Christian Voice	3330af	6065af		
0600-0700 vl	Zambia, R Zambia/ZNBC 1	7220do			
0600-0700 vl	Zambia, R Zambia/ZNBC 2	6165do			
0600-0700 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
0605-0700	Swaziland, Trans World R	4775af	6100af	9500af	
0630-0700	Finland, YLE/R Finland	11945as	17830au		
0630-0700 as/vl	Italy, IRRS	7120va			
0630-0700 smtwha	Malta, VO Mediterranean	9600eu			
0630-0700	USA, Voice of America	7170eu	11805af	11965me	15205eu
0630-0700 as	USA, Voice of America	5970af	6035af	6080af	7195af
		9630af	11995af	12080af	
0630-0645	Vatican State, Vatican R	11625af	13765af	15570af	
0630-0645 mtwhfa	Vatican State, Vatican R	4005eu	5883eu	7250eu	9645eu
		11740eu	15595eu		
0641-0656	Romania, R Romania Intl	9550eu	9625eu	9665eu	11885eu
0645-0655 s	Albania, TWR Tirana	9685eu			
0645-0655 as	Monaco, Trans World Radio	9755eu			
0645-0700	Vatican State, Vatican R	11625af	13765af	15570af	
0655-0700	Albania, TWR Tirana	9685eu			
0655-0700 mtwhf	Monaco, Trans World Radio	9755eu			

Selected Programs

Sundays

0600 Costa Rica, R Peace Intl: Disability Radio Worldwide. Jean Parker with issues, events, political analysis and interviews.

0600 USA, KTBN Salt Lk City UT: Bob Larson in Action. Bob Larson fights satanism and the occult.

0600 USA, WWCR #1 Nashville TN: Inspirations Across America. Bert Johnson plays contemporary Christian music.

0600 USA, WWCR #3 Nashville TN: Prophecy Flash. William Dankenbring preaches about the second coming.

0630 Costa Rica, R Peace Intl: Vietnam Veterans Radio Network. Bringing to light the real stories behind the Vietnam War.

0630 USA, KTBN Salt Lk City UT: The Meadowlark Lemon Show. An athletic-based ministry.

0630 USA, WWCR #3 Nashville TN: World of Radio. Glenn Hauser's communications program for shortwave radio listeners.

Mondays

0600 Costa Rica, R Peace Intl: UNESCO. A feature program of the United Nations focusing on world educational, scientific, or cultural matters.

0600 USA, KTBN Salt Lk City UT: The Winner's Way. Mac Hammond shows how to breeze through the storms of life.

0600 USA, WWCR #1/3 Nashville TN: USA Radio News. See NAm 0500.

0605 USA, WWCR #1 Nashville TN: The Hour of Courage. See NAm 0530.

0605 USA, WWCR #3 Nashville TN: Freedom's Call. Bo Gritz hosts this talk radio program.

0630 Costa Rica, R Peace Intl: The Far Right Radio Review. The program that analyzes the growing phenomenon of far right/hate programming on radio.

0630 USA, KTBN Salt Lk City UT: Myles Munroe. Myles Munroe evangelizes.

0635 USA, WWCR #1 Nashville TN: Ken's Country Classics. Key Berryhill with country music from a bygone era.

Tuesdays

0600 Costa Rica, R Peace Intl: New Dimensions Radio. See M 0330.

0600 USA, KTBN Salt Lk City UT: This Week in Bible Prophecy. With Peter and Paul LaLonde; Sue Rodgers is the host.

0600 USA, WWCR #1/3 Nashville TN: USA Radio News. See NAm 0500.

0605 USA, WWCR #1 Nashville TN: The Hour of Courage. See NAm 0530.

0605 USA, WWCR #3 Nashville TN: Freedom's Call. See NAm 0605.

0630 USA, KTBN Salt Lk City UT: Calling Dr. Whitaker. The doctor talks to a guest about medical matters.

0635 USA, WWCR #1 Nashville TN: Natural Health Clinic. Terrance Sullivan.

Wednesdays

0600 Costa Rica, R Peace Intl: Voices of Our World. Maryknoll missionary Steve De Mott hosts this social justice magazine program.

0600 USA, KTBN Salt Lk City UT: Alvin Slaughter. Winning souls with his concert ministry.

0600 USA, WWCR #1/3 Nashville TN: USA Radio News. See NAm 0500.

0605 USA, WWCR #1 Nashville TN: The Hour of Courage. See NAm 0530.

0605 USA, WWCR #3 Nashville TN: Freedom's Call. See NAm 0605.

0630 Costa Rica, R Peace Intl: University of the Air. Self-directed and participatory learing of a variety of courses.

0630 USA, KTBN Salt Lk City UT: Jubilee TV. Pastor Dick Bernal with services from the Jubilee Christian Center in San Jose, California.

0635 USA, WWCR #1 Nashville TN: Natural Health Clinic. See NAm 0635.

Thursdays

0600 USA, WWCR #1/3 Nashville TN: USA Radio News. See NAm 0500.

0605 USA, WWCR #1 Nashville TN: The Hour of Courage. See NAm 0530.

0605 USA, WWCR #3 Nashville TN: Freedom's Call. See NAm 0605.

0630 Costa Rica, R Peace Intl: University of the Air. See W 0630.

0635 USA, WWCR #1 Nashville TN: Natural Health Clinic. See NAm 0635.

Fridays

0600 USA, WWCR #1/3 Nashville TN: USA Radio News. See NAm 0500.

0600 USA, WWCR #3 Nashville TN: USA Radio News. See NAm 0500.

0605 USA, WWCR #1 Nashville TN: The Hour of Courage. See NAm 0530.

0605 USA, WWCR #3 Nashville TN: Freedom's Call. See NAm 0605.

0630 Costa Rica, R Peace Intl: University of the Air. See W 0630.

0630 USA, KTBN Salt Lk City UT: The Doctor and the Word. Reginald B. Cherry, MD answers listeners' questions about medical matters.

0635 USA, WWCR #1 Nashville TN: Natural Health Clinic. See NAm 0635.

Saturdays

0600 Costa Rica, R Peace Intl: Steppin' Out of Babylon. See T 0530.

0600 USA, KTBN Salt Lk City UT: Josh McDowell Program. Ministering in Russia.

0600 USA, WWCR #1/3 Nashville TN: World of Radio. See NAm 0630.

0630 Costa Rica, R Peace Intl: University of the Air. See W 0630.

0630 USA, KTBN Salt Lk City UT: Jeff and Reeni Fenholt. See S 0500.

0630 USA, WWCR #1 Nashville TN: The View from Europe. Harvey Thomas presents the European point of view on current events.

0630 USA, WWCR #3 Nashville TN: Words of Hope. See NAm 1230.

0635 USA, WWCR #1 Nashville TN: Natural Health Clinic. See NAm 0635.

0645 USA, WWCR #3 Nashville TN: A Brighter Day. Jane Rogowski evangelizes from Maryland.

Frequencies

0700-0800	Anguilla,Caribbean Beacon	6090am			
0700-0800	Australia, Radio	9660pa	12080as	15240pa	15415as
		15510pa	17715pa	17750as	21820pa
		21890pa			
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	7385am			
0700-0727	Czech Rep, Radio Prague	7345eu	9505eu		
0700-0800	Ecuador, HCJB	9640pa	11960eu	21455am	
0700-0800 as	Eqt Guinea, R East Africa	15186af			
0700-0800 mtwhf	Eqt Guinea, Radio Africa	15186af			
0700-0800 vl	Germany, Sunrise Radio	5850va			
0700-0800	Germany,Overcomer Ministr	13810au	15735as		
0700-0715	Ghana, Ghana Broadc Corp	3366do	4915do		
0700-0800	Guyana, GBC/Voice of	3290do	5950do		
0700-0800	Ireland, Unt Christian BC	6200do			
0700-0800 as/vl	Italy, IRRS	7120va			
0700-0800	Kenya, Kenya Broadc Corp	4885do	4935do		
0700-0800 vl	Kiribati, Radio	9810do			
0700-0800	Liberia, Radio Veritas	5470do			
0700-0800	Liberia, Star Radio	3400do			
0700-0715	Liberia,LCN/R Liberia Int	5100do			
0700-0800	Malaysia, Radio	7295do			
0700-0800	Malaysia, Voice of	6175as	9750as	15295au	
0700-0800	Monaco, Trans World Radio	9755eu			
0700-0800	Myanmar, Radio	9730do			
0700-0715 vl	Namibia, NBC	3270af	3289af		
0700-0716	New Zealand, R NZ Intl	11690pa			
0700-0800 as	New Zealand, R NZ Intl	6100pa			
0700-0730 s	Norway, Radio Norway Intl	13800eu	15640eu		
0700-0800 vl	Papua New Guinea, NBC	9675do			
0700-0800	Romania, R Romania Intl	17735af	21480af		
0700-0800	Russia,Voice of Russia WS	9450au	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			
0700-0735	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	USA, KAIJ Dallas TX	5810am	9815am		
0700-0800	USA, KTBN Salt Lk City UT	7510am			
0700-0800	USA, KWHR Naalehu HI	11565pa	17780as		
0700-0800	USA, WEWN Birmingham AL	5825eu	7405na		
0700-0800	USA, WHRA Greenbush ME	11565af			
0700-0800	USA, WHRI Noblesville IN	5745am	7315am		
0700-0800	USA, WJCR Upton KY	7490na	13595na		
0700-0800	USA, WMLK Bethel PA	9465am			
0700-0800 mtwhf	USA, WRMI/R Miami Intl	9955ca			
0700-0800	USA, WSHB Cypress Crk SC	7535eu	9835af		
0700-0800	USA, WWCR Nashville TN	2390am	3210am	5070am	5935am
0700-0800	USA, WYFR Okeechobee FL	7355eu	9985af	13695va	
0700-0715 vl	Vanuatu, Radio	3945do	4960do		
0700-0800	Zambia, Christian Voice	6065af			
0700-0800 vl	Zambia, R Zambia/ZNBC 1	7220do			
0700-0800 vl	Zambia, R Zambia/ZNBC 2	6165do			
0700-0800 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
0705-0710 s	Croatia, Croatian Radio	5945eu	9830eu	13820au	
0715-0730 s	Greece, Voice of	9375eu	9425au	9755au	11645eu
		15650au			
0715-0800 vl	Namibia, NBC	4930af	4965af		
0716-0800 mtwhf	New Zealand, R NZ Intl	6100pa			
0716-0800 as	New Zealand, R NZ Intl	11690pa			
0730-0800	Austria, R Austria Intl	6155eu	13730eu	15410me	17870me
0730-0755	Belgium, R Vlaanderen Int	7290eu	9940au		
0730-0740 s	Greece, Voice of	9375eu	9425eu	9755au	11645eu
		15650au			
0730-0800	Netherlands, Radio	9730pa	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			
0735-0800 as	Swaziland, Trans World R	4775af	6100af	9500af	
0740-0800	Guam, TWR/KTWR	15200as			
0745-0800 s	Ghana, Ghana Broadc Corp	3366do	4915do		

0800 UTC

0800-0820	Albania, TWR Tirana	9685eu			
0800-0900	Anguilla,Caribbean Beacon	6090am			
0800-0900	Australia, Radio	5995pa	9710pa	9770pa	12080as
		15415as	17750as	21820pa	
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	7385am			
0800-0810 mtwhfa	Croatia, Croatian Radio	7185eu	9830eu	13820au	
0800-0900	Ecuador, HCJB	9640pa	11960eu	21455am	
0800-0900 as	Eqt Guinea, R East Africa	15186af			
0800-0900 mtwhf	Eqt Guinea, Radio Africa	15186af			
0800-0900 vl	Germany, Sunrise Radio	5850va			
0800-0830 s	Germany, Universal Life	17780as			
0800-0900	Germany,Overcomer Ministr	13810au	15735as		
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	11785as		
0800-0900	Ireland, Unt Christian BC	6200do			
0800-0900 as/vl	Italy, IRRS	7120va			
0800-0900	Kenya, Kenya Broadc Corp	4885do	4935do		
0800-0900 vl	Kiribati, Radio	9810do			
0800-0900	Liberia, Radio Veritas	5470do			
0800-0900	Liberia,LCN/R Liberia Int	5100do			
0800-0900	Malaysia, Radio	7295do			
0800-0830	Malaysia, Voice of	6175as	9750as	15295au	
0800-0900 s	Malta, VO Mediterranean	9600eu			
0800-0835 a	Monaco, Trans World Radio	9755eu			
0800-0820 as	Monaco, Trans World Radio	9755eu			
0800-0830	Myanmar, Radio	9730do			
0800-0900 vl	Namibia, NBC	4930af	4965af		
0800-0900	Netherlands, Radio	9720pa	9820pa		
0800-0900 mtwhf	New Zealand, R NZ Intl	6100pa			
0800-0900 mtwhf	New Zealand, R NZ Intl	6100pa			
0800-0900 as	New Zealand, R NZ Intl	11690pa			
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		
0800-0805 as	Swaziland, Trans World R	4775af	6100af	9500af	
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	USA, KAIJ Dallas TX	5810am	9815am		
0800-0900 s	USA, KHBI N Mariana Is	15665eu			
0800-0900	USA, KNLS Anchor Point AK	9615as			
0800-0900	USA, KTBN Salt Lk City UT	7510am			
0800-0900	USA, KWHR Naalehu HI	11565pa	17780as		
0800-0900	USA, WEWN Birmingham AL	5825eu	7405na		
0800-0900	USA, WHRI Noblesville IN	5745am	7315am		
0800-0900	USA, WJCR Upton KY	7490na	13595na		
0800-0900 mtwhf	USA, WRMI/R Miami Intl	9955ca			
0800-0900 smtwh	USA, WSHB Cypress Crk SC	9835eu	9845pa		
0800-0900	USA, WWCR Nashville TN	2390am	3210am	5070am	5935am
0800-0815 vl	Vanuatu, Radio	3945do	4960do		
0800-0900	Zambia, Christian Voice	6065af			
0800-0900 vl	Zambia, R Zambia/ZNBC 1	7220do			
0800-0900 vl	Zambia, R Zambia/ZNBC 2	6165do			
0800-0900 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
0805-0810	Pakistan, Radio	15530eu	17835eu		
0815-0900 mtwtf	Nigeria, FRCN/Radio	3326do	4770do	4990do	
0815-0900 f	Seychelles, FEBA Radio	15540as			
0820-0835 as	Albania, TWR Tirana	9685eu			
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	Georgia, Radio	11910eu			
0830-0900	Switzerland, Swiss R Intl	9885au	13685au		
0835-0850 s	Albania, TWR Tirana	9685eu			
0835-0850 s	Monaco, Trans World Radio	9755eu			
0855-0900	Guam, TWR/KTWR	15330pa			

USA: WWCR Frequencies

Transmitter #1: 15685, 9475, 3215, 3210 kHz
Transmitter #2: 13845, 5935 kHz
Transmitter #3: 12160, 5070 kHz
Transmitter #4: 7435, 9475, 2390 kHz

FREQUENCIES

0900-1000	Anguilla,Caribbean Beacon	6090am			
0900-1000	Australia, Radio	6080as	9770pa	11880as	17750as
0900-1000 vl	Australia, VL8A Alice Spg	2310do			
0900-1000 vl	Australia, VL8K Katherine	2485do			
0900-1000 vl	Australia, VL8T Tent Crk	2325do			
0900-1000	Canada, CFRX Toronto	6070do			
0900-1000	Canada, CFVP Calgary	6030do			
0900-1000	Canada, CHNX Halifax	6130do			
0900-1000	Canada, CKZU Vancouver	6160do			
0900-1000	China, China Radio Intl	9785pa	9890pa	11755pa	
0900-1000	Costa Rica,RF Peace Intl	7385am			
0900-0927	Czech Rep, Radio Prague	17485af	21745as		
0900-1000	Ecuador, HCJB	9640pa	21455am		
0900-1000 as	Eqt Guinea, R East Africa	15186af			
0900-1000 mtwhf	Eqt Guinea, Radio Africa	15186af			
0900-0950	Germany, Deutsche Welle	6160pa	9565af	12055as	15205af
		15410af	17715as	17800af	21600af
		21680as			
0900-1000	Germany, Sunrise Radio	5850va			
0900-1000	Germany,Overcomer Ministr	13810au	15735as		
0900-0915 mtwtf	Ghana, Ghana Broadc Corp	3366do	4915do		
0900-0915	Guam, TWR/KTWR	15200as			
0900-0930	Guyana, GBC/Voice of	3290do	5950do		
0900-1000	Ireland, Unt Christian BC	6200do			
0900-1000 as/vl	Italy, IRRS	7120va			
0900-1000	Kenya, Kenya Broadc Corp	4935do			
0900-0930 vl	Kiribati, Radio	9810do			
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 vl	Namibia, NBC	4930af	4965af		
0900-0925	Netherlands, Radio	9720pa	9820pa		
0900-1000	New Zealand, R NZ Intl	6100pa			
0900-1000 as	New Zealand, R NZ Intl	11690pa			
0900-0930 s	Norway, Radio Norway Intl	18950au			
0900-1000 vl	Papua New Guinea, NBC	4890do			
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	USA, KAIJ Dallas TX	5810am	9815am		
0900-1000	USA, KHBI N Mariana Is	9385pa	15665as		
0900-1000	USA, KTBN Salt Lk City UT	7510am			
0900-1000	USA, KWHR Naalehu HI	11565pa	17780as		
0900-1000	USA, WEWN Birmingham AL	5825eu	7405na		
0900-1000	USA, WHRI Noblesville IN	5745am	7315am		
0900-1000	USA, WJCR Upton KY	7490na	13595na		
0900-1000 mtwhf	USA, WRMI/R Miami Intl	9955ca			
0900-1000 th	USA, WSHB Cypress Crk SC	9455sa	9835af		
0900-1000	USA, WWCR Nashville TN	2390am	3210am	5070am	5935am
0900-1000	Zambia, Christian Voice	6065af			
0900-1000 vl	Zambia, R Zambia/ZNBC 1	7220do			
0900-1000 vl	Zambia, R Zambia/ZNBC 2	6165do			
0900-1000 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
0905-0910 s	Croatia, Croatian Radio	7185eu	9830eu		
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			
0930-1000 mtwhfa	Austria, R Austria Intl	15455as	17870au		
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	Lithuania, Radio Vilnius	9710eu			
0930-1000	Netherlands, Radio	12065as	13710as		
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 smtwhf	UK, BBC Slow Speed News	6065as	9580as	11945as	11955as
		15280as			

1000 UTC

1000-1100	Anguilla,Caribbean Beacon	6090am			
1000-1100	Australia, Radio	6080as	9770pa	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	7385am			
1000-1100	Ecuador, HCJB	9640pa	21455am		
1000-1100 as	Eqt Guinea, R East Africa	15186af			
1000-1100 mtwhf	Eqt Guinea, Radio Africa	15186af			
1000-1100	Germany, Sunrise Radio	5850va			
1000-1100	Germany,Overcomer Ministr	15715au	15735as	17505pa	
1000-1100 as	Germany,Overcomer Ministr	5900eu			
1000-1030	Guam, AWR/KSDA	11790as			
1000-1100	Guam, TWR/KTWR	9865as			
1000-1100	India, All India Radio	11585au	11735au	13700au	15050au
		17387au	17840as		
1000-1100	Ireland, Unt Christian BC	6200do			
1000-1100 as/vl	Italy, IRRS	7120va			
1000-1100	Japan, R Japan/NHK World	9695as	11730as	11850pa	
1000-1100	Jordan, Radio	11690eu			
1000-1100	Kenya, Kenya Broadc Corp	4935do			
1000-1100	Malaysia, Radio	7295do			
1000-1100 irreg	Malaysia,RTM KotaKinabalu	5980do			
1000-1100 vl	Namibia, NBC	4930af	4965af		
1000-1030	Netherlands, Radio	12065as	13710as		
1000-1100	New Zealand, R NZ Intl	6100pa			
1000-1100	Nigeria, Voice of	7255af	15120af		
1000-1100 vl	Papua New Guinea, NBC	4890do			
1000-1100	Phlippines, FEBC/R Intl	11635as			
1000-1100	Singapore,RCorp Singapore	6150do			
1000-1100 vl	Solomon Islands, SIBC	5020do			
1000-1030	Switzerland, Swiss R Intl	6165eu	9535eu		
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	USA, KAIJ Dallas TX	5810am	9815am		
1000-1100	USA, KHBI N Mariana Is	15665as	15725pa		
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	7425na	9465na	15745eu	
1000-1100 mtwhfa	USA, WGTG McCaysville GA	9400am			
1000-1100	USA, WHRI Noblesville IN	6040am	9495am		
1000-1100	USA, WJCR Upton KY	7490na	13595na		
1000-1100 mtwhfa	USA, WRMI/R Miami Intl	9955ca			
1000-1100 mwh	USA, WSHB Cypress Crk SC	6095na	9455sa		
1000-1100	USA, WWCR Nashville TN	2390am	5070am	5935am	
1000-1100 mtwhf	USA, WWCR Nashville TN	3210am			
1000-1100 as	USA, WWCR Nashville TN	15685am			
1000-1100 mtwhfa	USA, WYFR Okeechobee FL	5950na			
1000-1030	Vietnam, Voice of	9840as	12020as	15010as	
1000-1100	Zambia, Christian Voice	6065af			
1000-1100 vl	Zambia, R Zambia/ZNBC 1	7220do			
1000-1100 vl	Zambia, R Zambia/ZNBC 2	6165do			
1000-1100 vl	Zimbabwe, Zimbabe BC	4828do	5012do		
1030-1100 s	Austria, R Austria Intl	15455as	17870au		
1030-1055	Belgium, R Vlaanderen Int	9925eu	15595eu		
1030-1057	Czech Rep, Radio Prague	7345eu	11640eu		
1030-1100	Guam, AWR/KSDA	11790as	15170as		
1030-1035	Israel, Kol Israel	15640eu	15650na		
1030-1100	Netherlands, Radio	6045eu	9860eu	12065as	13710as
1030-1100	South Korea, R Korea Intl	11715sa			
1030-1100	Sri Lanka, Sri Lanka BC	11835as	15120as	17850as	
1030-1100	UAE, Radio Dubai	13675eu	15370eu	15395eu	21605eu
1030-1100	UK, BBC Asian Service	6195as	9740as	11765pa	15310as
		17790as			
1030-1045	Vatican State, Vatican R	5883eu	9645eu	11740eu	15595va

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Frequencies

1100-1200	Anguilla,Caribbean Beacon	11775am			
1100-1200	Australia, Radio	6080as			
1100-1200 vl	Australia, VL8A Alice Spg	2310do			
1100-1200 vl	Australia, VL8K Katherine	2485do			
1100-1200 vl	Australia, VL8T Tent Crk	2325do			
1100-1200	Bulgaria, Radio	15175eu	17585eu		
1100-1200	Canada, CFRX Toronto	6070do			
1100-1200	Canada, CFVP Calgary	6030do			
1100-1200	Canada, CHNX Halifax	6130do			
1100-1200	Canada, CKZN St John's	6160do			
1100-1200	Canada, CKZU Vancouver	6160do			
1100-1200	Costa Rica,RF Peace Intl	7385am			
1100-1200	Ecuador, HCJB	12005ca	15115am	21455am	
1100-1200 as	Eqt Guinea, R East Africa	15186af			
1100-1200	Eqt Guinea, Radio Africa	9530as			
1100-1150	Germany, Deutsche Welle	15370af	15410af	17765af	17800af
1100-1200	Germany, Sunrise Radio	5850va			
1100-1200 as	Germany,Overcomer Ministr	5900eu			
1100-1200	Germany,Overcomer Ministr	15375as	15715au	17505pa	
1100-1200	Iran, VOIRI	11830as	11875as	13605me	15260as
1100-1200	Ireland, Unt Christian BC	6200do			
1100-1200 as/vl	Italy, IRRS	7120va			
1100-1200	Japan, R Japan/NHK World	6120na	9695as	11730as	
1100-1200	Jordan, Radio	11690eu			
1100-1120 fa	Kazakhstan, R Almaty Intl	9505eu	9620eu	11720as	
1100-1200	Kenya, Kenya Broadc Corp	4935do			
1100-1110	Liberia,LCN/R Liberia Int	5100do			
1100-1200	Malaysia, Radio	7295do			
1100-1200 irreg	Malaysia,RTM KotaKinabalu	5980do			
1100-1200 vl	Namibia, NBC	4930af	4965af		
1100-1125	Netherlands, Radio	6045eu	9860eu	12065as	13710as
1100-1200	New Zealand, R NZ Intl	6100pa			
1100-1157	North Korea, R Pyongyang	3560as	9640af	9975me	11335va
		15230va			
1100-1130 as	Palau, KHBN/Voice of Hope	9965as			
1100-1200 vl	Papua New Guinea, NBC	4890do			
1100-1200	Singapore,R Singapore Int	6150as			
1100-1130 vl	Solomon Islands, SIBC	5020do			
1100-1200	South Korea, R Korea Intl	7275as			
1100-1130	Sri Lanka, Sri Lanka BC	11835as	15120as	17850as	
1100-1200	Switzerland, Swiss R Intl	9810as	17515as		
1100-1200	Taiwan, Voice of Asia	7445as			
1100-1200 vl	Tanzania, Radio	5050do			
1100-1200	UK, BBC African Service	6190af	11940af	15400af	17830af
		17885af	21660af		
1100-1200	UK, BBC Asian Service	6195as	9580as	9740as	11955as
		15280as	15310as	17785as	
1100-1130 mtwhf	UK, BBC Caribbean Report	6195ca	15220ca		
1100-1130	UK, BBC World Service	5965na	9410eu	11760me	12095eu
		15485eu	15565eu	15575eu	17640eu
		17705eu	17790sa		
1100-1130 as	UK, BBC World Service	6195am	15190sa	15220am	
1100-1200	USA, KAIJ Dallas TX	5810am	9815am		
1100-1200	USA, KHBI N Mariana Is	9385au	15665as		
1100-1200	USA, KTBN Salt Lk City UT	7510am			
1100-1200	USA, KWHR Naalehu HI	9930as	11565pa		
1100-1200	USA, Voice of America	5985pa	6160as	9645as	9760as
		11720as	15160as	15425as	
1100-1200	USA, WEWN Birmingham AL	7425na	9465na	15745eu	
1100-1200 mtwhfa	USA, WGTG McCaysville GA	9400am			
1100-1200	USA, WHRI Noblesville IN	6040am	9495am		
1100-1200	USA, WJCR Upton KY	7490na	13595na		
1100-1200	USA, WRMI/R Miami Intl	9955ca			
1100-1200 wf	USA, WSHB Cypress Crk SC	6095na	9455sa		
1100-1200	USA, WWCR Nashville TN	5070am	5935am	7435am	15685am
1100-1200 mtwhfa	USA, WYFR Okeechobee FL	5950na			
1100-1200	USA, WYFR Okeechobee FL	5850na			
1100-1130	Vietnam, Voice of	7285as	9730as		
1100-1200	Zambia, Christian Voice	6065af			
1100-1200 vl	Zambia, R Zambia/ZNBC 1	7220do			
1100-1200 vl	Zambia, R Zambia/ZNBC 2	6165do			
1100-1200 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
1105-1120	Pakistan, Radio	15530eu	17835eu		
1120-1140 w	Kazakhstan, R Almaty Intl	9505eu	9620eu	11720as	
1125-1200	Netherlands, Radio	6045eu	9860eu		
1130-1200	Sweden, Radio	15235am	15240am	17870am	
1130-1200 as	UK, BBC Asian Service	15310as	17785as		
1130-1200	UK, BBC World Service	6195am	15220am		
1130-1200	USA, Voice of America	11680eu			
1130-1200 f	Vatican State, Vatican R	15595va	17550va		
1140-1200 t	Kazakhstan, R Almaty Intl	9505eu	9620eu	11720as	

Selected Programs

Sundays

1100 Costa Rica, R Peace Intl: Our Americas. See S 0400.
1100 USA, KTBN Salt Lk City UT: Breakthrough. Rod Parsley conducts services from the World Harvest Church in Columbus, OH.
1100 USA, WWCR #1 Nashville TN: Words of Hope (Paul Bryson). Paul Bryson preaches from Georgia.
1100 USA, WWCR #3 Nashville TN: The Paul and Molly Show (live). GEET/Paul Pantone.
1115 USA, WWCR #1 Nashville TN: Frank and Ernest. George Passios.
1130 USA, WWCR #1 Nashville TN: Staff of Life. Irene Armstrong evangelizes from Zion, Illinois.

Mondays

1100 Costa Rica, R Peace Intl: New Dimensions Radio. See M 0330.
1100 USA, KTBN Salt Lk City UT: Good News Today!. T.L. Osborn evangelizes.
1100 USA, WWCR #1 Nashville TN: Unshackled. Pacific Garden Mission's radio drama.
1100 USA, WWCR #3 Nashville TN: Newswatch Magazine. See NAm 0400.
1130 Costa Rica, R Peace Intl: Living Enrichment Center. See M 0430.
1130 USA, KTBN Salt Lk City UT: Candi Staton Sussewell. See S 0500.
1130 USA, WWCR #1 Nashville TN: Grace and Truth. RJ Bruno.

Tuesdays

1100 Costa Rica, R Peace Intl: Alternative Radio. See T 0400.
1100 USA, KTBN Salt Lk City UT: Dean and Mary. Dean and Mary Brown with music that ministers.
1100 USA, WWCR #1 Nashville TN: The Old Record Shop. See NAm 0430.
1100 USA, WWCR #3 Nashville TN: Newswatch Magazine. See NAm 0400.
1130 USA, KTBN Salt Lk City UT: Reasons to Believe. Astronomer/minister Hugh Ross provides scientific, historical and philosophical evidence for religious skeptics.
1130 USA, WWCR #1 Nashville TN: Walls of Fire. Glenn Bleakney.
1145 USA, WWCR #1 Nashville TN: Women Who Overcome. Shirley Beaver of California offers advice for women.

Wednesdays

1100 Costa Rica, R Peace Intl: My Green Earth. See M 0200.
1100 USA, KTBN Salt Lk City UT: The Laverne Tripp Family. Country Christian music performed by Laverne and Edith Tripp and their kin.
1100 USA, WWCR #1 Nashville TN: Ken's Country Classics. See NAm 0635.
1100 USA, WWCR #3 Nashville TN: Newswatch Magazine. See NAm 0400.
1130 Costa Rica, R Peace Intl: Living Enrichment Center. See M 0430.
1130 USA, KTBN Salt Lk City UT: Back on Course. Patti and Gavin MacLeod talk about marriage.
1130 USA, WWCR #1 Nashville TN: Roberta Reads the Word. Roberta Lightfoot with 15 minutes of scripture reading.
1145 USA, WWCR #1 Nashville TN: Foundations of Truth. Robert Diamond.
1154 Radio Netherlands: Documentary. Who Makes the Wine? (26th). See A 0154.

Thursdays

1100 Costa Rica, R Peace Intl: New Dimensions Radio. See M 0330.
1100 USA, KTBN Salt Lk City UT: Jerry Barnard. Services from the Cathedral of Faith in San Jose, CA.
1100 USA, WWCR #1 Nashville TN: Afterglow. See NAm 1200.
1100 USA, WWCR #3 Nashville TN: Newswatch Magazine. See NAm 0400.
1115 USA, WWCR #1 Nashville TN: Willingheart. Trail Christian Fellowship.
1130 USA, KTBN Salt Lk City UT: Revivals in the Land Today. Walt Mills evangelizes.

Fridays

1100 Costa Rica, R Peace Intl: Voices of Our World. See W 0600.
1100 USA, KTBN Salt Lk City UT: The Meadowlark Lemon Show. See S 0630.
1100 USA, WWCR #1 Nashville TN: What a Fellowship Hour. Clay Evans preaches from Chicago.
1100 USA, WWCR #3 Nashville TN: Newswatch Magazine. See NAm 0400.
1130 Costa Rica, R Peace Intl: WINGS. See W 0530.
1130 USA, KTBN Salt Lk City UT: Steve Brock. See H 1530.
1130 USA, WWCR #1 Nashville TN: Roberta Reads the Word. See NAm 1130.

Saturdays

1100 Costa Rica, R Peace Intl: World of Radio. See S 0200.
1100 USA, KTBN Salt Lk City UT: Superbook. Animated stories from the bible for children.
1100 USA, WWCR #1 Nashville TN: USA Radio News. See NAm 0500.
1100 USA, WWCR #3 Nashville TN: World Wide Country Radio. News, weather and the best of country music.
1105 USA, WWCR #1 Nashville TN: Word of Wisdom. Howard Kirkwood evangelizes from Arkansas.
1110 USA, WWCR #1 Nashville TN: The View from Europe. See NAm 0630.
1115 USA, WWCR #1 Nashville TN: Rhema Radio Church. Kenneth Hagin, Jr. preaches from Tulsa, Oklahoma.
1130 Costa Rica, R Peace Intl: RFPI's Mailbag. See S 0230.
1130 USA, KTBN Salt Lk City UT: Colby's Clubhouse. A program by kids and for kids.
1145 USA, WWCR #1 Nashville TN: Brother Ed. Ed Skultety evangelizes from Oregon.

