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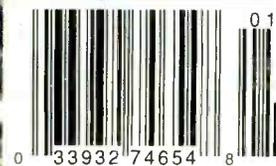
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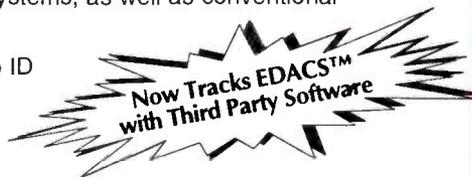
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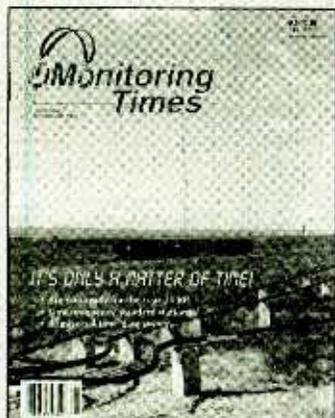
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Monitoring Times™

Vol. 18, No. 1 January 1999



Cover Story

These Stations Set the Standard for all Time

By Albert Lozano

Spaced throughout the shortwave spectrum are some unusual stations which, though they broadcast to the public, are commonly considered utility stations. Their primary function is to broadcast the time with the pinpoint accuracy of their atomic clocks, but they also establish frequency standards. The electrical grid, telecommunications systems, broadcast networks, and maybe even your wristwatch may rely upon the accuracy of these signals.

If you'd like to log an easy "utility" signal, check propagation conditions, or log a new country with an easily identifiable signal, give these standard-setting stations a try. The story begins on page 8.

Cover photo: Red and white 2.5 MHz antenna and a wideband standby antenna are part of frequency/time standard station WWV's antenna arsenal on the high plains above Fort Collins, Colorado. Photo by Joan Heinen.

A Common Date/Time Standard 12

By Ian Galpin

Ian Galpin is a champion of ISO 8601 — a solution to computer problems in the new millennium and a way to avoid international misunderstandings. Radio hobbyists can promote its adoption by using it in all loggings and transactions.

Are You Ready for the Year 2000? 14

By Philip Chien

The year 2000 (Y2K) will bring with it problems our ancestors never had to consider in the age before the computer chip. In fact, we are largely unaware of our reliance upon computer operations — operations that could fail on January 1, 2000. Are you prepared?

Alternative Power

A Simple Solar Set-up 16



By Robert Brown, Jr

When looking for alternative power, why not go straight to the source — the sun! Draw inspiration from Brown's description of his home-brew system and design your own.

Battery in a Bucket 18

By Jacques d'Avignon

When on a DXpedition to remote sites without ac power, a lead-acid battery is an ideal alternative power source — or it would be if it weren't for nasty battery acid. This project fits the battery safely and snugly into its own tidy enclosure!



Regulating the Alternative Power System 20

By A.W. Edwards

Operating directly from solar panels is not the ideal set-up; on the other hand, you could also damage a battery by applying too much voltage. Here are a few simple ways to regulate your alternative power both to and from a lead acid battery.

A Turning Point for International Broadcasting? 22

By John Figliozzi

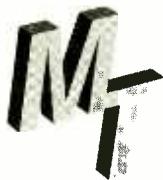
The end of the Cold War caught many international broadcasters unprepared to justify their existence in a new and even colder market economy. The good news is that the broadcast community is learning to redefine itself in terms of content, not means of transmission, and it is learning to compete for its share of audience attention.



Reviews:



Reviewed in this issue are AOR's AR7000 wide coverage receiver (p.92), Grundig's Platinum Traveller shortwave portable (p.90), Maxon's FRS-214 handheld two-way radio (p.87), Alpha Delta's VRC speaker and Icom's Q7A Transceiver (p.97), and Grove Enterprises' FCC Database CD-ROM (p.82).



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

Bob and Judy Grove
judy@grove-ent.com

Publisher

Bob Grove, W8JHD
bgrove@grove-ent.com

Managing Editor

Rachel Baughn, KE4OPD
mtditor@grove-ent.com

Assistant Editor

Larry Van Horn, N5FPW

Art Director

Belinda McDonald

Advertising Svcs.

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

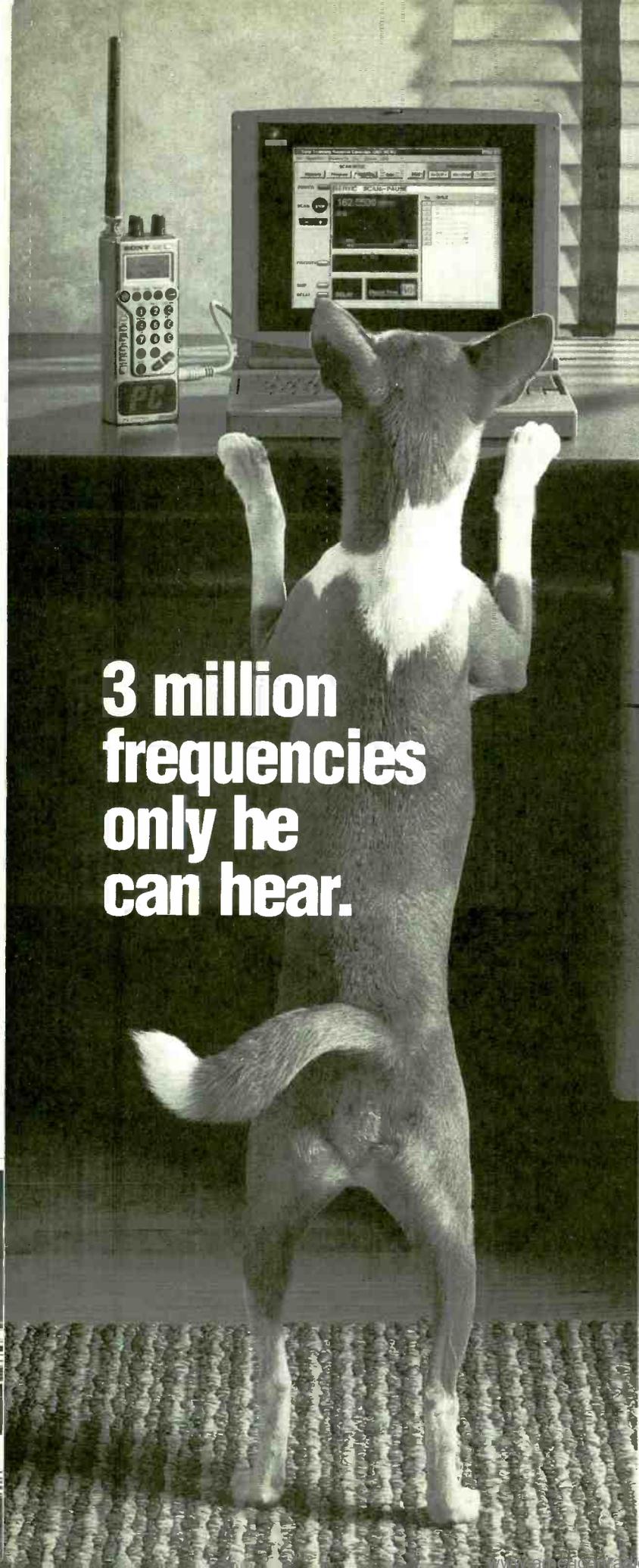
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EDITORIAL STAFF

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

Frequency Manager	Gayle Van Horn	gayle@grove.net
Frequency Monitors	David Datko, Mark J. Fine	
Program Manager	Jim Frimmel	frimmel@star-telegram.com
American Bandscan	Doug Smith, W9WI	w9wi@bellsouth.net
And More!	Jock Elliott KB2GOM	lightkeeper@sprintmail.com
Antenna Topics	W. Clem Small, KR6A	clemsmal@bitterroot.net
Beginner's Corner	T.J. Arey, WB2GHA	tjarey@home.com
Below 500 kHz	Kevin Carey, WB2QMY	lowband@gateway.net
Computers and Radio	John Catalano	j_catalano@conknet.com
Digital Digest	Stan Scalsky	sscalsk@mail.ameritel.net
	Mike Chace	michace@dtus.com
Experimenter's Wkshp	Bill Cheek	bcheek@cts.com
Federal File	Larry Van Horn, N5FPW	larry@grove-ent.com
K.I.S. Radio	Richard Arland, K7SZ	k7sz@juno.net
Magne Tests	Lawrence Magne	
Milcom	Larry Van Horn N5FPW	larry@grove-ent.com
On the Ham Bands	Ike Kerschner, N3IK	
Outer Limits	George Zeller	George.Zeller@acclink.com
PCS Front Line	Dan Veeneman	dan@decode.com
Plane Talk	Jean Baker, KIN9DD	
Programming Spotlight	John Figliozzi, KC2BPU	figlio1@nycap.rr.com
Propagation	Jacques d'Avignon	monitor@rac.ca
QSL Corner	Gayle Van Horn	gayle@grove.net
Satellite Radio Guide	Robert Smathers	roberts@nmia.com
Scanning Equipment	Bob Parnass, AJ9S	
Scanning Report	Richard Barnett	ScanMaster@aol.com
SW Broadcasting	Glenn Hauser	ghauser@hotmail.com
SW Broadcast Logs	Gayle Van Horn	gayle@grove.net
The Launching Pad	Ken Reitz, KS4ZR	ks4zr@compuserve.com
Utility World	Hugh Stegman, NV6H	driver8@netcom.com
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Washington Whispers	Fred Maia, W5YI	fmaia@cwixmail.com



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SONY



By Fred Maia, W5YI
fmaia@cwixmail.com

FCC Begins New Effort to Curb Violations

The commission has examined its historical approach to amateur and unlicensed radio enforcement and determined that there is a need to aggressively and systematically address conduct by amateur licensees and non-licensees, as well as those who violate the rules in other services. Evidence of this new stance may be seen in the growing numbers of enforcement operations being conducted on unlicensed radio users across the country.

Recently the Compliance and Information Bureau (CIB) — formerly the Field Operations Bureau (FOB) — assumed complete enforcement authority over the various radio services and a new Enforcement Bureau is being established which will consolidate all of the current bureaus' enforcement activities.

CIB is responsible to conduct the investigation, determine what violation has been committed, and to take appropriate corrective action. The more egregious violations will include the possibility of monetary forfeitures and/or license suspensions, revocations and/or seizures of radio equipment. The FCC's effort is headed up by Riley Hollingsworth, K4ZDH, the CIB's legal advisor for enforcement.

The concentration of the entire enforcement process into one bureau should be a wake-up call to those individuals who have demonstrated their disregard for the rules. CIB resources, including the High Frequency Direction Finding (HFDF) Operations Center in Columbia, Maryland, has already begun to make life uncomfortable for them.

■ Amateur radio operator guilty of jamming

A case in point is the recent inspection and close-down of James C. Thompson, 58, (KA2YBP) in Waretown, New Jersey, for jamming the Association of North American Radio Clubs (ANARC) amateur radio net on 7240 kHz by rebroadcasting a local commercial AM station while the net was meeting — a charge to which he has now admitted. On Sunday, October 18th, agents from the Philadelphia District Office of CIB were able to locate and observe Thompson while he was involved in the jamming activity. The FCC's Philadelphia field office has already issued James C. Thompson a Notice of Apparent Liability for

Forfeiture (NAL) in the amount of \$7,500, which he was ordered to pay by December 9th.