Hauser's Highlights
PAKISTAN: R. Pakistan

English:
0230-0245 13610, 7485
0805-0810 &
1105-1120 17835, 15530
1400-1410 15170v, 11570, 9650
1600-1630 17720, 15170, 11570, 9650
(via BBCM)

1200 UTC SHORTWAVE GUIDE 8:00 AM EDT 5:00 AM PDT

Frequencies

1200-1300	Anguilla,Caribbean Beacon	11775am			
1200-1300	Australia, Radio	6020pa	6080as	9580pa	9770as
1200-1300 vl	Australia, VL8A Alice Spg	2310do			
1200-1300 vl	Australia, VL8K Katherine	2485do			
1200-1300 vl	Australia, VL8T Tent Crk	2325do			
1200-1300	Brazil, Radio Bras	15445na			
1200-1215 vl	Cambodia, Natl Voice of	11940do			
1200-1300 vl	Canada, CBC N Quebec Svc	9625do			
1200-1300	Canada, CFRX Toronto	6070do			
1200-1300	Canada, CFVP Calgary	6030do			
1200-1300	Canada, CHNX Halifax	6130do			
1200-1300	Canada, CKZN St John's	6160do			
1200-1300	Canada, CKZU Vancouver	6160do			
1200-1229	Canada, R Canada Intl	9640am	9660as	11855am	13650am
		15195as			
1200-1300	China, China Radio Intl	6950pa	7385pa	9715as	9945as
		11660as	11675as	11980as	
1200-1300	Costa Rica,RF Peace Intl	7385am	21460am		
1200-1300	Ecuador, HCJB	12005ca	15115am	21455am	
1200-1300 as	Eqt Guinea, R East Africa	15186af			
1200-1300	Eqt Guinea, Radio Africa	9530as			
1200-1300	France, Radio France Intl	9805eu	11600as	15155eu	15195eu
		15530am	15540af	17575am	
1200-1300	Germany, Sunrise Radio	5850va			
1200-1230 s	Germany, Universal Life	9710as			
1200-1300	Germany,Overcomer Ministr	15715au	15735as	17505pa	
1200-1300	Ireland, Unt Christian BC	6200do			
1200-1300 as/vl	Italy, IRRS	7120va			
1200-1300	Jordan, Radio	11690eu			
1200-1300	Kenya, Kenya Broadc Corp	4935do			
1200-1300	Malaysia, Radio	7295do			
1200-1300 irreg	Malaysia,RTM KotaKinabalu	5980do			
1200-1300 vl	Namibia, NBC	4930af	4965af		
1200-1225	Netherlands, Radio	6045eu	9860eu		
1200-1206	New Zealand, R NZ Intl	6100pa			
1200-1230 s	Norway, Radio Norway Intl	17535as			
1200-1300	Palau, KHBN/Voice of Hope	9965as			
1200-1300 vl	Papua New Guinea, NBC	4890do			
1200-1255	Poland, Polish R Warsaw	6095eu	7270eu	9525eu	11820eu
1200-1300	Singapore,R Singapore Int	6150as			
1200-1230	South Korea, R Korea Intl	7285as			
1200-1230	Switzerland, Swiss R Intl	6165eu	9535eu		
1200-1300	Taiwan, Radio Taipei Intl	7130as	9610au		
1200-1300 vl	Tanzania, Radio	5050do			
1200-1300	UK, BBC African Service	6190af	11940af	17830af	17885af
		21660af			
1200-1300	UK, BBC Asian Service	6195as	9580as	9740as	11955as
		15280as	15310as	17785as	
1200-1300	UK, BBC World Service	5965na	6195am	9410eu	9515na
		11760me	12095eu	15220am	15485eu
		15565eu	15575as	17640eu	17705eu
1200-1300	USA, KAIJ Dallas TX	5810am	9815am		
1200-1300	USA, KHBI N Mariana Is	9355as	9385au		
1200-1300	USA, KTBN Salt Lk City UT	7510am			
1200-1300	USA, KWHR Naalehu HI	9930as	11565pa		
1200-1300	USA, Voice of America	6160as	9645as	9760as	11715as
		15160as	15425as		
1200-1300	USA, WEWN Birmingham AL	7425na	9465na	15745eu	
1200-1300 mtwhfa	USA, WGTG McCaysville GA	9400am			
1200-1300	USA, WHRI Noblesville IN	6040am	9495am		
1200-1300	USA, WJCR Upton KY	7490na	13595na		
1200-1300	USA, WRMI/R Miami Intl	9955ca			
1200-1300 mwh	USA, WSHB Cypress Crk SC	6095na	11660sa		
1200-1300	USA, WWCR Nashville TN	5070am	7435am	13845am	15685am
1200-1300 mtwhfa	USA, WYFR Okeechobee FL	5950na			
1200-1300	USA, WYFR Okeechobee FL	5850na	6015na	17750na	
1200-1228	Uzbekistan, R Tashkent	7285as	9715as	15295as	17775as
1200-1300	Zambia, Christian Voice	6065af			
1200-1300 vl	Zambia, R Zambia/ZNBC 1	7220do			
1200-1300 vl	Zambia, R Zambia/ZNBC 2	6165do			
1200-1300 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
1205-1210	Croatia, Croatian Radio	7125eu	9830eu		
1206-1300 occsnal	New Zealand, R NZ Intl	6100pa			
1209-1215 mtwhf	UK, BBC Caribbean Report	6195ca	15220ca		
1209-1215 as	UK, BBC World Service	6195am	15220am		
1210-1240	Mongolia, Voice of	12085au			
1215-1300	Egypt, Radio Cairo	17595as			
1229-1259	Canada, R Canada Intl	9640am	11855am	13650am	
1230-1300	Austria, R Austria Intl	6155eu	13730na		
1230-1300	Bangladesh, Bangla Betar	7185as	9548as		
1230-1255	Belgium, R Vlaanderen Int	15545na			
1230-1300	Guam, AWR/KSDA	13720as			
1230-1300	Italy, AWR Europe	7230as			
1230-1300	South Korea, R Korea Intl	6055as	9570as	9640am	13670as
1230-1300	Sri Lanka, Sri Lanka BC	9730as	15425as		
1230-1300	Sweden, Radio	13740as	15240au		
1230-1300	Thailand, Radio	9655as	9885as	11905as	
1230-1300	Turkey, Voice of	11995as	15185as	15290eu	
1230-1300 a	USA, Voice of America	7768eu			
1230-1300	Vietnam, Voice of	9840as	12020as	15010as	
1240-1250	Greece, Voice of	17525af			
1240-1255 smtwh	UK, BBC Slow Speed News	7140me	11820me	13660af	15180af
		15555me	17585af		

Selected Programs

Sundays

1200 USA, KTBN Salt Lk City UT: Cornerstone. Evangelizing by John Hagee and music by the Cornerstone Choir.
1200 USA, WWCR #1 Nashville TN: Voice of Hope. Oliver Fenison.
1200 USA, WWCR #3 Nashville TN: The Paul and Molly Show (live). See NAm 1100.
1230 USA, WWCR #1 Nashville TN: Words of Hope. Eugene Brown preaches from Nashville, Tennessee.
1245 USA, WWCR #1 Nashville TN: Totally Devoted. Charles Johnson preaches from Memphis, Tennessee.

Mondays

1200 USA, KTBN Salt Lk City UT: Richard and Robin Wilkerson. See S 0500.
1200 USA, WWCR #1 Nashville TN: New Harvest International. Dennis Deruz.
1200 USA, WWCR #3 Nashville TN: Unshackled. See NAm 1100.
1215 USA, WWCR #1 Nashville TN: One Nation Under God. T. Rodriguez.
1230 USA, KTBN Salt Lk City UT: Dino. Christian music from Branson, Missouri.
1230 USA, WWCR #1 Nashville TN: Bread of Life Victory Hour (1). Brother Jack Meeks offers a free bible study correspondence course.
1230 USA, WWCR #1 Nashville TN: The Hour of Grace (3/5). Gene Griffin.
1230 USA, WWCR #1 Nashville TN: Victory Baptist Church (2/4). David Robinson preaches from Hildebrand, NC.
1230 USA, WWCR #3 Nashville TN: Financial Power Network. Steve Boneberger.
1245 USA, WWCR #1 Nashville TN: Walking Through the Land of Promises. Bobbie Lively evangelizes from Tennessee.

Tuesdays

1200 USA, KTBN Salt Lk City UT: Joy. Interviews with Christian authors and musicians.
1200 USA, WWCR #1 Nashville TN: The King is Coming. Steve Johnson.
1200 USA, WWCR #3 Nashville TN: Afterglow. Don Johnson plays beautiful sacred music.
1215 USA, WWCR #1 Nashville TN: Have Faith in God. Claude Milan.
1230 USA, KTBN Salt Lk City UT: Alive! Jesuit Priest Michael Manning teaches Christian principles.
1230 USA, WWCR #1 Nashville TN: World of Radio. See NAm 0630.
1230 USA, WWCR #3 Nashville TN: Financial Power Network. See NAm 1230.

Wednesdays

1200 USA, KTBN Salt Lk City UT: Get in Shape. Pamela Carter takes you through an exercise program.
1200 USA, WWCR #1 Nashville TN: Faith and Truth. Ken Megilligan.
1200 USA, WWCR #3 Nashville TN: Unshackled. See NAm 1100.
1215 USA, WWCR #1 Nashville TN: Faith Revival Ministries. Randolph Scott.
1230 USA, KTBN Salt Lk City UT: By the Way. Del & Cindy Way host this music program from Dallas.
1230 USA, WWCR #1 Nashville TN: The Chapel Hour. Otis Tillman evangelizes from Buffalo, New York.
1230 USA, WWCR #3 Nashville TN: Financial Power Network. See NAm 1230.

Thursdays

1200 USA, KTBN Salt Lk City UT: Our Town. See S 0500.
1200 USA, WWCR #1 Nashville TN: Abounding Grace. Gary Jones of the Charismatic Teaching Center near Orlando, Florida.
1200 USA, WWCR #3 Nashville TN: Afterglow. See NAm 1200.
1215 USA, WWCR #1 Nashville TN: Living Waters. Spencer Tiernan evangelizes from Minnesota.
1230 USA, KTBN Salt Lk City UT: The Love Special. Nancy Harmon with gospel music.
1230 USA, WWCR #1 Nashville TN: The Big Backyard. Thirty minutes of rock music from Australia.
1230 USA, WWCR #3 Nashville TN: Financial Power Network. See NAm 1230.

Fridays

1200 USA, KTBN Salt Lk City UT: Doctor to Doctor. See T 0430.
1200 USA, WWCR #1 Nashville TN: Faith for Today. William Rowe of Pennsylvania with a bible-teaching program.
1200 USA, WWCR #3 Nashville TN: Unshackled. See NAm 1100.
1230 USA, KTBN Salt Lk City UT: The Joy of Music. Diane Bish takes you on a world music tour and plays one of the great organs at each location.
1230 USA, WWCR #1 Nashville TN: Battle Cry Sounding. Deborah Green evangelizes from El Paso, Texas.
1230 USA, WWCR #3 Nashville TN: Financial Power Network. See NAm 1230.

Saturdays

1200 USA, KTBN Salt Lk City UT: Kids Against Crime. Talk about programs making a difference in the lives of youth.
1200 USA, WWCR #1 Nashville TN: Brother Ed (from 1145). See NAm 1145.
1200 USA, WWCR #3 Nashville TN: The Great American Polka Show. An hour of polka favorites both old and new.
1215 USA, WWCR #1 Nashville TN: Holy Ghost Revival. Clayton Reynolds.
1230 USA, KTBN Salt Lk City UT: Gospel Bill. Kids program.
1230 USA, WWCR #1 Nashville TN: Battle Cry Sounding. See NAm 1230.

Frequencies

1300-1400	Anguilla,Caribbean Beacon	11775am			
1300-1330	Australia, Radio	9770as			
1300-1400	Australia, Radio	6020pa	6080as	9580pa	
1300-1400 vl	Australia, VL8A Alice Spg	2310do			
1300-1400 vl	Australia, VL8K Katherine	2485do			
1300-1400 vl	Australia, VL8T Tent Crk	2325do			
1300-1320	Brazil, Radio Bras	15445na			
1300-1400 vl	Canada, CBC N Quebec Svc	9625do			
1300-1400	Canada, CFRX Toronto	6070do			
1300-1400	Canada, CFVP Calgary	6030do			
1300-1400	Canada, CHNX Halifax	6130do			
1300-1400	Canada, CKZN St John's	6160do			
1300-1400	Canada, CKZU Vancouver	6160do			
1300-1400 smtwhf	Canada, R Canada Intl	11855am	13650am		
1300-1400 mtwhf	Canada, R Canada Intl	9640am			
1300-1400	China, China Radio Intl	7385pa	7405na	9945pa	11660as
		11675pa	11980as	15180as	
1300-1400	Costa Rica,RF Peace Intl	7385am	21460am		
1300-1330	Czech Rep, Radio Prague	13580as	21745af		
1300-1400	Ecuador, HCJB	12005ca	15115am	21455am	
1300-1330	Egypt, Radio Cairo	17595as			
1300-1400	Eqt Guinea, R East Africa	15186af			
1300-1400	Eqt Guinea, Radio Africa	9530as			
1300-1400	Germany, Sunrise Radio	5850va			
1300-1330 s	Germany, Universal Life	12025as			
1300-1400	Germany,Overcomer Ministr	15625pa	15735as		
1300-1400	Ireland, Unt Christian BC	6200do			
1300-1400 as/vl	Italy, IRRS	7120va			
1300-1400	Jordan, Radio	11690eu			
1300-1400	Kenya, Kenya Broadc Corp	4935do			
1300-1310	Liberia,LCN/R Liberia Int	5100do			
1300-1400	Malaysia, Radio	7295do			
1300-1400 irreg	Malaysia,RTM KotaKinabalu	5980do			
1300-1400 vl	Namibia, NBC	4930af	4965af		
1300-1400 occsnal	New Zealand, R NZ Intl	6100pa			
1300-1330 s	Norway, Radio Norway Intl	9590eu	15640na	15650as	
1300-1400	Palau, KHBN/Voice of Hope	9985as			
1300-1400 vl	Papua New Guinea, NBC	4890do			
1300-1400	Philippines, FEBC/R Intl	11995as			
1300-1400	Romania, R Romania Intl	15250na	15390eu	17770eu	17790na
1300-1400 as	S Africa, Channel Africa	9445af	17675af	17870af	
1300-1400	Singapore,R Singapore Int	6150as			
1300-1400	Sri Lanka, Sri Lanka BC	9730as	15425as		
1300-1400	Switzerland, Swiss R Intl	7230as	7480as		
1300-1400 vl	Tanzania, Radio	5050do			
1300-1330	Turkey, Voice of	11995eu	15185as	15290eu	
1300-1400	UK, BBC African Service	6190af	11940af	15420af	17830af
		17885af	21660af		
1300-1400	UK, BBC Asian Service	5990as	6195as	9740as	11750as
		15310as			
1300-1400	UK, BBC World Service	5965na	6195am	9410eu	9515na
		11760me	11865na	12095eu	15220am
		15485eu	15565eu	15575eu	17640eu
		17705eu			
1300-1400	USA, KAIJ Dallas TX	5810am	9815am		
1300-1400	USA, KHBI N Mariana Is	9355as	9385pa		
1300-1400	USA, KJES Mesquite NM	11715am			
1300-1400	USA, KNLS Anchor Point AK	7365as			
1300-1400	USA, KTBN Salt Lk City UT	7510am			
1300-1400	USA, KWHR Naalehu HI	9930as	11565pa		
1300-1400	USA, Voice of America	6160as	9645as	9760as	11715as
		15160as	15425as		
1300-1400	USA, WEWN Birmingham AL	7425na	9465na	15745eu	
1300-1400 mtwhfa	USA, WGTG McCaysville GA	9400am			
1300-1400	USA, WHRI Noblesville IN	6040am	15105am		
1300-1400	USA, WJCR Upton KY	7490na	13595na		
1300-1330 a	USA, WRMI/R Miami Intl	9955ca			
1300-1400 tf	USA, WSHB Cypress Crk SC	9430na	11660na		
1300-1400	USA, WWCR Nashville TN	9475am	12160am	13845am	15685am
1300-1400	USA, WYFR Okeechobee FL	11830na	11970na	13695na	17750na
1300-1400	Zambia, Christian Voice	6065af			
1300-1400 vl	Zambia, R Zambia/ZNBC 1	7220do			
1300-1400 vl	Zambia, R Zambia/ZNBC 2	6165do			
1300-1400 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
1302-1400	USA, WYFR Okeechobee FL	11550as			
1315-1400 mtwhfa	Bhutan, Bhutan BC Service	5030do			
1330-1359	Canada, R Canada Intl	9535as	11795as	11935eu	15325eu
1330-1359 mtwhfa	Canada, R Canada Intl	17820va			
1330-1400	China, Heilongjiang PBS	4840do			
1330-1400	Georgia, Voice of Hope	15715as			
1330-1400	Guam, AWR/KSDA	9650as			
1330-1400	India, All India Radio	9545as	11620as	13710as	
1330-1400	Netherlands, Radio	9890as	15585as		
1330-1400	Sweden, Radio	13740as	15240am	17515au	
1330-1400	UAE, Radio Dubai	13630eu	13675eu	15395eu	21605eu
1330-1400 as	USA, WRMI/R Miami Intl	9955ca			
1330-1400	Uzbekistan, R Tashkent	7285as	9715as	15295as	17775as
1330-1400	Vietnam, Voice of	9840eu	12020as	15010as	
1335-1345	Greece, Voice of	9395eu	11730na	15175eu	15630eu
1345-1400	Vatican State, Vatican R	13765au	15540au		

Selected Programs

Sundays

1300 USA, KTBN Salt Lk City UT: Spiritual Protocol. Pastor Earl Paulk preaches from Atlanta.
1300 USA, WWCR #1 Nashville TN: Wings of Healing. Evelyn Wyatt directs this international broadcast from Los Angeles.
1300 USA, WWCR #3 Nashville TN: Answers for Life. Gospel music and a sermon by Pastor Hoover of Wichita, Kansas.
1330 USA, WWCR #1 Nashville TN: Wayne Avenue Church of God. J.C. Wilber preaches from Columbus, Ohio.

Mondays

1300 USA, KTBN Salt Lk City UT: Changing Your World. See M 0130.
1300 USA, WWCR #1 Nashville TN: USA Radio News. See NAm 0500.
1300 USA, WWCR #3 Nashville TN: Journey to Good Health (live). Keith Morey.
1305 USA, WWCR #1 Nashville TN: Life Issues. John Wilke on events affecting everyday living.
1310 USA, WWCR #1 Nashville TN: Messianic Minutes. Ted Simon presents five minutes of scriptural interpretation for Jewish listeners.
1315 USA, WWCR #1 Nashville TN: Masterbuilder Ministries. Kim Harrington reviews and interprets scripture from the New Wine Church in Saint Paul, Minnesota.
1320 USA, WWCR #1 Nashville TN: Joni and Friends. Joni Erickson-Tada presents help and advice especially for the disabled.
1330 USA, KTBN Salt Lk City UT: John Hagee Today. Evangelizing by John Hagee of the Cornerstone Church in San Antonio, TX.
1335 USA, WWCR #1 Nashville TN: The Bright Spot Hour. Music and meditation by Harold Sightler of Greenville, South Carolina.

Tuesdays

1300 USA, KTBN Salt Lk City UT: Changing Your World. See M 0130.
1300 USA, WWCR #1 Nashville TN: USA Radio News. See NAm 0500.
1300 USA, WWCR #3 Nashville TN: Journey to Good Health (live). See NAm 1300.
1305 USA, WWCR #1 Nashville TN: Life Issues. See NAm 1305.
1310 USA, WWCR #1 Nashville TN: Messianic Minutes. See NAm 1310.
1315 USA, WWCR #1 Nashville TN: Masterbuilder Ministries. See NAm 1315.
1320 USA, WWCR #1 Nashville TN: Joni and Friends. See NAm 1320.
1330 USA, KTBN Salt Lk City UT: John Hagee Today. See M 1330.
1335 USA, WWCR #1 Nashville TN: The Bright Spot Hour. See NAm 1335.

Wednesdays

1300 USA, KTBN Salt Lk City UT: Changing Your World. See M 0130.
1300 USA, WWCR #1 Nashville TN: USA Radio News. See NAm 0500.
1300 USA, WWCR #3 Nashville TN: Journey to Good Health (live). See NAm 1300.
1305 USA, WWCR #1 Nashville TN: Life Issues. See NAm 1305.
1310 USA, WWCR #1 Nashville TN: Messianic Minutes. See NAm 1310.
1315 USA, WWCR #1 Nashville TN: Masterbuilder Ministries. See NAm 1315.
1320 USA, WWCR #1 Nashville TN: Joni and Friends. See NAm 1320.
1330 USA, KTBN Salt Lk City UT: John Hagee Today. See M 1330.
1335 USA, WWCR #1 Nashville TN: The Bright Spot Hour. See NAm 1335.
1354 Radio Netherlands: Documentary. Who Makes the Wine? (26th). See A 0154.

Thursdays

1300 USA, KTBN Salt Lk City UT: A New Perspective. Richard and Lindsay Roberts evangelize from Tulsa, Oklahoma.
1300 USA, WWCR #1 Nashville TN: USA Radio News. See NAm 0530.
1300 USA, WWCR #3 Nashville TN: Journey to Good Health (live). See NAm 1300.
1305 USA, WWCR #1 Nashville TN: Life Issues. See NAm 1305.
1310 USA, WWCR #1 Nashville TN: Messianic Minutes. See NAm 1310.
1315 USA, WWCR #1 Nashville TN: Masterbuilder Ministries. See NAm 1315.
1320 USA, WWCR #1 Nashville TN: Joni and Friends. See NAm 1320.
1330 USA, KTBN Salt Lk City UT: John Hagee Today. See M 1330.
1335 USA, WWCR #1 Nashville TN: The Bright Spot Hour. See NAm 1335.

Fridays

1300 USA, KTBN Salt Lk City UT: Changing Your World. See M 0130.
1300 USA, WWCR #1 Nashville TN: USA Radio News. See NAm 0500.
1300 USA, WWCR #3 Nashville TN: Journey to Good Health (live). See NAm 1300.
1305 USA, WWCR #1 Nashville TN: Life Issues. See NAm 1305.
1310 USA, WWCR #1 Nashville TN: Messianic Minutes. See NAm 1310.
1315 USA, WWCR #1 Nashville TN: Masterbuilder Ministries. See NAm 1315.
1320 USA, WWCR #1 Nashville TN: Joni and Friends. See NAm 1320.
1330 USA, KTBN Salt Lk City UT: John Hagee Today. See M 1330.
1335 USA, WWCR #1 Nashville TN: The Bright Spot Hour. See NAm 1335.

Saturdays

1300 USA, KTBN Salt Lk City UT: Circle Square. A program for children in a hotel setting.
1300 USA, WWCR #3 Nashville TN: Lyon Gold and Silver Magnet Program (repeat). See NAm 2300.
1330 USA, KTBN Salt Lk City UT: Joy Junction. Fun and games for children from the Christian Television Network (CTN).
1330 USA, WWCR #1 Nashville TN: Hour of Reasoning. P. Mobley preaches to his congregation in Oakland, California.

1400 UTC SHORTWAVE GUIDE 10:00 AM EDT 7:00 AM PDT

Frequencies

1400-1500	Anguilla,Caribbean Beacon	11775am			
1400-1500	Australia, Radio	5995pa	6020pa	6080as	9580pa
1400-1500 vl	Australia, VL8A Alice Spg	2310do			
1400-1500 vl	Australia, VL8K Katherine	2485do			
1400-1500 vl	Australia, VL8T Tent Crk	2325do			
1400-1500 vl	Canada, CBC N Quebec Svc	9625do			
1400-1500	Canada, CFRX Toronto	6070do			
1400-1500	Canada, CFVP Calgary	6030do			
1400-1500	Canada, CHNX Halifax	6130do			
1400-1500	Canada, CKZN St John's	6160do			
1400-1500	Canada, CKZU Vancouver	6160do			
1400-1500 s	Canada, R Canada Intl	11855am	13650am		
1400-1500	China, China Radio Intl	7260as	7405na	9535as	9700as
		11825as			
1400-1500	Costa Rica,RF Peace Intl	7385am	21460am		
1400-1500	Ecuador, HCJB	12005ca	15115am	21455am	
1400-1500 as	Eqt Guinea, R East Africa	15186af			
1400-1500	France, Radio France Intl	11910as	15405as	17560af	
1400-1500	Georgia, Voice of Hope	15715as			
1400-1500	Germany, Sunrise Radio	5850va			
1400-1430 s	Germany, Universal Life	9955na			
1400-1500	Germany,Overcomer Ministr	13810me	15625pa		
1400-1500	India, All India Radio	9545as	11620as	13710as	
1400-1500	Ireland, Unt Christian BC	6200do			
1400-1430	Israel, Kol Israel	12535eu	15640na		
1400-1500 as/vl	Italy, IRRS	7120va			
1400-1500	Japan, R Japan/NHK World	9505na	11730as	11880af	
1400-1500	Jordan, Radio	11690eu			
1400-1500	Kenya, Kenya Broadc Corp	4935do			
1400-1500	Malaysia, Radio	7295do			
1400-1500 vl	Malaysia, RTM Kuching	4895do	7160do		
1400-1500 irreg	Malaysia,RTM KotaKinabalu	5980do			
1400-1430	Mexico, Radio Mexico Intl	5985na	9705na		
1400-1500 vl	Namibia, NBC	4930af	4965af		
1400-1500	Netherlands, Radio	9890as	15585as		
1400-1500 occsnal	New Zealand, R NZ Intl	6100pa			
1400-1410	Pakistan, Radio	9650as	11570me	15170af	
1400-1500 as	Palau, KHBN/Voice of Hope	9985as			
1400-1500 vl	Papua New Guinea, NBC	4890do			
1400-1500	Philippines, FEBC/R Intl	11995as			
1400-1500	Russia,Voice of Russia WS	4730as	4940as	4975as	7510as
		11655as	12025as	15510as	17570as
1400-1455 as	S Africa, Channel Africa	9445af	17675af	17870af	
1400-1500	Singapore,RCorp Singapore	6150do			
1400-1500	Sri Lanka, Sri Lanka BC	9730as	15425as		
1400-1500	Switzerland, Swiss R Intl	9575as	15265as		
1400-1500 vl	Tanzania, Radio	5050do			
1400-1430	Thailand, Radio	9655as	9830as	11905as	
1400-1500	UK, BBC African Service	6190af	11940af	17830af	21490af
		21660af			
1400-1500	UK, BBC Asian Service	5990as	6195as	9740as	11750as
		15310as			
1400-1500	UK, BBC World Service	9410eu	9515na	11865na	12095eu
		15220na	15485eu	15565eu	15575eu
		17640eu	17705eu	17840am	
1400-1500	USA, KAIJ Dallas TX	13815am			
1400-1500	USA, KHBI N Mariana Is	9355as			
1400-1500	USA, KJES Mesquite NM	11715am			
1400-1500	USA, KTBN Salt Lk City UT	7510am			
1400-1500	USA, KWHR Naalehu HI	9930as	11565pa		
1400-1500	USA, Voice of America	6160as	7125as	7215as	9645as
		9760as	15160as	15255va	15395as
		15425as			
1400-1500	USA, WEWN Birmingham AL	9455na	11875na	15745eu	
1400-1500 mtwhfa	USA, WGTG McCaysville GA	9400am			
1400-1500	USA, WHRI Noblesville IN	6040am	15105am		
1400-1500	USA, WJCR Upton KY	7490na	13595na		
1400-1500 as	USA, WRMI/R Miami Intl	9955ca			
1400-1500	USA, WWCR Nashville TN	9475am	12160am	13845am	15685am
1400-1500	USA, WYFR Okeechobee FL	11502as	11830na	11970na	17750na
1400-1405	Vatican State, Vatican R	13765au	15540au		
1400-1500	Zambia, Christian Voice	6065af			
1400-1500 vl	Zambia, R Zambia/ZNBC 1	7220do			
1400-1500 vl	Zambia, R Zambia/ZNBC 2	6165do			
1400-1500 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
1415-1425	Nepal, Radio	5005do	7165do		
1430-1500	Australia, Radio	9500as	11660as		
1430-1500	Guam, AWR/KSDA	9385as			
1430-1500	Mongolia, Voice of	9720as	12085as		
1430-1500	Myanmar, Radio	5986do			

Selected Programs

Sundays

1400 USA, WWCR #1 Nashville TN: Foursquare Gospel Tidings. J.E. Cartier presents a half-hour of gospel music and meditation.
1400 USA, WWCR #3 Nashville TN: Church of the Harvest. Clarence McClendon preaches from Los Angeles.
1415 Thailand, Radio: Travel Thailand. Places to see, buying advice, and other information for the tourist visiting Thailand.
1430 USA, KTBN Salt Lk City UT: Winning Walk. Ed Young sermonizes from the Second Baptist Church of Houston, Texas.
1430 USA, WWCR #1 Nashville TN: A Temple of Jesus Christ. Cleveland Waters preaches from Philadelphia.

Mondays

1400 USA, KTBN Salt Lk City UT: Breakthrough. See S 1100.
1400 USA, WWCR #1 Nashville TN: The Nice Jewish Boy. See NAm 1359.
1400 USA, WWCR #3 Nashville TN: USA Radio News. See NAm 0500.
1402 USA, WWCR #1 Nashville TN: The Grace Hour (live). Carl Stevens of Baltimore answers listener questions about religion.
1406 USA, WWCR #3 Nashville TN: Duke and The Doctor (live). Dr. Jan McBarren and Duke Libertori answer listener's medical questions.
1415 Thailand, Radio: Travel Thailand. See S 1415.
1430 USA, KTBN Salt Lk City UT: Today with Marilyn. Marilyn Hickey teaches.

Tuesdays

1400 Thailand, Radio: Thai Culture. A selection of Thai music or song or an interview.
1400 USA, KTBN Salt Lk City UT: Breakthrough. See S 1100.
1400 USA, WWCR #1 Nashville TN: The Nice Jewish Boy. See NAm 1359.
1400 USA, WWCR #3 Nashville TN: USA Radio News. See NAm 0500.
1402 USA, WWCR #1 Nashville TN: The Grace Hour (live). See NAm 1402.
1406 USA, WWCR #3 Nashville TN: Duke and The Doctor (live). See NAm 1406.
1415 Thailand, Radio: Travel Thailand. See S 1415.
1430 USA, KTBN Salt Lk City UT: Today with Marilyn. See M 1430.

Wednesdays

1400 Thailand, Radio: Business Digest. A 15-minute weekly program about business, finance and the IMF bailout.
1400 USA, KTBN Salt Lk City UT: Breakthrough. See S 1100.
1400 USA, WWCR #1 Nashville TN: The Nice Jewish Boy. See NAm 1359.
1400 USA, WWCR #3 Nashville TN: USA Radio News. See NAm 0500.
1402 USA, WWCR #1 Nashville TN: The Grace Hour (live). See NAm 1402.
1406 USA, WWCR #3 Nashville TN: Duke and The Doctor (live). See NAm 1406.
1415 Thailand, Radio: Travel Thailand. See S 1415.
1430 USA, KTBN Salt Lk City UT: Today with Marilyn. See M 1430.

Thursdays

1400 USA, KTBN Salt Lk City UT: Breakthrough. See S 1100.
1400 USA, WWCR #1 Nashville TN: The Nice Jewish Boy. See NAm 1359.
1400 USA, WWCR #3 Nashville TN: USA Radio News. See NAm 0500.
1402 USA, WWCR #1 Nashville TN: The Grace Hour (live). See NAm 1402.
1406 USA, WWCR #3 Nashville TN: Duke and The Doctor (live). See NAm 1406.
1430 USA, KTBN Salt Lk City UT: Today with Marilyn. See M 1430.

Fridays

1400 Thailand, Radio: Bangkok Vibrations. Things to see, places to go, and activities around town.
1400 USA, KTBN Salt Lk City UT: Breakthrough. See S 1100.
1400 USA, WWCR #1 Nashville TN: The Nice Jewish Boy. See NAm 1359.
1400 USA, WWCR #3 Nashville TN: USA Radio News. See NAm 0500.
1402 USA, WWCR #1 Nashville TN: The Grace Hour (live). See NAm 1402.
1406 USA, WWCR #3 Nashville TN: Duke and The Doctor (live). See NAm 1406.
1415 Thailand, Radio: Travel Thailand. See S 1415.
1430 USA, KTBN Salt Lk City UT: Today with Marilyn. See M 1430.
1454 Radio Netherlands: Documentary. Who Makes the Wine? (28th). See A 0154.

Saturdays

1400 Thailand, Radio: Thai Culture. See T 1400.
1400 USA, KTBN Salt Lk City UT: Just the Facts. A program for youth ages 10 to 16.
1400 USA, WWCR #1 Nashville TN: World Ministries. Lynn Dozier evangelizes from Alabama.
1400 USA, WWCR #3 Nashville TN: Prescription for Health (live). See NAm 0505.
1415 Thailand, Radio: Travel Thailand. See S 1415.
1430 USA, KTBN Salt Lk City UT: Janice's Attic. Janice Smith finds items in her attic to entertain and teach children.
1430 USA, WWCR #1 Nashville TN: Sonrise. Larry Reichardt evangelizes.

Hauser's Highlights

IRAN: Voice of Iran Int'l, Tehran

Current observed schedule in English:

0030-0130	6055, 9022, 9685
1100-1230	9585, 11830, 11875, 13605, 15260
1530-1630	7215v, 9780, 13605
1930-2030	7160, 7260, 9022
2130-2230	6165, 6175v

(Mikhail Timofeyev, St. Petersburg, Russia, mid-May)

Frequencies

0200-0300	Anguilla,Caribbean Beacon	6090am			
0200-0300 twhfa	Argentina, RAE	11710am			
0200-0300	Australia, Radio	9660pa	12080pa	13605pa	15240pa
		15415as	15510pa	17750as	17795pa
0200-0300 vl	Australia, VL8K Katherine	5025do			
0200-0300 vl	Australia, VL8T Tent Crk	4910do			
0200-0210	Bangladesh, Bangla Betar	4880do			
0200-0300	Canada, CBC N Quebec Svc	9625do			
0200-0300	Canada, CFRX Toronto	6070do			
0200-0300	Canada, CFVP Calgary	6030do			
0200-0300	Canada, CHNX Halifax	6130do			
0200-0300	Canada, CKZN St John's	6160do			
0200-0300	Canada, CKZU Vancouver	6160do			
0200-0259	Canada, R Canada Intl	6155am	9535am	9755am	9780am
		11865am			
0200-0300	Costa Rica,RF Peace Intl	7385am	15050am		
0200-0205	Croatia, Croatian Radio	5840am			
0200-0300	Cuba, Radio Havana	6000na	9820na	9830na	
0200-0300	Ecuador, HCJB	9745am	21455am		
0200-0300	Egypt, Radio Cairo	9475na			
0200-0250	Germany, Deutsche Welle	6035as	7160as	7285as	7355as
		9515as	9615as	9815as	
0200-0300	Germany,Overcomer Ministr	5880na	7335na		
0200-0300 as/vl	Italy, IRRS	7120va			
0200-0300 vl	Kenya, Kenya Broadc Corp	4885do	4935do	6150do	
0200-0300 smtwh	Malaysia, Radio	7295do			
0200-0300 s	Malta, VO Mediterranean	15550au	17570as		
0200-0300	Netherlands, Radio	9860as	11660as		
0200-0300	New Zealand, R NZ Intl	17675pa			
0200-0230 m	Norway, Radio Norway Intl	7565am			
0200-0300 vl	Papua New Guinea, NBC	9675do			
0200-0300	Philippines, FEBC/R Intl	15450as			
0200-0256	Romania, R Romania Intl	6155na	7195na	9510na	9570na
		9690as	11940na		
0200-0300	Russia,Voice of Russia WS	5930na	5940na	6150na	7105na
		7175na	7345na	7350na	9580na
0200-0300 mtwhfa	Russia,Voice of Russia WS	5920na			
0200-0300	Singapore, SBC Radio One	6160do			
0200-0300 vl	Solomon Islands, SIBC	5020do			
0200-0300	Sri Lanka, Sri Lanka BC	9730as	15425as		
0200-0300	Taiwan, Radio Taipei Intl	5950na	7130as	9680na	11740am
		11750as	11825pa	15345as	
0200-0300	UK, BBC African Service	6050af	6135af	7125af	9610af
0200-0300	UK, BBC Asian Service	9410as	9605as	9825as	11760as
		11955as	15280as	15310as	15360as
		15405as			
0200-0230	UK, BBC World Service	5970sa	5975am	6175na	9590am
		9915sa			
0200-0300	USA, KAIJ Dallas TX	5810am			
0200-0300	USA, KTBN Salt Lk City UT	7510am			
0200-0300	USA, KVOH Los Angeles CA	9975am			
0200-0300	USA, KWHR Naalehu HI	7560pa	17510as	17555pa	
0200-0300	USA, Voice of America	7115as	7205as	9740as	9850as
		11705as	15250as	15300as	17740as
		17820as			
0200-0300	USA, WEWN Birmingham AL	5825eu			
0200-0300	USA, WGTG McCaysville GA	5085am			
0200-0300 s twhfa	USA, WHRI Noblesville IN	5745am			
0200-0300 m	USA, WHRI Noblesville IN	5770am			
0200-0300	USA, WHRI Noblesville IN	7315am			
0200-0300	USA, WINB Red Lion PA	11950am			
0200-0300	USA, WJCR Upton KY	7490na			
0200-0300 mtwhfa	USA, WRMI/R Miami Intl	9955am			
0200-0300	USA, WRNO New Orleans LA	7355am			
0200-0259 m	USA, WSHB Cypress Crk SC	5850na			
0200-0259 mh	USA, WSHB Cypress Crk SC	7535na			
0200-0300	USA, WWCR Nashville TN	2390am	3215am	5070am	5935am
0200-0300	USA, WYFR Okeechobee FL	6065na	9505na		
0215-0220	Nepal, Radio	3230do	5005do		
0230-0300	Hungary, Radio Budapest	6010na	9840na		
0230-0245	Pakistan, Radio	7485as	11760as	13620as	15485as
0230-0300	Sweden, Radio	7280na			
0230-0300	UK, BBC World Service	5970sa	5975am	6175na	7325sa
		9895am			
0245-0300	Albania, R Tirana Intl	6115na	7160na		
0245-0300	UK, BBC World Service	5995am	6110am	6190ca	9515am
0245-0300 vl	Zambia, R Zambia/ZNBC 2	6165do			
0250-0300 sf	Greece, Voice of	6260na	7450na	9420na	9935na
0250-0300	Vatican State, Vatican R	6095am	7305ca		
0255-0300 vl	Zambia, R Zambia/ZNBC 1	4910do			

Selected Programs

Sundays

0200 Cuba, Radio Havana Cuba: International News. See S 0100.
0200 Germany (Deutsche Telekom): The Overcomer Broadcast. See S 0000.
0200 Radio Taipei International: Frequency Announcements/ Anthem. Opening three minutes of each transmission.
0203 Radio Taipei International: News. Twelve minutes of world news.
0211 Cuba, Radio Havana Cuba: National News. News about Cuba.
0215 Radio Taipei International: People. An introduction to people from all walks of life in Taiwan.
0216 Cuba, Radio Havana Cuba: Feature Report. In-depth coverage of a news item from another country of the hemisphere.
0230 Cuba, Radio Havana Cuba: News Supplement. See S 0130.
0234 Cuba, Radio Havana Cuba: DXers Unlimited. Arnie Coro discusses the technical aspects of shortwave listening and amateur radio.
0235 Radio Taipei International: Mailbag Time. Host Carlton Wong reads letters from listeners and plays music requests.
0247 Radio Taipei International: Let's Learn Chinese. Chinese lessons with commentary and translation in English.
0248 Cuba, Radio Havana Cuba: Music. See S 0122.

Mondays

0200 Cuba, Radio Havana Cuba: Sunday Edition (from 0100). The second hour of RHC's two-hour magazine of features, reports, and music.
0200 Germany (Deutsche Telekom): The Overcomer Broadcast. See S 0000.
0200 Radio Taipei International: Frequency Announcements/ Anthem. See S 0200.
0201 Cuba, Radio Havana Cuba: The Mailbag Show. Listener letters and E-mail are reviewed and answered.
0203 Radio Taipei International: News. See S 0203.
0215 Radio Taipei International: Jade Bells and Bamboo Pipes. Chinese folk and temple music.
0230 Cuba, Radio Havana Cuba: Breakthrough. See S 2300.
0235 Cuba, Radio Havana Cuba: From Havana. A showcase of Cuban music.

Tuesdays

0200 Cuba, Radio Havana Cuba: International News. See S 0100.
0200 Germany (Deutsche Telekom): The Overcomer Broadcast. See S 0000.
0203 Radio Taipei International: News. See S 0203.
0213 Cuba, Radio Havana Cuba: National News. See S 0211.
0215 Radio Taipei International: Taiwan Today. Focus on an aspect of Taiwanese life such as education.
0218 Cuba, Radio Havana Cuba: Report from the United States. A telephone report about an event in the U.S.that is reminiscent of cold-war communist radio.
0222 Cuba, Radio Havana Cuba: Music. See S 0122.
0230 Cuba, Radio Havana Cuba: News Supplement. See S 0130.
0230 Radio Taipei International: Main Roads and Byways. Hop a tour bus to a Taiwan attraction.
0235 Cuba, Radio Havana Cuba: Feature Report. See S 0216.
0250 Cuba, Radio Havana Cuba: Music. See S 0122.

Wednesdays

0200 Cuba, Radio Havana Cuba: International News. See S 0100.
0200 Germany (Deutsche Telekom): The Overcomer Broadcast. See S 0000.
0203 Radio Taipei International: News. See S 0203.
0214 Cuba, Radio Havana Cuba: Stories Making News in Cuba. See S 0111.
0215 Radio Taipei International: Music Box. Featuring some of the popular artists of Taiwan and their music.
0220 Cuba, Radio Havana Cuba: Spotlight on the Americas. See M 2306.
0223 Cuba, Radio Havana Cuba: Feature Report. See S 0216.
0230 Cuba, Radio Havana Cuba: News Supplement. See S 0130.
0235 Cuba, Radio Havana Cuba: Be My Guest. See T 0421.
0242 Cuba, Radio Havana Cuba: Feature Report. See S 0216.

Thursdays

0200 Cuba, Radio Havana Cuba: International News. See S 0100.
0200 Germany (Deutsche Telekom): The Overcomer Broadcast. See S 0000.
0203 Radio Taipei International: News. See S 0203.
0213 Cuba, Radio Havana Cuba: National News. See S 0211.
0215 Radio Taipei International: Jade Bells and Bamboo Pipes. See M 0215.
0219 Cuba, Radio Havana Cuba: Spotlight on the Americas. See M 2306.
0224 Cuba, Radio Havana Cuba: Music. See S 0122.
0230 Cuba, Radio Havana Cuba: News Supplement. See S 0130.
0238 Cuba, Radio Havana Cuba: Timeout. See T 0135.

Fridays

0200 Cuba, Radio Havana Cuba: International News. See S 0100.
0200 Germany (Deutsche Telekom): The Overcomer Broadcast. See S 0000.
0203 Radio Taipei International: News. See S 0203.
0208 Cuba, Radio Havana Cuba: National News. See S 0211.
0213 Cuba, Radio Havana Cuba: Spotlight on the Americas. See M 2306.
0215 Radio Taipei International: Taipei Magazine. A young couple's escapades in Taiwan.
0217 Cuba, Radio Havana Cuba: Feature Report. See S 0216.
0229 Cuba, Radio Havana Cuba: News Supplement. See S 0130.
0233 Radio Taipei International: New Record Time. The latest releases of the popular music of Taiwan.
0234 Cuba, Radio Havana Cuba: Timeout. See T 0135.
0239 Cuba, Radio Havana Cuba: Cuba Today. See W 0350.

Saturdays

0200 Cuba, Radio Havana Cuba: International News. See S 0100.
0200 Germany (Deutsche Telekom): The Overcomer Broadcast. See S 0000.
0203 Radio Taipei International: News. See S 0203.
0211 Cuba, Radio Havana Cuba: National News. See S 0211.
0215 Radio Taipei International: Kaleidoscope. See S 0315.
0216 Cuba, Radio Havana Cuba: Spotlight on the Americas. See M 2306.
0225 Cuba, Radio Havana Cuba: Music. See S 0122.
0230 Cuba, Radio Havana Cuba: News Supplement. See S 0130.
0232 Radio Taipei International: Reflections. See S 0332.
0236 Cuba, Radio Havana Cuba: Timeout. See T 0135.
0248 Radio Taipei International: Let's Learn Chinese. See S 0247.

Frequencies

0100-0200	Anguilla,Caribbean Beacon	6090am			
0100-0200	Australia, Radio	9660pa	12080pa	13605pa	15240pa
		15415as	15510pa	17750pa	17795pa
0100-0200 vl	Australia, VL8K Katherine	5025do			
0100-0200 vl	Australia, VL8T Tent Crk	4910do			
0100-0200	Canada, CBC N Quebec Svc	9625do			
0100-0200	Canada, CFRX Toronto	6070do			
0100-0200	Canada, CFVP Calgary	6030do			
0100-0200	Canada, CHNX Halifax	6130do			
0100-0200	Canada, CKZN St John's	6160do			
0100-0200	Canada, CKZU Vancouver	6160do			
0100-0200	Costa Rica,RF Peace Intl	7385am	15050am		
0100-0105	Croatia, Croatian Radio	5840am			
0100-0200	Cuba, Radio Havana	6000na	9820na	9830na	
0100-0127	Czech Rep, Radio Prague	6200na	7345na		
0100-0200	Ecuador, HCJB	9745am	21455am		
0100-0150	Germany, Deutsche Welle	5960na	6040na	6085na	6145na
		9640na			
0100-0200	Germany,Overcomer Ministr	5840na			
0100-0115	Ghana, Ghana Broadc Corp	3366do	4915do		
0100-0130	Hungary, Radio Budapest	6035na	9840na		
0100-0200	Indonesia, Voice of	11785as			
0100-0125	Iran, VOIRI	6055eu	9022eu	9685eu	
0100-0110	Italy, RAI Intl	6010na	9675na	11800na	
0100-0200	Japan, R Japan/NHK World	11790na	11860as	11890as	13630na
		15570as	15590as	17810as	21610pa
0100-0200	Liberia,LCN/R Liberia Int	5100do			
0100-0200 smtwh	Malaysia, Radio	7295do			
0100-0125	Netherlands, Radio	5905as	6020na	6165na	7305as
		9860as	11660as		
0100-0200	New Zealand, R NZ Intl	17675pa			
0100-0130 m	Norway, Radio Norway Intl	7465na	7545am		
0100-0200 vl	Papua New Guinea, NBC	9675do			
0100-0200	Philippines, FEBC/R Intl	15450as			
0100-0200	Russia,Voice of Russia WS	5930na	7105na	7345na	9580na
		12030na	13665na		
0100-0200 mtwhfa	Russia,Voice of Russia WS	5920na			
0100-0130	Serbia, Radio Yugosiavia	6180na	7130na		
0100-0200	Singapore, SBC Radio One	6160do			
0100-0130	Slovakia, R Slovakia Intl	5930na	7300af	9440sa	
0100-0200 vl	Solomon Islands, SIBC	5020do			
0100-0200	South Korea, R Korea Intl	7275as	11725am	11810am	15575am
0100-0200	Spain, R Exterior Espana	6055am			
0100-0200	Sri Lanka, Sri Lanka BC	9730as	15425as		
0100-0130	Switzerland, Swiss R Intl	6135na	9885na	9905ca	
0100-0200	UK, BBC Asian Service	5965as	6195as	9410as	11955as
		15280as	15310as	15360as	
0100-0200	UK, BBC World Service	5970sa	5975am	6175na	9590am
		9915sa	11750sa		
0100-0200	USA, KAIJ Dallas TX	5810am			
0100-0200	USA, KTBN Salt Lk City UT	7510am			
0100-0200	USA, KWHR Naalehu HI	7560as	17510as	17555pa	
0100-0200	USA, Voice of America	7115as	7205as	9740as	9850as
		11705as	15250as	15300as	17740as
		17820as			
0100-0200 twhfa	USA, Voice of America	5995am	6130am	7405am	9445am
		9775am	13740am		
0100-0200	USA, WEWN Birmingham AL	5825eu			
0100-0200	USA, WGTG McCaysville GA	5085am			
0100-0200	USA, WHRI Noblesville IN	5745am			
0100-0200	USA, WINB Red Lion PA	11950am			
0100-0200	USA, WJCR Upton KY	7490na			
0100-0200 twhfa	USA, WRMI/R Miami Intl	9955am			
0100-0200	USA, WRNO New Orleans LA	7355am			
0100-0159 m	USA, WSHB Cypress Crk SC	9430am			
0100-0159	USA, WSHB Cypress Crk SC	7535na			
0100-0200	USA, WWCR Nashville TN	3215am	5070am	5935am	7435am
0100-0200	USA, WYFR Okeechobee FL	6065na	7520as	9505na	11550as
0100-0130	Uzbekistan, R Tashkent	5040eu	5955eu	5975eu	7105eu
		9540eu	9540eu		
0100-0127	Vietnam, Voice of	5940na			
0115-0200 m	USA, WRMI/R Miami Intl	9955am			
0125-0200	Netherlands, Radio	9860as	11655as		
0130-0200	Austria, R Austria Intl	7325na	9495am	9870am	
0130-0150	Greece, Voice of	6260na	7450na	9420na	9935na
0130-0200	Guam, AWR/KSDA	17645as			
0130-0200	Sweden, Radio	7265as			
0140-0200	Vatican State, Vatican R	5980au	7335au	9650au	

Selected Programs

Sundays

0100 Cuba, Radio Havana Cuba: International News. News from around the world and the hemisphere.
0100 Germany (Deutsche Telekom): The Overcomer Broadcast. See S 0000.
0100 Japan, NHK/Radio: News. See S 0000.
0110 Japan, NHK/Radio: Hello from Tokyo. The weekend magazine program.
0111 Cuba, Radio Havana Cuba: Stories Making News in Cuba. Current news in the Cuban media.
0118 Cuba, Radio Havana Cuba: Viewpoint. An editorial comment on a current event or topic.
0122 Cuba, Radio Havana Cuba: Music. The ever-popular latin music of Cuba.
0130 Cuba, Radio Havana Cuba: News Supplement. A five-minute news summary at the half-hour point of the broadcast.
0136 Cuba, Radio Havana Cuba: The World of Stamps. Philatelic news for collectors.
0141 Japan, NHK/Radio: Japan Diary. Life in Japan as seen through the eyes of a foreign resident in Japan.

Mondays

0100 Cuba, Radio Havana Cuba: Sunday Edition. RHC's two-hour magazine of features, reports, and music.
0100 Germany (Deutsche Telekom): The Overcomer Broadcast. See S 0000.
0100 Japan, NHK/Radio: News. See S 0000.
0115 Japan, NHK/Radio: Top News Asia. The most important stories from other Asian media organizations are summarized in a new 10-minute format.
0125 Japan, NHK/Radio: Sounds of Asia. Focus on a style of music popular in an asian country.
0130 Cuba, Radio Havana Cuba: Musical Corner. Top ten countdown of Cuba's popular music.

Tuesdays

0100 Cuba, Radio Havana Cuba: International News. See S 0100.
0100 Germany (Deutsche Telekom): The Overcomer Broadcast. See S 0000.
0100 Japan, NHK/Radio: News. See S 0000.
0111 Cuba, Radio Havana Cuba: Stories Making News in Cuba. See S 0111.
0115 Japan, NHK/Radio: Top News Asia. See M 0115.
0116 Cuba, Radio Havana Cuba: Viewpoint. See S 0118.
0118 Cuba, Radio Havana Cuba: Feature Report. See S 0216.
0125 Japan, NHK/Radio: Enjoy Japanese. Learn and practice the Japanese language.
0130 Cuba, Radio Havana Cuba: News Supplement. See S 0130.
0135 Cuba, Radio Havana Cuba: Timeout. Five minutes of Cuban sports coverage.
0140 Cuba, Radio Havana Cuba: Spotlight on the Americas. See M 2306.
0146 Cuba, Radio Havana Cuba: Caribbean Outlook. The prospects for conditions in the region.

Wednesdays

0100 Cuba, Radio Havana Cuba: International News. See S 0100.
0100 Germany (Deutsche Telekom): The Overcomer Broadcast. See S 0000.
0100 Japan, NHK/Radio: News. See S 0000.
0111 Cuba, Radio Havana Cuba: Stories Making News in Cuba. See S 0111.
0115 Japan, NHK/Radio: Top News Asia. See M 0115.
0116 Cuba, Radio Havana Cuba: Viewpoint. See S 0118.
0120 Cuba, Radio Havana Cuba: Feature Report. See S 0216.
0125 Japan, NHK/Radio: Music Reflections. Music from around the world which shares a common theme.
0130 Cuba, Radio Havana Cuba: News Supplement. See S 0130.
0135 Cuba, Radio Havana Cuba: Timeout. See T 0135.
0140 Cuba, Radio Havana Cuba: DXers Unlimited. See S 0234.

Thursdays

0100 Cuba, Radio Havana Cuba: International News. See S 0100.
0100 Germany (Deutsche Telekom): The Overcomer Broadcast. See S 0000.
0100 Japan, NHK/Radio: News. See S 0000.
0111 Cuba, Radio Havana Cuba: Stories Making News in Cuba. See S 0111.
0115 Japan, NHK/Radio: Top News Asia. See M 0115.
0118 Cuba, Radio Havana Cuba: Viewpoint. See S 0118.
0120 Cuba, Radio Havana Cuba: Feature Report. See S 0216.
0125 Japan, NHK/Radio: Enjoy Japanese. See T 0125.
0130 Cuba, Radio Havana Cuba: News Supplement. See S 0130.
0136 Cuba, Radio Havana Cuba: Feature Report. See S 0216.

Fridays

0100 Cuba, Radio Havana Cuba: International News. See S 0100.
0100 Germany (Deutsche Telekom): The Overcomer Broadcast. See S 0000.
0100 Japan, NHK/Radio: News. See S 0000.
0111 Cuba, Radio Havana Cuba: Stories Making News in Cuba. See S 0111.
0115 Cuba, Radio Havana Cuba: Viewpoint. See S 0118.
0115 Japan, NHK/Radio: Top News Asia. See M 0115.
0119 Cuba, Radio Havana Cuba: Feature Report. See S 0216.
0125 Japan, NHK/Radio: Music Beat. What people in Japan are listening to.
0130 Cuba, Radio Havana Cuba: News Supplement. See S 0130.
0135 Cuba, Radio Havana Cuba: Feature Report. See S 0216.

Saturdays

0100 Cuba, Radio Havana Cuba: International News. See S 0100.
0100 Germany (Deutsche Telekom): The Overcomer Broadcast. See S 0000.
0100 Japan, NHK/Radio: News. See S 0000.
0110 Japan, NHK/Radio: Asia Weekly. A magazine of news from other Asian broadcasters, entertainment update and music.
0111 Cuba, Radio Havana Cuba: Stories Making News in Cuba. See S 0111.
0113 Japan, NHK/Radio: Asian People in Japan. An "Asia Weekly" segment in which a foreigner living in Japan is interviewed.
0118 Cuba, Radio Havana Cuba: Viewpoint. See S 0118.
0120 Cuba, Radio Havana Cuba: Feature Report. See S 0216.
0121 Turkey, Voice of: White and Black. See M 0324.
0128 Japan, NHK/Radio: Business Report. A summary of regional financial news heard as part of the program "Asia Weekly."
0130 Cuba, Radio Havana Cuba: News Supplement. See S 0130.
0130 Japan, NHK/Radio: Asia Hotline. A 10-minute segment of the program "Asia Weekly" featuring current events in the Asia-Pacific region.
0136 Cuba, Radio Havana Cuba: Weekly Review. The end of the week wrap-up of international and national events affecting Cuba.
0141 Japan, NHK/Radio: Short Story. Narration of a short story by a Asian author.
0150 Cuba, Radio Havana Cuba: Feature Report. See S 0216.
0154 Japan, NHK/Radio: Asian News Summary. A wrap-up of regional events is heard as a segment of the program "Asia Weekly."

FREQUENCIES

2100-2200	Anguilla,Caribbean Beacon	11775am			
2100-2200	Australia, Radio	7240as	9660pa	11880pa	12080as
		17715pa	21740pa		
2100-2130	Australia, Radio	9500as			
2100-2130 vl	Australia, VL8A Alice Spg	2310do			
2100-2130 vl	Australia, VL8K Katherine	2485do			
2100-2200 vl	Australia, VL8K Katherine	5025do			
2100-2130 vl	Australia, VL8T Tent Crk	2325do			
2100-2200 vl	Australia, VL8T Tent Crk	4910do			
2100-2200	Bulgaria, Radio	9700eu	11720eu		
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			
2100-2129	Canada, R Canada Intl	7235va	11690va	11890va	13650va
		13670va	15150va	15325va	17820va
2100-2130	China, China Radio Intl	3985eu	6590eu	7170af	7180af
		9535af	9920eu		
2100-2200	Costa Rica,RF Peace Intl	15050am	21460am		
2100-2130	Cuba, Radio Havana	13720eu	13750eu		
2100-2200	Ecuador, HCJB	17735eu	21455am		
2100-2200	Egypt, Radio Cairo	15375af			
2100-2200	Eqt Guinea, Radio Africa	15186af			
2100-2200	Georgia, Voice of Hope	6285eu	12125eu		
2100-2150	Germany, Deutsche Welle	7115as	9670as	9735af	9765as
		11785as	11865af	15135va	
2100-2200	Germany, R Asia Canada	15560eu			
2100-2200	Germany,Overcomer Ministr	3945eu	9510as	11625sa	12050sa
2100-2130	Hungary, Radio Budapest	3975eu	11700eu		
2100-2200	India, All India Radio	7150au	7410eu	9910au	9950eu
		11620eu	11715au		
2100-2200 irreg	Iraq, Radio Iraq Intl	11785eu			
2100-2200	Ireland, Unt Christian BC	6200do			
2100-2200 as/vl	Italy, IRRS	3955va			
2100-2200	Japan, R Japan/NHK World	6035pa	9725eu	11850pa	13630na
2100-2200	Liberia, Radio Veritas	3450do			
2100-2115	Liberia,LCN/R Liberia Int	5100do			
2100-2200	Malaysia, Radio	7295do			
2100-2200 vl	Namibia, NBC	3270af	3289af		
2100-2105 smtwh	New Zealand, R NZ Intl	17675pa			
2100-2105 fa	New Zealand, R NZ Intl	11735pa			
2100-2200	Nigeria, FRCN/Radio	3326do	4770do	4990do	
2100-2157	North Korea, R Pyongyang	4405eu	6575eu	9335eu	11700na
		13760na			
2100-2200 vl	Papua New Guinea, NBC	4890do			
2100-2200	Romania, R Romania Intl	7105eu	9550eu	9690eu	
2100-2130	Serbia, Radio Yugoslavia	6100eu	6185eu		
2100-2200	Singapore,RCorp Singapore	6150do			
2100-2130	South Korea, R Korea Intl	3970eu	6480eu	15575eu	
2100-2200 s	Spain, R Exterior Espana	9855eu	11830af		
2100-2130	Switzerland, Swiss R Intl	3985eu			
2100-2200	Syria, Radio Damascus	12085na	13610na		
2100-2200 vl	Tanzania, Radio	5050do			
2100-2130	Turkey, Voice of	7210as			
2100-2110	Uganda, Radio	4976do			
2100-2200	UK, BBC African Service	3255af	6005af	6190af	11835af
2100-2200	UK, BBC Asian Service	3915as	5965as	5975pa	6195as
		9740pa	11945as		
2100-2200	UK, BBC World Service	5975am	6180eu	6195eu	7325eu
		9410eu	12095sa		
2100-2200 w	UK, Merlin Network One	11915eu	11985eu	13690va	
2100-2200	Ukraine, R Ukraine Intl	5905eu	6020eu	6080eu	7180eu
		7240eu	7380eu	7410eu	9550na
		9560eu	12040na	13590eu	
2100-2200	USA, KAIJ Dallas TX	13815am			
2100-2200	USA, KTBN Salt Lk City UT	15590am			
2100-2200	USA, KWHR Naalehu HI	15405as			
2100-2200	USA, Voice of America	6035af	6040me	6095me	7375af
		7415af	9535af	9760eu	11870pa
		11975af	15185as	15410af	15445af
		15580af	17725af	17735as	
2100-2200	USA, WEWN Birmingham AL	5825na	13615na	15745eu	
2100-2200 mtwhfa	USA, WGTG McCaysville GA	9400am			
2100-2200	USA, WHRA Greenbush ME	15460af			
2100-2200	USA, WHRI Noblesville IN	9495am	13760am		
2100-2200	USA, WINB Red Lion PA	13790am			
2100-2200	USA, WJCR Upton KY	7490na	13595na		
2100-2200 as	USA, WRMI/R Miami Intl	9955ca			
2100-2200 w	USA, WSHB Cypress Crk SC	15665eu			
2100-2200	USA, WWCR Nashville TN	9475am	12160am	13845am	15685am
2100-2200	USA, WYFR Okeechobee FL	11855na	15215va	15695va	17845va
2100-2200	Zambia, Christian Voice	3330af	4965af		
2100-2200 vl	Zambia, R Zambia/ZNBC 1	4910do			
2100-2200 vl	Zambia, R Zambia/ZNBC 2	6165do			
2100-2200 vl	Zimbabwe, Zimbabwe BC	3306do	4828do		
2105-2200	New Zealand, R NZ Intl	17675pa			
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	Albania, R Tirana Intl	6025eu	7165eu		
2130-2200	Austria, R Austria Intl	5945eu	6155eu	13730va	
2130-2200	China, China Radio Intl	6590eu	9920eu		
2130-2157	Czech Rep, Radio Prague	11600va			
2130-2200	Ghana, Ghana Broadc Corp	3366do			
2130-2200	Guam, AWR/KSDA	15310as			
2130-2200	Iran, VOIRI	6025au	6175au		
2130-2155	Moldova, R Moldova Intl	7520eu			
2130-2200	South Korea, R Korea Intl	15575eu			
2130-2200 as	Sweden, Radio	6065eu	9430af		
2130-2145 t f	UK, BBC Calling Falklands	11680sa			
2130-2200	USA, Voice of America	6040me	6095me	9535af	9760eu
		11870pa	15185as	17735as	
2130-2200 smtwhf	USA, Voice of America	6035af	7375af	7415af	11975af
		15410af	15445af	15580af	17725af
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	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	5960am	9755am	11705as	13670am
		15305am			
2200-2300	China, China Radio Intl	9880eu			
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,Overcomer Ministr	3945eu	9510as	11625sa	12050sa
2200-2215	Ghana, Ghana Broadc Corp	4915do			
2200-2230	India, All India Radio	7150au	7410eu	9910au	9950eu
		11620eu	11715au		
2200-2230	Iran, VOIRI	6025au	6175au		
2200-2300 irreg	Iraq, Radio Iraq Intl	11785eu			
2200-2300	Ireland, Unt Christian BC	6200do			
2200-2225	Italy, RAI Intl	6150pa	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	
2200-2230 s	Norway, Radio Norway Intl	11635au			
2200-2300 vl	Papua New Guinea, NBC	9675do			
2200-2215	Sierra Leone, SLBS	3316do			
2200-2300	Singapore,RCorp Singapore	6150do			
2200-2205	Syria, Radio Damascus	12085na	13610na		
2200-2300	Taiwan, Radio Taipei Intl	15600eu	17750eu		
2200-2300	Turkey, Voice of	7190eu	9655na		
2200-2300	UK, BBC African Service	11835af	15400af		
2200-2300	UK, BBC Asian Service	5965as	6195as	7110as	9660as
		9890as	11955as	12080ps	
2200-2300	UK, BBC World Service	5975am	6175na	6195na	7325eu
		9410eu	9590am	9915sa	12095sa
2200-2300 w	UK, Merlin Network One	9645eu	9780na	11915eu	11985na
		13690na			
2200-2300	USA, KAIJ Dallas TX	13815am			
2200-2300	USA, KTBN Salt Lk City UT	15590am			
2200-2300	USA, KWHR Naalehu HI	17510as			
2200-2300	USA, Voice of America	7215as	9705as	9770as	11760as
		15185as	15290as	15305as	17735as
		17820as			
2200-2230 mtwhf	USA, Voice of America	6035af	7340af	7375af	7415af
		11975af			
2200-2300	USA, WEWN Birmingham AL	5825na	9975eu	13615na	
2200-2300 mtwhfa	USA, WGTG McCaysville GA	9400am			
2200-2300	USA, WHRA Greenbush ME	15460af			
2200-2300	USA, WHRI Noblesville IN	5745am	9495am		
2200-2300	USA, WINB Red Lion PA	13790am			
2200-2300	USA, WJCR Upton KY	7490na	13595na		
2200-2300	USA, WRMI/R Miami Intl	9955ca			
2200-2300 sh	USA, WSHB Cypress Crk SC	13770eu	15285sa		
2200-2300	USA, WWCR Nashville TN	5070am	7435am	9475am	13845am
2200-2300	USA, WYFR Okeechobee FL	11855na	15215va	17845va	
2200-2205 vl	Zambia, R Zambia/ZNBC 1	4910do			
2200-2210 vl	Zambia, R Zambia/ZNBC 2	6165do			
2230-2300	Canada, R Canada Intl	5960am	9755am	13670am	
2230-2300	Cuba, Radio Havana	9550am			
2230-2257	Czech Rep, Radio Prague	9435na	11600na		
2230-2300	UK, BBC World Service	5975am	6175na	9590na	9915sa
		12095sa			
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	

2300 UTC SHORTWAVE GUIDE 7:00 PM EDT 4:00 PM PDT

Frequencies

2300-0000	Anguilla,Caribbean Beacon	6090am			
2300-0000	Australia, Radio	9660pa	12080as	17715pa	17795pa
		21740pa			
2300-0000 vl	Australia, VL8K Katherine	5025do			
2300-0000 vl	Australia, VL8T Tent Crk	4910do			
2300-0000	Bulgaria, Radio	9485na	11720na		
2300-0000	Canada, CBC N Quebec Svc	9625do			
2300-0000	Canada, CFRX Toronto	6070do			
2300-0000	Canada, CFVP Calgary	6030do			
2300-0000	Canada, CHNX Halifax	6130do			
2300-0000	Canada, CKZN St John's	6160do			
2300-0000	Canada, CKZU Vancouver	6160do			
2300-2329	Canada, R Canada Intl	5960am	9755am	11895am	13670am
		15305am			
2300-0000	Costa Rica,RF Peace Intl	15050am	21460am		
2300-2330	Cuba, Radio Havana	9550am			
2300-0000	Egypt, Radio Cairo	9900am			
2300-2350	Germany, Deutsche Welle	5975as	6090as	7235as	9690as
2300-0000	Germany,Overcomer Ministr	3945eu	9510as	11625sa	12050sa
2300-2330 as	Guam, AWR/KSDA	11775as			
2300-0000 mtwhf	Guam, AWR/KSDA	11775as			
2300-0000	India, All India Radio	7410as	9705as	9950as	11620as
2300-0000	Ireland, Unt Christian BC	6200do			
2300-2315	Liberia,LCN/R Liberia Int	5100do			
2300-0000	Malaysia, Radio	7295do			
2300-0000 vl	Namibia, NBC	3270af	3289af		
2300-0000	New Zealand, R NZ Intl	17675pa			
2300-2315	Nigeria, FRCN/Radio	3326do	4770do	4990do	
2300-2357	North Korea, R Pyongyang	11335na	11700na	13760na	15130na
2300-2330 s	Norway, Radio Norway Intl	9935as	11640as	11735sa	13805am
2300-0000 vl	Papua New Guinea, NBC	9675do			
2300-0000	Romania, R Romania Intl	6130eu	7195eu	9570na	11830na
2300-0000	Singapore,RCorp Singapore	6150do			
2300-0000	UK, BBC Asian Service	3915as	5965as	6035as	6195as
		7110as	11945as	11955as	17790as
2300-0000	UK, BBC World Service	5975am	6175na	9590na	9915sa
		12095sa			
2300-0000 w	UK, Merlin Network One	9645eu	9780na	11985na	13690na
2300-0000	USA, KAIJ Dallas TX	13815am			
2300-0000	USA, KTBN Salt Lk City UT	15590am			
2300-0000	USA, KWHR Naalehu HI	17510as			
2300-0000	USA, Voice of America	7215as	9705as	9770as	11760as
		15185as	15290as	15305as	17735as
		17820as			
2300-0000	USA, WEWN Birmingham AL	5825na	9975eu	13615na	
2300-0000 mtwhfam	USA, WGTG McCaysville GA	5085am			
2300-0000	USA, WHRA Greenbush ME	15460af			
2300-0000	USA, WHRI Noblesville IN	13760am			
2300-0000	USA, WINB Red Lion PA	13790am			
2300-0000	USA, WJCR Upton KY	7490na	13595na		
2300-0000 s	USA, WRMI/R Miami Intl	9955ca			
2300-0000 s	USA, WRNO New Orleans LA	7355am			
2300-0000 sm	USA, WSHB Cypress Crk SC	13770af	15285sa		
2300-0000 irreg	USA, WWBS Macon GA	11910na			
2300-0000	USA, WWCR Nashville TN	5070am	7435am	9475am	13845am
2300-0000	USA, WYFR Okeechobee FL	11855na			
2300-2315	Vatican State, Vatican R	7305au	9600au	11830au	
2310-2315	Kyrgyzstan, Kyrgyz Radio	4010do	4050do		
2329-2359 as	Canada, R Canada Intl	11895am	15305am		
2329-2359	Canada, R Canada Intl	5960am	9755am	13670am	
2330-0000 vl	Ghana, Ghana Broadc Corp	4915af			
2330-0000	Netherlands, Radio	6020na	6165na	9845na	
2330-0000	Vietnam, Voice of	9840eu	12020eu	15010eu	
2335-2345	Greece, Voice of	9395sa	9425sa	11595sa	11645sa
2335-2345	Sierra Leone, SLBS	3316do			
2345-0000 mtwhf	UK, BBC Asian Service	3915as			

Selected Programs

Sundays

2300 Costa Rica, R Peace Intl: World of Radio. See S 0200.
2300 USA, KTBN Salt Lk City UT: Dr. Clarence MacClendon. See S 0500.
2300 USA, WWCR #1 Nashville TN: The Down Home Gospel Program. Brother Gary and Sister Wanda evangelize from California.
2300 USA, WWCR #3 Nashville TN: Talk USA. Five minutes of news from the USA Radio Network.
2306 USA, WWCR #3 Nashville TN: Discoveries in Health (hour 1) (live). A health and herbs show from the American Freedom Network in which new treatments are discussed.
2330 USA, KTBN Salt Lk City UT: The Living Way. Jack Hayford preaches from The Church on the Way in Van Nuys, California.
2345 Costa Rica, R Peace Intl: Hightower Radio. A commentary by Jim Hightower, the provocative progressive voice from Texas, on national issues.
2355 Costa Rica, R Peace Intl: Earthwatch Radio. A free-form radio program produced and hosted by Robert Knight, a distant visitor to a strange planet.
2357 Costa Rica, R Peace Intl: Earth and Sky. A short earth science and astronomy feature.