The FCC is now working very closely with its Amateur Auxiliary — volunteer ham operators who perform preliminary investigations of complaints. While the Commission will now act on complaints from the amateur radio community, the concluding investigation and any necessary shut-down is carried out by CIB agents.

The FCC said that an inspection at Thompson's home found an AM receiver "...positioned adjacent to the Amateur station's microphone and tuned to 1450 kHz." The interfering station was tracked down by a combination of long-range and local monitoring to zero in on Thompson's home as the source of the interfering signal. The FCC also charged Thompson with failing to properly identify.

■ HF Pirate Broadcasters raided, closed

On November 6th, the FCC's Compliance and Information Bureau announced that it has shut down four HF pirate radio stations. CIB Chief Richard D. Lee said the four high frequency unauthorized radio broadcasting stations were located in Tewksbury, Massachusetts; Glendale Heights, Illinois; Katy, Texas; and Sierra Madre, California.

The subjects, whose names are being withheld pending further official action, were all operating on the frequency of 6955 kHz in the HF (shortwave) band. The FCC's Columbia Operations Center coordinated and provided information to FCC agents from the Boston, Chicago, Houston and Los Angeles offices, who then performed on-site visits to the unauthorized stations.

In another unlicensed broadcasting case, the FCC is taking steps to remove a Bloomfield, Connecticut, pirate known as "Prayze 105" from the FM airwaves. A federal judge ordered the black-oriented religious broadcaster to obtain an FCC waiver or to leave the airwaves. Unlicensed gospel "Prayze" radio operates on 105.3 and has been on the air for more than two years. The station operators use a simple antenna, several CD players and an electronic sound board to broadcast gospel music and local advertisers' spots.

The station's attorney said it plans to appeal

to a higher court if Prayze FM is not granted "experimental station" status. A neighboring licensed broadcaster, WKND (1480 AM in Windsor, CT), claims it's losing ad revenue to the long-running pirate.

Under the Communications Act, unlicensed broadcasters may be subject to penalties up to \$11,000 and the equipment used is subject to seizure and forfeiture by court order. Pirate station operators also could be subject to criminal fines of up to \$100,000 and/or imprisonment for up to one year, or both, for a first time offense.

■ Unlicensed stations struggle to stay on the air

Some pirate stations are moving to the Internet. Paige Jarrett intends to move her pirate 40-watt radio station (KBLT-FM) to the Internet. "Cybercasting" without a license over the Internet is legal.

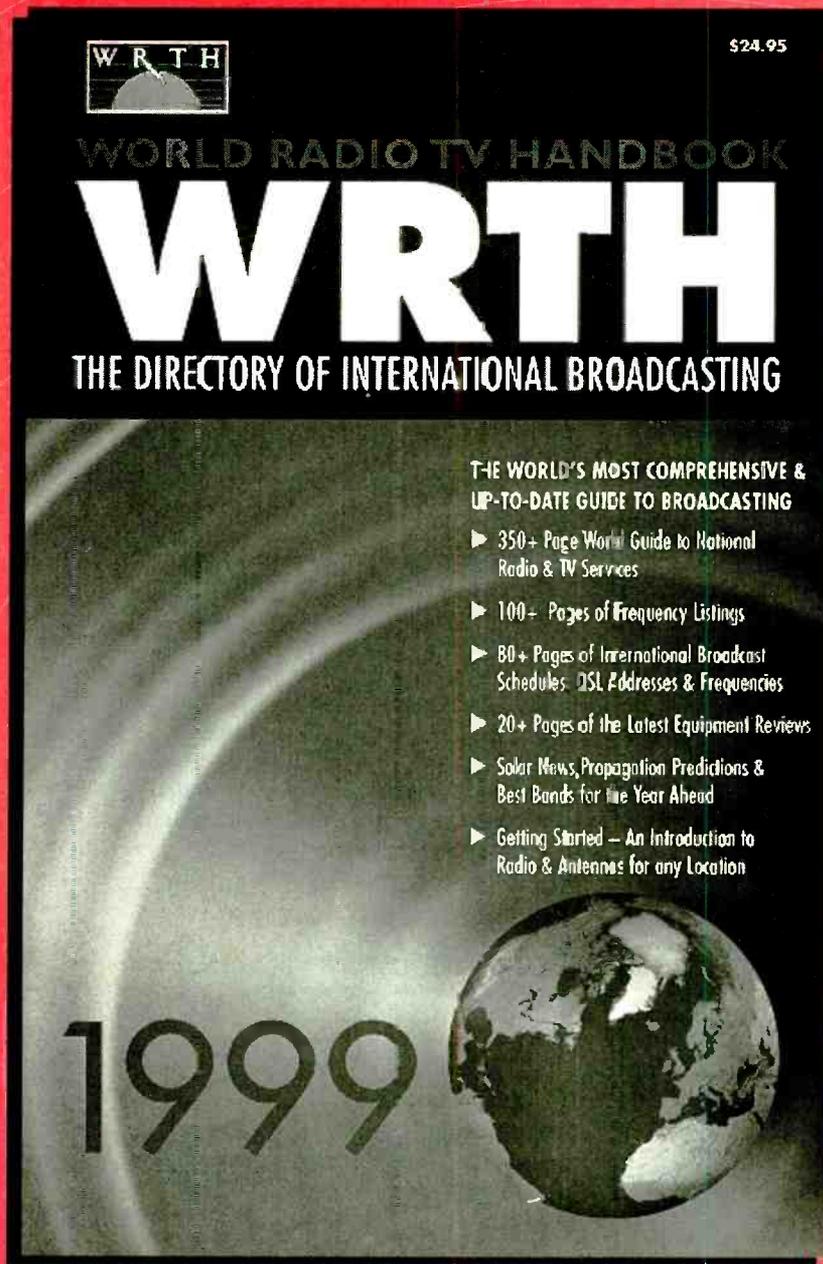
The total number of on-air radio stations now on-line has skyrocketed in the past year from fewer than 100 to nearly 2,000, according to one recent estimate. The secret is computer software that "streams" a highly compressed audio signal over the Internet, initially storing several seconds of audio in a buffer, then downloading more as it begins playing. That tactic smooths out the hiccups in transmission that could otherwise interrupt a cybercast. Sound quality depends on a listener's computer audio system and Internet connection, but normally at least rivals FM broadcasts.

But as a rule, the majority of the nation's "microbroadcasters" — as they like to call themselves — are furious with the FCC and the National Association of Broadcasters who oppose them. A group of about 50 pirate radio broadcasters carrying bull horns and signs converged on Washington DC October 5th to protest the closing of nearly 300 low-powered "community" stations during the past two years.

After demonstrating outside FCC headquarters, the protestors marched to the Washington DC headquarters of the National Association of Broadcasters where they tore down the NAB flag and hosted up the skull and crossbones, commonly referred to as the "Jolly Roger." The guilty parties were released by police when the NAB declined to press charges.

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Passing the Freedom Torch

In 1994, when Radio Free Europe/Radio Liberty made its move from Munich, Germany, to a former parliament building in Prague, the Czech Republic felt it was repaying a debt. Many residents are more dubious about the station's presence, however, now that RFE/RL is sharing its quarters with the newly formed Radio Free Iraq.

Although RFE had already been broadcasting into Iraq, Radio Free Iraq officially began October 30, with two hours of news and analysis targeted for Iraq each day. Both Iraq and Iran (the Farsi language service) have complained, and Tehran even removed its ambassador.

Initial plans were to locate Radio Free Iraq in a secure building in a residential section of the city, but this was rejected by the Czech government after it was reported that a known Islamic terrorist had been to the city to investigate the station.

To those who are nervous about the station's presence, Czech President Vaclav

Havel says, "We cannot ask others to propagate freedom in the Czech Republic and at the same time refuse to give permission to propagate freedom in other countries."

Successful launch for AfriStar

Worldspace — a venture to open the continents of Africa, South America, and Asia by satellite — is officially underway after eight years of preparation. On October 28, Arianspace successfully launched the AfriStar satellite, along with GE Americom's GE-5 telecommunications satellite.

The AfriStar satellite will have the ability to broadcast digital data, text, software and images into the African continent, with the area's growing middle class as its target customer.

Low-cost, portable, digital receivers, which will receive shortwave and AM/FM transmissions as well as the satellite signals, are being developed for distribution in 1999. The key to the WorldSpace receiver is a special chipset, being produced by SGS Thomson and Micronas Intermetall, which will demodulate and decompress the transmissions. Expected initial cost for the receivers will be around \$200, though prices should fall after a couple of years.

Developers realize that comparatively few Africans will at first be able to afford the new receivers, though Worldspace has approached UN agencies, nongovernmental organizations and private donors to help make them available to local villages, where communal listening is already a common practice.

Rod Calarco, senior vice president at WorldSpace said, "we hope to revolutionize radio broadcasting for an entire continent with the push of a button."

Digital Radio Border Agreement

The longest friendly border in the world is having a hard time staying that way, but the dispute isn't over border crossings on the ground; it's about the airwaves above it. Canada has been resisting the dominance of U.S. television and radio in program content, but the desire of both countries to broadcast digital radio signals by satellite has raised a new problem.

An agreement has now been reached in which the countries have agreed to disagree. Canada will abandon any plans to utilize satellite-delivered digital audio broadcasting (DAB) and will put its efforts into a land-based system in the L-band between 1452 and 1492 MHz. The United States will develop its

satellite-delivered DAB services on S-band between 2320 and 2345 MHz.

In Canada, the S-band is used for some mobile aeronautical telemetry broadcasts, and in the U.S., the L-band is used for aeronautical flight test telemetry broadcasts. The agreement will allow these functions to continue, though some adjustments will be required in order to protect the neighboring country's air space.

This virtual border in the air will only solidify as Canada becomes increasingly committed to the Eureka-147 DAB system, whereas U.S. broadcasters pursue satellite S-band digital audio radio service (DARS) and a terrestrial system using in-band, on-channel (IBOC) delivery.

Radio Canada Int'l Anticipates Repairs

Since 1993, RCI has been operating on "a wing and a prayer." But at last, funding has been assured for the next three years, and RCI Director of Operations Jean Claude Asseline has big plans to breath life into a service that has been operating out of hallways and on equipment that's already living on borrowed time.

The studios in Montreal are to be rebuilt and two new 250 kW transmitters are being ordered which will be capable of digital transmissions. Although Director Asseline warns that, "With this money I can live, but I cannot grow," it may seem a miracle to a staff accustomed to pink slips.

Leonids pass without incident

Satellite operators breathed a sigh of relief when the November Leonid meteor shower passed without catastrophic collision between a speck of dust travelling 155,000 miles per hour and any of the 600-plus satellites orbiting the earth.

"We passed the peak and the peak was actually less intense than predicted, and there are no incidents related to the storm," said Gregory Hughes, spokesman for The Aerospace Corp., in El Segundo, California.

The Leonid shower is caused by Earth's passage through the wake of the Comet Tempel-Tuttle. They are spectacular only every 32 to 33 years, when the comet speeds through the inner solar system and sheds swarms of particles as it nears the sun.