Mondays

2300 Costa Rica, R Peace Intl: Peace Forum. A grab bag of individual programs and special short series received by RFPI.
2300 USA, KTBN Salt Lk City UT: Lifestyle Magazine. A Faith for Today production that has brought family values to television since 1950.
2300 USA, WWCR #1 Nashville TN: Freedom Now (live). Irwin Schiff, a self-professed leading authority on federal income tax, talks from Las Vegas.
2300 USA, WWCR #3 Nashville TN: The Baker Report (live). Across the nation and around the world with Jeff Baker (1st hour).
2330 Costa Rica, R Peace Intl: The Neumaier Report. Poughkeepsie NY columnist, Dr John Neumaier, comments on a wide variety of socially relevant issues.
2330 Costa Rica, R Peace Intl: The Tico Times Report. The most important news from Central America as reported in The Tico times in Costa Rica.
2330 USA, KTBN Salt Lk City UT: Get Ready. Bishop Jakes preaches from Crenshaw Christian Center in Los Angeles.
2345 Costa Rica, R Peace Intl: UN Daily News. A daily news feed from the United Nations News Service reporting on UN activites around the world.
2355 Costa Rica, R Peace Intl: Earthwatch Radio. See S 2355.
2357 Costa Rica, R Peace Intl: Earth and Sky. See S 2357.

Tuesdays

2300 Costa Rica, R Peace Intl: Adventures in Life. Dr Earl Beecher.
2300 USA, KTBN Salt Lk City UT: Gospel America. See S 0330.
2300 USA, WWCR #1 Nashville TN: Freedom Now (live). See NAm 2300.
2300 USA, WWCR #3 Nashville TN: Lyon Gold and Silver Magnet Program (live). Jackie Lyon hawks a variety of products for healing.
2330 Costa Rica, R Peace Intl: UN Perspective. A weekly program of political, economic and social issues.
2330 USA, KTBN Salt Lk City UT: Armed and Dangerous. Mario Murillo hosts a program about drugs and gangs.
2345 Costa Rica, R Peace Intl: UN Daily News. See M 2345.
2355 Costa Rica, R Peace Intl: Earthwatch Radio. See S 2355.
2357 Costa Rica, R Peace Intl: Earth and Sky. See S 2357.

Wednesdays

2300 Costa Rica, R Peace Intl: Peace Forum. See M 2300.
2300 USA, KTBN Salt Lk City UT: Praise the Lord. See M 0200.
2300 USA, WWCR #1 Nashville TN: Freedom Now (live). See NAm 2300.
2300 USA, WWCR #3 Nashville TN: The Baker Report (live). See NAm 2300.
2330 Costa Rica, R Peace Intl: Women. A program for and about women from United Nations Radio.
2345 Costa Rica, R Peace Intl: UN Daily News. See M 2345.
2355 Costa Rica, R Peace Intl: Earthwatch Radio. See S 2355.
2357 Costa Rica, R Peace Intl: Earth and Sky. See S 2357.

Thursdays

2300 Costa Rica, R Peace Intl: Peace Forum. See M 2300.
2300 USA, KTBN Salt Lk City UT: Jerry Barnard. See H 1100.
2300 USA, WWCR #1 Nashville TN: Freedom Now (live). See NAm 2300.
2300 USA, WWCR #3 Nashville TN: Lyon Gold and Silver Magnet Program (live). See NAm 2300.
2330 Costa Rica, R Peace Intl: UN Scope. A news program about the United Nations and its related agencies.
2330 USA, KTBN Salt Lk City UT: This Week in Bible Prophecy. See T 0600.
2345 Costa Rica, R Peace Intl: UN Daily News. See M 2345.
2355 Costa Rica, R Peace Intl: Earthwatch Radio. See S 2355.
2357 Costa Rica, R Peace Intl: Earth and Sky. See S 2357.

Fridays

2300 Costa Rica, R Peace Intl: Peace Forum. See M 2300.
2300 USA, KTBN Salt Lk City UT: Praise the Lord. See M 0200.
2300 USA, WWCR #1 Nashville TN: Freedom Now (live). See NAm 2300.
2300 USA, WWCR #3 Nashville TN: The Baker Report (live). See NAm 2300.
2345 Costa Rica, R Peace Intl: UN Daily News. See M 2345.
2354 Radio Netherlands: Documentary. Who Makes the Wine? (28th). See A 0154.
2355 Costa Rica, R Peace Intl: Earthwatch Radio. See S 2355.
2357 Costa Rica, R Peace Intl: Earth and Sky. See S 2357.

Saturdays

2300 Costa Rica, R Peace Intl: This Way Out. A lesbian and gay radio magazine.
2300 USA, KTBN Salt Lk City UT: The Coral Ridge Hour. See S 1500.
2300 USA, WWCR #1 Nashville TN: Tell the World. Horace Bridges.
2300 USA, WWCR #3 Nashville TN: The Hour of Courage. See NAm 0530.
2315 USA, WWCR #1 Nashville TN: The Blessed Word of Life. Perry L. Johnson preaches in Spanish and English from Washington, DC.
2330 USA, WWCR #1 Nashville TN: The People's Gospel Hour. From Nova Scotia, Canada, Perry Rockwood interprets scripture for Christian life.
2345 Costa Rica, R Peace Intl: Hightower Radio. See S 2345.
2355 Costa Rica, R Peace Intl: Earthwatch Radio. See S 2355.
2357 Costa Rica, R Peace Intl: Earth and Sky. See S 2357.

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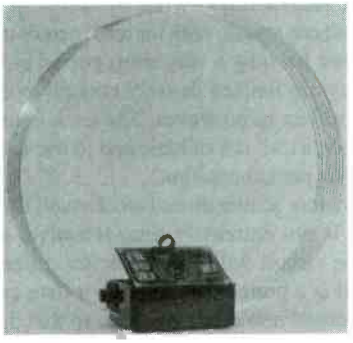

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monitor@rac.ca

On the Coattails of Meteors

August is the month when children look up at the sky and wish on a shooting star. Although this may be the month when shooting stars are most visible, these meteors bombard earth's atmosphere continuously, day and night, and they range in size from the very small to the very big. When meteors burn up in the earth's atmosphere, they leave behind a highly ionized trail, and like the ionosphere, this trail can be used to reflect radio waves.

What can you do with ionized meteor trails? They last for only a very short period of time, but they are ionized densely enough to effectively reflect radio waves. The trick is to find out when a trail is available and to use it while it is at its peak ionization.

A meteor scatter circuit works well for data which is not extremely time-sensitive, given that the circuit will operate better on certain days. It is a prerequisite that your data can be compressed into dense packets, so that during the short operation of the circuit you will be able to transmit a large volume of data.

Each site is equipped with a transmitter that sends a pulse containing information towards a section of the sky where meteors are known to be prevalent. If there is no ionized trail, the colocated receiver does not hear the reflected pulse of information and the transmitter tries again until an echo is received. (If you are visualizing a radar system, you are on the right track.)

When an echo is received, the system rapidly transmits packets of information destined for another station. To make sure that the packets have been properly received, the receiving station retransmits the packet to the originating station for comparison. If the checksum of the returned information is not correctly matched, the originating station will send the packets again. This back and forth exchange will continue until the packets have been correctly received and authenticated.

In a variant of this system, the originating system dispenses with the "pinging" component and simply transmits data continuously and waits for the receiving stations to repeat the data for checksum comparison.

The receiving stations can be located anywhere around the main transmitting station as long as their antennas are looking at the same area in the sky; this means that any station can talk to any other station on the circuit while the meteors are streaking through the sky.

A very similar communication system is often employed by the ham community which uses the reflection off the auroral curtains to communicate on VHF and/or UHF with other stations. Because of the constant movement of the auroras, the quality of the signal is not optimum, but it is still possible to exchange some information using this technique. In a previous column I did talk about the quality of an HF signal traveling across the auroral zone. If you use the aurora itself to reflect your signal you will definitely suffer signal degradation.

You can find more information on meteors and radio at **www.imo.net/radio/** and at **medicine.wustl.edu/~kronkg/**

Here are some upcoming meteor showers: Perseids August 11, 5 days; Orionids, October 21, 2 days; and Geminids, December 13, 3 days. They'll not only provide you with some great viewing, but be sure to listen for some unusual stations on FM being reflected by their ionized tails.

Next month we start the DX season, so get your antenna ready and don't wait till the snow and ice drag it down.

OPTIMUM WORKING FREQUENCIES (MHz)

For the Period 15 August to 14 September 1998 Flux=140 SSN=100

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

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

PROGRAMMING SPOTLIGHT

John Figliozzi
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End of the Year Review

What are ya—outaya mind, Figliozzi? What's this end of the year stuff? It's only August!

Well, before you sign that order to have me committed, let me make my case.

There are all sorts of calendars. There are fiscal years. Several religions have their own way of recording the passage of time. So, too, I submit, does the shortwave hobby. There is a pronounced lull in DXing activity during the summer months. Whether due to higher static or better weather, reduced member contributions to monitoring columns and thinner club publications clearly demonstrate this fact.

However, in September this trend reverses. A renewed enthusiasm for the hobby emerges and many speak of the start of the "DXing season." In fact, this magazine is planning to put its primary focus on shortwave in September. I ask you—why else would anyone consider the month of September something to celebrate? Vacations are over; we go back to work and school; the weather for most of us starts to deteriorate.

With September, then, as the start of the year, August must be the end. That's just how it is for we shortwave listeners and DXers. Your apology for questioning my sanity is accepted. Now, on to business.

Mea Culpa

It is customary at year's end to step back and review one's activities and make amends where necessary.

The gathering of information about shortwave programming can be a nasty and unforgiving business. For every cooperative station, there seems to be a fistful of uncooperative ones. Send a note specifically requesting program information (even explaining what it is!) and, more often than not, only a frequency guide comes back. Sometimes the information sent is incomplete, already dated or just plain incorrect. Stations are also increasingly in the habit of implementing last-minute changes in their schedules with little or no advance warning.

The arrival of the Internet has certainly been a help, but it takes considerable and persistent communicating, writing, listening and verifying to document the programming offered there by international broadcasters. Add to that the lead time necessary to get information into print and the stage is well set for changes and errors to occur. And, I am bound to report, they have. So, let's set the record straight.

Back in November, we wrote of science and technology programs. Here's what's changed since then:

KEY TO ABBREVIATIONS

S-Sunday; M-Monday; T-Tuesday; W- Wednesday; H-Thursday; F-Friday; A-Saturday. *- to end of program

BBC - *Science Extra* now is more eclectic in the programs and topics it includes. *Seeing Stars* remains, but the other segments noted have either not appeared as originally planned or have not appeared at all for some time. The 0930 slot to the Americas/Europe has been dropped. *Waveguide* has been removed from the rotation into its own monthly slots. (Check the quarterly listing on page 39.) Times for the two youth-oriented programs (*Pop Science* and *The Lab*) turned out much differently than we had guessed. *Pop Science* runs as a periodic 6-8 week series alternating with other series assigned to new BBC weekly youth programming slots (Americas/Europe: S1730, M1430, T0730; Africa: M0230, 1430; Asia/Pacific: M0730, H1615). *The Lab* also runs as a periodic 6-8 week series in slots starting 15 minutes after those set out above.

Deutsche Welle - The *What's New* rotation, which was replaced by *SciTech*, has in turn been replaced by *Spectrum*, a weekly 1/2 hour science/technology magazine, which has also been retimed (A1615, 1915; S0315).

HCJB - The T0830 broadcast of *El Mundo Futuro* has moved to T0730.

R. Australia - *Innovations* has moved from S0130 to S0830 and has added F2130. *Science File* is no longer heard. *The Science Show* airs only once: A0905.

VOA - has dropped its long-form science programming so *New Horizons* is no longer aired.

Voice of Russia - Revised air times for *Science and Engineering:* S0511*; M0311*, 0611*, 2011*;T0211*, 1611*; W0411*, 0711*, 1411*, 1911*; H2011*; F0211*, 0611*, A0411*, 1411*, 1911*.

In February, we looked at various successful 30 minute formats.

R. Sweden- We failed to mention that *Nordic Report* airs on the first Thursday of each month.

R. Vlaanderen Internationaal- English to North America has moved to 1230 daily. *Rockspot*, focusing on a contemporary Flemish music group, has replaced *Living in Belgium* on Wednesdays.

YLE R. Finland- Daily broadcasts to North America have moved to 0200. A Sunday morning broadcast remains at 1230. Here's the new grid:

0200	Daily	*Compass North*
0205	S	*Capital Cafe*
	M	*Nordic Update*
	A	*Compass North* Selection (best reports of the week from *Compass North*)
		Nordic Report [2nd Sat. only]
0214	A	*Starting Finnish*
0224	M-A	*Finnish Press Review*
1230	S	*Compass North*
1235	S	*Capital Cafe*

Nuntii Latini apparently is no longer broadcast to North America.

The March column examined environmental programs.

R. Australia- The M2130 airing of *Earthbeat* has been discontinued.

BBC- The W0330 broadcast of *One Planet* has moved to W0530 until November.

Deutsche Welle (DW) - *Man and Environment* has added a T1645 broadcast.

In April, we profiled the voices out of Africa. We were told (by the Executive Editor of **Channel Africa** himself!), there is no program titled "Africa at Six." *Dateline Africa* airs M-F at 0300, 0400, 0500 and 0600. *Newswatch* is broadcast M-F at 1500, 1600 and 1700.

In May we catalogued the programs broadcast to Africans from outside the continent. The **BBC** has changed *The Art House* to *Art Beat*, but the program itself remains very similar. The daily features at 1615 and 1901 have undergone a change. *Money Focus* and *Jive Zone* have apparently been dropped. Here's the new line-up:

M-*Fast Track* (African sport)
T-*African Perspective*
W-*Talkabout Africa*
H-*Art Beat* (at 1615 only; *Assignment* at 1901)
F-*Friday Fast Track* (African sport)

DW has added additional times (T-F0630) for *Good Morning Africa*.

Finally, in July's column, because information was not yet available, we guessed (gasp!) and consequently came up with a partially incorrect schedule for the three **VOA** *Communications World* segments on Saturdays. Here's the correct grid:

Segment A (media and international broadcasting news)-0136, 0536, 1136, 1736
Segment B (longer reports and interviews)-0336, 1336, 1936
Segment C (audience feedback and other reports)-1536, 2136, 2336

There! Confession *IS* good for the soul. I feel much better and ready to start fresh in the new shortwave year. So, until the new year (September, that is), good listening!

SKIP AREY, N2EI
tjarey@home.com

Summertime Medium Wave Fun

Traditionally, the summer is perceived as being a down time in the world of medium wave monitoring. The noisy atmospherics tend to put a damper on most long distance listening. Most of the clubs reduce their publication schedules for this period. It would appear that a period of general malaise descends over this normally vibrant aspect of the radio monitoring hobby.

However, if you are a truly dedicated and tenacious AM broadcast band monitor, you will find plenty to do to keep yourself busy during this period of reduced listening. Further, you may even be able to do a few things to help you and your listening colleagues along the way. Oh and, yeah, you're gonna have some fun too!

I find, especially among beginners to medium wave monitoring, a general neglect of nearby and local stations. In the joy of the pursuit of long distance signals (DX) those easy "slam dunk" catches around the corner sometimes never even get the briefest of entries in a monitor's logbook. This is unfortunate, because you can be missing out on some of the best memories of your hobby history. I often quote my own personal failing in this area as an example.

The station that served as background music for my formative years was WIBG 990 kHz. Those of you who consult your current station guides will not find these call letters assigned to a station on 990 kHz in the city of Philadelphia, PA. Alas, that change occurred in the early 1970s with a format change from Rock and Roll to Religious and the station is now in the Atlantic City area on the frequency of 1020 MHz. So here I am, a dedicated radio monitor and long time medium wave DXer, who flat out missed the opportunity to have a confirmation from a station that was not only important in my life but a big part of radio music history.

I'm sure most of us in the hobby, if we are honest with ourselves, missed one or two stations we would just love to bring back on the air just to get that confirmation that is so obviously missing from our collections. Well, learn from my mistakes: while those long distant stations are buried under the static crashes of summer, it's time to do a good local band scan and get things caught up in the log book and confirmation areas.

Unless you are really out in the middle of Nowhere U.S.A., you should have a fist full of AM broadcast radio stations that fall within fifty miles or so of your monitoring location. Also, you can count on maybe another half dozen or so stations that consider your location as falling within their "coverage area" even though they are a bit more distant. Warm up the receiver and break out a pencil and paper.

Start at the bottom and work your way up the AM broadcast band taking special note of your identifiable local stations. If something really juicy and distant shows up, go ahead and log it — you're still a DXer after all. But keep focused on your mission. List your locals with special attention to noting any changes. Some stations change their formats more often than I change my cat's litter box. Report any format changes from the last time you listened in.

Another thing that changes frequently these days is callsigns. Again, take notice of any such changes and note them for further reference. With the advent of the new chunk of frequencies above the traditional AM broadcast band (and other more traditional reasons), some stations are moving up the band. And, of course, anything that gets vacated is going to be snapped up by somebody else at some point in time. Log those frequency changes, too. Also note if stations are going on or off the air at different times from the norm due to construction, maintenance or financial difficulties.

Get the picture? Anything that is a change from the status quo is worth a note. While you're at it, remember to keep an eye on your local newspaper's business section and (if it has one) radio column. Often such columns will note changes in station ownership. A new owner is often the precursor of a format change or other changes to the station's life.

In fact, here's another strange but true story. I was eating dinner in a local restaurant with a few friends, when a few tables away a loud discussion between two men got louder. On what appeared to be the brink of violence, one of the two men got up and left the restaurant. One of my compatriots was quick to point out that these two men were partners in a recently licensed radio station. I filed this away in my memory bank and was not all that surprised when a few weeks later the station went "dark" for an extended period while the ownership went through a period of regrouping ... You never know where information about your local station's might turn up, so keep your eyes and ears open.

Share the Wealth

Since these stations are local to you and most of what they broadcast is just interference to your ability to hear those longer distant signals, you may be wondering why I want you to take such copious notes of your local station changes. If you have been reading this column for a while now you should know what I'm going to say next: I want you to share this information with your fellow radio monitors! Your extra effort in this area can be helpful to other hobbyists when they are trying to identify your local station from their far away listening posts. Likewise, their efforts on your behalf will help you when you go hunting for DX. So you need to get this information into the hands of your compatriots.

How can you do that? Well, columns such as American Bandscan here in the pages of *MT* are always looking for contributions of

material of interest to the medium wave hobby. Further, you can reach your fellow medium wave mavens through your friendly medium wave hobby club. What?! You're not a member of a medium wave club? Hmmm. Time to get with the program, Bunky. There are two major national medium wave clubs in operation these days.

The **National Radio Club** was founded in 1933 and has served mediumwave monitors exclusively throughout its history. The club publishes a newsletter called *DX News* 30 times yearly; it contains recent loggings from members, station information, features on equipment and monitoring techniques, and even construction projects for antennas and accessories. Of additional use to the beginner is an exhaustive reprint service of articles from past issues that will help a newcomer find out information about particular areas of interest.

The club also produces several publications that serve as essential tools for AM monitors. The club holds an annual convention where members can get together and share radio experiences each Labor Day weekend. More information about this club can be had by writing: National Radio Club: Paul Swearingen, Publisher, P.O. Box 5711, Topeka, KS 66605-0711. A sample bulletin and information about current membership rates can be had by sending first class postage to this address.

The **International Radio Club of America** was formed in 1964 and is almost identical to the NRC in its offerings to the beginning hobbyist. Their publication *DX Monitor* comes out 34 times per year. With its west coast headquarters, this club might prove particularly useful to people on that side of the United States. More information is available by sending first class postage to International Radio Club of America, c/o Ralph Sanserino, P.O. Box 1831, Perris, CA 92572-1831

My suggestion is you send out for sample bulletins from these organizations and make your choices based upon what you find. Many serious monitors find enough in both publications to belong to both clubs. But we're not just here to recruit new members to these clubs. Let's get back to all that information you have been compiling about your local stations.

That local data may be of only passing interest to you on your way to medium wave DX stardom. However, that information you have gathered might just make the difference in a logging or two for someone else in your chosen club. Compile your data based upon whatever format is common to your club or other publication such as *MT* and send it on in. Remember, while you're taking stock of your locals, your compatriots will be doing the same in their areas. Your info helps them and their stuff gives you a leg up on your future DX sessions when the season begins to turn in the medium wave monitor's favor. This process of *noblesse oblige* is the very foundation of medium wave clubs, or any other monitoring club for that matter.

PR for the Hobby

Now let's take a bit of a turn away from the monitoring aspect of the hobby toward the very necessary public relations aspects of radio monitoring. As we have often said in *MT*, no station of any shape, size or band is under even the slightest obligation to respond to your hobby efforts. Signal confirmation remains a act of essential good will. With increasing budget constraints on any business (and *never* forget that radio is a business to the people on the other side of the microphone) radio stations have even a bit less will (good or otherwise), when it comes to responding to our requests for confirmation.

These summer months of low listening activity can be an ideal time for you to help your fellow hobbyists in yet another way. You can take a little time to reach out personally to your local stations to let them know about the radio monitoring hobby. Throughout my radio hobby career I have always made it a point to visit my local broadcast stations in an effort to make our hobby better understood by the people in the radio business. In the over twenty years of maintaining this practice I have never had a bad experience. I have even made a few friends for both the hobby and myself.

Finding out your local stations' office and studio locations is as easy as flipping through your area telephone book. It's a common beginner's mistake to expect the radio studios to be at the same location as the transmitter site. Once you have an idea of where you need to go, make yourself presentable. Remember, you'll be representing the whole hobby to these folks: First impressions can be lasting.

During normal business hours, you can usually get a few minutes with either the station manager or engineer. Sometimes you'll have to settle for a salesperson or other office associate. Some stations have big staffs and some places might have only one person manning a few automated systems. Keep smiling; even a salesperson can sway a station's attitude toward the hobby. Bring a few sample club bulletins or handout sheets about the hobby to share freely with those you encounter. Remember that these folks are in fact working, so don't take up too much of their time. Do your best to clue them in on the nature of reception confirmation and let them know how important it is to the hobby. If at all possible, try to find out to whom any confirmation queries should be addressed. Getting that confirmation letter in the right hands is often half the battle.

Summertime logging of your local stations and doing a little PR for the hobby is just another way to have fun with medium wave listening.

ASK BOB

ANSWERS TO YOUR RADIO QUESTIONS

Bob Grove, W8JHD
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Q. *I have a 1977 JVC portable TV, and the original Sanyo NiCd rechargeable battery pack only recently gave up. Have you ever heard of a pack lasting that long—and where can I find another one just like it?! (Vern Batt, Cheektowaga, NY)*

A. That's a pretty long time, and let me know when you find another one just like it! Five years is a good average for a well-maintained NiCd. In my experience the larger cells and batteries seem to hold up better than the small, probably a result of the extra room to absorb destructive growth of short-circuiting crystal "whiskers," plus more electrolyte (chemical) as well. Finally, the reserve current capacity of the larger units are under-taxed during discharge, while the small units are more deeply cycled.

Our local telephone company gave me some of their surplus—and very big—NiCds about 20 years ago; they had already served ten years in constant use, and most were still in superb shape.

Q. *The numeric sequence on the pushbutton telephone is just the opposite from that on my calculator. Why the difference? (Mark Burns, Terre Haute, IN)*

A. The two keyboards were developed independently of one another. The calculator is ergonomically designed so that the numbers grow larger as the fingers extend farther and farther from the function keys at the bottom. In this respect, it is similar to touch typing. Telephoning is a more manual, non-repetitive effort, and since we learn to read left to right, top to bottom, it is more logical for the keys to ascend in value the same way.

Q. *Does the so-called "Power Tip" advertised in the spring/summer issue of the AAA auto accessory catalog really work? It says it was developed by military communications experts for Operation Desert Storm and that it boosts reception of cordless phones, eliminates static, and brings in distant stations loud and clear. (Mike, Modesto, CA)*

A. I've never seen one, but military personnel who have seen it say that it wasn't developed for communications purposes in Desert Storm and, other than protecting your eye from being poked by the top of a whip antenna, it doesn't do anything. I'm more inclined to believe them than the Madison Avenue promoters who have blitzed the mass media with this little plastic ball which sells for up to $20.

Tell you what. Anyone who has one of

Bob's Tip of the Month

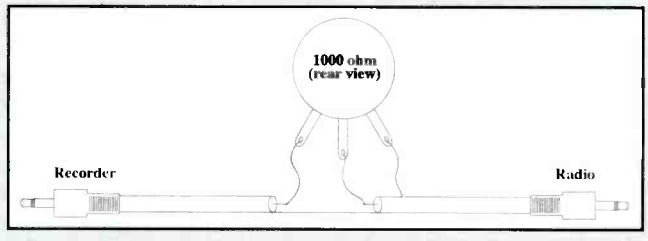
The Proper Way to Record from a Radio

I often hear from hobbyists who attempt to record signals from their shortwave and scanner receiver and are surprised by the distorted, mushy sounds which often result. What causes this and how can it be perfected?

There are two problems here. First, the high sensitivity of the mike or auxiliary pickup jack on the tape recorder is bombarded by the high audio output of the external earphone/speaker jack of the receiver. Second, the impedance of the audio output of the radio is in the 4-8 ohm range while that of the tape recorder input is more like 600-1000 ohms.

The easiest way to cure the problem is to check your parts bin or go to Radio Shack and get a 1000 ohm potentiometer (actually, probably nearly anything from 100 to 10,000 ohms will work, but stick close to 1000 ohms if possible). This can even be a tiny trimpot since you will only need to adjust it once.

Next, get an audio cable of the appropriate length and outfitted with the correct mating plugs. Cut the cable near its midpoint to insert the pot. Trim the cut leads of the cable(s) to prepare them for soldering.



With the rear of the pot facing you and the three solder lugs downward:

(1) Solder the two shields of the cables to the lower right lug;

(2) Solder the center wire from the radio's earphone jack to the center lug;

(3) Solder the remaining center wire from the recorder input jack to the lower left lug.

Now you can adjust for proper levels as well as maintain reasonable impedance match.

these little devices and wishes to send it in, I'll personally do a review of it and print the results in *MT*. If it's a legitimate product, I'll objectively report it as such; if it's a fraud, I'll report that as well. Fair enough, Madison Avenue?

***Q.** How old is the Radio Shack Patrolman SW-60 portable radio? I came across one recently and wonder if there are any modern equivalents. (Samuel Guzman, Brentwood, NY)*

A. A series of fine portables came out from Radio Shack in the 1970s; my personal favorite was the VHF/UHF Patrolman 6, priced in the $60 range. Another series, the AX-190 and SX-190 amateur and shortwave receivers, was highly regarded, as was the lower cost DX-150 series.

The 1980s decade was rife with shortwave portables like the SW-60. While there are many low-cost, multiband portables now on the market, in my opinion none comes close to the construction, performance, or sound quality of the earlier products from a variety of manufacturers, including Radio Shack, Toshiba, Panasonic, Sony, and others.

Starting in the 1950s, Japanese-manufactured consumer electronics began permeating the American marketplace. At that time, complacent consumers and American manufacturers alike scoffed at the idea of inferior merchandise providing much competition. As time went on, however, the equipment became better quality, and we saw many U.S. companies fold under the pressure. At the present time, there are no U.S. manufactured consumer TVs or radios. But the Japanese economy has also gone full circle.

As the Japanese electronics industry experienced incredible success and consequent growth, their profit margins lagged as they struggled with competition, increased wages, operating costs, and a change in the value of the yen on the world market. Japanese marketers down-shifted, moving their manufacturing to Taiwan, Hong Kong, and mainland China, often at the expense of quality control. At this writing, there is growing global concern for the stability of the Japanese economy.

***Q.** What is the simplest way to calculate the recharging time for a NiCd and NiMH cells and batteries? It seems that dividing the battery capacity in milliamper-hours mAH) by the charging current in milliamps (mA) doesn't provide enough time. (Lynn Gilliland, King George, VA)*

A. Just as no system is 100% efficient (except our *MT* editorial staff!), there is heat wasted during the recharging cycle, and when batteries are recharged, the voltage rises, opposing the incoming current and extending the required charge time.

Most manufacturers have already calculated the approximate charging time recommended for their appliances when they specify or supply the batteries and charger, but a good rule of thumb is to charge a discharged battery at 10% of its rated current for 12-16 hours. Thus, a 600 mAH battery would be charged at approximately 60 mA for 12-16 hours, or proportionately longer for lower charge current.

Some newer rechargeables can be fast-charged; use the manufacturer's recommendations to avoid damaging the battery.

Keep in mind that a NiCd battery is considered fully discharged when each cell has dropped from its normal 1.25 volts to 1.0 volt. Thus, a 12.5 volt NiCd battery is fully discharged at 10.0 volts. If discharged to near 0.0 volts, it may suffer irrecoverable polarity reversal.

Don't worry about mildly overcharging NiCds unless they feel hot (warm is OK); this causes "outgassing" (or even explosion!) which leaks chemical electrolyte, destroying the battery. In modern NiCd chemistry, "memory" is not a problem; the battery may show some minor voltage depression from not allowing it to discharge enough before recharging, but one or two correct discharge/charge cycles will correct that.

Questions or tips sent to "Ask Bob," c/o *MT* are printed in this column as space permits. If you desire a prompt, personal reply, mail your questions along with a self-addressed stamped envelope (no telephone calls, please) in care of *MT*, or e-mail to **bgrove@grove.net**. (Please include your name and address.) The current "Ask Bob" is now online at our WWW site: **www.grove-ent.com**

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Getting on the Air

Last month we began discussing antennas and loading coils for the license-free "Lowfer" (160-190 kHz) transmitter described in the June issue of *MT*. This month we'll describe the construction of a typical loading coil, and discuss the grounding requirements for an effective transmitting antenna.

Loading coils and antennas are probably the trickiest part of designing an effective station. It is impossible to predict the exact dimensions and number of turns required in a loading coil because of differences in antenna length, top hat size, transmitter impedance and ground conductivity.

Perhaps the best approach is to look at what has worked for many lowfers on the air today. Lyle Koehler (K0LR) estimates that for a typical 50 foot base loaded antenna with a good-sized top hat, a 2500 microhenry (µH) loading coil will be required. A similar antenna without a top hat would require about 5000 µH of inductance. (Base loaded antennas that are shorter than 50 feet but include a top hat will probably fall somewhere between these figures.)