Well, almost without incident

Five basket-ball sized meteors did break free from a meteor shower and crashed into

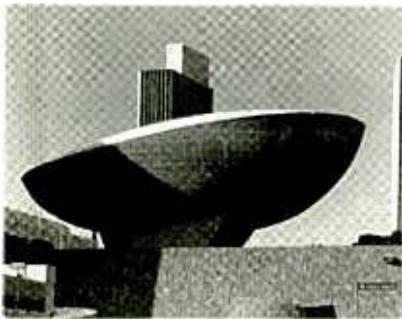


BULLETIN BOARD

Sat, Jan 9: Loveland, CO
Northern Colorado ARC hosts their Winter Superfest at Larimer Co Fairgrounds, 700 Railroad Ave, 9am - 3pm. Talk-in 145.115 (-100 Hz offset) or 146.85 (-). VE exams, commercial exhibits, computer and radio goodies, more. General info call 970-352-5304.

Sat., Jan 16: St. Joseph, MO
Ninth Annual Northwest Missouri Winter Hamfest sponsored by MO Valley ARC and Ray-Clay ARC will take place at the Ramada Inn in St. Joseph, I-29 and Frederick Ave (exit 47), 8 am to 3pm. Talk-in 146.85 and 444.925. FCC exams, major exhibitors and flea market all indoors. \$3 admission. Contact Kevin Phillips KC0AWM, 4809 Northern Hills Drive, Holt, MO 64048-8883.

Sat, Jan 16: Hammond, LA
19th annual Hammond Hamfest sponsored by SE Louisiana ARC (SELARC) at University Center on University Drive (off I-12, I-55, US-51 or US-190). VE exams and forums. For more info write SELARC, PO Box 1324, Hammond, LA 70404.



the performing arts building in Albany, New York, known as The Egg, on Wednesday, November 11.

The Leonid shower arriving early? That was the guess of WPYX's morning weatherman Steve Caporizzo, who, along with Kiss' bass player Gene Simmons, was one of the many callers who corroborated the reports of devastation at the local landmark.

When CNN, Associated Press, and regional newspapers called to investigate the story, they discovered what WPYX listeners who had been listening before 8 a.m. already knew — it was just a prank, and they had helped disc jockey Bob Wohlfeld pull it off by calling in "sightings" and traffic reports.

Who will rescue 9-1-1 in Y2K?

The Federal Communications Commission (FCC) is having a hard time determining the state of preparedness of the nation's public safety agencies, with regard to Y2K compliant computer systems. Following are some excerpts from FCC Order 98-191 seeking public comment.

"Many of the automated and intelligent machines and systems on which public safety entities depend for their operations were not designed to take into account the date change that will occur on January 1, 2000. Because it is difficult to determine all the ways in which this problem can affect computer systems or microprocessors, it is not easy to predict what will happen on January 1, 2000. Companies are still testing their systems and finding new problems.

"Therefore, it is critical that the U.S. telecommunications community, including all sectors of the public safety communications community, take prompt, comprehensive and effective action to address the Year 2000 problem in their organizations.

"Government agencies cannot solve the Year 2000 problem. This is a job that individual entities must undertake on their own, and the involvement of the public safety communications community is critical to solving

the problem. The Commission has little information regarding the efforts of the public safety community to address the Year 2000 problem.

"Therefore, we conclude that it is important to increase our efforts to alert the public safety communications community to the nature and seriousness of the Year 2000 problem and to ascertain both the current state of Y2K readiness and the progress and range of compliance initiatives in that community.

"We note at least three possible ways of accomplishing this goal. We could require the Regional Planning Committees to file amendments to their 800 MHz band plans to describe the state of Y2K readiness and the nature, progress and estimated completion schedule of Y2K compliance initiatives being undertaken by licensees in their regions. Alternatively, we could require the frequency coordinators to obtain this information from the licensees for whom they have provided coordination services and either file this information themselves or ask the licensees to do so; or we could require individual licensees to file this information with the Commission."

Getting off the power grid

"Imagine a future when every home has its own electric generating device ... Imagine a future when ice storms and tornadoes and hurricanes no longer cause power outages." That was the vision outlined last summer by Plug Power CEO Gary Mittleman in Latham, Massachusetts, as he unveiled the first house ever to be powered by fuel cell technology.

The technology, which has been around in theory since 1839 and was used to power the Gemini Project in the 1960s, uses hydrogen molecules. When split, the electrons provide electrical power, and the protons combine

with oxygen to form water. The only trick has been to find a way to do it cheaply!

At least four U.S. companies feel they're close enough that they have announced plans to produce, test, and market residential fuel cell systems over the next two years, and the government has pledged to make grants available to owners of early beta units to help defray the purchase cost.

Research is also continuing into using fuel cells to power automobiles.

"Communications" is compiled by Rachel Baughn, from news sent in by MT readers, including: Anonymous, NY; "Capt. Bob," WPYX, NY; David Alpert, NJ; Alan Amman, NC; Kevin Klein, WI; Don Wambolt, MS; Gayle and Larry Van Horn, NC.

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• These DX Stations Set the Standards of All Time •

Aerial view of CHU, Canada, showing the station and some of the antennas

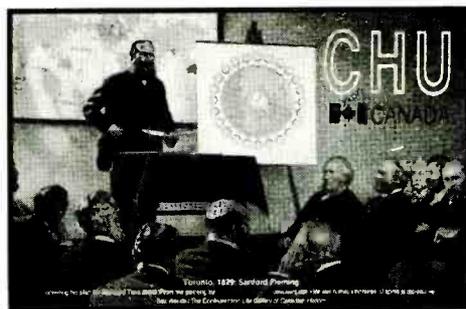
By Albert Lozano

As you push across the dial, trying to catch a new and far-distant station in this unique hobby known as DXing, you are likely to have run into all kinds of interference, noise, and non-voice communications. You are probably familiar with sounds produced by atmospheric noise, man-made interference, and multiple broadcast stations competing to come in clearer and stronger than the other in the same frequency range. You are also familiar with the characteristic sound of Morse code identifications in the broadcast bands, as well as other digital modes that are more difficult to identify.

One of the “noises” that spot the radio spectrum caught my attention in my very first year of DXing. There was something different in that signal: it could be its clearly repetitive pattern . . . *beep, beep, beeeeeeep*. And I could clearly understand it without the characteristic distortion of single sideband (SSB) signals. A friend with more

DXing hours than I helped me to identify it as coming from a standard time and frequency station.

Further research and hours of listening have led me to understand and appreciate the nature and purpose of these radio transmissions. Especially for those of you that recently joined the radio hobby, I’d like to share some of the main characteristics of these standard stations that make them different from all the rest.



A BRIDGE BETWEEN BROADCAST AND UTE

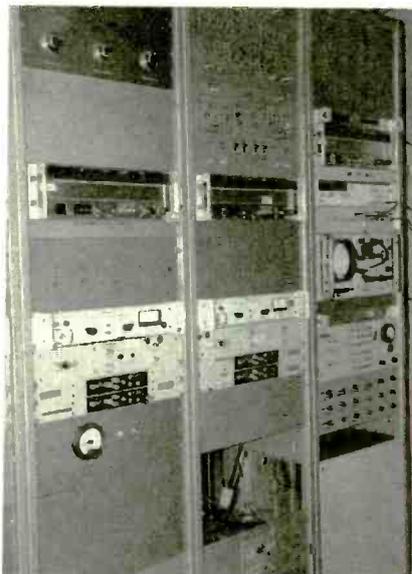
Standard time and frequency radio stations play a unique role in shortwave radio; I see them as the bridge between broadcasting and utility stations. Like broadcast stations they transmit to the general public, they can be logged with inexpensive shortwave receivers because they transmit in AM instead of SSB that requires more complex equipment, and they welcome your reception reports. On the other hand, they have a purpose other than general information, entertainment, or propaganda; utility stations transmit very specific and important information, in this case aimed toward the scientific and technical communities.

Standard stations may provide the first revelation that there are a lot of interesting, but different radio stations in the spectrum along with the familiar broadcasters. Just by browsing through the loggings in *Moni-*



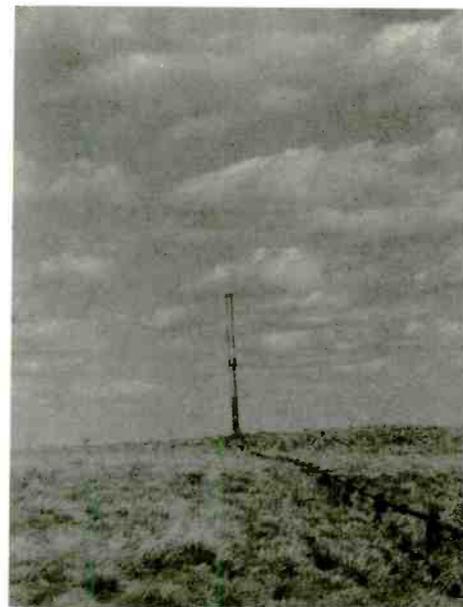
WWV building

Photo by Joan Heinen



WWVB's clock RF oscillator, frequency counter and controller

Photo by Joan Heinen



15 MHz tower

Photo by Joan Heinen

Monitoring Times you can see how both broadcast and utility stations attract hobbyists. If you think that you could be interested in listening to utility stations, but are hesitant to spend the money on a sophisticated receiver, this can be a good trial.

Try to find these frequency stations on your current AM shortwave set: their relatively powerful transmissions should be fairly easy to catch. Furthermore, as we are nearing the peak of the sunspot cycle, the next few years should allow you to add to your logs.

WHAT DO STANDARD TIME AND FREQUENCY STATIONS DO?

These unique stations provide a wide range of information. They send accurate time data that is required to synchronize many different services such as commercial radio, radionavigation systems, electric power companies, air traffic control systems, computer networks, and many others. In addition, the frequencies at which these stations transmit are extremely accurate, so scientific and technical laboratories can compare and calibrate their instrumentation systems in order to carry out measurements accurate to the millisecond.

The information that these stations transmit is generated at very specialized laboratories that use the latest technology to main-

tain the highest possible degree of accuracy. In the United States, it is the responsibility of the National Institute of Standards and Technology (NIST) to give the public

information that is accurate, convenient and easy to use.

The time signals that are generated by NIST have an accuracy better than 0.01 ms.

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transmitting frequency of 10,000 kHz, the frequency that you detect can vary up to 0.1 Hz, very accurate for most industry needs.

So, how can you benefit from tuning into standard time and frequency stations? As most of you know, with an older receiver with its analog tuning, it is sometimes difficult to estimate the exact frequency at which the radio is receiving signals. By tuning into WWV or any other standard station, you know the *exact* transmission frequency and can make a mark in the dial to indicate this frequency. Repeating the process with all the stations that you can receive at your location will result in a series of calibration marks in your dial that will help later when you try to tune into a specific frequency.

But not only the owners of analog receivers can benefit from the standard time and frequency stations. Although most of the modern shortwave receivers have a digital display with frequency resolution better than 1 kHz, the lower-end models may not have high accuracy¹.

The WWV and WWVH information includes data and predictions of ionospheric conditions, the geomagnetic field, solar flares, warnings on marine storms, and announcements regarding the status of the Global Position System (GPS) satellites and related operations. Each one of these special announcements lasts 45 seconds and is transmitted every hour at the same minute (see Table 2). All transmissions are in English.

HOW CAN I LOG THESE STATIONS?

How can you distinguish between WWV and WWVH? After all, both stations transmit the same information on the same frequencies and, in some locations, both can be received with similar signal strength.

First, the voice announcements are made at different time intervals: 7.5 seconds before the minute mark for WWV and 15 seconds before the time mark for WWVH. The minute mark is easily identified by an acoustical note longer than the others, followed by the voice announcements in English. Even more characteristic, WWV broadcasts use a male voice, while the announcements from WWVH use a female voice.

From almost all locations in the United

States, you can log easily at least one of the NIST stations even with low-end radio receivers. All the usual tips about DXing are also applicable here: during daytime listen above 10 MHz, while the lower frequencies work better at night. Also, consider the seasonal variations and the sunspot cycle. From my location in Pennsylvania I receive WWV, CHU, and a more distant time and frequency station, YVTO in Caracas, Venezuela, on 5000 kHz with 2 kW of power.

Although all these two stations transmit in the same frequency, the propagation paths change and it is not unusual for me to receive YVTO stronger than WWV. YVTO identification and the minute marks are given in Spanish language, local time for Venezuela. The QSL from YVTO is pictured: Note that the transmission frequency stated in the YVTO QSL is an old one.

AND AT VLF...

Another NIST station, WWVB, also located in Fort Collins, Colorado, transmits at 60 kHz with its recently-boosted 40 kW of power. This is the signal used by automatically calibrated clocks like the popular Zeit models. WWVB does not broadcast voice announcements, but similar to the other NIST stations, it gives the time information using a code recognized by computer-controlled instrumentation systems.

SOME FINAL REMARKS

Although they might seem boring to the outsider, the rhythmic patterns of the ticks and marks can be hypnotic, and for those interested in DXing, time and frequency stations can be used to map signal conditions with which you receive them. Comparing these signals will provide a good estimation of the propagation conditions in the direction and area from where that sta-



TABLE 3: STANDARD TIME/FREQUENCY STATIONS

Call	Country	Frequencies (24 hrs)
ATA	India	10000
BPM	China	10000
CHU	Canada	3330 7335 14670
HLA	South Korea	5000
JJY	Japan	5000 8000 10000
LOL	Argentina	5000 10000 15000
RWM	Russia	4996 9966 14996
VNG	Australia	5000 8638 12984
YVTO	Venezuela	5000
ZSC	South Africa	4291 8461 12724 17018 22455

tion is located, acting as gigantic beacons to help you decide what geographical area and what frequency are optimum for concentrating your DXing efforts.

The personnel who work at these stations have technical backgrounds and interests and it is not infrequent to find amateur call signs. They will normally answer all your questions and give you technical literature in addition to the station QSL.

Finally, some readers will want to try the new clocks that use the signals transmitted by WWVB to synchronize their time. You can find their advertisements in the pages of *Monitoring Times* and other radio related magazines. But, before you decide to buy one of these clocks, consider one potential drawback of owning such atomic precision: You'll run out of excuses for being late!

.....
Albert Lozano is Assistant Professor of Engineering at the Wilkes-Barre Campus of Penn State. He is interested in applications of electronics to medicine and biology, electrical interference and its solutions, and radio in all its shapes and forms.

.....
Note:

¹ While you can't calibrate a digital dial by marking it as you can with an analog dial, you can measure and record the difference between the frequency in the display and the one used by the standards station. Repeating this process for all the standard time and frequency stations that you can receive will give you a good picture of your receiver's accuracy, and how much you have to add or subtract to the displayed frequency in order to have an accurate frequency reading.

A Common Date/ Time Standard

By Ian Galpin, G1SMD

Dates and times are an incidental but very important part of the radio-communication hobby. We use them when logging or reporting what we hear, or in arranging monitoring or contact schedules. They are necessary on QSL (verification) cards, and in computer programs which predict propagation conditions or the pass times of various satellites.

The trouble is that there can be problems if people do things in different ways from country to country.

■ Radio hobby has a head start

We already have a few standards to work to. We generally all work in the Universal Time Coordinated zone (UT or UTC, formerly known as Greenwich Mean Time, GMT). So, an American can tell an Australian what time a broadcast occurs, and no confusion arises about what was meant. You don't have to worry about the other person's time zone; just know your own time difference from UTC and make all reports using UTC rather than your own local time.

We use the 24-hour clock system, rather than the old 12-hour am/pm version. This removes a certain amount of confusion. Is 12:00 am mid-day or mid-night? With the 24-hour system this dilemma becomes irrelevant.

Don't forget: when you convert the time to or from UTC, that you may need to alter the date. For example, where local time is five hours behind UTC, an event that happens on Monday evening 22:00 local time, actually occurs on Tuesday morning 03:00 UTC.

But, most importantly, we have all agreed to write times in the order hours:minutes:seconds. Everyone in the world does this. No one uses seconds:minutes:hours or minutes:seconds:hours. By writing times in the order hours:minutes:seconds, precedence always runs from left to right, and the rollover of digits runs from right to left. This seems the most logical way to work; any other way sounds totally ludicrous.

■ The Calendar Confusion

Now, consider the way we represent dates.

In America, the month/day/year format is often used. In Britain and some of Europe day/month/year has been used. This immediately leads to a conflict. What, for example, does the date 08/09/97 mean?

To an American it is clearly August 9th. To some Europeans it means 8th September. The difference in method across the two sides of the Atlantic has been a daily problem for international business. Now, with the wired society every Joe Public runs into this problem when reading internet email messages and web pages.

When radio amateurs communicate via packet radio or exchange QSL cards this problem is encountered again. It also occurs when using computer software with the date format different to the one you normally use, such as in log book or satellite tracking programs. It is also to be found in the band reports or events diary of some radio magazines.

In a few years' time, we will run into dates like 03/02/01. This has a myriad of possible meanings. Not only is it unclear as to which number represents the day and which the month, it is also unclear if the date is in the 20th or 21st century. This highlights another common problem with dates — the usage of a 2-digit year is the basis of the Year 2000 Problem with computer software. Writing 03/02/2001 solves the century problem, but does not help with the UK/US day/month ambiguity.

■ An already acceptable standard

Is there a solution to all of this? There sure is. Is it simple and easily understood? Yes, very much so. Is anyone already using it? Lots of people are. Astronomers have been using it for over 200 years. For at least the last 25 years the solution has also been defined in an International Standard. That standard is now known as ISO 8601.

In Europe it is known as EN 28601 (BS EN 28601 in Britain). In America see the ANSI X3.30 and NIST FIPS 4-1 standards; and CSA Z234.5 in Canada. A longer standards list can be found on Internet at: <http://www.qsl.net/g1smd/isoimp.htm>. ISO 8601 is already the default national standard for well over a third of the world's population, notably in Scandinavia,

Germany (since 1996), some of Eastern Europe, and most of Asia. Most of the rest of the world has adopted the standard "on paper," such as Australia and South Africa. It was adopted in Britain in 1971 but it has not yet been compulsory.

Organizations like IBM are touting this standard as the best, most complete, and permanent method of tackling the computer software Year 2000 Problem in their literature. But, using the standard also eradicates the UK/US date format ambiguity, which is what this article is primarily about.

Using the "Full Format for Gregorian Calendar Date" section of the ISO standard, we find that dates should be written using a four-digit year, with the order year-month-day. Hyphens are used as separators. A leading zero should be used for month and day numbers from 01 to 09.

That date mentioned above is therefore written as 2001-02-03 if 2001 February 3rd is intended. Astronomers sometimes write the month as a three-letter English abbreviation, so 2001-Feb-03 may also be encountered. Dates in any of these year-month-day formats cannot be confused with dates in any other format, just as long as a four-digit year is used.

There has been a proposal document circulating around the main amateur radio organizations to adopt the ISO year-month-day date format for all facets of the amateur radio hobby. This includes computer programs and data, packet radio messages, log books, QSL cards, web pages, magazine articles, membership cards, awards — every place that dates and/or times are used.

But, there is no reason to limit the usage to amateur radio. There is plenty of scope to use the year-month-day formats in shortwave listening, scanning, utility listening, satellite monitoring, and all other parts of any related activities.

Readers of *Monitoring Times* and the former *Satellite Times* are already used to reading dates in the year-month-day format on the pages devoted to satellite launches and allied subjects. This usage derives straight from astronomical origins, but does not need to be limited

to that use.

A number of software developers have already agreed to change the default format of their programs to the ISO format in the next release. Several magazines are changing to this format realizing that this will make life easier for their international readership: Some programs and magazines have already been using the ISO format for some time, recognizing the problems that will otherwise occur when the Year 2000 arrives. Many people may not have noticed this format in use as it is very logical and comfortable to work with.

It is worth reminding readers that the US has already adopted ISO 8601 as an ANSI standard, so there is now no real excuse not to be using it. The US military has adopted the 1997-Aug-09 format as their default. It is hoped that by the time 1999 ends, we can eradicate the ambiguous dates such as 03/02/01 that will occur if no such action is taken.

■ Applying the ISO format

For US citizens, simply rewrite a date like 08/09/97 as 1997-08-09; that is, retain the existing month/day ordering whilst moving the year from last to first place and expanding it from two to four digits. Don't forget to use a hyphen as the separator. The slash has a different meaning within the standard and should not be used in dates. The date now works in the same way as time. It has full left to right precedence, with rollover from right to left.

When dates and times are combined, write the date before the time, thereby retaining full left-to-right precedence across all of the data items present.

All of these ideas — including the definitions for writing times in the hours:minutes:seconds format, using the 24-hour clock, the UTC time-zone, and so on — are already defined in ISO 8601. We've all been following the ISO definitions for *times* for many years; now is the time to bring our *dates* into compliance.

Windows has options in your computer's Control Panel to set the date and time formats to the ISO format. Under Windows 3.x look in the International option. Choose YMD, Hyphen Separator, Show Century, Month Leading Zero and Day Leading Zero.

In Windows 95 and 98 see Regional Settings. Set the date format to yyyy-MM-dd, yyyy-MMM-dd or yyyy-MMMM-dd as appropriate, the time format to HH:mm:ss, then click on Apply. (See www.qsl.net/g1smd/iso-pc.htm)

■ Other Refinements

ISO 8601 also includes a definition for dates expressed as Ordinal Day of Year (Ordinal Date). The full format requires a four-digit

year, a hyphen separator, and a three-digit day number from 001 to 365 (366 in a leap year). A reduced version of this (with only a two-digit year) is already in use as the Epoch in satellite Kepler elements: 97300, for example. To avoid problems in the Year 2000, expansion of the year element to four digits is recommended.

In all of the ISO definitions it is permitted to strip out the separators when dates and times are to be stored on disk or passed across computer networks. This is called the "basic format." The date 1997-08-09 can be stored as 19970809. The Ordinal Date 1997-300 can be stored as 1997300; the time 23:44:59 as 234459. Using these representations in computer programs can save on storage space and can speed up programs that need to compare or sort dates and times. The algorithm becomes trivial compared with other methods — methods where the date has to be cut up into Century, Year, Month, and Day elements and each of these compared in turn.

I recommend the ISO method to you. Let's avoid problems with the coming Year 2000 by ensuring early adoption of the ISO 8601 formats, with a four-digit year, in everything that we do. If you use software try setting it up for the ISO format. If you write software, then add this format to the allowed options, and preferably make it the default. Many programs already use the ISO format for data storage. This proposal is to extend the usage to screens and printouts. Try also using it for hand-written dates — on forms, log-books, QSL cards and letters.