As a starting point we'll use Lyle's handy "awg-coil" program (available for download at: **http://www.qsl.net/k0lr/** to determine the physical dimensions of a 2500 µH and a 5000 µH coil respectively. Let's assume our coil will be wound with #14 AWG (1.626 mm) insulated building wire, although smaller sizes (down to 20 gauge) could also be used with a different number of turns. For a 2500 µH coil, we come up with the following results:

Coil Length: 8.72" (221.5 mm)
Coil Diameter: 19.38" (492.3 mm)
Number of Turns: 68
Wire Length Required: 345.7 feet (105.4 Meters)

A 5000 µH coil requires these parameters:

Coil Length: 11" (279 mm)
Coil Diameter: 24.42" (620.3 mm)
Number of Turns: 86
Wire Length Required: 549 feet (167.3 Meters)

With this information, you can begin constructing your own loading coil. (Review last month's issue for suggested coil form materials.) Here are some additional reminders:

--For best coil "Q" a single layer winding is recommended. Avoid overlap of turns.

--Experience has shown that the best efficiency is achieved with spacing between turns equal to the wire diameter.

--Several taps should be included along the coil for coarse tuning. These can be made by twisting small loops in the coil windings every two inches or so along its length. In addition, an air-spaced capacitor (365 pf or so) should be placed across the coil to allow fine tuning.

--The coil must be protected from the weather if it is to hold its inductance value during rain, snow or humidity changes. Many operators place the coil inside a small plastic garbage pail, or bucket, and mount it close to the base of the antenna.

Grounding/Radials

Besides the loading coil, a good ground system is perhaps the next most critical element of a lowfer antenna. An 8 foot copper ground rod is not enough. A series of radial wires (6 to 12 of them) should be extended out from this central ground point at least as far away as the antenna is long. The longer and the more the radials, the better. Many operators prefer to bury the radial wires just below the soil line for safety and aesthetic reasons.

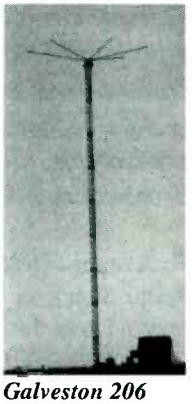
It would not hurt to terminate several of the radial wires with ground rods at their far ends. In addition, any other available grounds (nearby well casings, fences, water pipes, etc.) should be tied into the radial system. All ground connections should be soldered if possible, to ensure a good connection.

As an alternative to radial wires, some operators have reported good success with wire mesh or chicken wire. They lay out several sections of it on top of the ground and solder the sections together to form a square of about 50 feet per side. Small U-shaped wires can be used to hold the screening close to the ground.

Tuning the Antenna

Here again, we can't hope to cover every detail of tuning the transmitter to the antenna. It is usually a lengthy process involving much trial and error. The main objective is to get the maximum possible RF current flowing into the antenna, which translates into maximum field strength.

Tuning can be accomplished by changing the feedpoint tap on the loading coil and adjusting the capacitor installed across the coil until maximum current/field strength is obtained. It may be helpful to have an assistant monitor your signal strength at a distance of one-half mile or more to verify your tuning results. It may be necessary to repeat the process several times before the best performance is obtained from the antenna.



Galveston 206 kHz "G" beacon

Although this photo shows a commercial longwave antenna (Beacon GLS/206 kHz in Galveston, TX), it shows a top hat arrangement that can be applied to homebrew lowfer antennas. Photo by Richard Ashley (TX).

Recommended Reading

Lyle Koehler has written an excellent tutorial on LF antennas at **http://members.aol.com/us66soft/loferant.htm**. If you are not on the web, drop me an SASE and I will send you a copy. The paper deals with tuning many different types of antennas.

Another text that I highly recommend is *W1FB's Antenna Notebook* by Doug DeMaw. This book is published by the American Radio Relay League, 225 Main Street, Newington, CT 06111. It deals extensively with vertical antennas and how to tune them to resonance. Although most of the text is aimed at ham band antennas, the same principles can be applied to the lower frequencies of the radio spectrum.

This completes our three part series on assembling a basic, lowfer transmitting station. By necessity, we have not covered every detail of construction, but hopefully it will inspire many of you to get out the soldering iron and experiment with this special corner of the radio hobby.

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New AM targets

If you were to announce plans to build a new AM station, many people would say you were wasting your money, AM radio is a dying service. Only time will tell whether they're right, but one thing's for sure — you'd have plenty of company.

A cursory check of the FCC's AM database shows 46 applications for completely new AM stations on file. There's also a handful of "mutually exclusive" applications — requests to take over a frequency already in use by another station in the same area. Changes in FCC regulations have made it more difficult to revoke the license of an existing station — don't expect to hear any of your locals replaced by a competing applicant. The sidebar lists potential new DX targets.

As you might expect, the lower population densities in the West mean many of these stations are appearing in that part of the country. A new "graveyard" station on 1340 in Elko, Nevada, went on the air last year and has already been received by a Scandinavian DXer! Another new station, KPAM-860, signed on the air from suburban Portland, Oregon, in October of last year. KPAM airs religious rock music under the slogan "Christian Hit Radio."

Pacific Northwest DXers may also note the KPAM programming on a second frequency in the area; *Radio World* reports KPAM has purchased the construction permit for another new Oregon AM station. KZTU-660 is licensed to Junction City, a Eugene suburb.

Expanded-band news

Two new expanded-band stations have been testing, while two more have begun regular operations. KDSX-1700 Denison, Texas, ran a test broadcast with Morse Code IDs for the National Radio Club on May 2; this test was heard from Idaho to Michigan. At my location near Nashville, KDSX was much stronger than WCMQ Miami. Also reported testing is WTDY-1670 Madison. Despite several attempts, I have yet to log this station from my Wisconsin hometown.

The most widely-heard new station is WNML-1670 Warner-Robins, Georgia. It carries the Sports Fan satellite network and uses the slogan "The Sports Animal," simulcasting with their FM station on 96.5 at Gray, Georgia — in fact, when I first heard them, the IDs were only for the FM station.

Another new expanded-band station is KQXI-1690 Arvada, Colorado. This is a religious station, simulcasting "Kingdom Radio" on 1550. DXer reports suggest this one isn't getting out very well, and may not yet be using full power.

A fifth station has been logged in the expanded-band by many DXers, but doesn't appear in the FCC Database. KZYP-FM Pine Bluff, Arkansas, is being heard on 1685 kHz. KZYP is co-owned with two AM stations (KCLA-1400 and KPBA-1270); presumably one of these two stations has a transmitter fault generating a spurious signal. This kind of thing has happened before, most recently with KDAA-1590 in Missouri. Be careful about trying for verification: Station personnel are understandably reluctant to verify in writing that they've been transmitting on the wrong frequency!

Bits and Pieces

- The entire DXing world was saddened to learn of the passing of Hank Holbrook in April. Hank was active in just about every part of the DX hobby, and his name is well known to both AM and FM broadcast DXers. He'll be missed!
- On a happier note, I want to wish a belated happy retirement to Tom Bryant, formerly of WSM Radio. Tom is an active AM and TV DXer and has provided WSM QSLs for hundreds of listeners around the world. He has provided hours of hard work to preserve and strengthen the Worldwide TV-FM DX Association. And, a couple of years ago, he was named "DXer of the Year" for his efforts.
- The same stagnant high pressure area that trapped smoke from Central American fires along the Gulf Coast also caused excellent tropospheric propagation conditions in mid and late May. I logged FM and TV stations as far away as San Antonio, Texas (and a tentative logging of a Mexican FM station at over 1,000 miles), and other DXers closer to the Gulf did much better. Those interested in distant FM and TV reception should keep a close eye on the weather maps. This type of weather pattern can repeat at any time of year along the Gulf Coast.

Pass along your DX to P.O. Box 98, Brasstown NC 28901, or via the Internet to **w9wi@bellsouth.net**. Good luck!

NEW AM STATION APPLICATIONS ON FILE

Frequency	City	Day power	Night power
720	Hanover, NH	50,000	500
760	Palm City, FL	2,500	250
780	Sabana, PR	500	350
800	Sauk Rapids, MN	2,600	850
830	Hartselle, AL	285	285
830	Palmetto, GA	50,000	250
840	Golden Gate, FL	250	250
870	Christiana, DE	250	210
870	Chesterfield, SC	400	none
880	Florida City, FL	1,800	450
880	Beaufort, SC	500	none
890	South Tucson, AZ	10,000	1,000
890	Julian, CA	250	330
890	Longwood, FL	50,000	500
890	Buena Vista, GA	2,500	none
890	Bernalillo, NM	4,000	1,000
890	Anthony, TX	2,500	1,000
950	Easley, FL	5,000	1,000
1030	Tye, TX	5,000	1,000
1040	Pinetop, AZ	10,000	1,000
1060	Woodburn, OR	250	none
1060	Lancaster, SC	400	none
1090	Hawthorne, NV	50,000	250
1100	Palm Beach, FL	2,000	950
1100	Umatilla, FL	4,900	200
1180	Havana, FL	1,000	1,000
1180	Payne, GA	50,000	2,200
1180	Roswell, NM	1,000	460
1200	Thonotosassa, FL	5,000	230
1240	Seward, AK	1,000	1,000
1340	Rupert, ID	1,000	1,000
1400	Marlborough, NH	1,000	1,000
1400	Silverdale, WA	1,000	1,000
1430	Palm Bay, FL	2,500	none
1440	Sterling Park, VA	500	none
1450	Colona, CO	1,000	1,000
1490	Kinston, AL	660	660
1530	Hartselle, AL	1,000	none
1550	San Jacinto, CA	1,000	700
1560	Combs, KY	1,000	none
1570	Lebanon, OR	1,000	250
1570	Parkersburg, WV	1,000	280
1580	Redding, CA	10,000	none
1600	Blaine, WA	50,000	10,000

OUTER LIMITS

THE CLANDESTINE, THE UNUSUAL, THE UNLICENSED

George Zeller
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Nigerian Turmoil Spawns New Clandestines

The fatal heart attack suffered in June by Nigerian President Sani Abacha increased political unrest in this African country. An already brisk clandestine radio scene saw new stations and reactivations. In *Cumbre DX*, Hans Johnson reported **Radio Save Nigeria Broadcasting Service** as a reactivation of **Radio New Nigeria** from the Juelich, Germany transmitter. It's on for a half hour using 5085 kHz at 0530 UTC and 9400 kHz at 1930 UTC. Another new operation is **Egbe Omo Yoruba** from a group of Yoruba state separatists. It's heard Mondays on 15460 and 17665 kHz for an hour at 2000 UTC.

Veteran Nigeria clandestine **Radio Kudirat** is on 6205 kHz for an hour at 1905 UTC daily. The **Voice of Free Nigeria** uses 11645 and/or 12015 kHz for an hour on Saturdays at 1900 UTC. **Radio Save Nigeria Broadcasting Service**, relayed via **WGTG** in Georgia, has half hour shows on 5085 kHz at 0530 UTC and 9400 kHz at 1930 UTC. All of these stations have provided fascinating listening lately, including coded messages of uncertain validity or destination.

During fast-moving political events like this, all of us need immediate information that can't make the deadlines of magazines and newsletters. Nick Grace's award-winning Clandestine Radio Intel web site at **http://www.qsl.net/yb0rmi/cland.htm** remains a great place to find the latest station and schedule changes.

Shortwave Pirate Activity

The North American shortwave pirate bands remain extremely active, particularly on weekends and holidays. Given summer propagation, station operations are less evident during midday hours, but are increasingly audible from a couple hours before sunset to about three hours after the sun goes down. Despite higher seasonal static levels, many pirates are coming through. Our list of pirates heard by our readers last month all used frequencies within 500 kHz of 6955 kHz on your dial. Joe Mama of **Radio Nonsense** says he's also been active on 27500 kHz around 2100 UTC. Station formats and contact maildrops (when known) are listed.

Alan Masyga Project- Alan Parsons Project music dedicated to a DXer. (Providence)
Anteater Radio- Peter Worth's truck driving classic rock and comedy, supplemented by relays of other pirates. (Belfast)
Betty Boop Radio- Rollo Verndigh sends the QSLs we see this month. (Providence)

Nostalgia Pirate Radio from Betty Boop

Deliverance Radio- Dueling banjos and squealing noises, but not much else. (None)
Free Hope Experience- Major Spook with rock music and pirate advocacy, sometimes In Morse code. (Blue Ridge Summit)
KAMP- Rock music with I. M. Nutz using the X-Files theme song. (Blue Ridge Summit)
KBLK- Rap music mixed with jokes about pirate DXers. (Providence)
KXXX- Rev. X and an "Extreme Pirate Radio" slogan. (Blue Ridge Summit)
Mystery Radio- The Shadow with instrumental new age music, lately with TV show themes. (Stoneham)
Omega Radio- Dick Tator hosting a progressive Christian rock format. (Moline)
One Voice Radio- Joe with health tips for DXers. (Belfast)
Radio 510- DJ Stevie, rock music, and interviews from the 1998 Winter SWL Festival in Kulpsville, PA. (Basel)
Radio Azteca- Bram Stoker's hilarious and long running DX parody station. (Belfast)
Radio Eclipse- Steve Mann with rock, commercials, and skits. (Providence)
Radio Fan Man- An alternative rock Europirate with USA relays; the ID is *not* Radio Sandman. (Wuppertal)
Radio Nonsense- Joe Mama, rock, comedy, and pirate scene discussions. (Belfast)
Reefer Madness Radio- Harry Anslinger's heavy handed anti-drug message is a parody. (Belfast)
Rock-It Radio- This West Coast oldies rock program often gets pirate relays. (Ventura)
Scream of the Butterfly- A new one, with Frank Zappa providing the title music. (Providence)
Take It Easy Radio- Desperado hosts classic rock songs. (Belfast)
Voice of Pancho Villa- Stevie of **Radio 510** has been relaying this annual feature of the Winter SWL Fest. (Blue Ridge Summit)
Voice of South Dublin- Entertainment and information from Ireland (Dublin)
Voice of Stupidity- A novelty music format, but they're not smart enough for a maildrop. (None)
WLIQ- Rock and blues music from host Mo Joe. (Blue Ridge Summit)
WACK- This new one is a real phenomenon, with two hour live shows of rock music and a listener phone line. (No address, 888-959-8177 or announced number for reports)
WARR- Captain Nobeard with rock and marijuana advocacy. (Belfast)
WKND- Radio Animal, the famous "Grenade" transmitter builder, programs rock and pirate news. (Blue Ridge Summit)
WLAD- New, not affiliated with the **Voice of the Night**, and obscure so far. (None)
WLIQ- Rockabilly and country tunes. (Blue Ridge Summit)
WREC- Novelty songs, rock music, and comedy from P. J. Sparx. (Belfast)
WUNH- Unh Radio transmits rock and novelty music from Lake Superior. (Providence)

Three first class stamps go to USA maildrops, with $2 US required for mail forwarding outside the USA. 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 98, Moline, MI 49335; PO Box 5617, Ventura, CA 93025; PO Box 293, Merlin, Ontario N0P 1W0, Box 510, Basel, Switzerland; PO Box 220342, Wuppertal, Germany; and 333 Glenview Park, Dublin 24, Ireland.

Thanks!

Reader input is always welcome via PO Box 98, Brasstown, NC 28902, or via the e-mail address atop the column. We thank the following radio hobbyists for material used this month: John T. Arthur, Belfast, NY; Shawn Axelrod, Winnipeg, Manitoba; Artie Bigley, St. Louis, MO; Ranier Brandt, Hoefer, Germany; Ross Comeau, Andover, MA; *Cumbre DX;* Joe Filipkowski, Providence, RI; Ulis Fleming, Glen Burnie, MD; Harold Frodge, Midland, MI; Nick Grace, Washington, DC; Paul Griffin, San Francisco, CA; William Hassig, Mt. Prospect, IL; Hans Johnson, Houston, TX; Rich and Talea Jurrens, Katy, TX; Kevin Klein, Neenah, WI; David Krause, Eastlake, OH; Zacharias Liangas, Italy; Chris Lobdell, Stoneham, MA; Greg Majewski, Oakdale, CT; Bill McClintock, Minneapolis, MN; Jim McLeod, Callaway, MD; A. J. Michaels, Pittsburgh, PA; Kevin Nauta, Grand Rapids, MI; Ira Paul, Royal Oak, MI; Dick Pearce, Brattleboro, VT; Michael Prindle, New Suffolk, NY; Al Quaglieri, Albany, NY; Brian Rogers, Melvindale, MI; Martin Schoech, Merseburg, Germany; Lee Silvi, Mentor, OH; Walter Szczapaniak, Philadelphia, PA; Robert Thomas, Bridgeport, CT; Niel Wolfish, Toronto, Ontario; and Andrew Yoder, Blue Ridge Summit; PA..

Note to U.S. consumers only: It is unlawful to import, manufacture, or market cellular-capable or cellular-restorable scanners into the U.S.

Ike Kerschner, N3IK

Using a Transmatch

Several times in this column I have discussed using a transmatch and why a transmatch is such a useful piece of equipment in the ham shack (e.g., enables us to efficiently match the rig to the antenna). From the letters I have received it appears the major reason why more hams do not use a transmatch is because they do not know how! Let's try to change that.

There are automatic transmatches that require little effort to use; let's bypass the autotransmatch and assume, as an average ham, we are going to use a plain old manual unit. There are many different circuits available. The type most often used is referred to as a universal transmatch, of which the MFJ 948 is one commercial example.

The universal transmatch incorporates two variable capacitors, one near the transmitter end of the circuit and another near the antenna side of the circuit. One end of a variable inductor is connected between the capacitors; the other end of this inductor is grounded. (Most use a switch to vary the inductance, but some use what is called a roller inductor which allows the user to obtain very precise control of the inductance.)

How it works

Our transmitters are designed to work into a 50 ohm load. Older rigs with tune and load controls must first be tuned to optimum output (or minimum standing wave ratio - SWR) into a 50 ohm dummy load at the frequency we desire to work. In other words, when we connect a 50 ohm noninductive resistor (or dummy load) across the output of our transmitter and tune the rig for optimum output, we are looking for a low SWR. To do this safely, reduce the drive to the transmitter to a low level (i.e., if you have a 100 watt rig, try loading up at about 25 watts or so).

The set-up for this procedure is to connect an SWR meter between the output of the transmitter and a 50 ohm dummy antenna (note: the dummy antenna must be rated for the same or higher power level as the transmitter it is being used with). Most commercial transmatches have a built-in SWR/power meter and a switch to connect the dummy to the transmitter. (You must connect the dummy load into the transmatch first, though.) Some transmatches even have a built-in dummy load. After the transmitter is tuned, connect the desired antenna into the transmatch.

This step is not required if you have a new "no-tune" rig. All you need do in this case is reduce the power level and go to the next step.

Which is: With the rig in the receive position, set the transmitter and antenna control to the mid-point of the setting dial. Be sure the desired antenna is connected to the antenna input of the transmatch. Now rotate the inductor control for maximum received noise or signal at the desired frequency.

Next, transmit a low level CW signal. (Be sure the SWR/power meter is in the SWR position.) Adjust the transmitter and antenna controls for minimum SWR. These controls interact, so tune each in small increments until minimum SWR is obtained. Finally, increase power and retouch the transmitter and antenna controls for minimum SWR.

It is possible to obtain an SWR of 1 : 1 at several settings of the inductor; use the one that produces maximum power.

With a transmatch a wide variety of antennas can be used successfully on almost any frequency. This is very important to most of us, as it is not always possible to put up the ideal antenna for a given band.

Most commercial transmatches will allow you to run several different types of feedline, open wire, single wire or coax. Always be sure to use the correct feedline connector to match your feeder.

Okay, now get a transmatch connected and see what it will do for you.

10 Meter AM

For many years, I have had a crystal controlled AM rig on 10 meters. When ten is open it has provided me with many DX contacts and during the doldrums of propagation, it sat on the bench monitoring 28.660 MHz which a bunch of locals used as an intercom.

This little rig is a simple CB rig that was recrystalled and peaked up for ten meters. When the rig was rebuilt in the 1960s, phase locked loop (PLL) frequency control was not even thought of. Several years ago there was a strong movement to rebuild CB rigs for ten meters, but that seems to have petered out. I would be very interested in hearing from anyone who has converted any PLL rig to ten meters (either for AM or SSB). 10 AM is still fairly active and a supply of inexpensive rigs for this band might help to maintain activity.

Jock Elliott, KB2GOM
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Icom's Potent IC-4008A FRS Transceiver

Radio manufacturers have jumped on the Family Radio Service bandwagon like there's no tomorrow. At last count, there were at least a dozen different companies — from Alinco to Yaesu — now offering FRS handheld transceivers to the general public. It's no surprise: FRS transceivers operate in the 460 MHz range and offer clear, skip-free, license-free communications over distances up to about 2 miles.

Icom's offering, the IC-4008A, is a neat, ruggedly built package that boasts water-resistant construction. "Can be used in bad weather — even when it is raining," the package says. Measuring 2-3/16 inces wide by 4-1/32 inches high by 1-1/32 inches deep, the IC-40008A is roughly the same size as the Cherokee FR-465, making it small enough to slip into a shirt pocket. The antenna folds completely into the transceiver body for convenient carrying when not in use.

On the front of the handi-talkie is a liquid crystal display with indicators for transmit, busy, key lock, auto power off, low battery, group tone number, channel number, power on, answer back and PTT hold. Also on the front panel is a large grill for the speaker and microphone and four buttons: one for power, one for mode, and a pair for channel up and down.

On the left side of the handi-talkie, there is a push-to-talk (PTT) switch. On top, jacks for an external speaker microphone under a rubber protective cover and a large knob for volume. On the back panel, a belt clip attaches through an unusual thumbwheel arrangement that makes it easy to remove the belt clip without tools.

The IC-4008A takes just three AA batteries. A rechargeable NiCd battery pack is available as an option, as is a drop-in charger. The IC-4008 features 38 what Icom calls "group codes." These are really Continuous Tone Coded Squelch System (CTCSS) tones. Setting the same CTCSS tone for all members of a group allows them to receive only those transmissions that include the same CTCSS tone. To activate "group mode" on the IC-4008A, press the Mode button briefly. Three dashes will be displayed, indicating group mode is currently turned off. Press the Up or Down button to select the desired code number. Then push the Mode button again. The group code you have selected will then be applied to all 14 FRS channels. What this does not allow you to do, however, is to activate at CTCSS code for one channel but not for another.

If you press and hold the Mode button for about a second, the auto squelch will open and stay open, which is handy for copying very faint signals. To activate the auto squelch again, press and hold the Mode button again for about a second.

The IC-4008A has a bunch of interesting tricks built into it. One called "Smart-Ring." Set two IC-4008As on the same channel and activate the same CTCSS tone. Now, press the PTT button and the UP button at the same time. If the unit you are calling is within range, turned on, and on the same channel, *both* FRS handhelds will ring — like a telephone — for about ten seconds. That confirms that your signal has reached the other transceiver, even if no one answers. If the second unit is out of range, not powered up, or on another channel, you'll get three shorts beeps, indicating that the other radio did not automatically "call back."

A function called "Call-Ring" sends ring tones during transmit. To activate, press the PTT button and the Down button. Both your IC-4008A and any others that are within range and on the same channel will ring for as long as you hold both buttons down. Unfortunately, your radio will ring even if the other radio is not hearing your signal. As a result, Smart-Ring is a much better technique if you want to confirm that another station is within range.

The Icom IC-4008A FRS transceiver is the range winner among the units tested so far.

The Automatic Transponder System allows you to confirm whether a signal has been received by another IC-4008A without ring tones. To activate the ATS function, press the PTT button and the Mode button at the same time. A symbol appears in the display and your radio will send a searching signal every 60 seconds. When your transceiver receives an "answer back" signal, the symbol in the display changes. If no reply is received, the original symbol blinks. To turn off this function, press the PTT button and the Mode button at the same time again.

In almost all respects, the performance of the Icom IC-4008A was exemplary. The receive audio was powerful and clear, and this tiny transceiver offered the best range — by about 30 yards — of any FRS radio I have tested so far. The only small complaint from my test partner (my wife) was that my voice occasionally sounded muffled if I held the IC-4008A too close or a bit hollow if I held it too far from my mouth. I suspect that the microphone may be biased toward the treble, since I didn't observe these problems on any of my wife's transmissions.

In all, the Icom IC-4008A is a fine FRS radio, offering superior range and wealth of features. Suggested retail price is $159.95: Grove's price is $119.95 plus shipping. For more information, contact Grove Enterprises at 800-438-8155 or Icom at (425) 454-8155.

Clem Small, KR6A

Design Your Own Field Day

Field days are occasions when we take our radio equipment to the field and enjoy our hobby as part of a picnicking or camping event. I have read some interesting reports written by shortwave listeners (SWLs), broadcast band (BCB) DXers, hams, and other radio enthusiasts who took to the desert, mountain tops, or woods for a field day or two. Some went in groups; others by themselves.

These folks headed for the outdoors equipped with their picnic or camping gear, and their radio equipment. The point is to put up antennas and enjoy peaceful and quiet communications far from the electrical radio interference and hectic, noisy environment of city life; regardless of what happens, it's always a vacation from the ordinary.

An HF, MF or LF Field Day

Single band antennas: For specific bands the old, reliable, halfwave dipole is a good choice. If there are a couple of trees around then a dipole (fig. 1A) can often be erected and operational in a matter of a half hour or less. If we have only one good tree to hang our antenna from, then a sloper (fig. 1B) or inverted-V (fig. 1C) will go up even easier than the dipole. The inverted-V, and to some extent the dipole, give relatively nondirectional reception. The sloper has some directivity as shown in fig. 1C.

Groundplane vertical antennas: (fig. 1D) are also a good choice for nondirectional, easy-up antenna work. They often produce excellent DX results. Even a single, simple, vertical quarterwavelength wire with radials will do a good job. Use elevated (well above ground) radials with your quarterwave verticals if possible. If the antenna is at ground level lay the radials on the ground. A rod in the ground is a poor substitute for radials, but it is better than nothing. Two elevated radials are enough, but the more you use for on-ground radials the better.

Multiband antennas: For an easy-up multiband antenna the random length antenna is a good choice. This design is made by stringing as much wire as practical as high and as in-the-clear as possible. Twenty feet will work, but 50 feet is better, and 100 to 200 feet is even better.

This antenna works best if you have a 4:1 balun or an antenna tuner with a high-impedance (long-wire) antenna connection. When using a balun connect the feedline to the low-impedance winding, the antenna to one side of the high-impedance winding, and a ground to the other side.

For using the tuner, place the tuner at the base of the vertical antenna and attach the feedline from your receiver to the tuner. Then attach its high-impedance terminal to the antenna, and its ground connection to long wires (30 or more feet long) laid out on the ground or to a rod in the ground (not as good). The more radials you use the better. This is one of the rare instances where the so-called antenna tuner is actually used to tune an antenna!

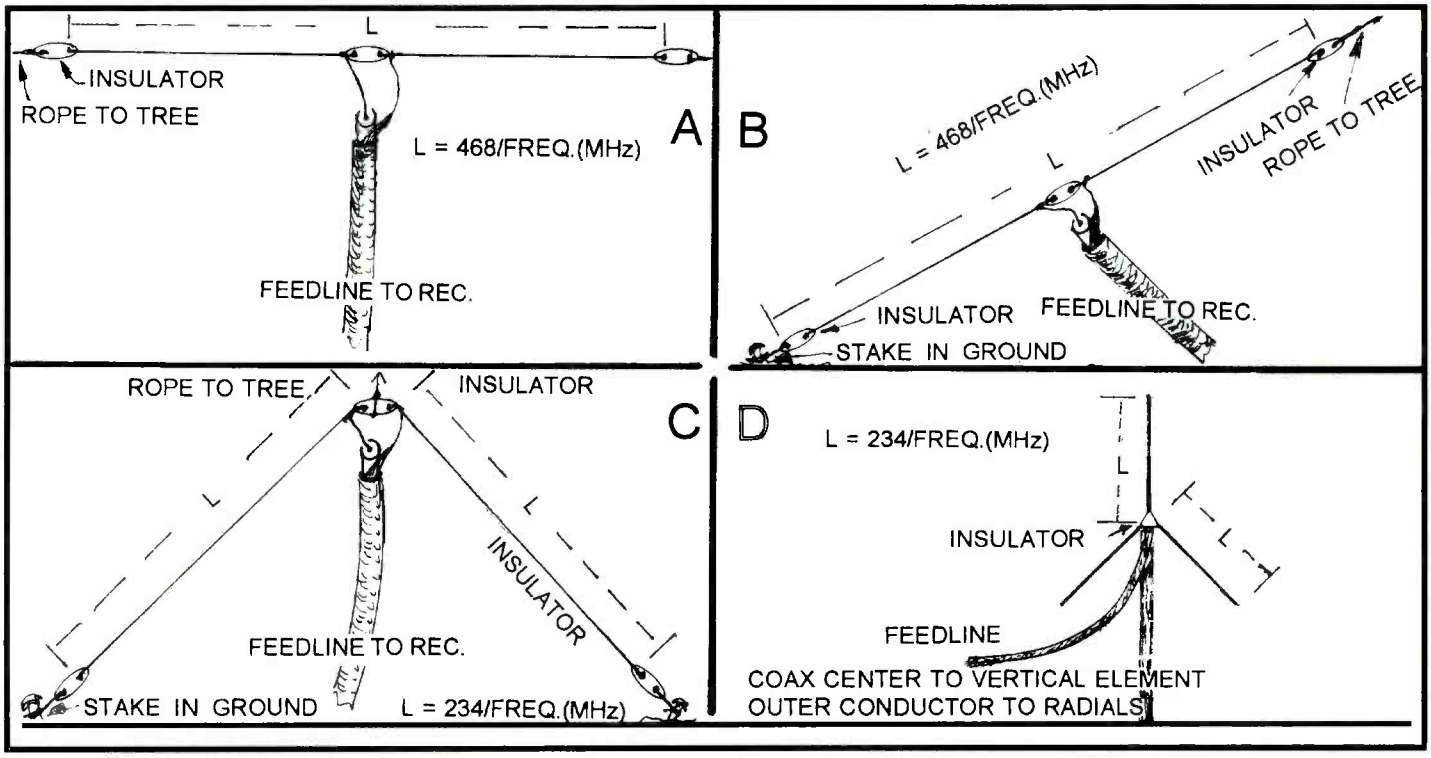


FIGURE 1. *Halfwave dipole antenna (A), halfwave sloper antenna (B), inverted-V antenna (C), and quarterwave vertical antenna with radials (D).*

You can also put up a random-length antenna vertically. Get the tallest tree practical, and make your wire as tall as you reasonably can. With one such wire vertical that I put up during a personal field day I was able to tap my transceiver key, and hear my signal a fraction of a second later as it encountered the antenna again after a complete round-the-world trip!

Most antennas designed for one band can be "tuned" with an antenna tuner to give multiband performance, but they usually have less efficiency than on the band for which they are designed. (But see the discussion below on using an antenna tuner.) To try this connect both conductors of the feedline together to the receiver antenna-input center connector. The antenna should perform similarly to a random-length antenna of comparable length and height.

Erecting the antennas: The ropes supporting our antennas can be hoisted into position by first getting a fishing line over a tree limb, and then pulling up the rope with the line. The line is initially put in place on the tree limb by tying the line to a weight or arrow and shooting it over the limb with a sling shot or bow. Even tying the line to a hefty rock may work if you have a good pitching arm! If the line is wound on a spinning reel it will be *much* easier to handle, and less likely to tangle.

A Scanner Field Day

For a scanner field day an ideal site is a location where you have line of sight signal propagation paths to several different towns or cities. A high hilltop or mountain with the towns visible, or almost visible, is a good choice. Ordinary whips or, for more gain, ground plane antennas are easy to transport and erect.

For even more gain a Yagi or log-periodic array will help bring in more distant signals as well as allow some directional selection between two signals coming in on the same channel, but from different directions. At VHF-UHF frequencies these beams are small and light weight, and can easily be temporarily mounted on short masts. The masts can then be held up by small homemade tripod stands, or stuck in the ground and braced to the bumper of a vehicle.

Do You Need an Antenna Tuner?

If you are to get the best reception possible on VHF, UHF and microwave bands, and sometimes on HF (shortwave), both the feedpoint impedance of your antenna, and the antenna-input impedance of the receiver should be matched to the impedance of your feedline. This matching is probably already okay for receiving if you use commercial antennas, or well-designed homemade antennas, and 50-ohm feedline.

Nevertheless it is sometimes useful to add an antenna tuner (AT) to an HF receiving system, or very infrequently a MF (mediumwave) receiving system. Note that the AT is connected between the receiver antenna input and feedline. It matches the entire antenna system to the receiver; it doesn't really tune the antenna. Improving the match between your antenna system and your receiver input increases any signal received.

Received noise is a signal. If received noise level is significant, then using an AT will increase noise as well as signal and reception improves little. But nicely, on a field day, you are likely to be far from the electrical noise pollution that accompanies power lines, automobile ignition sparking, and electrical machinery found around towns and cities. This could mean that an AT could be of use on the HF, or even rarely the high end of the MF, band. Below that, noise is likely be too prevalent for an AT to help.

RADIO RIDDLES

Last Month: I said "What is the relationship between a matched line with low SWR values and the unidirectional Beverage antenna?" First, the Beverage antenna is a single wire strung typically about 12 feet above the earth. It is said to be like a transmission line with one conductor being the antenna wire, and the other being the earth.

If the antenna is terminated (grounded) through an appropriate resistor at the end away from the end to which the feedline attaches, then signals received from the direction of the feedline end travel down the wire and are dissipated in the resistor. Thus they don't reflect back down the line, and therefore never enter the antenna feedline. Due to this they cause no interference to other signals received by the antenna.

In other words, the antenna is like a feedline terminated with its characteristic impedance, and has no standing waves (i.e., very low SWR) with respect to signals travelling toward its resistor-terminated end.

Next Month: What is the relationship between the "knife-edge" phenomenon, the earth's curvature, and ground waves below about 3 MHz?