For more information on Year 2000 and ISO 8601 issues try the following publications and internet resources:

Magazines:

- *DUBUS* magazine, 1997-Q1, page 83 to 85.
- *Byte* (USA, Europe), 1997-Jul, Page 89 to 96: 'Double Zero'.
- *QST* (ARRL), 1997-Aug, Page 69 and 70: 'Software Traps'.
- *CQ-TV* (BATC), 1997-Autumn, Issue 180 (1997-Nov).
- *Communications of the ACM*, 1997-May, Page 26 to 30 and Page 111 to 117.
- *The Software Practitioner*, 1997-May/Jun, Page 1 to 5.
- *New Scientist* (UK), 1997-Nov-08, Page 59.
- *The AMSAT Journal* (AMSAT-NA), 1998-Jul/Aug, Vol 21 No 4, Page 16 to 21.
- *The 432 MHz and Above* EME newsletter (K2UYH), 1998-September.
- *Computer Shopper* (UK), 1998-November, Issue 129, Page 793 to 798.
- *QST* (ARRL), 1998-Aug, Vol 82 No 8, Page 92.
- *NCJ* (ARRL), 1998-Nov/Dec, Page ??.

Longer Items:

- IBM Publication GC28-1251-xx: *The Year 2000 Guide* ('xx' = edition number).
- International Standard: ISO 8601.
- European Norm: EN 28601 (British Standard: BS EN 28601).
- American Standard: ANSI X3.30-1985(R1991).

Internet:

<<http://ourworld.compuserve.com/homepages/dstrange/y2k.htm>>
<<http://www.qsl.net/g1smd/>>
<<http://www.saqqara.demon.co.uk/datefmt.htm>>
<<http://www.cl.cam.ac.uk/~mgk25/iso-time.html>>
<<http://www.s390.ibm.com/stories/tran2000.html>>
<<http://www.batc.org.uk/batc-iso.htm>>
<<http://www.righttime.com/>>
<<http://www.cv.nrao.edu/y2k/>>
<<http://www.merlyn.demon.co.uk/year2000.txt>>
<<http://www.cinderella.co.za/>>
<<http://www.newscientist.com/ns/971108/letters.html>>
<http://www.npl.co.uk/npl/ctm/time_rep.html>
<<ftp://ftp.funet.fi/pub/ham/misc/year2000.zip>>

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ARE YOU READY FOR THE YEAR 2000?

By Philip Chien, KC4YER

The new millennium actually begins on January 1, 2001, but most folks will celebrate on January 1, 2000. It may be one heck of a New Year's celebration — but it's one giant headache for computer users. And, in an era where practically every appliance down to the coffee maker has a built-in computer, we're *all* computer users.

The problem is, computers are dumb. When the century rolls over most programs will "think" the year becomes 1900 — not 2000. This is the "Y2K" (Year 2000) or "millennium bug" you may have heard about. (See "Closing Comments" on page 104 for more.) Most programmers are working diligently to anticipate the full variety of problems that may ensue.

Contrary to the doomsayers, the Y2K bug will not cause the world to come to a halt nor signal the coming of the apocalypse. Neither will your microwave oven, refrigerator, or VCR suddenly fail on January 1, 2000.

The Y2K phenomenon is caused by omitting the first two digits in a year. A date is typically written as Apr-12-61 or 04-12-61 instead of Apr-12-1961. This is such a common standard in the U.S. that we rarely think about it or realize how widespread it is. Even credit card expiration dates only feature the last two digits of the year.

Fortunately, January 1, 2000, is a Saturday: that may allow for a number of unexpected glitches and malfunctions to be corrected with the least impact. But once people arrive on work on Monday, January 3rd, they may still be in for a rude surprise if they haven't prepared ahead of time.

■ Computers are the weakest link

The most obvious appliance you have which can be affected by the Y2K bug is your computer. There are plenty of software products — free and commercial — and web pages for checking out whether or not you're affected by the Y2K bug. However, there is no 100 percent guarantee these testers will be accurate, since they cannot check every date-sensitive application.

The Macintosh operating system is relatively immune to the Y2K problem, due to a fix

initiated some years ago. Applications, however, must still be suspect. IBM compatibles (MS DOS and Windows) computers vary — some have the inherent Y2K glitch in their BIOS; others won't have any problems. One obvious check is to set the system's clock to January 1, 2000, and check the day of week — it should be Saturday. (Before doing any such test on your programs or operating system, however, be sure to create a back up copy of your hard drive and data.)

Your programs may suddenly think that the clocks have gone back in time by 99 years. Programs which log your contacts might place your most recent entries at the beginning of the file instead of at the end. A satellite tracking program which monitors how long *Mir* has been in orbit since its launch in February 1986 may suddenly think that it still has 86 years to go until launch, instead of the correct value of 14 years on January 1, 2000!

Calendar-based computer functions which could be affected by Y2K include: operating systems, such as DOS, OS/2, Windows-based systems, and Macintosh; databases and spreadsheets; accounting, financial and tax software; contact or project manager programs; utilities, such as file managers, personal information managers, uninstallers, backup programs and anti-virus software; and fax, e-mail or other communication programs.

■ Other devices

The problem really gets compounded when you realize how many other devices have computerized clocks or use a calendar-sensitive chip. Elevators are computer operated and many include automatic timers which the maintenance technician presses each time the elevator is inspected. If the elevator is past due for inspection, then it refuses to work until a technician presses the button. Once January 1, 2000, rolls around will the elevator think that it's 99 years overdue for inspection?

The simple solution in this case is to just have a maintenance tech press the reset button, and then you won't have to worry about the century roll-over problem for another hundred years. But most solutions aren't as simple.

Satellite tracking is one place where Y2K is a major concern. USSPACECOM has decided to take a head-in-the-sand attitude. Each object

in orbit has an international ID, consisting of the last two digits of the year, the number of the launch in the year, and a letter designating each piece associated with that launch. For example, 86 017A is *Mir*, since it was the 17th launch of 1986. The first piece of the launch vehicle which put *Mir* in to orbit is 86 017B and successive objects associated with *Mir* go through the alphabet. Sputnik 1 was the first artificial object in orbit and it has the designation 57 01A.

Since no objects were launched between 1900 and 1956, USSPACECOM reasons that the Y2K problem can be put off until the year 2056! So the first satellite launched into orbit in the year 2000 will receive the designation 00 1A.

In addition, the epoch time (a determination of the spacecraft's location and velocity) also uses the last two digits of the year; for example, 98345 is the 345th day of 1998. Programmers who write software to sort satellites by chronological order must be aware of these limitations if they want their programs to work properly.

As a general rule, you don't have to worry about Y2K compatibility for hardware devices which don't have clocks or timers — unless you've added transaction-logging or time-stamping components to it. Your fax machine, for example, will continue to work, but may stamp outgoing and incoming documents with the wrong date.

■ Check it out

From now on, remember: whenever you buy anything — even if it's just a radio with a built-in clock — make sure that it's Y2K compliant. Don't be afraid to contact manufacturers and ask them whether or not their products are Y2K compatible. Or you may query the Electronic Data Systems database regarding the operational status of hundreds of thousands of products and software at www.eds.com/vendor2000

For consumer advice and helpful links on the subject of Y2K, see the Federal Trade Commission's web page at www.ftc.gov/bcp/online/edcams/y2k/index.html. Or write or call for a free brochure on Y2K to: Consumer Response Center, Federal Trade Commission, Washington, DC 20580; 202-FTC-HELP (382-4357); TDD: 202-326-2502.

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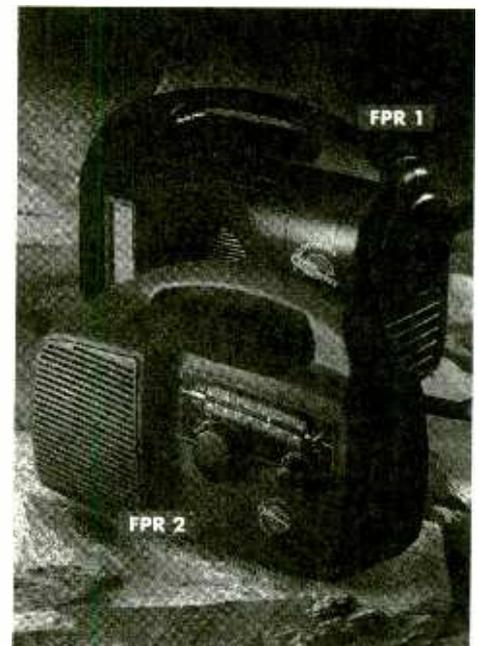
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Cost-savings, preparation for potential power outages on the advent of year 2000, anticipation of severe winter storms, building a portable DX station for remote outings — there are plenty of excellent reasons to put together an alternative source of energy for reliable communications. Following are some ideas being used by other hobbyists which you may be able to apply to your own emergency or DX station.

A Simple Solar Set-up

By Robert Brown, Jr.

Robert Brown says he is not a disciplined electronic wiz, but he does possess a basic understanding of the fundamentals of electricity. Following is a rough description of the solar system he designed. Some investigation on the internet or at your library should fill in enough circuit details to put together your own solar alternative energy source.

My natural curiosity led me to investigate solar energy as a realistic alternative power source. Investigation proved that even here near the 45th parallel, solar energy can be a reasonable solution to 12 volts, direct current (Vdc) energy consumption, year-around.

The attached photos show my solution to making this alternative more practical. All framework is milled from 3/4-inch clear pine and sealed with satin finish polyurethane. The horizontal support bracket floor is 1/8-inch tempered masonite. The electrical and mechanical aspects of the device are all “off-the-shelf” components, readily available from suppliers (like Digi-Key, 800-344-4539, for the solar panels) and Radio Shack (other electrical components).

Each solar panel output lead is terminated with a silver-plated, teflon-insulated UHF (PL-259) plug. UHF termination was selected for use throughout the primary distribution system, since it provides a secure fastening method and cabling alternatives available in conductor gauges and insulation.*

Each solar panel output lead is plugged into its own switchable junction/test box (single pole-double throw, SP-DT/Center-Off). Switching to the left provides panel output confirmation via an LED and/or measurement by a multimeter through a 5.5 x 2.1 millimeter (mm) dc panel jack. Switching to the right provides output to the distribution system.

All three junction boxes are blocking diode protected and permanently fastened to the floor of their respective bays.

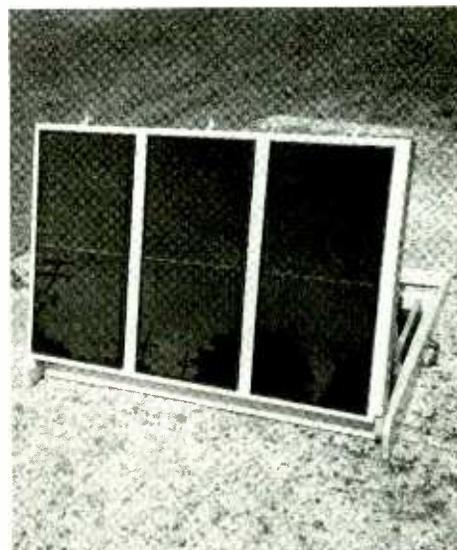
Three, fifty-foot power distribution cables are standard RG-58/U terminated with UHF plugs to provide connection between the three junction/test boxes and the remotely located power distribution box. When storing or transporting, the power distribution box is stored in the center bay and fastened to the flooring with Velcro.

The power distribution box is designed to:

- remotely collect the output from each solar panel
- provide test ports for system performance evaluation
- provide LED power distribution switching and circuit monitors
- combine and/or segregate solar power output for application-specific power requirements (i.e., may be used in any combination or may perform up to three separate applications)
- use standard 5.5 x 2.1 mm dc power jack output terminals to match “standard” nickel-cadmium battery pack termination.

The power distribution box is also blocking-protected at several levels to assure power distribution circuit integrity.

The vertical support bracket elevation is adjustable from 25 to 55 degrees off-horizon in increments of five degrees to compensate for sun position. Additional in-board eleva-



tion support brackets are provided as well.

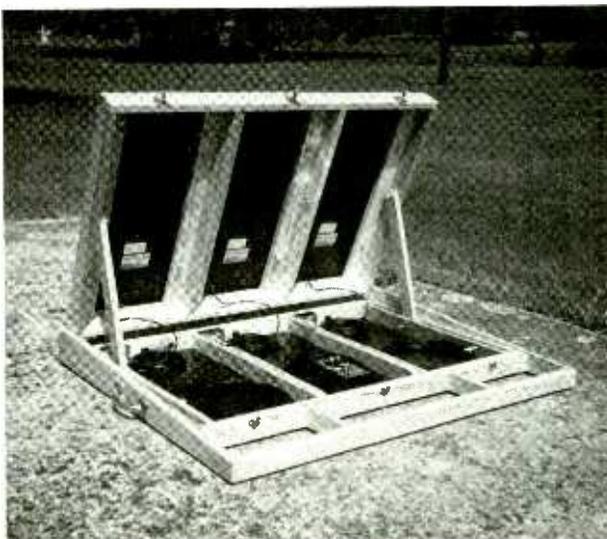
As pictured, with the cables and distribution box stored onboard, the system weight is 50 pounds. The approximate dimensions of this system in its closed position are 45 inches wide by 37 inches long by 6 inches high.

Thus far the system appears to perform better than anticipated, for the most part due to the conservative output rating of the panels themselves. The system is currently relegated to charging 12 Vdc rechargeable battery packs utilizing manual charge control, and 12 Vdc gel-cell portable power stations which have their own onboard, automatic charge controller. It will also charge lead-acid storage batteries, as long as a fuse or other charge rate controller is put in line.

... and that leads us to our next article: a safe way to store and transport energy in a lead-acid battery!

.....

* Editors' note: If you're using what you have on hand, coaxial cable and PL-259 connectors will work, but they are certainly overkill for transmission of electrical power. Standard dc connectors and flexible, insulated wire are entirely adequate for the purpose.



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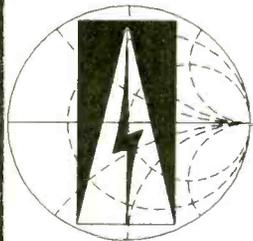
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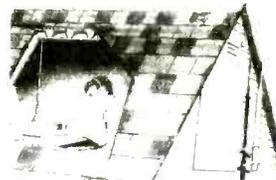
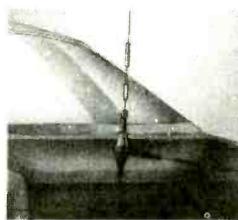
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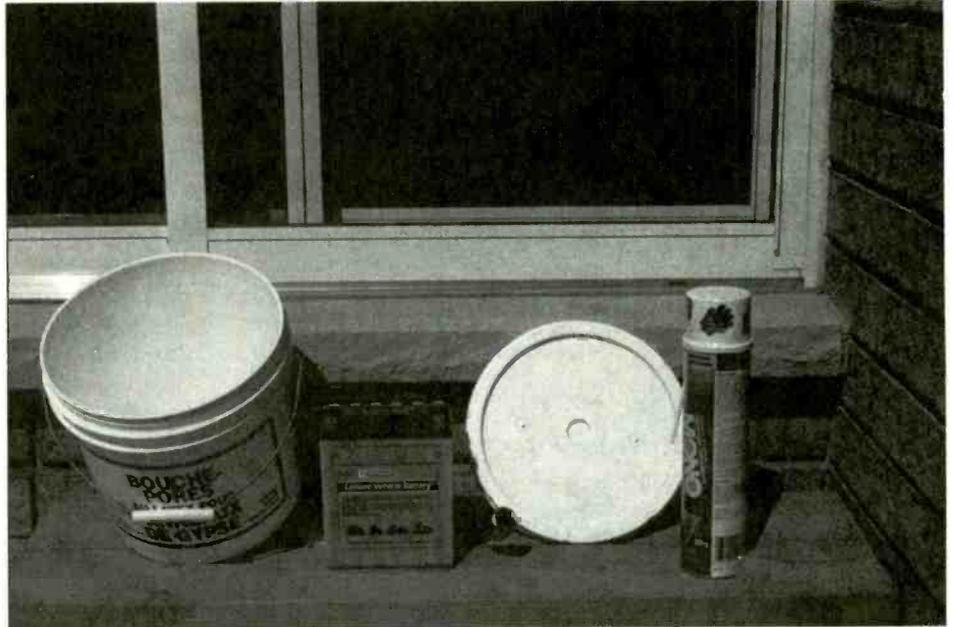


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Battery in a Bucket ... the safe way!

By Jacques d'Avignon



Over the past few years, I have endeavored to build up a totally portable listening station that will permit me to travel to quiet radio frequency (RF) places and do some monitoring. The main receiver is a Sony 2010 operating from out-board batteries, a Q-Stick LF (low frequency) antenna, and a battery-operated tape recorder. Just recently a new LF Datong VLF/LF converter and a Radio Shack Pro-26 scanner were added to this arsenal.

All this equipment can easily be transported in one or two bags to sites that are RF quiet, largely because they do not have access to regular alternating current (ac) house power.

Until last winter I was operating all the equipment from nickel-cadmium (Ni-Cd) rechargeable batteries, but for long operation a new source of power was contemplated. A small rechargeable battery, complete with a charger and all built into a carrying case, was tried with very poor results: the battery had a capacity of only 0.7 A/h (Ampere/hour). This was totally insufficient to operate this listening set-up for more than four to five hours.

The other source of power that I contemplated was an automotive rechargeable battery. But, these power sources are normally heavy and contain nasty acid that can be spilled easily. On the other hand, a good automotive

battery will give you a lot of autonomy in the field and can be recharged many times.

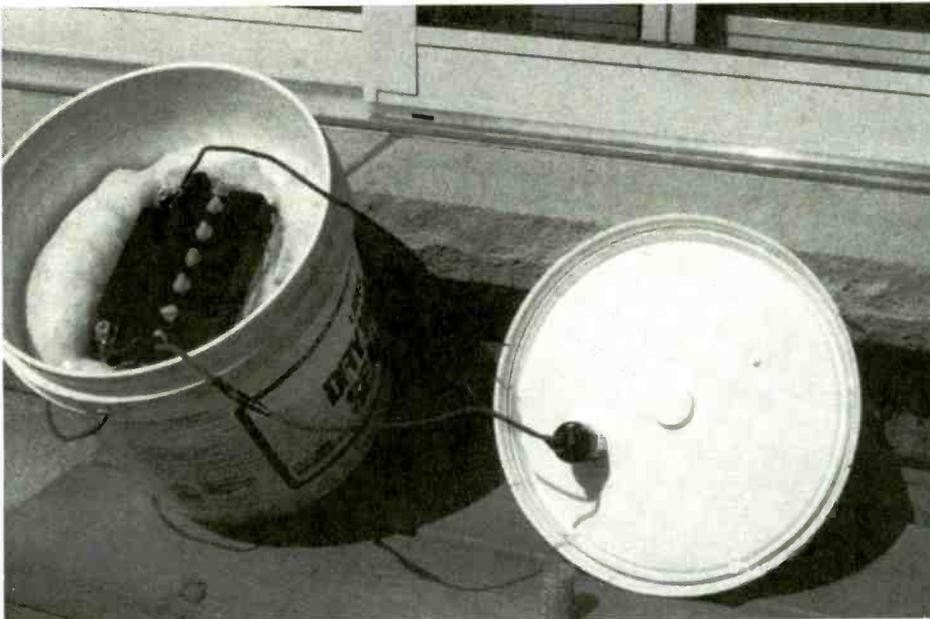
A lead-acid battery needs both a sturdy enclosure for transport and one that's impervious to acid, so plastic is ideal. Having had to paint many rooms in the last two houses that we have lived in, I found a five-gallon plastic paint bucket with a sturdy bail just begging to be used.

The next step was to find a small lead-acid battery with sufficient power to fit nicely in the pail. Not being very adept in taking accurate measurements, I took my pail to the friendly automotive store and asked them to fill it with a battery. The looks that I was given by the clerks were priceless!

One small battery was found to fit the pail with some room to spare: The battery is normally used for starting a riding lawnmower and according to the specs has a 14 A/h capacity — 20 times the capacity of the original battery that I was using.

The plan was to firmly seat the battery in the pail using spray foam and then install a 12V socket in the plastic cover. The completed installation would make it easy to carry the battery, plug a power cord in the cover when required, and contain any acid that could be spilled should the pail get kicked or vented while charging.

It is easy to charge the battery without removing the lid by inserting a plug in the socket built in the cover, it is only necessary to insert a 20 amp fuse to take care of the current surge when you start the charging process. According to the specifications of the battery, a charge of about 2A for 10 hours is required to fully recharge the small battery. I already had a small battery charger at my disposal; if



you do not have one, most automotive stores can help you.

A Word about Foam

Foam was used to wedge the battery in the pail. This is the trickiest and definitely the messiest part of the operation. As the foam is normally used for insulation around windows and doors, the bead coming out of the dispenser is very narrow and does not at first appear to increase in size very rapidly. *Don't let yourself be lulled by appearances!*

Here is some basic advice on working with foam: it seems to double in quantity as it cures, it is very gooey, and not the best for your skin and clothes. While curing you might see vertical spikes coming out of the foam surface. During my last try, a spike of foam 2 inches in diameter and about 9 inches long just sprouted out of the pail. Refrain from touching any of the foam for at least 12 hours after you have sprayed it; it might look cured on the surface but the inside is really messy. Shake the foam can for a long time before spraying, and when

you think you have shaken it enough, shake again for double the amount of time.

My first approach with the foam was to fill the cavity up to the top of the battery. That was a mistake! The next morning the foam had increased in size and was four inches above the rim of the pail. An attempt to clean this mess up was met with the gooey remains of foam that had not yet cured in the innards of the foamy mass.

The battery was finally removed from the pail and left to stand for a full day so that the uncured foam could harden up and be peeled from the walls of the pail and from the battery. Having learned how much the foam would increase while curing, the whole operation was tried again.

This time the foam was sprayed only up to about half the height of the battery, the terminals were protected with pieces of cardboard, and the vent hole at one end of the battery was also protected so that it would be clear after the foam had hardened. The foam did rise to about the top of the battery. I carved out the foam on one side of the battery so that the

socket mounted in the pail cover would have a clear space below.

Ready for Use

Finally, the wires and the in-line fuse holder were soldered in and the cover was securely refastened to the pail. The fuse used was a 20A, which adds a safety factor to this power supply: if a piece of metal falls in the socket, the fuse will blow before the battery starts boiling. See the photo for a complete view of the final product. Buy a corked bottle of wine to celebrate completion of your project, and use the cork to plug the socket when not in use!

By my calculations, this battery will give me ample power for more than 36 hours of continuous monitoring from ELF to UHF, and then I can recharge the power source in only 10 hours.

I would be interested in getting some feedback from anyone that builds a similar unit. May you never have to use this power supply except for good DX at a remote DXpedition!