You'll find an answer for this month's riddle, and much more, in next month's issue of *Monitoring Times*. 'Til then Peace, DX, 73

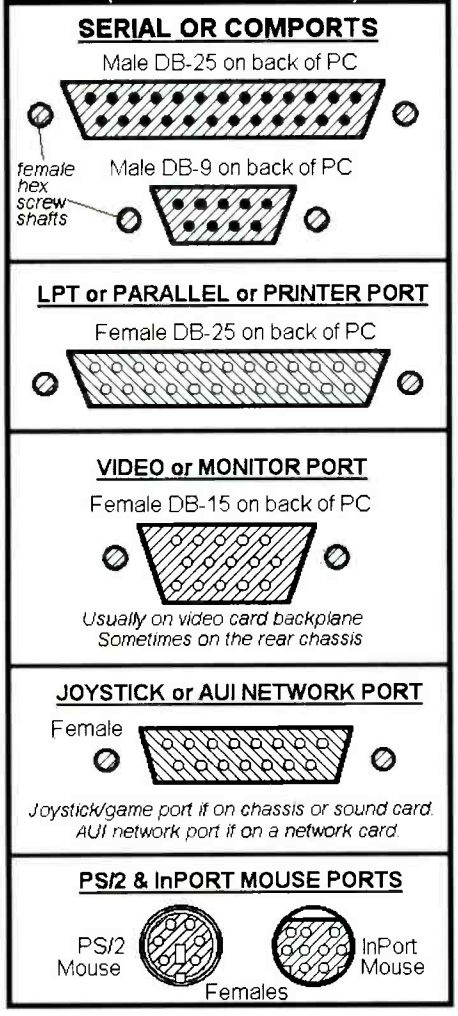
Bill Cheek
email: bcheek@san.rr.com

Data Decoding and Serial Ports

The May '97 and July '98 columns explored data decoder interface circuits and programs that decode digital data from the airwaves. Data decodable by the casual hobbyist include teletype, fax, packet, mobile display terminals, Morse Code, pagers, and trunk control signals — not to mention lots of amateur radio signals. The columns presented easy "roll your own" decoder interface circuits and the software to decode the data.

Several readers wondered how to connect an interface to their computers when there were no spare COMports. The most common configuration of a mouse and an external modem uses up the standard COM1 and COM2 ports, with no serial ports left over to connect radio toys.

FIG-1: COMPUTER PORTS
(Viewed from rear of PC)



We will fix that minor problem. This article presents all you need to know about IBM/PC-compatible serial ports, also known as RS-232 ports and COMports. You don't particularly need my May-97 article, but it is recommended for the background material. Last month's column is vital, if cheap and easy data decoding attracts you. If you don't have it, contact *MT* directly at 800-438-8155 for a reprint or the back issue.

Types of Computer Ports

Computer-controlled radios and accessories usually require connection to one or sometimes two serial ports. Some applications might call for connection to an LPT or printer port, so it's important to know these ports. Figure 1 shows the more common computer ports.

Our primary interest is the serial ports — the easiest to recognize, even at a glance. If the ports are **male** (with pins), they're COMports. I don't know of any other kinds of male ports on a PC. All other PC ports are female. If there is any doubt, it's a COMport if it's a male with 25 pins (DB25) or 9 pins (DB9).

If it's a **female** DB25 (with sockets), then it's a parallel printer or LPT port. If it doesn't match these descriptions, it's not a serial or parallel port. Figure 1 clues you to most port types, but learn to recognize COM and printer ports.

Pin Functions

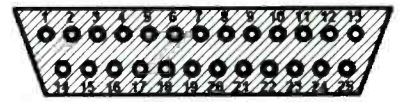
It isn't necessary to memorize the function of each pin of a serial and parallel port, but it is helpful to have a ready reference to these functions when building circuits and connectors that use these ports. Figure 2 shows the function of each pin in a serial DB25 port. Figure 3 shows the pin functions of a serial DB9 port. Figure 4 gives the pin functions of a parallel port.

Table 1 correlates serial DB9 pins to serial DB-25 pins. This is handy when making your own cables with perhaps a DB9 on one end and a DB25 on the other. Just match the pin functions end to end, and it will work.

Note: Figures 2-3 show pinouts of the wiring sides of *female* serial plugs. This makes it easier to fabricate plugs and cables to mate with the male serial ports on the PC. You'll rarely wire a male serial plug because it can't mate to the PC ports. Most of your work will be on the female plugs from their wiring sides, so don't get confused over pinout views that seem to differ, depending on front or rear views and male or female gender. Fortunately, DB25 and DB9 jacks and plugs are pin-numbered on both sides, though it may take a magnifying glass and a light to clearly see the pin numbers.

FIG-2: DB25 RS-232 PORT DATA

DB-25 PINOUT - Rear View of Female



Note: physical pin arrangement varies with gender and view (front or rear), but pin functions do not vary

DB-25 Serial Port - RS-232 Pin Functions

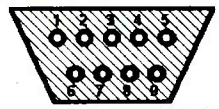
Boldface = primary/important functions (See DB9)
Italics = rarely used and/or unimportant functions *

1: *Chassis Ground*	14: *Secondary TxD*
2: TxD (Transmit Data)	15: *TCLK (Transmit Clock)*
3: RxD (Receive Data)	16: *Secondary RxD*
4: RTS (Ready To Send)	17: *RCLK (Receive Clock)*
5: CTS (Clear to Send)	18: *LCLLB (Local Analog Loopback)*
6: DSR (Data Set Ready)	19: *Secondary RTS*
7: SG (Signal Ground)	**20: DTR (Data Terminal Ready)**
8: DCD (Data Carrier Detect	21: *REMLB (Remote Analog Loopback)*
9: *Data Set Test*	**22: RI (Ring Indicator)**
10: *Data Set Test*	23: *Data Signal Rate Select*
11: *Unassigned*	24: *XTCLK (External Transmit Clock)*
12: *SI (Speed Indicator)*	25: *Unassigned*
13: *Secondary CTS*	

* *Can be left unconnected in most cases*

FIG-3: DB9 RS-232 PORT DATA

DB-9 PINOUT - Rear View of Female



Note: physical pin arrangement varies with gender and view (front or rear), but pin functions do not vary

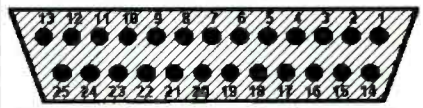
DB-9 Serial Port - RS-232 Pin Functions

1: DCD (Data Carrier Detect	6: DSR (Data Set Ready)
2: RxD (Receive Data)	7: RTS (Ready To Send)
3: TxD (Transmit Data)	8: CTS (Clear to Send)
4: DTR (Data Terminal Ready)	9: RI (Ring Indicator)
5: GND (Ground)	

See DB-25 for comparable pin functions

FIG-4: DB25 LPT PORT DATA

DB-25 PINOUT - Rear View of Male



Note: physical pin arrangement varies with gender and view (front or rear), but pin functions do not vary

DB-25 Parallel Port - LPT Pin Functions

No relationship to DB-25 serial port other than pin numbering

1: -STROBE	10: -ACK (Acknowledge)
2: +Data Bit 0	11: +BUSY
3: +Data Bit 1	12: +PE (Paper End)
4: +Data Bit 2	13: +SLCT (Select)
5: +Data Bit 3	14: -Auto Feed XT
6: +Data Bit 4	15: -ERROR
7: +Data Bit 5	16: -INIT (Initialize Printer)
8: +Data Bit 6	17: -SLCT IN (Select Input)
9: +Data Bit 7	18. - 25: GND (Ground)

Adding More Ports

Most PCs come standard with two built-in serial ports and one parallel port that originate on the motherboard with internal cables to external jacks. Standard input-output (I-O)/PortName/interrupt request (IRQ) configurations for these ports are: 03F8/COM1/IRQ4, 02F8/COM2/IRQ3, and 0378/LPT1/IRQ7. It's easy to run out of ports. A serial mouse on COM1, an external modem on COM2, and a printer on LPT1 can put you out of business. No data decoding for you until you add more ports!

Fortunately, it is easy and cheap. Just get what's called a *configurable add-on serial I/O card.* It should come with two serial ports, one parallel port, and possibly a game port. Cost should be around $15-$35, depending on age, frills, and doodads. Cheap (and adequate) cards come as 8-bit ISA cards. You'll pay more for PCI or VLB versions, but there is no need for this extravagance unless you're out of ISA slots.

Another cost booster is the type of UART (universal asynchronous receiver-transmitter) chips on the card. The fast 16550A fifo buffered UARTs cost more, but are vital for high speed (14.4-kbps and up) modem communications. 16550A's are not necessary for mouse and radio toys. I happily pay more for 16550A UARTs because I frequently shift my modems around. You decide.

Figure 5 shows the layout of a typical 8-bit ISA add-on I/O card. If it looks confusing, relax. The backplane-mounting strip holds a female DB25 LPT jack and a male DB9 designated as COM-A. There is no jack for COM-B, but it has a standard header along the upper-left edge. There is also a header for a game port on the upper-right edge. Headers accept standard ribbon cables and plugs that usually come with the card, or they can be bought at low cost. Appropriate jacks are on the other ends of the ribbon cables. For COM-B, you'd want either a male DB9 or a male DB25; for the game port, a female DB-15. These "loose" jacks can be mounted in knock-out holes on the rear chassis of the PC, or on an extra standard backplane mounting strip (usually provided with an add-on card.)

Configurable add-on cards are important because you can set up additional ports exactly as needed. In most cases, you will set up the added serial and parallel ports as: 02F8/COM3/IRQ4, 02E8/COM4/IRQ3, and 0278/LPT2/IRQ5

Configuration

Also visible in Figure 5 are positions of the various IC chips on the card, most of which require no attention. The two UARTs, one for COM-A and one for COM-B, are the key IC's. Usually, the UARTs are socketed to facilitate quick and easy upgrades from the 16450 to 16550A.

Last but not least, Figure 5 shows six groups of jumper-pins. This is where the card is programmed to establish the desired assignments for COM-A, COM-B, and the LPT- port. You can assign COM-A and B any port names from COM1 to COM4, and the LPT port any of LPT1-LPT3. Obviously, you don't want to duplicate existing ports! COM-A is usually assigned COM3; COM-B as COM4, and the LPT port becomes LPT2. If you have no use for the extra LPT port, a jumper can deactivate it; likewise, the game port.

In addition to the port names, you can usually set IRQ assignments and even port addresses. The keynote is that assignments are made via the board's jumper pins. The card's documentation covers the exact procedure.

Ultramodern I/O cards might be "jumperless," with configuration done via software in the form of an accompanying utility program. The documentation will painlessly guide you.

TABLE 1: RS-232 PIN CORRELATION

DB9	FCN	DB25
1	DCD	8
2	RxD	3
3	TxD	2
4	DTR	20
5	GND	7
6	DSR	6
7	RTS	4
8	CTS	5
9	RI	22

What If?

By now, you know every situation is slightly different, but here are some general guidelines to help. First, there are only sixteen available IRQs, several of which are allocated by the system for its own needs. In general, IRQ 3-5, 7, and 10-13 have a degree of flexibility.

One IRQ cannot support different devices at the same time. Suppose you have a mouse on COM1/IRQ4 and a modem on COM2/IRQ3. This means you cannot put an RS-232 radio device on COM3 because COM3 typically uses IRQ4 that will conflict with the mouse. The solution is to forget COM3 and put your radio gizmo on COM4/IRQ3 under the assumption that you won't use the COM2/IRQ3 modem at the same time as the radio device.

Some add-on I/O cards let you reassign IRQs to other than the standard 4 and 3. If you aren't using a sound card or the second LPT port, IRQ5 might be free for this purpose. Perhaps the I/O card will let you use IRQ10-12. Another trick is to use an IRQ assigned to a printer port for your radio device so long as you don't attempt to print or use the LPT port while the radio device is engaged.

If you are pinched for free IRQs, run MSD.EXE (Microsoft Diagnostics) from a command prompt and click the "IRQ Status" button to see the status of all IRQs. MSD.EXE comes with all later versions of MS-DOS and with all versions of Windows, though you might have to get it from the Windows95 CD-ROM in the d:\OTHER\MSD directory, if it wasn't previously installed on your hard drive. Windows 95/98 can assess IRQ status, too. Right-click on MY COMPUTER; click DEVICE MANAGER; and then double-click the COMPUTER icon at the top of the list. You'll then see how your IRQs are assigned and used.

Occasionally, certain RS-232 applications don't work with the standard COMports supplied with a PC. The quickest and easiest solution is to install a cheap add-on serial card and try those ports. Another nice thing to know is that you can usually reconfigure the motherboard's COMports and LPT port from the BIOS (CMOS). It's possible to reassign COM1/2 to COM3/4, and then configure the new add-on card to COM1/2. This makes a great troubleshooting aid and offers more flexibility.

Support for this and all my columns is freely available by e-mail. Programs and files can be downloaded from my Web and FTP sites. If you're not computerized, please include an SASE with any postal requests.

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Dan Veeneman
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Pinpointing a Cellular Caller

By the time you finish reading this column more than 500 emergency calls will have been made using a cellular or PCS phone. With more than 60 million wireless subscribers out there, any accident or injury is often reported by passers-by before those involved can get to a payphone. Some automobile manufacturers are even offering cellular telephone packages that can automatically dial 911 in the event of an accident.

In most areas of the country, when a 911 call is made from a traditional wired phone the number and service address are delivered to a Public Safety Answering Point (PSAP) usually staffed by county or municipal emergency operators. Using database information from the phone company, the service address and telephone number appear on a screen in front of an operator, giving the address where the call came from and a call-back number in case the connection is cut off. As you can imagine, getting the number and location of a 911 caller who is using a cellular telephone is much more complicated.

Locating a cellular telephone

As covered in the December 1996 column of *PCS Front Line*, the fixed portion of cellular network consists of a number of cell sites connected to a mobile telephone switching office (MTSO). Calls from a mobile phone are transmitted by radio to the nearest cell site, where the conversation is passed to the MTSO and on out to the public switched telephone network (PSTN). When a cellular subscriber makes a call to 911, the MTSO must decide how to handle the call. Delivering the call like any other call won't work, since the service address and telephone number that would show up at the PSAP would be for the MTSO, where the landline is connected, not the caller. Also, because cellular systems cover a wide geographic area, the PSAP that serves the MTSO might not be the same one that serves the caller's location.

To remedy these problems the Federal Communications Commission has issued a series of rules to get 911 calls to the right place with the right information. Phase I, which went into effect in April of this year, requires wireless service providers to identify the cell site that a 911 call is using and to deliver the mobile phone number of the caller. In Phase II, scheduled to begin in 2001, service providers must deliver to the PSAP the latitude and longitude of the caller, accurate to at least 410 feet two-thirds of the time. A number of different location strategies have been suggested to meet the Phase II requirements.

Signal Strength

Traditional cellular systems have special receivers at each cell site that measure the signal strength of each mobile telephone operating in their coverage area. When the signal strength falls below a certain level, the system begins a "hand-off" procedure to have a (presumably) closer cell site serve the mobile. By examining the signal strength of a particular mobile a guess can be made as to how far away it is. Handing off the phone to two or more cell sites, each of which makes a guess about distance, can help narrow down the general direction.

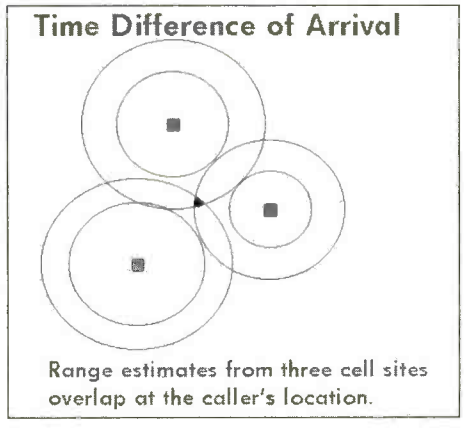
However, in real-world conditions these methods are not very accurate. Received signal strength is affected by a number of factors besides distance, including blockage from buildings, foliage from trees, and even the orientation of the caller with respect to the cell site. While it's good enough to transfer calls from site to site, signal strength alone will not meet the accuracy requirements of the FCC.

Time Difference of Arrival

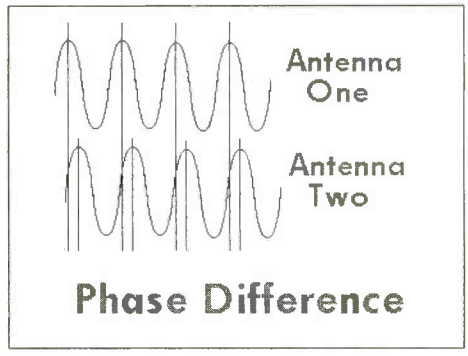
We all learned in school that time and distance are related by the formula **distance = speed X time**, so that if we know how fast something is moving and how long it takes, we can determine the distance it traveled.

Time Difference of Arrival (TDOA) schemes use this basic idea to locate the position of a cellular telephone. Three widely separated cell sites use a synchronized and extremely accurate clock to record the exact time a signal arrives. By making educated guesses as to when the signal might have left the cell phone some distance estimates can be calculated for each cell site.

If we represent these estimates as circles centered on each of the sites, there will be an area where all three overlap. By adjusting our starting time guess forward and backward we can narrow the size of that overlap and pinpoint the caller's location. Besides a very accurate clock, this method requires a significant amount of communication between the cell sites and some computer equipment to perform the necessary computations.



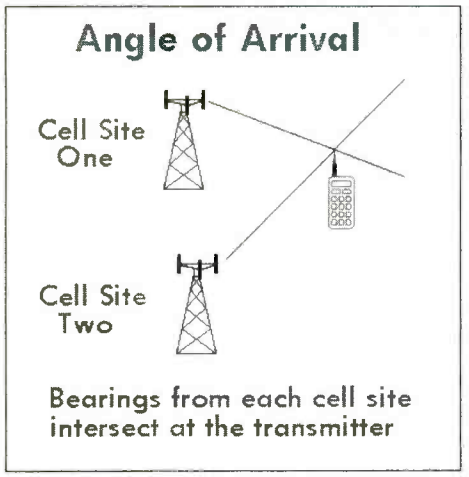
Range estimates from three cell sites overlap at the caller's location.



Angle of Arrival

Radio signals are traveling electromagnetic waves. If we receive the same signal at two different antennas, the waves may be slightly offset from each other. For example, one antenna may be receiving the peak of a wave at the same time another antenna is receiving the trough. This offset is more commonly called a phase difference, and can be determined with a properly equipped receiver. In fact, some amateur radio "fox hunting" equipment uses this technique.

In Angle of Arrival (AOA) location systems each cell site is equipped with a special antenna array consisting of several individual antennas spaced less than one wavelength apart. Using the phase differences between



antennas, a bearing from the site to the caller can be computed. Two of these bearings from two different cell sites will (hopefully) cross at the location of the cellular telephone.

On the minus side, AOA equipment is sensitive to multipath, losing directional accuracy when the signal bounces off buildings and other reflective objects before arriving at the antenna array. Like TDOA, it also requires coordinating multiple cell sites and some sophisticated computing equipment.

Global Positioning System

The United States Air Force operates a fleet of orbiting spacecraft that continuously transmit navigation information. This Global Positioning System uses 24 satellites to provide very accurate "position solutions" to users equipped with a proper receiver. Advances in miniaturization and large production runs have lowered the size and cost of a GPS receiver to the point where it is feasible to install one inside a cellular telephone.

GPS does have a number of limitations, however. Besides the additional weight, cost, and battery drain of a GPS receiver, a position solution requires a clear line of sight to at least three satellites. Any shadowing that blocks the reception of GPS signals would render the system inoperative. The downtown area of large cities, for instance, would create problems due to the urban canyon effect of skyscrapers and other tall buildings.

In addition, GPS receivers require a certain amount of time to produce a position solution, anywhere from 30 seconds to several minutes from being powered on. This kind of delay may be unacceptable in certain emergency situations.

Multipath Fingerprinting

One idea that's still in the proof-of-concept stage is multipath fingerprinting, sometimes called raytracing. In most applications multipath is, at best, a nuisance. Radio signals bounce off billboards, buildings, and other objects, scattering the signal before arriving at the cell site.

Multipath fingerprinting counts on this scattering to uniquely identify a location by comparing the received signals to a database of surveyed patterns. If the scattering pattern just received matches a pattern that was previously measured, the assumption is that the caller is located at the same place the stored measurement was taken. This process requires a lot of work beforehand and the matching process can take a long time, but the idea is interesting nonetheless.

Big Brother

Almost everyone agrees that locating a phone during an emergency call is a good thing. What is not so good is that the same technology that can find you for 911 can also find you while you're making other calls, and even when your phone is on but not in use. The implications of this are still being worked out, as civil libertarians argue for strict privacy and law enforcement officials demand access to all location information.

Implementation of the 1994 Communications Assistance for Law Enforcement Act (CALEA), which will make wired and wireless communication networks "wiretap-friendly," is a subject for another column, but it appears now the civil libertarians are fighting a losing battle.

Delivering 911

In survey after survey subscribers have reported that safety was the primary reason they signed up for cellular service. Many subscribers have never used their phone, merely keeping it nearby in case they ever need to make an emergency call. This has been a significant source of revenue for service providers, who found themselves on the losing end of a related FCC ruling issued last December.

In the same proceeding that established the Phase I and Phase II 911 caller location requirements, the FCC also ruled that wireless service providers must complete 911 calls to the correct PSAP whether the phone is under a subscription plan or not.

Prior to the ruling many wireless service providers were routinely blocking 911 calls from phones that were not currently subscribed or from roamers whose carriers did not have a local roaming agreement. Other callers were transferred to authorization centers, where they were asked to provide a credit card number or other form of payment. These validation procedures often delayed the arrival of emergency personnel to the scene, and in many cases prevented help from arriving at all. In outlawing such delays and denials of service, the FCC noted that one of their mandates under the Communications Act is "promoting safety of life and property through the use of wire and radio communication."

Working secondhand and older-generation cellular telephones are often available for a few dollars at garage sales, flea markets, and thrift stores. Under FCC rules, these phones are perfectly suited and completely legal for placing 911 calls in times of emergency. These might make nice gifts for spouses or older children who may need to make an emergency call, but who can't afford a cellular subscription.

That's all for this month. As always, more information is available on my website at **http://www.decode.com**, and I welcome electronic mail at *dan@decode.com*. Also, a plethora of cellular and PCS information is available in my new book *Inside Mobile Telephone Systems*, available from Index Publishing at (800) 546-6707. Until next time, happy monitoring!

FEDERAL FILE

A GUIDE TO GOVERNMENT COMMUNICATIONS

John Fulford, WA4VPY
email: JOHNF0413@aol.com

Washington Goes Trunked

In addition to the Fedcom email list server, I also subscribe to several regional scanner email lists. One of the most useful is the Scan-DC list. The following comes from Ed Kutrzyba who lives just over the line in Maryland. Ed wrote that he is getting into 400 MHz federal trunking and is using the Trunker 3.7 program. For information on this trunking program, it is imperative you subscribe to the Trunkcom email list server.

Ed writes that he is using a Bearcat 895 and an Icom R7000 for receivers and is monitoring the following control channels:

Frequencies	System ID
407.150	6b01
407.405	6b03
408.705	4e00
409.355	2c36
410.430	4732

The frequencies are not exact, but are close enough for his scanner. The system identifiers look to be correct. Let's look at the trunked systems used in Washington, D.C., and their actual frequencies and who is using them.

The first system to observe is the **Department of Defense Specialized Mobile Radio (SMR)** trunked system. This is also referred to as the Belvoir/Tysons SMR. The control as of the day of this writing is 407.950 MHz. The outputs are:

406.200 406.300 406.525 406.775
407.025 407.950 408.850 409.250
411.200 MHz

This system is used by Department of Defense elements such as the motor pool, DISA, DLA, White House Communications Agency, and other Army elements such as the Military District of Washington, Ft. Belvoir, Ft. Myer, and Ft. McNair. There are approximately 50 talkgroups on it. One of the major users sends nothing but encrypted communications.

Our next system is out at **Andrews Air Force Base**. The frequencies on it are:

406.350 406.950 407.150 407.425
408.025 408.200 408.750 408.950
409.350 409.725 MHz

Almost everyone on the base uses this system. There are approximately 75 individual talkgroups.

The next system is at Ft. Meade. This is the one mentioned above as having a frequency of 407.405 MHz: The actual frequency is 407.400 MHz. The system is known as the **Ft. Meade** trunk. The frequencies used are:

406.325 407.400 407.575 409.450 MHz.

There are approximately 20 talkgroups in use.

The **Washington DC Federal SMR**, also known as "DC1," is the one mentioned above with the frequency of 408.705. The actual control frequency is 408.700 MHz. The frequencies in use are:

406.100 406.250 406.850 408.450
408.700 408.750 408.900 MHz.

There are many users to this system, both civilian and military. Some of the known users are:

11th. Wing AFDoW
Air and Space Museum
Bolling Air Force Base
Food and Drug Admin.
Holocaust Museum
Naval Intel Center
Navy Yard Medics
Office of Naval Inv.
Public Works at Navy Yard
Supreme Court Motor Pool

There are about 50 known talkgroups. Also out at Andrews Air Force Base is a sub-fleet of the system using 409.350 MHz for their mobile phones on base.

The **National Institutes of Health** at Bethesda Hospital use 410.425 MHz for a control channel. The frequency listed above was the 410.430 MHz channel. The system is up and running, but no talkgroups have been identified on it.

The **NASA-Goddard Space Flight Center** has a low power trunked system using the following frequencies:

408.150 408.625 409.525 410.275 MHz.

It also uses 407.000 as a telephone interconnect channel. There are approximately 25 identified talkgroups on this system.

Our thanks to SCAN-DC people, especially Bill Hardman, for this information.

Bill Hardman also sent in information that the Secretary of Defense was at Ft. Belvoir back on May 5, 1998. The Ft. Belvoir Trunked system was up and active. The CID people that travel with and protect the Secretary of Defense run an encrypted system on 406.225, 407.225, and 409.075 MHz.

Also up in the Washington area, the frequency of 167.5125 MHz has been extensively used in the past few months for FBI aerial surveillance with traffic in the clear.

News From Miami

• One of our correspondents from Miami, who wishes to remain anonymous, reports on a couple of frequencies in use down there. U.S. Customs is using 166.300 MHz at the Miami International Airport and 166.200 MHz at the Customs Seaport at the Port of Miami. Also, he reports a *very* reliable source tells him that Customs is hiding up on one of the old Dade County systems. Dade County has gone over to 800 MHz trunking and has all but vacated their old 150 MHz frequencies.

Hint: this might be a good place to check in your area if you suddenly have made the switch up to 800. See who is using the old "empty" frequencies.

The frequencies Customs is using are:

155.985	Headquarters
155.970	Old tactical channel
155.790	Old Channel D

• Out in the Everglades is the Krome Detention Camp, which is next door to the old Central Intelligence Agency (CIA) KKN39 transmitter site. It seems the Immigration and Naturalization Service (INS) people at Krome are using 163.650 MHz as a simplex and repeater channel output there. Their antenna is on the top of the 250 foot tower located there with a low power repeater feeding it.

More Treasures out of Trash

A couple of months ago I did a "Trash or Treasures" section in column regarding the equipment you could find at major hamfests. One of our readers reports that he checked his frequencies for Alcohol, Tobacco and Firearms (ATF) when I mentioned the BirdDog Tracking unit I saw at the Miami Hamfest. The frequencies on the equipment were 165.9125 and 166.4625 MHz. He reports that both frequencies are heavily used in the South Philadelphia area.

It seems that our friend also purchased a surplus Drug Enforcement Administration (DEA) Video Surveillance Unit. It was the Dell-Star and still had the U.S. Government tags on it. It was the older model DS-602A. He hooked it up to an outside antenna and

started sweeping the Philadelphia neighborhoods. He observed video coming in and determined it to be a neighborhood several blocks from him. The picture was a house in a residential neighborhood. Our friend did a quick drive by and determined the transmitter was mounted on a power pole across the street from the target house. The unit was concealed in a nonworking cable television box. After about four weeks of rather uninteresting views of the front of the residence, the video disappeared and has not come back.

The frequency of this unit was in the 2.4/2.5 GHz band. You never know what you will find at these hamfests!

Notes from Readers

• This year's tornado season hit early and with a vengeance. Dale Urban, N0KQX, of Garden City, Kansas, reports that the NOAA Storm Chasers have been active in his area. The frequency they are using is 165.4375 MHz. If you live in "Tornado Alley" or its environs this might be a good frequency to keep in your *battery powered* scanner.

• We just had the launch of STS-91 a few weeks ago. For those of us down here in Florida, the communications from the Kennedy Space Center or the Cape Canaveral Air Force Station are always interesting to monitor. The frequency of 173.6625 MHz is used by KSC Safety. Before a shuttle launch, this frequency is active all night and day. It contains comms of clearing personnel from various portions of the launch pad during launch preparations and tests. The frequency of 165.0875 is used by Cape Canaveral Air Force Station Security. Our contributor from down there, Al Stern of Satellite Beach, Florida, reports these are great frequencies for night owls and insomniacs. Thanks Al.

• Our resident monitor for the Houston area, Chris Parris, wrote in and reported that someone important was coming to town. It seems the following Secret Service frequencies became active with encrypted traffic and paging:

162.8625	Yankee
166.5125	Sierra
164.8875	Oscar
167.025	Whiskey--paging

"We never did find out who came in and needed all of that security."

• Mike Fink, who operates Mike's South Florida Scanning Page at **http://www.laker.net/mikef** reports the following federal frequencies have been very active the past month in South Florida:

FBI--PL 167.9 Hz
167.4625 167.5125 167.6625 169.575
169.975
DEA--PL 156.6 Hz
414.075--CH19
418.625--CH1
418.750--CH3
418.675--CH4
418.725--CH16
418.825--CH5
418.900--CH2

Business Good at Motorola

A friend of mine was taking her class through the Motorola plant in Ft. Lauderdale, Florida, and reported that she saw two things of interest.

It seems that the U.S. Army Southern Command is receiving a shipment of handheld radios. These are some new type of Motorola product and she did not know the model number. She said they were trunking with high level digital encryption boards installed but she did not determine if they were in the 400 MHz band of the 400 MHz Federal Trunking band or if they were conventional 800 MHz trunking radios.

The second thing she noticed was that there were dozens and dozens of boxes of finished Motorola Astro walkie talkies headed out the door for the Drug Enforcement Administration. These Astro units are either digital or analog and have digital encryption. Looks like DEA is getting its Christmas wish list delivered early.

While on the subject of encryption, we all know about the digital encryption out there that is being used by the government. These systems include DVP, DVP-XL, DES, and DES-XL. The highest level of security is offered by DES-XL. Even with the highest level of security offered by DES-Xl, *no* classified traffic can be transmitted using that format. What is the government using now?

According to a 1995 paper by Doug Graham, the government is now using a system called Facinator. This new type of encryption offers the government the ability to encrypt land mobile and other traffic up to the level of Top Secret. Facinator uses a completely different encryption algorithm whose details are classified by the government. The Secret Service is reportedly using Facinator in their Motorola Saber radios for executive protection and other security details.

Sources also tell us that *no* Facinator work on the radios is done at the radio provider, even Motorola. It seems that all of the radios are sent to an unknown location where this work is done. If anyone out there has any details on Facinator that are in the public domain (don't send anything remotely confidential), send it in to your Fed File!

Jean Baker, KIN9DD

Clearing the Way

Welcome aboard! Let's continue the examination of air traffic control (ATC) clearances from last month. On the aero band we hear talk of clearances from ATC towers, centers, and flight service stations. Hopefully, this information will help you understand what controllers and pilots are talking about.

Clearance Elements

Clearance Limit - The traffic clearance issued prior to an aircraft's departure will normally authorize flight to the airport of intended destination. Under certain circumstances and at some locations, a short range clearance procedure is used, whereby a clearance is issued to a fix within or just outside of the terminal area. Pilots then are advised of the radio frequency on which they will receive the long-range clearance directly from the center controller.

Departure Procedure - Controllers may issue headings and altitude restrictions to separate a departing aircraft from other air traffic in the terminal area. In areas with a large volume of traffic, standard instrument departures (SIDs) have been developed to facilitate aircraft movement.

Clearances normally are issued for the routes that pilots request, including altitude and flight level. However, traffic conditions frequently require controllers to specify a route, an altitude, or flight level different from that requested by the pilot. In certain congested areas or between congested areas, traffic is cleared to preferred routes and established flow patterns.

If the controller can approve the route filed by the pilot, he uses the statement, "cleared - as filed." When this procedure first was introduced, skeptics made dire predictions that planes would fly off in unexpected directions, because pilots had filed two flight plans and chose to follow the wrong one. This has happened only rarely, and the procedure has worked well.

Altitude Data - In most cases, controllers issue an altitude to be maintained by aircraft. If the initially cleared altitude is not within the stratum filed by the pilot (a jet route, for example), the controller provides a time or location when a pilot can expect a clearance to a higher altitude. After departure, if a pilot desires a different altitude than the one assigned, the pilot must request the change from the controller. If the requested altitude would conflict with other traffic, the controller will either advise the pilot when he can expect the altitude change, or suggest that he request it from the next sector's controller along the flight route.

Altitudes are generally assigned according to the direction of flight, unless there is reason for a nonstandard assignment. If the aircraft is heading in the half-circle from 360 to 179 degrees and the altitude is 29,000 feet or less, the aircraft will be assigned an odd altitude (such as 29,000 or 31,000). However, if the heading is from 180 to 359 degrees, the aircraft will be assigned an even altitude (30,000).

The term "cruise" is occasionally used in connection with altitude instead of "maintain." Cruise means that a pilot can go no higher, but can go lower than the stated altitude. If the pilot reports leaving cruise altitude in descent, he may not return to that altitude unless he gets clearance from the controller. This type of clearance is often issued to a pilot who intends to land at an airport that is outside of controlled airspace.