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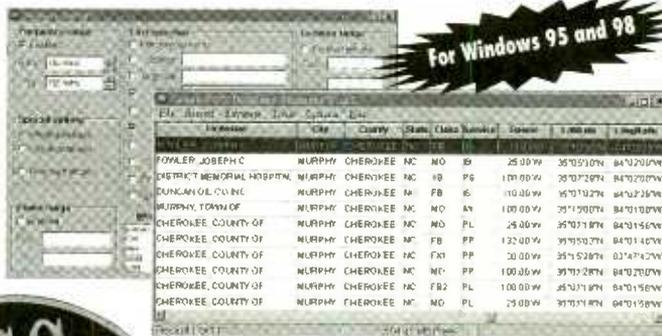
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Regulating the Alternative Power System

By A.W. Edwards, K5CN

Much portable and mobile equipment is designed around automotive standards. While it is nominally described as "12-volt equipment," it is made to work best at around 14 volts, direct current (Vdc).¹

Popular and available solar panels have outputs of 16-17 Vdc. This is too high for direct, safe operation of "12-volt equipment," so regulators are usually employed to adjust the voltage. Even so, momentary fluctuations in incident sunlight cause the panel output to fall below a regulator's capability, since they require an overvoltage to work and cannot boost a low voltage. The equipment then is presented with too low a voltage and may cease to operate for a time unless a ballast battery is on line.

On the automotive market are batteries of both six and eight volts. Connecting these in series makes a lead-acid battery of 14 volts. This is very compatible with the power equipment for much mobile or portable equipment. While the direct solar panel output of 16 volts is too great for these radios, guess what? It quite satisfactorily matches the charging voltage level for a 14-volt, lead-acid battery! So I invoked the KISS (Keep It Simple, Stupid!) principle. I did a little thinking and decided on the following system for my own purposes.



"So I said, what if I take this out of here and plug it in there."

I decided I would always operate the load from a resting battery: that is, not have the battery charging at the same time. This dictated a minimum of two identical portable power packs consisting of 14-volt lead-acid batteries. One unit is on charge while the other unit is powering the load. This also avoids accidental application of 16 or 17 volts to equipment that might be damaged by it.²

The 14-volt power pack (battery box) has a socket. Power is taken from this socket for nominal 12-volt loads. The charging power also enters the battery via this socket. The positive battery lead inside each power pack has a main fuse or circuit breaker in it adequate to deliver the expected amperage but preventing catastrophic power dissipation in case of a short circuit. Separate external fusing is recommended for each piece of equipment.

When the power packs are delivering, they present a maximum of 14 volts to the load, with excellent ampere-hour capacity. Since they are independent of the solar panel, they also present a stable voltage to the load. When they are on charge directly from a solar panel at 16 volts, no regulator is needed.

In keeping with most field setups, and because aggregations of solar panels soon become cumbersome to lug around and set up, probably three or four panels would suffice. This would generate, in full sun, 16 volts at 6 or 8 amperes for charging.

An isolating diode to prevent reverse current flow from the battery into the (paralleled) solar panels is required. If the sun is out brightly and reliably, and if the unit being charged is monitored, a slightly greater charge rate is had by bypassing this diode with an SPST (single pole, single throw) switch of 10 ampere rating or more.

Because it is likely all panels will receive the same amount of incident light, individual isolating diodes (with their voltage drops) between them will not be needed. So we may KISS these items off.

Other Options

An ammeter and voltmeter (or suitable connections for them) may be a part of the

charging system.

A tap may be installed at the power pack to take off six-volt output for equipment using that power, and of course regulators *can* be used to bring a highest potential down to desired levels of voltage at the output. This permits free charging at 16 volts while the regulator drops the load voltage to a safe level.

This may not be for everyone; some may find fault with it, but that is why there are horse races: everyone has his own ideas about which one to bet on!

1) While it is true much "12-volt" equipment is designed to work at around 13.5 volts, a dc-powered monitoring station should work just fine at 12 volts using a standard automotive battery as in the preceding article.

2) Simultaneous charging and use of the battery would be simple to achieve. Power would be unlikely to rise to damaging levels, and most radio equipment is already protected by fuses.

Editor's note: These three experimenters projects were obviously independently submitted and need some tweaking to create a complete system. Monitoring Times would be interested in showcasing a complete alternative power system, with full documentation of schematics, parts, and photos, plus written text describing the system and its performance. We'll pick the simplest and slickest alternative power solution and publish it. The winner not only performs a public service, but gets paid for the article and receives a full year's subscription to Monitoring Times as well!