Pilots are required to follow both air traffic control clearances and air traffic control instructions unless they are exercising an emergency authority (a distinction without much difference since often the purpose of instructions is to ensure separation). Clearances usually start with the word "cleared." Controllers clear aircraft for taking off, for approaches, and to land. Most of the rest of what is said are instructions.

A Clear Tragedy

In the recent past, air traffic controllers also cleared aircraft to taxi, to cross runways, and to turn off runways, until a disastrous incident changed the procedure.

The airport at Tenerife in the Canary Islands is usually relatively quiet. On March 27, 1977, the airport was loaded with 747s that had been diverted from their European destinations because of bad weather conditions around the continent. By the time the aircraft were ready to depart for their destinations, a heavy fog had settled on Tenerife, which restricted visibility somewhat, but not enough to delay nor stop departures.

The airport at Tenerife was not built to accommodate this abnormal degree of activity. Aircraft had to taxi half way down the single runway before they could turn off onto a taxiway that would take them to the departure point. A KLM 747 was in position on the runway waiting for a departure clearance. The tower controller cleared a taxiing Pan Am 747 for a left turn off the runway. The KLM captain apparently heard the word "cleared." He understood it to be his takeoff clearance and began accelerating down the runway. The KLM was just barely airborne when it collided with the taxiing Pan Am 747. More than 400 people were killed in the collision.

The KLM captain was a top pilot, known for his care and precision. Shortly thereafter, to prevent misunderstanding, the air traffic control system stopped using the word "cleared" with taxiing aircraft.

Rules of the Road

Air traffic control depends upon clear, concise, and understandable communications between pilots and air traffic controllers. Pilots should read back to the clearance delivery controller the clearance or instruction that the controller gives them. If a pilot should read back the clearance incorrectly and the controller fails to catch it, it is the controller's error.

However, controllers expect pilots to react to instructions within a reasonable time, and often base separation instructions on that premise. If a pilot is told to "turn left heading 250" and acknowledges it but is slow in starting to turn for a minute or two, that delay is the pilot's error.

If a clearance or instruction should not be acknowledged, the situation is quite different. That is considered to be a clearance that has not been issued. Also, pilots are required to fly along the centerline of airways. The protected airspace of either side of the center line is to allow for equipment and pilot error, not for aircraft to wander off the center line. Pilots are also required to fly exactly at the altitude assigned — not somewhere near it.

Thanks to *Air Traffic Control - How to become an FAA Air Traffic Controller* by Walter S. Luffsey (Random House, 1990) for the above.

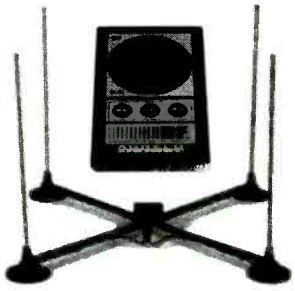
WHAT'S NEW?

TELL THEM YOU SAW IT IN MONITORING TIMES

Radio Direction Finding

Radio direction finding is a skill which hobbyists can use for recreation ("fox" or "bug" hunting contests), curiosity ("Where is that strange signal coming from?"), trouble-shooting or policing (IDing the source of interference to the repeater or ham radio violators), or it can contribute to any number of careers from investigative to working on commercial communications systems.

Using the latest enhanced Doppler-shift technology, this low cost, commercial grade, wideband mobile RDF antenna compares with government and military units costing thousands of dollars! With the Agrelo RDF control box connected between its rooftop antenna array and your



scanner, VHF/UHF receiver, or transceiver, you can pinpoint the direction of incoming signals from 25-900 MHz, depending on the antenna system purchased. If you are in motion yourself, the addition of GPS and Automatic Position Reporting System (APRS) software can help you follow the source of the signal via the Agrelo's RS-232 computer interface.

Or forget the direction-finding: When used with a suitable receiver, the Agrelo's high-gain amplifier allows nondirectional reception from the lowest radio frequencies clear through 2 GHz!

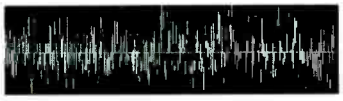
The RDF connects to your radio's antenna port, and a 1/8" audio plug connects to your radio's external speaker/earphone jack. 16 bright LEDs provide an accurate compass display with +/- 12.5 degree resolution; the optional computer or APRS can improve accuracy to within 1.4 degrees.

You can purchase a system covering 25-700 MHz or 700-900 MHz for $389.95, or you can purchase the system with both antennas for $539.95 (plus shipping) from Grove Enterprises (800-438-8155). Visit **www.agrelo.com** or **www.groveent.com** for information on accessories and options.

Positive ID!

Interference problems often plague repeater systems. Finding the people responsible can be very difficult. Yes, you can use "direction finding techniques" to locate them. But, in the case of malicious interference, you need to positively identify the transmitter being used. There is a software program now available that can provide positive proof in a contested case, and it's something any hobbyist can afford—it's free!

Every FM radio has a unique "fingerprint" that can be used for transmitter identification. XMIT_ID allows you to record and catalog this unique "fingerprint." It records the radio's dis-



criminator audio finger print, then time and date stamps every transmission.

XMIT_ID is an invaluable tool to anyone having interference problems, but it can also be used to find stolen transmitters, to help locate transmitter spurs, to help identify illegal users on a repeater, and to stop cellular phone fraud.

Here's all you need to run XMIT_ID: a modified receiver or 9600 baud packet ready radio, a 386 or better computer, DOS 5.0-6.22 (Windows 95 needs a lot of tweaking), VGA monitor, 1 meg of memory, sound card (8 bit Sound Blaster works best). XMIT_ID is copyrighted by Richard Rager (KB8RLN); you can download the program at **www.axom.com/kb8rln/xmit_id.html**

Miniature Radios

It's better than a mantra. Keep your cool while waiting in line at the amusement park, spotting for the local bike-a-thon, or toiling up the

Appalachian Trail with a tiny FM radio from American Technology Corporation. Their FM Sounds™ compact radios have a rich sound which belies their tiny size. All three models feature digital touch tuning, stereo earbuds, and 88-108 MHz tuning range. Batteries are included.

The smallest (Model 110) weighs less than an ounce and is a tiny 1-3/4 by 1 by 3/8 inches. Model 120 comes with a built-in key ring plus high-low volume control. Model 150 can clip to clothing, strap or belt and is a water-resistant radio with protective earbud jackets—you can actually listen while swimming!

Prices range from $11.99 for the smallest to $18.99 for the waterproof model. Visit **www.atcsd.com** for more or call 619-679-2114 or fax 619-679-0545.

Race Scanner

Radio Shack has tailored a basic scanner for the racing fan with frequencies for drivers and pit crews at the punch of a button: just enter the car number! The PRO-74 already contains frequencies for the most popular cars. The 100-channel, 800 MHz scanner can also be used as a regular scanner with access to all your favorite listening targets. The PRO-74 sells for $199.99 at Radio Shack and participating dealers.

Not Your Father's Cordless

Panasonic surprised nearly everyone with the introduction of three cordless phones that use the 2.4 GHz band to provide a range of up to 20 times more than a standard 46/49 MHz phone, almost eight times the range of current 900 MHz analog models, and twice the range of existing 900 MHz digital spread-spectrum units.

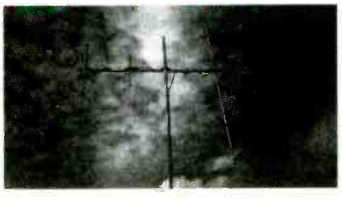
John McNenney, marketing manager for Panasonic telecommunications products, said "50 MHz is good, 900 MHz is better, 900 MHz spread spectrum is best, and our new GigaRange technology is even better than that...This is simply the best cordless phone we have ever made in terms

of range, in terms of sound clarity, and in terms of overall performance."

Scheduled to ship in September, the new phones transmit at 2.4 GHz from the base to the handset and at 900 MHz from the handset to the base to eliminate cross-talk interference and increase the power. In addition, the phones feature Direct Sequence Spread Spectrum Technology (SST) to increase the range and security of the cordless conversations. Another possible area of interference — microwave ovens that also use the 2.4 GHz frequency — has been eliminated by new circuitry.

The GigaRange phones, which range from $199 to $299, will use nickel metal hydride batteries, and feature two antennas in the base (one for 2.4 GHz and one for 900 MHz) as well as two antennas (one hidden) in the handset.

VHF/UHF/FM Antennas



Nil-Jon makes an FM antenna which requires no tuner because it is pre-tuned. Every aspect of these antennas has been mathematically figured for best gain, pattern, impedance, SWR, and bandwidth, taking into account the way each element interacts with the others. The result, according to testimonials, is an antenna which is superior for its size in capturing distant signals, whether it's for ham use, TV reception, FM stereo, or scanner use.

Nil-Jon antennas are precision manufactured in Ohio of high strength aluminum, polycarbonate and stainless steel fasteners. Street prices range from $100 to as much as $400.

For the dealer nearest you call Buckeye Marketing 800-955-7609 or visit **www.dynamall.com/nil-jon** or write or call NOARD Inc., Nil-Jon Distribution Center, 29462 Lorain Rd, North Olmsted OH 44070, (216) 777-9657 (fax) or (216) 777-9460.

Restoration Video

Hi-Res Communications has a line of repair and maintenance videos, but they have always been devoted to Collins amateur radio equipment. Now a video featuring Chuck Rippel, WA4HHG, walks you through four hours of maintenance procedures for the Hammarlund SP-600-JX receiver—including how to replace every one of the outdated capacitors. The results are worth the investment of $89.95 in the video, which you can purchase from Hi-Res Communications. Call or fax 248-391-6660 or visit **www.rust.net/~hires** (e-mail *hires@rust.net*)

Basic Radio

Are you interested in how radio really works? Can you stand just a little bit of math? Do you want to know more about signal-to-noise ratio and dynamic range? Then this is the primer for you. *Basic Radio* by Ian Poole is far from an engineering treatise; rather, it is a tutorial on transmitting and receiving signals, primarily those below 30 MHz, and is well illustrated by graphs, schematics, and tables.

Ian Poole takes us from the rudimentary components (coils, capacitors, crystals) and walks us through subsystems (modulation, amplification, filtering, conversion, detection, phase locked loops, stereo separation, and more). Receiving techniques from the simplest crystal sets and direct conversion through programmable, multiple conversion sets are described.

An extensive section on antennas covers most of the popular types, while a separate chapter brings us up to speed with a general overview on satellites.

The broadside approach to teaching the curious listener about how radio works is very informative, but don't expect to see construction projects or schematics with comprehensive information and measurements in a book of this scope. Scanning receivers are not addressed.

Basic Radio may be ordered for £14.99 plus shipping from Customer Services Department, Heinemann Publishers Oxford, PO Box 382, Halley Court, Jordan Hill, Oxford OX2 8RU, UK.

Crystal Set Building

Now this is *really* basic radio: In this age of bewildering technical advances, there is a prominent, grassroots interest in the simpler days of electronics. Antique radio shows are very popular, featuring active flea markets and restoration displays and workshops.

Published by the Xtal Set Society, this anthology of newsletters contains fascinating fun, including such topics as FM crystal sets, building a crystal headphone from a cat food tin, flame detectors, foxhole crystal radios, TRF designs, WWII underground crystal radios, cigar box crystal sets, and even an interesting treatise on how to make a dill pickle glow!

Crystal Set Building and More is 168 pages, $14.95 plus shipping from Grove Enterprises (800-438-8155 or visit **www.grove-ent.com**). For more information on The Xtal Set Society, call them at 800-927-1771, email *xtalset@midnightscience.com* or visit **www.midnightscience.com**

Listen to Mother Earth

Kiwa Electronics has announced a new ELF (extremely low frequency) receiver, expected to be available at presstime. Listening to radio signals as low as 50 Hz to 15 kHz tunes you in to distant lightning strikes and the sun's interaction with our atmosphere, and produces sounds described as "tweaks," "whistlers," and the "Dawn Chorus."

This newly-designed unit features a remote field probe for optimum reception. A variable bandpass filter helps to screen out interfering noise between 400 Hz and 6 kHz and also at 300 Hz. Headphone and record outputs, and 20 feet of cable for the remote probe are provided; six AAA cells are required for battery operation. The price is $145 from Kiwa Electronics, 800-398-1146 (or 509-453-5492) or visit **www.wolfe.net/~kiwa**

Software for Macs!

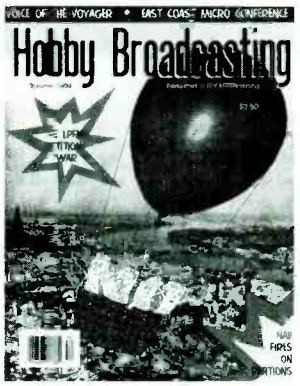
For a variety of radio-related software programs for Macintosh computers we recommend you visit Smolinski Scientific Systems' website at **www.access.digex.net/~cps/sssradio.html** You'll find antenna design packages, propagation forecasting, receiver control (Icom and Lowe), radio schedules, logbook, Morse code decoding and more!

For Macintosh computer control of your AR8000 handheld wideband receiver, Eddy Works has released a new version of AR8000 ToolKit. It's available for download at **http://**

www.mich.com/~eddy/works/ The new Version 2.0 provides a Virtual AR8000 display and keypad for easy operation. Those without the Internet may write Eddy Gurney, 18712 Westbook Way, Livonia, MI 48152-2896. The cost of AR8000 ToolKit is $50.

Hobby Broadcasting

With all the talk about community and microbroadcasting, it's not surprising to see a magazine emerge for this growing interest niche. Andrew Yoder has accepted the task; we've just seen the second edition of *Hobby Broadcasting*, "Dedicated to DIY broadcasting." It took us a while to figure out DIY stands for "do-it-yourself." That's clearly the focus of this 38-page magazine, whether it addresses unlicensed



broadcasting, traditional broadcasting, or netcasting.

Subscriptions are only $12 per year for the quarterly magazine, published by Cabinet Communications, P.O. Box 642, Mont Alto, PA 17237.

Citizens Band Review

Former *Monitoring Times* editor Larry Miller has founded an all-CB publication called *Citizens Band Review*. For a sample copy of the new magazine, send $2.00 cash to Citizens Band Review, P.O. Box 360, Wagontown, PA 19376.

Miller began producing *National Scanning* for Uniden's Bearcat Radio Club in 1990, but he is leaving that magazine (known as *National Communications* since last year). Miller said the parting was amicable but that proposed staff salary cuts made continuing with the publication impossible.

Norm Schrein, the president of the Bearcat Radio Club and publisher of the *Betty Bearcat Frequency Directories*, has hired another firm to produce National Communications, which will reportedly continue its bi-monthly schedule.

Books and equipment for announcement or review should be sent to "What's New?" c/o Monitoring Times, P.O. Box 98, 7540 Hwy 64 West, Brasstown, NC 28902 Press releases may be faxed to 704-837-2216 or e-mailed to mteditor@grove.net.

MT REVIEW

Icom IC-T8A Handheld Tri-Band Transceiver

By Bob Grove

Those of us with amateur radio licenses often wish for the convenience of hand-held transmitting and wideband receiving. Several cute radios have come out with this facility in the past, but few of them as small—and as feature-loaded—as the new ICOM IC-T8A.

Offering full six- and two-meter as well as 70 cm amateur communications (50-54/140-150/430-450 MHz), this handy handful also offers reception of 50-54, 118-174 (118-136 MHz AM aviation, 136-174 MHz FM land mobile), and 400-470 MHz, making it even more appealing to those of us with monitoring interests. Frequency coverage includes those for MARS (Military Affiliate Radio System) and CAP (Civil Air Patrol).

Weighing in at only 10 ounces and measuring a scant 2-1/4 inches wide by 4-1/4 inches high by 1-1/8 inches deep, the handheld is durable, too, meeting military specifications standards 810 for shock and vibration. It's even water resistant as well. Running 0.5 or 5 watts with the supplied NiMH (nickle metal-hydride) battery pack, the T8A is also compatible with drop-in chargers, external power sources, and speaker-mikes. The rubber ducky uses an inconvenient SMA connector, but SMA/BNC adaptors are available.

As a scanning receiver, the little ICOM does quite well, offering 123 memory channels with a variety of programmable scanning modes. CTCSS (Continuous Tone Controlled Squelch System) and DTMF (Dual Tone Multi Frequency: telephone keypad) tone generation is built in.

The receiver is double conversion, with 41.85 MHz for the first IF (intermediate frequency); 13.35 MHz (WFM) or 450 kHz (AM/NFM) provice the sound IF. Selectivity is sharp, a 2:1 shape factor for -6/-60 dB adjacent channel attenuation at 15 kHz bandwidth. And a sensitivity of better than 0.18 microvolts pulls in very weak signals.

A dual-function LCD bargraph indicates relative signal strength of incoming signals as well as relative output power during transmit. Tuning steps may be selected for 5, 10, 12.5, 15, 20, 25, 30, 50, or 100 kHz, while repeater offsets may be custom-selected for virtually any split.

The T8A can also be used as a pager, and the rotable tuning control may be used to tune through a band of frequencies or to select various options from the on-screen menu. Even the display can be custom adjusted for contrast levels and backlighting options.

The ICOM handheld can be cloned from a computer using the optional CS-T8 software and OPC-478 cable, or from another T8A via the optional OPC-474 cloning cable.

The new ICOM T8A is available for just under $400 from most ICOM dealers.

Bob Parnass, AJ9S

Sony ICF-SC1PC WaveHawk Scanner

Sony Corporation, already a major player in the portable shortwave receiver arena, is now marketing a very decent VHF/UHF portable scanner, the ICF-SC1PC. We are impressed by several aspects of the SC1PC we tested for this report (S/N 10233):

1. good RF and audio performance
2. 25 - 1300 MHz frequency coverage, minus cellular phone
3. selectable step size and mode (see measurements)
4. computer control and downloading with software provided
5. powered by ordinary AA batteries

Full Package

The SC1PC comes with all the trimmings, including a cable that connects your PC's serial port (DB-9) to the scanner's 10 pin jack and an interference fighting ferrite choke that snaps around the cable. Unlike most Radio Shack portables, the SC1PC comes with an earphone and AC adaptor, but the adaptor won't charge internal batteries.

A plastic belt clip, 6" flex antenna, and CD-ROM are provided, too. The CD-ROM includes both the scanner control program and the multi-million record PerCon FCC license database.

The operating and software booklets are both written in English, but not always understandably, e.g., "Do not lump the serial cable when using the computer."

Features

The SC1PC covers 25 - 1300 MHz, with gaps only in the cellular phone bands. The FCC will be licensing 2-way radio systems in the 700 MHz bands starting in September 1998. The SC1PC covers the entire new band, unlike the otherwise-stellar Uniden BC3000XLT.

You can override the default step size and choose a step of 5, 12.5, 25, 50, or 100 kHz, an operation that also coerces the display frequency to conform to the step. This drawback prevents you from searching interstitial frequencies in the 462.0125 - 462.9875 MHz range using a 25 kHz step size, for instance.

There are 10 banks ("pages" in Sony parlance) of 30 channels each. The firmware makes no check for duplicate frequencies when programming memory channels. A per-channel 2 second rescan delay makes it easier to scan a mixture of conventional systems and Motorola trunked systems concurrently, though you won't be able to actually track talk groups. Independent of the rescan delay, a defeatable 5 second pause can resume scanning after 5 seconds regardless of channel activity.

Unlike the ICOM IC-R10, you can scan any combination of memory banks. You can lock out ("skip") memory channels from scanning. The frequency stored in a skipped channel will also be skipped during searches, a different approach from other models. A single priority channel can be programmed and checked every 5 seconds.

You can enter a frequency without writing it to a memory channel, then step up or down, or perform a direct search. Sony's limit search is restricted to one pair of search limits, though computer control expands this to 20 linkable pairs. A band search lets you search through 17 bands programmed at the factory.

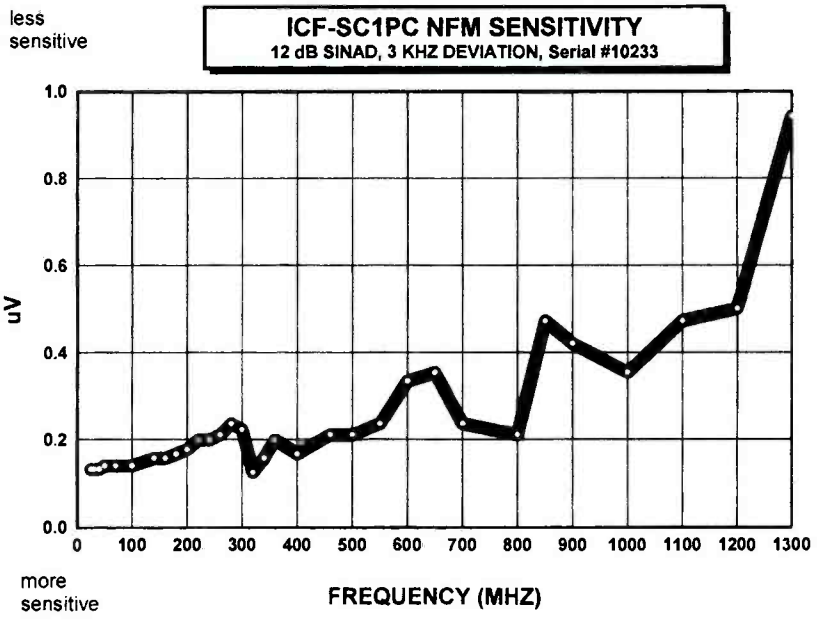
The familiar service search facility scans preprogrammed frequencies for weather, police, fire/emergency, marine, and VHF aircraft searches. Additionally, the SC1PC exploits its wideband coverage with handy service search keys for military air, VHF television, UHF television, and monaural FM broadcast, too!

A cache, termed Intelligent Memory, stores the last 10 unique frequencies that were active for longer than 5 seconds each. Sony's Intelligent Memory is a type of auto store feature but is active while scanning as well as searching and cannot be disabled.

Sizable Package

The SC1PC is housed in a 2-piece, silver and gray plastic case. Fit and finish is excellent, though some may find the large "WaveHawk" label gaudy.

If you want a miniature portable, search elsewhere. The SC1PC measures about 2-5/8 by 7 by 1-3/4 inches. Sony put the larger sized packaging to good use with a metallic speaker grille and display area.



Keypad - Physical vs. Logical

Most impressive is the man-sized, lockable keypad. Put bluntly, the SC1PC keypad feels good. The large, widely spaced rubber keys make it almost impossible to "fat finger" two adjacent keys simultaneously. The labels are large so you won't have to squint. Several keys protrude and are subject to accidental depression while the SC1PC is worn under a jacket. A keyboard lock is provided, but ruth-

lessly inhibits the lamp and power keys, too.

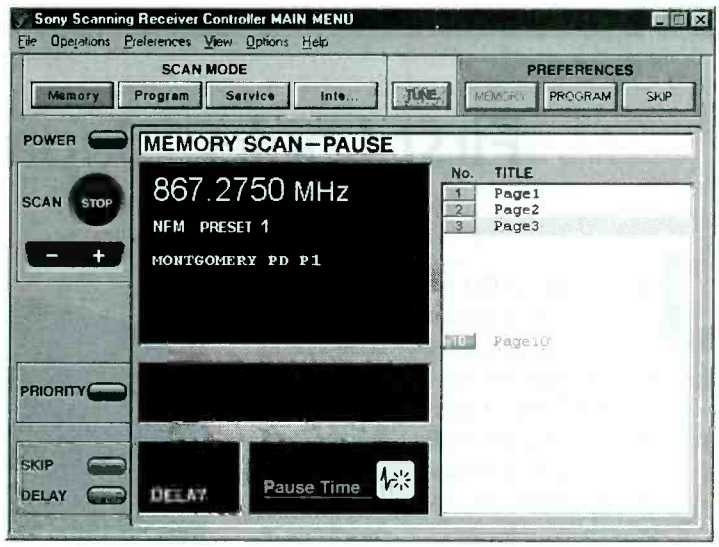
While the keypad physics are great, the keystroke logic is not. The SC1PC's keystroke sequence is complicated and quite different from Uniden and GRE made scanners. Some operations require pressing two keys simultaneously, others require a sequence of two keys. It gets worse. To store a frequency in memory, you must hold down the Enter key while pressing a multi-key sequence. Some keys activate on the downstroke, others (Skip) on the upstroke.

You can become enslaved to the SC1PC keypad. Some multi-key sequences are timed and the SC1PC will ignore your second keystroke if you aren't fast enough. Stepping through the memory channels one by one is an example. There is no simple "manual" key to press. Press Scan once to start scanning, again to stop. Fortunately, operating and programming the SC1PC via the supplied computer software is easier.

The separate, top mounted power pushbutton permits you to keep the volume control at a favored setting. The SC1PC powers up doing the same operation it was doing when you last turned it off and we like that. Green LED backlights remain lit for 10 seconds after pressing the Light button but they won't stay lit unless you power the scanner externally.

Performance

Our SC1PC scans a mixture of AM and NFM memories in multiple banks at a pokey 12 channels/sec (see comparison chart). That increased to 27 channels/sec by programming channels in ascending frequency order, using NFM only, and making sure there were no empty channels within banks we scanned — a contrived arrangement. We measured a reasonable 30 step/sec. search rate.



Clear and ample audio makes listening to our SC1PC a pleasure. It sounds better than most of the portables we've reviewed in this column. We detect no high frequency hiss through the monaural earphone jack.

Our SC1PC is one of the most sensitive scanners we've measured — consistently near 0.2 uV below 600 MHz (see graph). The SC1PC circuitry is triple conversion and the high first IF helps provide good image rejection, which we measured at 65 dB at 155 MHz. Our SC1PC hears images of cellular phone signals between 404 and 429 MHz, though they are reduced in strength by 30 dB. We hear cell signals in the 850 - 870 MHz range while driving in suburbia, too.

The squelch exhibits little hysteresis and only a brief noise burst at end of transmission. You can maintain the same squelch setting on AM and NFM throughout the spectrum, an important trait. Overall, the squelch performance is head and shoulders above the AOR AR2700 we tested.

We measured a 9.2 kHz modulation acceptance, about the same as our PRO-64, but more narrow than the 13 kHz of our Uniden portables. The smaller modulation acceptance means wider deviation signals are more apt to "chop out" of the squelch on voice peaks.

The low battery warning on our SONY flashes at 4.65 VDC, a bit conservative if using NiCd cells. Our SC1PC's memory was still intact 24 hours after removing the four AA batteries.

Computerized Operations

The Sony software requires Microsoft Windows 95. We used it on a Gateway 266 MHz Pentium II SCSI computer, running under Windows 95, version 4.00.1111. The SC1PC is connected to COM1.

The SONY software allows both scanning control and exchanging memory channel information between the PC and scanner. You can transfer memory channel information from ASCII disk files to the SC1PC and vice-versa. You can search the PerCon database and transfer entries into SC1PC memories using a multi-step process.

While the scanner has no alpha labels, the software does. You can label memory channels, memory banks, and search ranges.

The control software assumes your Win95 Control Panel Display Settings are configured to "small fonts." We saw the same bug when reviewing RELM MS-200 software.

Our SC1PC was not furnished with the interface protocol documentation necessary to write our own control software.

Bottom Line

Finally — a sensitive, wide coverage scanner with good audio, good RF performance, which comes with everything you need for computer control, and a power supply, too! The SC1PC's keystroke sequences are frustrating and the radio scans somewhat slowly, but this scanner merits your attention.

MEASUREMENTS
SONY ICF-SC1PC SCANNER
S/N 10233

Frequency coverage (MHz):
- 25 - 823.975
- 849.025 - 868.975
- 894.025 - 1300

Step sizes (kHz):
- selectable 5, 10, 12.5, 25, 50, 100

Modes:
- selectable AM, NFM, WFM

FM modulation acceptance: 9.2 kHz

Practical memory scan speed:
- 12 channels/sec.
- Search speed: 30 steps/sec.

Intermediate Frequencies (MHz):
- 600 (below 370 MHz), 232.5 (above 370 MHz), 45.0, and 0.455

Image rejection due to 1st IF:
- 65 dB at 155 MHz

Current consumption measured @ 6 VDC:
- 0.03 mA off
- 98 mA manual
- 98 mA scanning
- 175 mA open squelch, max. volume
- 28 mA additional for lamp

No battery saver action detected
- Low battery warning at 4.65 VDC
- Power off at 4.28 VDC

Lawrence Magne
Editor-in-Chief, Passport to World Band Radio

First Looks: Japan Radio NRD-545

Japan Radio's NRD-545 is so new that it is not yet even available in the United States, although it has been on sale in Europe and Japan for several weeks. The reason is FCC Type 15 approval, which if all goes according to plan should allow the '545 to go on sale here by August.

In the meantime, we have been testing a unit not yet blessed by the FCC. As I wrote in the July *MT*, the results of our initial lab and hands-on tests were extremely disappointing. We reported these to JRC, which confirmed them. As a result, they made a helpful modification to the receiver, and it is this improved version reported on here. Almost certainly no pre-modified receivers will be offered for sale in North America.

First, though, some useful fine print. We have not completed testing, and there is simply no substitute for having several grumpy, experienced panelists live with a receiver over time. To date, Rob Sherwood has lab tested the original and revised versions, and George Zeller has spent a decent amount of time using both versions. However, Toshi Ohtake, our man in Tokyo, and I have done little more to date than lay hands on the original version, and none of our other panelists has as yet been involved. So it ain't over.

Nevertheless, there is an uncommon unanimity of opinion concerning what has been found thus far, and these feelings are becoming more solid as testing progresses.

Heaps of features, including AM stereo

The Japan Radio NRD-545 is a fully-synthesized digital-signal-processing (DSP) receiver—like the Watkins-Johnson HF-1000, which reportedly was the engineering inspiration for the '545. However, unlike the '1000, which sells for nearly four kilobucks, the '545 is expected to sell for well under half that.

The '545 tunes from 0.01-30 MHz, with reduced performance below 0.1 MHz, plus an optional converter to tune up to 2,000 MHz. Modes are straight AM, AM with synchronous selectable sideband, AM-stereo (via audio jacks on the rear panel), LSB, USB, CW, RTTY and narrowband FM.

The optional high-end coverage should make the '545 competitive with a number of other so-called "DC-to-daylight" receivers, and AM-stereo should enhance the pleasure of listening to local stations. However, unless some frequency ranges are blocked out, the converter won't be legal for sale within the United States.

The digital frequency display is to the nearest 10 Hz and tuning is in ultra-precise 1 Hz steps. The frequency display can be off by more than 30 Hz within certain portions of the shortwave spectrum, worsening as frequency rises; but this can be ameliorated to some extent by tweaking an internal adjustment so that exact readings tend to fall within that part of the radio spectrum you use most often. The large-character World Time clock displays seconds numerically, which is helpful for those chasing IDs at the hour. Unfortunately, it shares the display with the frequency, so you can see one or the other, but not both at the same time.

Tuning aids include 1,000 presets, a handy scheme for scanning those presets, frequency scanning, a keypad and a tuning knob. Each preset can store frequency, mode, bandwidth, AGC decay timing, attenuator status and tuning step. Listening aids include passband shift that is fussy to adjust, automated/manual notch filtering, modestly performing DSP audio shaping, and a peculiar tone control. There is a digital signal-strength indicator, along with a timer, but no alphanumeric station-name display.

998 bandwidths, most ever

However, the big news—and it is *big* news—is bandwidth selection. Unlike most other tabletop receivers, which come with anywhere from two to several bandwidths, the '545 is tunable in 10 Hz steps from 0.01 to 9.99 kHz bandwidths or, if you prefer, 100 Hz steps from 0.1-9.9 kHz. That's an unprecedented 998 bandwidths (98 with the coarser option), effectively a continuously adjustable bandwidth throughout the entire range used by SWLs, DXers, hams and utility aficionados. Even the HF-1000, the reigning DX champ, has only 58 bandwidths.

This flexibility alone makes the '545 a potentially awesome rig, although in practice the "98 bandwidths option" proved to be not only fully adequate, but also more convenient for the operator.

More good news is that the AGC decay rate is exceptionally adjustable—from 0.04 to 5.1 seconds in hairsplitting 0.02 second increments—with the rate being shown on the display. However, there is a horsefly in the ointment, as we shall see.

Pleasure to operate

The ergonomics of the '545 will come as no surprise to users of the predecessor NRD-535. They are excellent in terms of layout, logic and feel, although the "fast" tuning speed is uncomfortably rapid.

Here, in the important arena of human interface, Japan Radio has once again hit a

home run. This radio is a pleasure to operate from the get-go, as well as for extended periods of time.

■ Many superior measurements

There's more good news. By and large, the '545 tests out in our lab the way you would expect from a house of champions. Image rejection, IF rejection, front-end selectivity, frequency stability, blocking and shortwave sensitivity/noise floor are all excellent or better, even though there is no preamp. (Sensitivity falls off slightly on mediumwave AM, more on longwave.) Phase noise and notch depth are both good, as is noise-blanker performance in the "narrow" setting.

The Watkins-Johnson HF-1000 suffers from a certain degree of digital hash caused by its own circuitry radiating noise into unshielded antenna inputs and/or nearby antenna pickup elements. This annoyance appears to be completely absent on the '545—especially helpful for BCB DXers using loops—plus the '545 is relatively free from the usual assortment of "birdies" present in most other receivers.

Overall audio distortion is more complicated, varying from a poor 12 percent in the AM mode at 400 Hz AF to a superb 0.1 percent at 2 kHz AF in all modes. Dynamic range and the third-order intercept point are both only fair, similarly to the earlier NRD-535.

Aside from taming a loud selective-fading "combing" noise consistently present when receiving in the AM mode, the synchronous selectable sideband circuit doesn't do much to improve audio quality—nor does the tone control. But as you would expect it does help in attenuating adjacent-channel interference. It also holds lock better than have past JRC receivers.

But the stickler is how all those bandwidths perform. Viewed positively, their skirt selectivity down to 40 dB is utterly breathtaking. For example, the 6 kHz bandwidth measures 6.0 kHz at -6 dB, 6.2 kHz at -40 dB. The same sort of vertical drop applies to all the other bandwidths, as well. Grab the bungee!

■ Dreadful ultimate rejection

But this is the nineties, so there has to be a catch. Below about 45 dB, the filters roll over and die, like cockroaches after an Orkin visit. Yes, ultimate rejection is only 45 dB, give or take—the sort of reading you might expect from a Chinese portable. Compare this to the ultimate rejection of the Drake R8B or AOR AR7030: 80 dB or greater!

In Midwestern and Western North America, shortwave signals tend to be of moderate strength. There, poor ultimate rejection is not quite the problem you might expect. But in Europe, the Near East and North Africa, beware. Ditto, to a lesser extent, in eastern North America, especially if you're into DXing faint AM-band or shortwave stations adjacent-channel to powerhouse signals. Be careful not to confuse the unfortunate audible result with "overloading," which although possible with the '545 is a less-likely cause for internally generated mishmash.

■ Tiring audio

Another pothole is audio quality, even though overall distortion is passable. This is one of the potential pitfalls of all fully synthesized receivers, but here the '545 fell into the deep end of the pit.

Japan Radio has never been renowned for its audio quality, but even by this pedestrian yardstick you may find this receiver too mentally fatiguing to enjoy over extended periods. Diddling with various IF and AF controls helps, but even then audio quality disappoints.

And it gets worse when there is thunderstorm static. This "static emphasis" was one of our complaints with the Watkins-Johnson HF-1000, but on the '545 it is harsher yet. This is an ill omen for tropical-band DXing, where overcoming static is an important objective.

■ Single AM-mode AGC

There's more. Although the '545's AGC decay rate is exceptionally adjustable in modes, such as single-sideband, that require a BFO, it is not adjustable in the AM mode—with or without the synchronous detector. Not only is this a drawback of exceptional proportions for a receiver of this class, the solitary AGC decay rate is too fast, making listening even more tiring. Somebody was clearly out to the sushi bar when this AGC was being designed.

Many tabletop receivers don't have an IF output, but can be given one by a skilled technician, five dollars' worth of parts and a few minutes' time. Not so the '545, which in all its DSP glory has no way by which an IF output can be created, period. With some receivers, this might not matter. But because the '545's audio leaves so much to be desired, it is an ideal candidate for a fidelity-enhancing accessory like the Sherwood SE-3. Alas, such devices require an IF output.

Lesser shortcomings include the audio notch, which won't tune beyond 2.5 kHz, greatly limiting its use with shortwave broadcasts. And the signal-strength meter overreads.

■ Bottom line: try, try again

There is much about the new NRD-545 that harks back to its distinguished Japan Radio heritage. Add to that some innovative improvements, such as the incredible variable bandwidth with cliff-steep skirts, and you should be looking at a knockout receiver. No question, the '545 is loaded with potential to be the best receiver around at any price.

But it was not to be. This is a rig that should never have made it out of the lab before having been checked out and properly debugged. It begs for further refinement, but a Japan Radio spokesman has stated to us that they have no plans to improve it further.

For North American utility DXers, the Japan Radio NRD-545's drawbacks are not as significant as they are for shortwave or mediumwave AM DXers. But for broadcast DXers, whether world band or AM band, our advice, plain and simple, is to keep what you've got—or wait for JRC to release an "NRD-555," if this ever comes to pass. Now, *that* could be the receiver we've all been waiting for!

This equipment review is performed independently by Lawrence Magne and his colleagues in accordance with the policies and procedures of International Broadcasting Services, Ltd. It is completely independent of the policies and procedures of Grove Enterprises, Inc., its advertisers and affiliated organizations.

John Catalano, PhD
j_catalano@conknet.com

Cyberlock Data Encryption Program

Last time we said that we would take a quick look at a data encryption program; the bane of every utility monitor. (You'll see why.) We'll also take a look at the rapidly changing computer market with its diving prices and increased performance. (Only crazy people are in this business!)

■ If You Can't Beat 'em - Join 'em

Remember when shortwave was a treasure trove of utility stations, sending radioteletype (RTTY) and SITOR (simplex teleprinting over radio) messages just waiting to be read? All it took was an Apple II computer with a bit of RTTY software and a simple, single integrated circuit interface. In the seventies and early/mid eighties this guaranteed you a front row seat to some of the most interesting and world altering events.

When the powerful IBM PC (8086 processor) replaced the Apple, digital message interception was made even easier and many additional modes became readable. But the near extinction of digital signal utility monitoring was also being ushered in with the introduction of inexpensive personal computers.

■ The Door Swings Both Ways

Just as the inexpensive PC provided radio monitors the power to read standard digital message formats (RTTY, etc), it also provided message originators added computer power, previously available only to the military in technologically advanced countries. This inexpensive computing power opened the world of data encryption to every digital message provider. The beginning of the end of digital signal monitoring was at hand. It's taken another eight years to be fully utilized, but today clear text (unencrypted) digital messages are the exception outside the ham bands.

■ One Peek = One Million Theories

Many of the concepts of "code breaking," as portrayed in movies and recorded by historians, are not quite accurate. Yes, many dedicated people worked hard and long at intercepting and decoding sites. But most of the major "breaking" actually occurred as the result of an opportunistic purchase (or theft) of the enemy's encoding/decoding machine and human intelligence (i.e., spies). The myth of an all-knowing and powerful cryptography section is maintained as a deterrent and for its propaganda value.

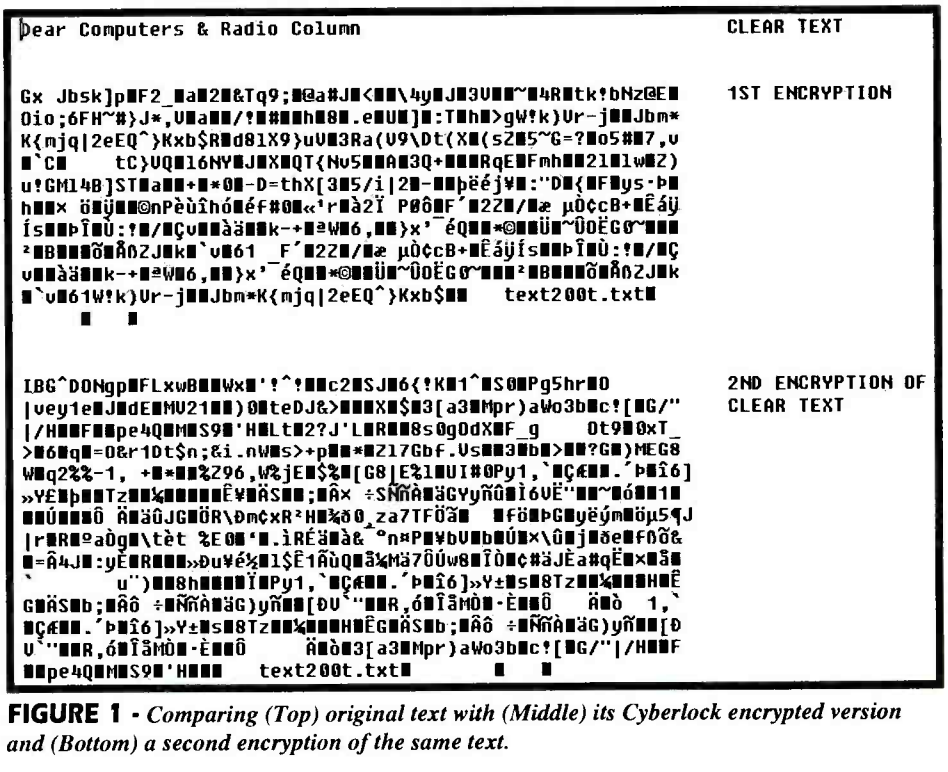


FIGURE 1 - *Comparing (Top) original text with (Middle) its Cyberlock encrypted version and (Bottom) a second encryption of the same text.*

Many books and magazine articles which discuss methods that individuals can use to break codes are only theoretical mathematical exercises, at best. The authors, being amateur, have enough information to be interesting though useless.

One of the simplest, and yet most secure manual encryption methods, is the One Time Use Pad. Here, unique printed pads are issued to field operatives. Each sheet on the pad is printed with a different encoding/decoding scheme. But since no two pads are alike in the order or encoding method of their individual sheets, many unique combinations can result. The catch is that headquarters and the field operative must be synchronized to the same decode sheet. (Maybe that gave rise to the phrase, "being on the same page.") Once used, the sheet and its decode method are discarded. This provides intercept stations with little, if any, code use repetition which is necessary for "breaking."

But what about scrambling of digital data sent over radio? Sure, with a Cray super computer and a staff of fifteen mathematicians, you too can break a few commercial codes in about two years ... maybe! For example, let's look at a commercially available data encryption program, **Cyberlock**, and see how to use it. Then we will compare the encrypted text against our original and see how easily the "code breaking" theories can be applied.

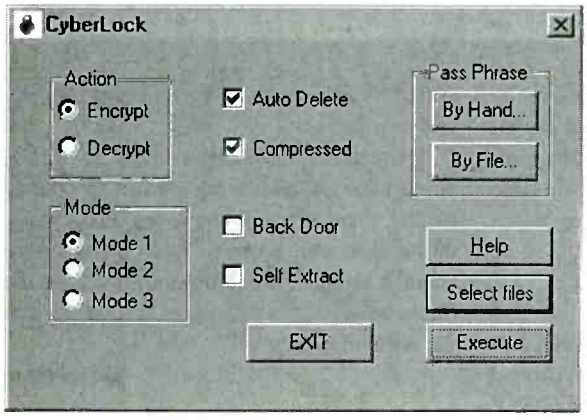
■ Locking Up Data

Cyberlock by Design Automation is an easy to use, Windows 95 program that provides data file encryption and decrypting. In its simplest form of operation, the user selects which message or data file is to be encrypted. Then the user types a passphrase (minimum ten characters), or designates any file whose first 128 characters will be used as the passphrase. This passphrase will be used to decrypt the message by the authorized receiver.

The resulting encrypted file appears as random letters and symbols after encryption. For example, if we write, "Dear Computers & Radio Column," Figure 1 Top, and encrypt it with the keyword of *MONITORINGTIMES*, the resulting encrypted file, when read as text, appears in Figure 1 Middle.

Notice the "C" in Computers and the "C" in Column are NOT simply replaced with the same character. This is not just a child's substitution cipher. The 386 byte WordPerfect file blows up to over 1200 bytes after encryption. That's the downside. On the upside, in no way can the resulting file be compared to the origi-

FIGURE 2 - *Cyberlock's Command Screen*



nal.

If we repeat the same process with the same files and the same passphrases the result is shown in Figure 1 Bottom.

Not at all close to the first encrypted file of the same starting text!

Yet, decrypting the files using the *MONITORINGTIMES* key results in the original text. Cyberlock has a provision which also allows the user to send encrypted files to a second party who does not have the Cyberlock program. Using this feature, the resulting encrypted file is transformed into a self-executing file. Upon running, it asks for the passphrase to be entered. If correct, the original text/data appears. That's pretty neat.

When I spoke with Dr. Lehrer of Cyberlock he said that an independent test has shown that their encryption method was "impossible to crack" using commonly available computers and methods. Cyberlock starts with Pseudo Random Number generation (PRNG) and then adds two additional layers. Their patented Random Coding and Random Transposition process adds a real challenge to any would-be message/data intruders.

Read all the books and magazines on encryption by the self-proclaimed "experts." Then knock yourself out trying to break Cyberlock with your 300 MHz Pentium II after work. Why not instead try using your computer and energy to predict the winning Powerball Lottery numbers? Statistically, you have a tremendously greater chance of winning the lottery than breaking the code of a quality encryption program; even one which costs only $50.

Cyberlock is easy to use, and if the sources are to be believed, provides a very high degree of data security. All commands are implemented from a single, simple menu screen. Figure 2. For the very reasonable retail price of $49.95 you too can feel like a utility station and encrypt all your messages. Cyberlock is available from retailers. See the parent company, Design Automation's web page at **www.DA.com** or telephone them at (713) 972-7912. Tell them John from *MT*'s Computers & Radio sent you.

The Price is Right ... for the Moment

Guess the price of a new Intel 233MHz, MMX processor based computer, 32MEG of RAM, video card with 1MEG, 24X CD ROM player, 16 bit sound card, 1.8G hard drive, 33.4K modem, 3.5 inch floppy, minitower case and keyboard. Come on, guess!

If you said $899 you would be $200 to $300 *too high*! These computers are now going for $599 to $699, not only in mail order computer companies, but in local shops. While in Long Island, New York, I was shocked to see an ad in the *Pennysaver* (free weekly newspaper) that advertised just such a computer system for $599. I checked it out and it proved to be true — except for the additional 8.5% sales tax. (Isn't that the reason we split from England?!) With these prices, don't bother looking at older used computers.

As Intel reduces the price of their Pentium II 233MHz processor to Pentium I prices, the bottom has fallen out of the market. Why? Good question. Perhaps it has to do with the fact that the PII uses completely new RAM and Motherboards. That's right. Soon the Pentium RAM and motherboards will be as valuable as 80486 hardware; hard to move at any price. So if you don't mind not having the latest and greatest, some excellent deals on powerful Pentium 233 MHz MMX systems can be yours.

Hand Computers / Wireless Data Transfer

Next time we will begin a series looking at one of the hand computers using Microsoft's Windows CE (consumer electronics). Casio's Cassiopeia made its debut at the January CES. Is it a toy, or a real computer? Can it run radio monitoring programs? Before you spend a few hundred dollars on a hand computer you may want to follow along as we find their strengths and limitations.

We'll also look at IrDA, wireless data transfer over infrared beams; almost a necessity for tiny portable devices such as the Cassiopeia and digital cameras. Companies such as Canon, IBM, Selectech, Casio and Philips (plus about 100 other companies) are sold on it. A product called the AirData Mouse allows Win 95 desktops to easily communicate with these, and many more IrDA products.

LETTERS TO THE EDITOR

NEWS AND VIEWS FROM OUR READERS — Rachel Baughn, Editor

Mediumwave Miscellany

• Steve Keithley writes, "I would guess that most of us started our hobby careers by catching a 'long-wave' at night. I have enjoyed radio as a hobby for almost 35 years now, and I got started hearing a station from Canada on my Dad's car radio. To this day I like MW DXing but for a more practical application. I drive a number of miles each week in New Mexico, Colorado and Arizona: As an avid baseball fan I look forward to driving at night, listening to Kansas City, Denver, Dallas, even San Francisco. I leave the more serious stuff for my home, ham radio, etc. But I am still grateful for that chance encounter with a Canadian station on my Dad's old Chevy radio!"

—Steve Keithley WD9FJL, Albuquerque, NM

• "I think the microbroadcasters mentioned in Fred Maia's *Washington Whispers* (May 1998) may have a point. Most of the country music lovers I know, including myself, also like the oldies, but I have yet to hear a station that plays both in my area. We may need a pirate to play a mix of country and oldies for us. Our country's needs for a different point of view may need to be met by some alternative to the talk shows and news on the legal stations, such as a liberal version of Rush Limbaugh. A pirate may be providing these alternatives.

"The FCC should look at this possibility if they want to continue to shut down these stations or win any cases against Steve Dunifer."

—Paula L. Spart, South Bend, Indiana

• *John Wingard, WB4GLJ*, wrote to thank Skip Arey for his June column about his first radio. " I too have my own 'Radio One' but it isn't exactly a transistor portable, although I do still have my trusty Philco 6-transistor portable that really got me interested in radio back in the early 60's. My first receiver was a Heathkit CR-1 crystal receiver that my dad ordered and built for me. I still have it and it still works.

"I grew up in a small town in Alabama with only one low-powered AM station on one of the 'graveyard' frequencies and this station was the only thing that I could hear on it. I spent many a night listening to that crystal set, usually in bed on school nights when I really should have been asleep! Later, after my interest in radio was obvious to my entire family, they gave me a Silvertone tube-style table radio that I nearly wore out listening to the AM band ... Thanks for stirring up some pleasant memories!"

• "I have been into radio since I was 10 years old. My first DXing was with television. I recall watching KFMB chnnel 8 and KGTV channel 10 (was KOGO) in San Diego, XETV channel 6 and XEWT channel 12 in Tijuana, Mexico, while growing up in California. Later on channel 3 and 4 Montana, Nebraska, Oregon, Colorado, would come in during hot summer days. When I got my first multi-band radio with AM, FM, MB (marine band), and SW (shortwave), I discovered more DX from Cuba, Canada, Germany, France, just to name a few. Then I got into two-way radio listening on the marine band (still my favorite) listening to fishing boats and Coast Guard.

"It has been 30 years since I started my radio hobby. Now I have ten radios in my shack and will be adding more. I have QSLed 29 countries, 24 states, and six Canadian provinces. I monitor frequencies from 150 kHz LW to 1300 MHz microwave. Now the hobby is leading me into a career in broadcasting. Been at it for 30 years and I still can't get enough!"

—Kevin in Hawaii

Great Scanning

"Thank you for Steve Douglass' great article (May '98) on scanning the Blue Angels! I took my Icom R1 to the big air show at Andrews Air Force Base on 17 May, and I was able to hear some great stuff!

"Show Control was on 124.000 MHz; listening to this let me have great advance warning of many events such as the magnificent parachute drop by over 320 members of the 82nd Airborne. Their aircraft gave 10 and 5 minute warnings on the way in. As the soldiers were accounted for I could track the injury report (two minor sprains) on 413.020 MHz, which seemed to be a control frequency for the ground security folks. Unfortunately I was unplugged from my scanner (with both hands full of very excited boys) when a couple of crazies attacked the B-52 that was on display. I happened to be right there and about 100 MP's came from all directions by foot, car and bicycle!

"I found the Blue Angels on 238.150 MHz, at least the lead plane was on this frequency calling out each maneuver of the show. Many of the calls were snippets of songs and were actually sung. For example, the call for the diamond to go straight up was 'Up we go, into the wild blue yonder!'"

—David Stein

Baltimore Air

"I had some corrections and additions for the BWI article in the May issue; I believe the author may have been working off an old frequency list." Suspect frequencies include 125.3, 133.75, and 154.98.

"254.3 should be 254.35: It is very common for controllers to drop the trailing '5' when giving frequencies.

"The 800 MHz ARINC system referred to in the article is a five channel system, Motorola Type I; fleet map E1P8 seems to work well for the trunktrackers. It's a fairly low power system with the following frequency plan: 856.8875 857.8875 858.8875 859.8875 860.8875. It's actually leased to USAir, and is very similar, I am told by the Scan-L and Scanner mailing lists, to the one set up in Charlotte, NC.

"The Anne Arundel trunk system is a type II Motorola, so you only need to program the frequencies in a trunktracker and press the trunk key. The frequencies are 856, 857, 858, 859 and 860 in the following bandplan: xxx.3625 .3875 .4125"

—Mike Agner

The Roots of LORAN

"Contrary to Albert Lozano's article in the June issue of *Monitoring Times*, LORAN-A did not operate between 30 and 80 MHz; it was a medium-frequency system using frequencies between 1.7 and 2.0 MHz. It was a true long-range system developed during WW-II, with a night-time range of several thousand miles. The 30 to 80 MHz system referred to in the article may have been SHORAN (Short Range Navigation).

"Like LORAN-C, LORAN-A was a hyperbolic navigation system using chains of

(Continued on page 94)

GLOSSARY OF TERMS USED IN *MT*

//	Indicates a parallel frequency
73	Best Regards
µF	Microfarad
µH	Microhenry
ABU	Asia Broadcast Union
AC	Alternating Current
ACARS	Aircraft Communications Addressing and Reporting System
ACE	Association of Clandestine Enthusiasts
AWR	Adventist World Radio
AIR	All India Radio
AM	Amplitude Modulation
AP	Associated Press
APRS	Automatic Packet Reporting System
ARRL	American Radio Relay League
ASCII	American Standard Code for Information Interchange
ATC	Air Traffic Control
AT&T	American Telephone and Telegraph
BBC	British Broadcasting Corporation
BBCM	British Broadcasting Corporation Monitoring Service
BNC	Coax connector commonly used with VHF/UHF equipment
CB	Citizen Band
CBC	Canadian Broadcasting Company
CBS	Columbia Broadcasting Company
CD	Compact Disc
CD-ROM	Compact Disc, Read Only Memory
CE	Chief Engineer
CIA	Central Intelligence Agency
CLA	Cuban Coastal Radio Station
CNN	Cable Network News
CPU	Central Processing Unit
CR	Croatia Radio
CTCSS	Continuous Tone Controlled Squelch System
CW	Continuous Wave (Morse code)
DC	Direct Current
dB	Decibels
DEA	Drug Enforcement Administration
DJ	Disc Jockey
DPS	Department of Public Safety
DSS	Digital Satellite System
DSWCI	Danish Shortwave Clubs International
DW	Deutsche Welle
DX	Distant reception of radio or television signals
DXer	A person who engages in the hobby of distant radio/television reception
DXing	The hobby of listening to distant radio or television signals
EMS	Emergency Medical Service
EOD	Explosive Ordnance Disposal
FAA	Federal Aviation Administration
Fax	Facsimile
FCC	Federal Communications Commission
FEMA	Federal Emergency Management Agency
FM	Frequency Modulation
FTP	File Transfer Protocol
Golay	Golay Sequential Pager Signaling System
GHz	Gigahertz
GPS	Global Postioning System
HF	High Frequency
HQ	Headquarters
Hz	Hertz
ID	Identification
IRC	International Reply Coupon
KBC	Kenya Broadcast Corporation
KBS	Korean Broadcasting System
kHz	kiloHertz
km	Kilometer
kW	kilowatt
LCD	Liquid Crystal Display
LSB	Lower Sideband
M	Meter
mb	meter band
MDT	Mobile Data Terminal
Med	Medical
MHz	Megahertz
MNO	Merlin Network One
MT	Monitoring Times
MW	Medium Wave
NAS	Naval Air Station
NATO	North Atlantic Treaty Organization
Nexrad	Next Generation Doppler Radar
NFM	Narrowband Frequency Modulation
NiCd	Nickel Cadmium Battery
NPR	National Public Radio
NOAA	National Oceanographic and Atmospheric Administration
NSW	New South Wales
NU	Numero Uno
NWS	National Weather Service
PC	Personal Computer
PD	Police Department
POCSAG	Digital Pager Code
QRA	The name of my station is ...
QRM	Man-made interference
QRP	Low power transmit operation
QSL	A card or letter confirming reception of a radio station
R.	Radio
RAM	Random Access Memory
RDP	Radiodifusao Portuguesa EP
REP	Republic
RF	Radio Frequency
RFE	Radio Free Europe
RFI	Radio France International
RFPI	Radio For Peace International
RHC	Radio Havana Cuba
RL	Radio Liberty
RTBF	Radio-Television Belge de la Communiaute Francaise
RTM	Radiodiffusion Television du Mali
RTTY	Radioteletype
RVI	Radio Vlaanderen International
SASE	Self Addressed Stamped Envelope
SBO	Voice of Oromo Liberation
SINPO	A code system used by radio hobbyists to indicate how well a station was received S=Strength, I=Interference, N=Noise, P=Propagation, O=Overall
S.O.	Sheriff Office
SSB	Single Sideband
SW	Shortwave
SWBC	Shortwave Broadcast
SWL	Shortwave Listener
SWR	Standing Wave Ratio
TRT	Turkiye Radyo-Televizyon Kurumu
TV	Television
UHF	Ultra High Frequency
UK	United Kingdom
UPI	United Press International
URL	Universal Resource Locator
US or USA	United States of America
USB	Upper Sideband
UT or UTC	Universal Time Coordinated
UV	Ultraviolet
v	variable
VAC	Volts Alternating Current
VC	Voz Christiana
VDC	Volts Direct Current
VHF	Very High Frequency
VOA	Voice of America
VOR	Voice of Russia
VOV	Voice of Vietnam
VP	Vice President
VRT	Vlaamse Radio en Televisie
VSWR	Voltage Standing Wave Ratio
WFM	Wideband Frequency Modulation
WWV	National Bureau of Standards Time Station in Boulder, Colorado
WWVH	National Bureau of Standards Time Station in Hawaii
WWW	World Wide Web

INDEX OF ADVERTISERS

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LETTERS TO THE EDITOR

(Continued from page 92)

NEWS AND VIEWS FROM OUR READERS

stations with different pulse rates. The frequencies used included the 160 meter amateur band, but this was of no consequence during WW-II because hams were off the air.

"The use of LORAN was continued after the war, and for a long time amateurs were still denied use of the band. Eventually the FCC relented and worked out a sharing arrangement with geographical and power restrictions, allowing amateurs limited use of the band depending upon location. The implementation of LORAN-C finally resulted in the decommissioning of LORAN-A and restored the full use of the 160 meter band to the amateur service.

"Incidentally, **http://194.143.106.151/skole/stud/fredrike/f_liste.txt** still lists LORAN-A channels for Norway; Channel 1, 1.95 MHz; Channel 2, 1.85 MHz; Channel 3, 1.90 MHz; Channel 4, 1.75 MHz."

—Perry Crabill, W3HQX, Winchester, VA

Albert Lozano replies that the US Coast Guard *Loran Users Handbook* indicated that "the first hyperbolic system, proposed first in 1937 and implemented by the United Kingdom in 1942, operated at a frequency between 30 and 80 MHz." He apologizes for incorrectly assuming that the name of the system was Loran-A, and we thank Perry for the additional background material.

Send your comments, critiques, and memos on monitoring to **Letters to the Editor**, PO Box 98, Brasstown, NC 28902.

—Rachel Baughn, mteditor@grove.net

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CLOSING COMMENTS

By Bob Grove, Publisher

FCC Proposes More Protective Rule Changes

On June 3, 1998, the Federal Communications Commission (FCC) released ET Docket 98-76, RM-9022, a Notice of Proposed Rule Making (NPRM) in response to the House Subcommittee hearings held in February 1997, which examined the vulnerability to cellular telephone users to eavesdropping by scanner listeners. This was covered extensively by *MT*.

Subsequent meetings between the Commission, manufacturers, and other interested parties resulted in a Petition for Rulemaking by Uniden America Corporation, arguably the largest manufacturer of scanning receivers in the world. Their proposals, along with other comments received by the Commission, have resulted in several proposed changes (listed here in brief) to Parts 2 and 15 of the FCC's Rules and Regulations.

(1) Image response in the cellular frequency ranges must be reduced by no less than 38 dB;

(2) Tuning and control circuitry must be opaque-encapsulated or metal-covered so that tampering will likely render the scanner inoperable;

(3) Cellular modification of scanners on an ongoing basis constitutes manufacturing, and is prohibited;

(4) Modification of any scanner to receive cellular frequencies, regardless of the original date of manufacture, voids its certification, rendering it contraband;

(5) Test equipment which receives cellular frequencies can be sold only to professional service personnel and not marketed to the general public; alternatively, sale shall not be restricted, but equipment shall not allow cellular audio to be heard;

(6) Scanner kits and converter kits to be used with scanners will be unlawful.

(7) Particularly disturbing is a proposal to outlaw any manually-tuned (non-scanning receiver) that covers, or could by modified to cover, cellular frequencies. The domino effect of this ill-advised proposal would severely impact an entire international industry, the manufacture and importation of analog receivers—multiband radios, AM/FM entertainment radios, receivers with TV audio, police band portables, weather radios, and more—since they could be "tweaked" to receive cellular signals, or used with frequency converters.

While Uniden's suggestion to attenuate cellular images by 38 dB (arrived at empirically as being reasonably achievable using conventional filter design) may seem practical, the simple addition of an external preamplifier will defeat the measure.

The illegality of private citizens owning test equipment is also troublesome. Countless one-man communications shops across the country currently maintain two-way radio systems and repair radio equipment, while other independent entrepreneurs conceive new radio products and designs which require full-coverage test equipment, often on a part-time, supplemental income basis for their financial survival. They should be praised, not penalized, for their contribution to the national product.

The intent of the proposal to ban kits may have been directed toward cellular frequencies, but the wording of the proposal bans all scanner kits and converters. This delivers a fatal blow to another key portion of a struggling American market, the amateur and hobby electronics industry.

In spite of attempts to acquire a copy of the NPRM from the Commission after its adoption on May 21, 1998, we were not given this NPRM until June 9th. At this writing, we have no suitable alternatives formulated to suggest to the FCC, but will attempt to submit something before closing.

The FCC should be commended for their response to the demands of technologically challenged legislators, but several proposals are very troubling and bode additional conflicts ahead.

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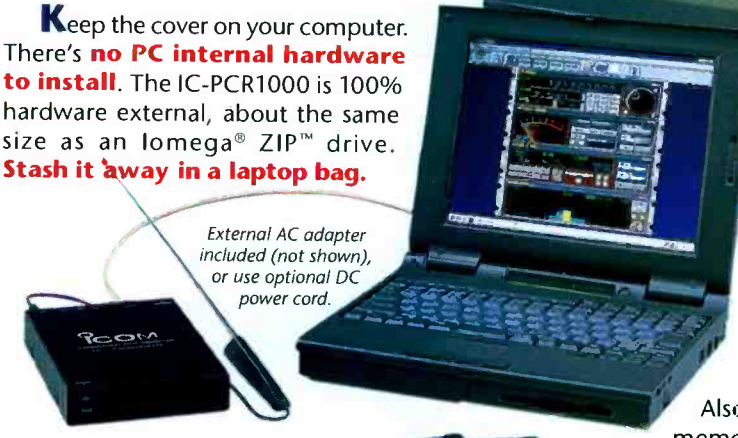

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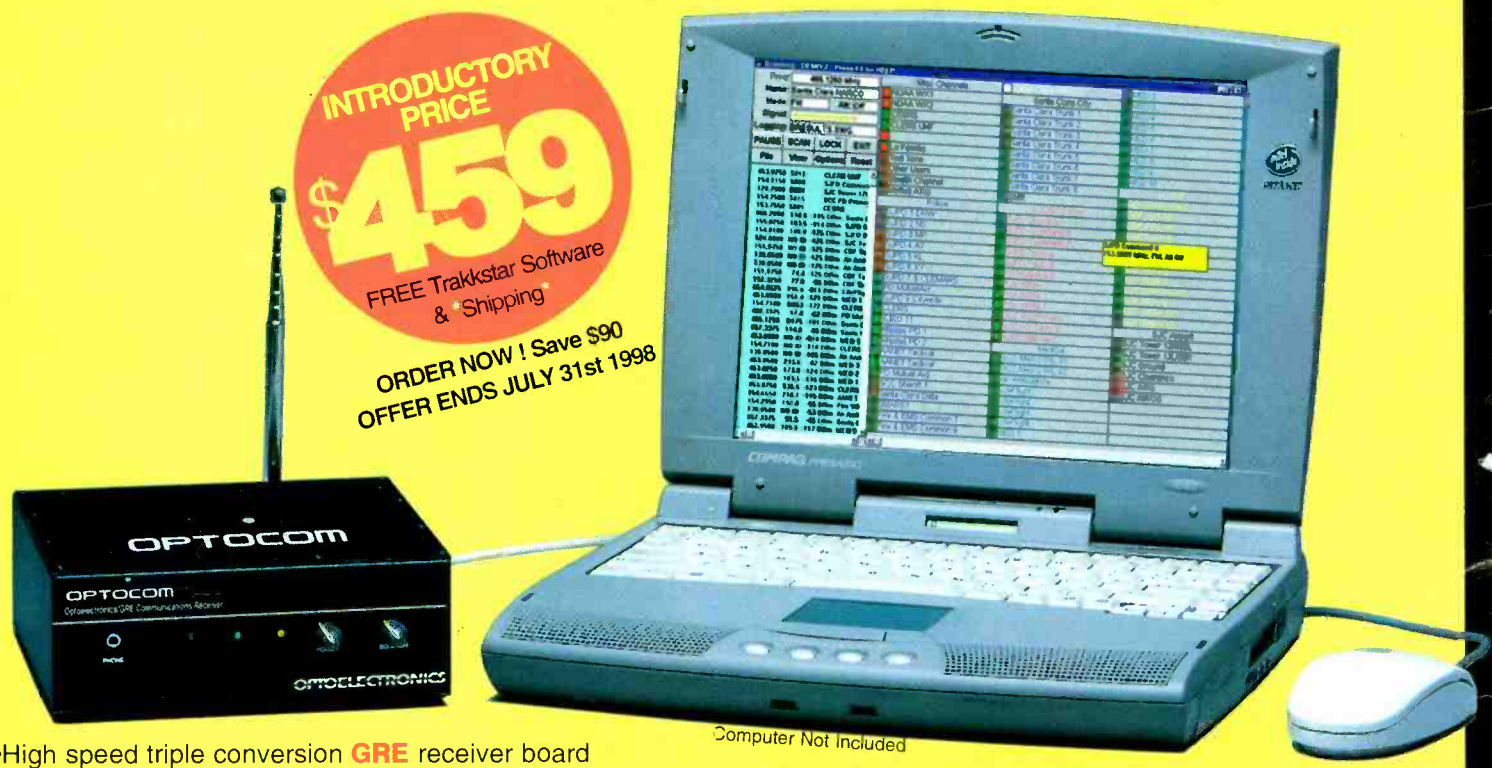

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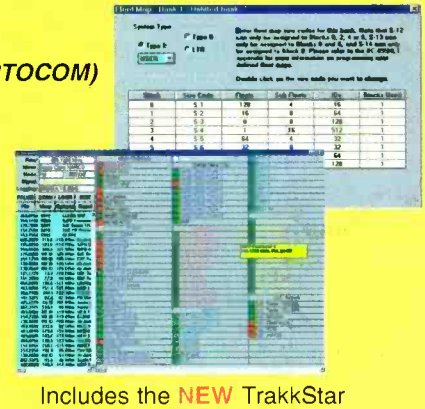

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