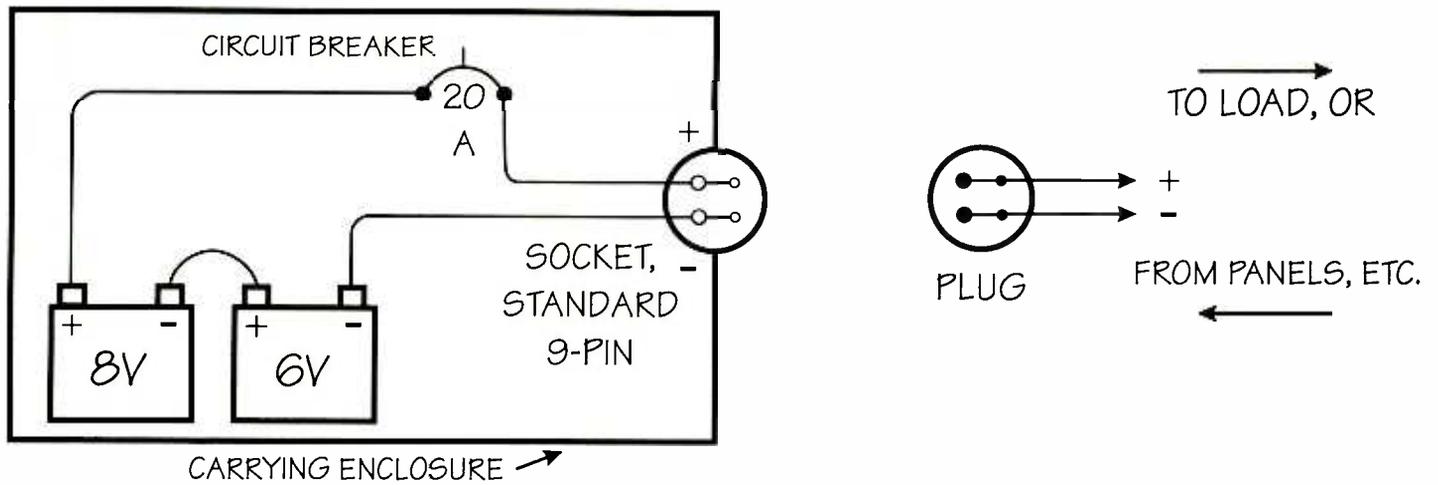


FIG 1. Typical 14V power pack, one of two or more identical units

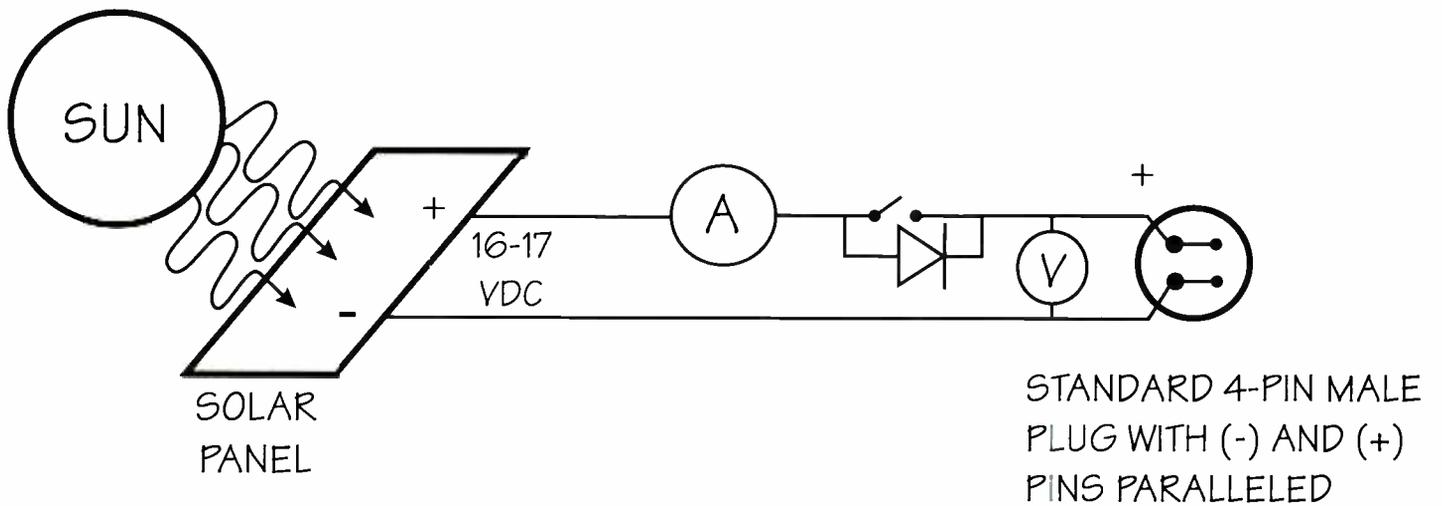


FIG 2. Simplified charger box showing metering and optional diode bypass switch

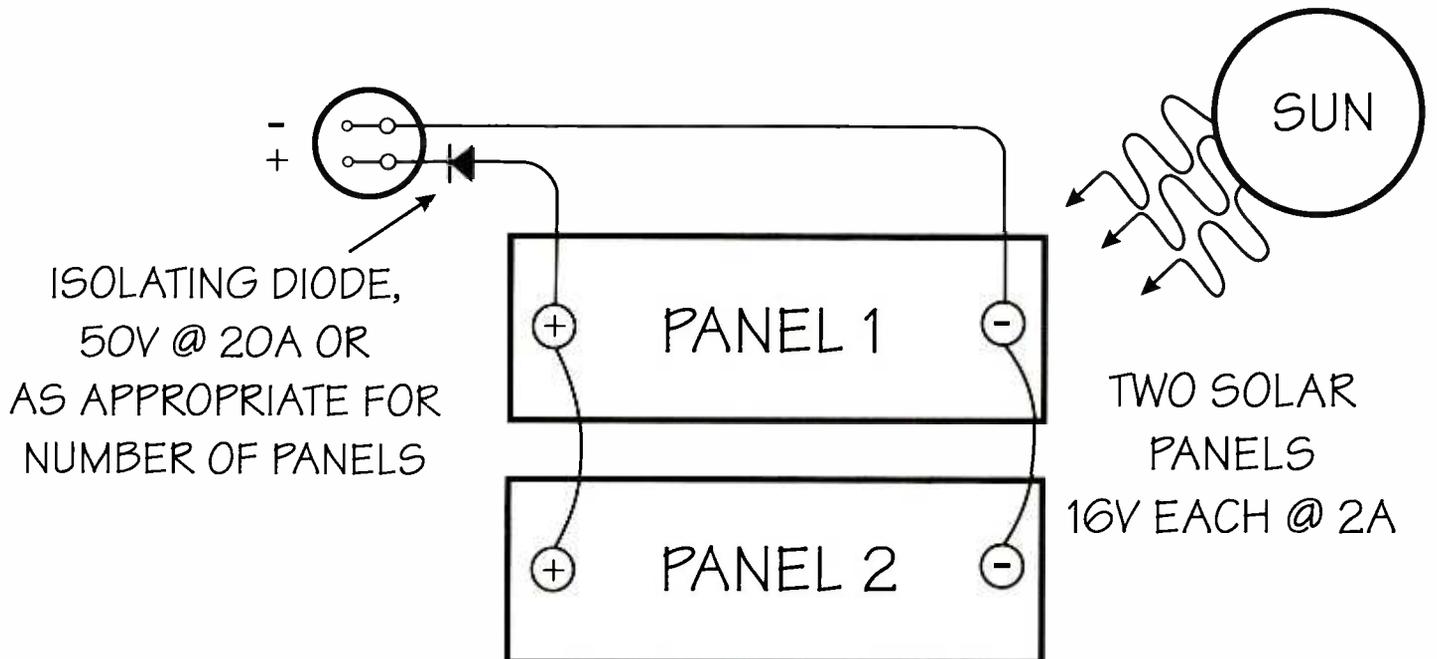
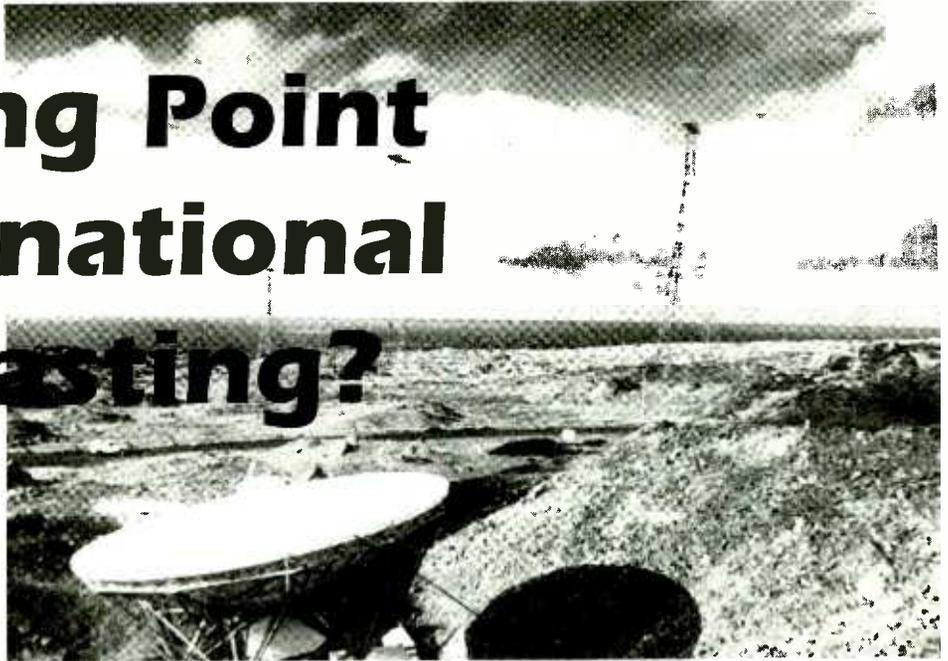


FIG 3. Two solar panels 16V each at 2 amps with isolating diode.

A Turning Point for International Broadcasting?

By John Figliozzi



International broadcasting is much more than just a mode. The BBC's relay site on Ascension Is. uses both shortwave and satellite technology.

What does the future hold for shortwave?

It's a question one hears frequently these days, spurred by the advent of new distribution technologies, the downsizing and outright closure of some services and stations, and unsettling announcements of changes and "new directions" by long-relied-upon "establishment" broadcasters.

Let me say at the outset that I possess no crystal ball nor gift of clairvoyance. But neither, it seems, does anyone else. Having said that, though, it is possible to learn both from history and from the experience of those in the field and, thus, we may discern some trends on this question.

■ What do we mean by "shortwave"?

As a start, though, we need to agree on what we're talking about. To the pure hobbyist, the term *shortwave* refers simply to the part of the radio frequency spectrum roughly between 2 and 30 megahertz, segments of which are reserved by international agreement for a range of distinct uses. Just flipping through the pages of this magazine will give you a sense of the wide and divergent nature of these services and modes.

The fact that shortwave is being put to so many uses may alone be enough to guarantee its viability as the focus for a range of radio hobby interests for many years to come. But for many, shortwave is — and has been for

some time — the place to find the programming of international broadcasters. For these listeners and hobbyists, international broadcasting provides a deeply valued source for information and entertainment that is simply unavailable via domestic media. Indeed, for this group the terms *shortwave* and *international broadcasting* have always been synonymous.

However, as we will see, this is no longer the case. Therefore, for our purposes, let's agree that the term *shortwave* refers to a broadcast delivery technology and that the term *international broadcasting* refers to a product that is carried over it.

■ Some Background

While there were, in fact, international shortwave stations on the air from the early twenties, most of these were experimental broadcasts usually serving to extend the reach of domestic broadcasters, who themselves were in their infancy.

The BBC commenced its Empire Service in 1932 to provide a British radio service to British colonies spanning the globe. International broadcasting specifically targeted to foreign audiences really began in earnest in the 1930s when Germany commenced shortwave broadcasts to the rest of Europe with programs designed to foster acceptance of the German view of current events as they were unfolding on the continent. These broadcasts were soon countered by the BBC with its European services, and soon many other nations had begun broadcasts of their own.

World War II brought almost all private, international broadcasting to an end. The medium took on a politically bi-polar, largely government-sponsored, and often propagandistic nature. The ensuing Cold War only served to reinforce this model until the breakup of the Soviet empire less than a decade ago began to force some radical changes in approach.

In short, it was World War II and the Cold War that provided international broadcasting with a longstanding *raison d'être*. During those years, there was no real need for broadcasters to justify their existence or their budgets because their missions were bound up in a global struggle centered around two competing world views. Each side's fear of the other created its own dynamic. Whether it was megatons or megawatts, almost no expense was too great in this battle for supremacy.

■ An Unforeseen Challenge

But when the Berlin Wall came down, the underpinnings of nearly all of the assumptions upon which life had been based and lived on this planet for decades were rocked at their core. Coordinately, international broadcasters almost immediately lost the justifications they had long relied upon for their programming choices, their budgets, and even their existence. And the swiftness with which these changes arrived understandably caught nearly all of them unprepared.

The sponsoring governments held a mostly one-dimensional view of the worth of broadcasting. With that single dimension now dis-

CHALLENGES FOR INTERNATIONAL BROADCASTING

It is a credit to **Radio Canada International** that, even when it was in its darkest hours and under continual threat of closure, it perceived and acted on a need for the international broadcasting community to meet and consider its collective future. For the past eight years, RCI has sponsored and hosted a biennial conference of global international broadcasting organizations, academics and professionals under the banner *Challenges for International Broadcasting*.

Some of the conclusions reached at the most recent meeting held in Ottawa between May 17 and 21, 1998, include:

- International broadcasters need to forge new alliances or reinvigorate existing ones with the domestic arms of their parent organizations. They also need to identify and develop relationships with constituent groups within their countries (such as businesses seeking international markets) for whom international broadcasting could prove helpful.

- There needs to be much more study in academia of international broadcasting, both in terms of its historical role and importance as well as its various structures and missions around the world.

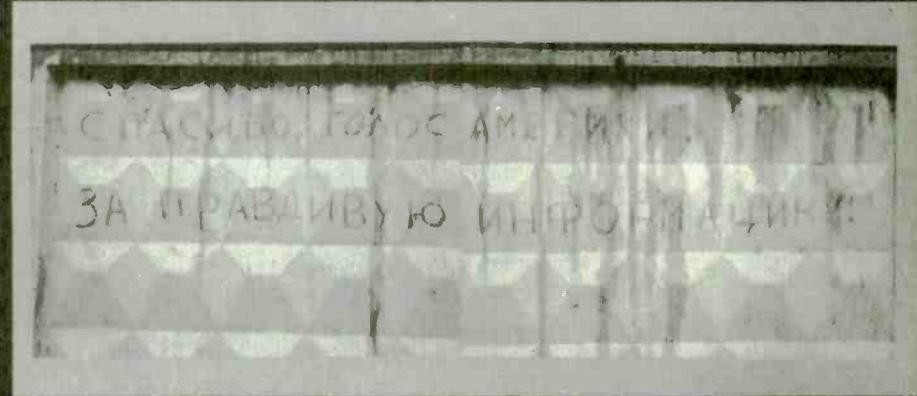
- While its growth and introduction will vary from place to place, the future for international broadcasting is definitely digital.

- While there is interest in new distribution technologies, average spending on implementing them over the past year averaged only about 3% of budget for the 40 or so broadcasters attending the conference. Shortwave is still — and will remain for the foreseeable future — the dominant delivery technology.

- In the end, international television is not a threat to international radio. The latter will thrive on its own merits.

A sixth conference is tentatively scheduled for the year 2000 in Montreal on the subject of programming. More information on the Challenges series can be obtained via the Internet at <http://www.rcinet.ca/biennial/index.htm> or by writing to: Challenges V, RCI, P.O. Box 6000, Montreal, Canada H3C 3A8. For books on the subject, go to amazon.com and search on "international broadcasting." Many thanks to Elzbieta Olechowska of RCI for her kind assistance in providing material for this article.

"Thank you Voice of America for the correct information."



Graffiti found on the wall of the Moscow White House facing the American Embassy after the August 1991 coup attempt in Moscow. The translation reads: "Thank you Voice of America for the correct information."

After the Cold War, international broadcasting lost its primary reason for being.

solved, governments began to view international broadcasting as no longer necessary and, therefore, dispensable. This view has been almost certainly helped along by a new, fierce competition for economic resources.

Politicians looking to slash public bureaucracies and corresponding budgets, first see international broadcasting — as provided by public organizations with public funding — as a Cold War relic. And in an age newly enamored of "markets" and the private sector, politicians are quick to look askance at any public benefit activity that may conceivably be provided commercially. Caught off-guard by the speed of these events and the arguments they have raised, international broadcasters have struggled to find and offer new justifications to counter this rush of impressions.

The fact is that many of these justifications — such as promoting cross-cultural understanding of a less globally influential country, explaining different geo-political points of view, and introducing a country's products to potential overseas customers — existed side by side with the Cold War imperative all along. But they were never well articulated or, if so, perhaps only in the context of that bipolar struggle. As with any longstanding and unchanging situation, a degree of stagnation had clearly set in — which became glaringly apparent when the Cold War ended.

■ The Broadcasters' View

The singular intention of the international broadcaster is to identify and serve audiences. It stands to reason that, in an era of restricted funding and skeptical masters, demonstrating that this is being done — and being done in the

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most effective way possible — would be a matter of the highest importance for the broadcaster.

It was much easier to do this when the prime motivation was to impart hard information to a self-motivated listener from a competing social system, using the only medium practically available and suited to this purpose. But recent history has changed all that. Governments are not as keenly interested, or in some cases have become wholly uninterested, in communicating with foreign, off-shore audiences. For their part, audiences are less interested in straight, hard, factual information than they are in softer, more entertaining and personally relevant fare. And since they have an ever-growing roster of alternatives — both in terms of technology and content — they now have to be enticed to both sample and become committed to the product.

Consequently, international broadcasters find themselves, perhaps for the first time, in a truly competitive posture — competing for funding, competing for resources, competing for attention, competing for audiences with other media. In short, they are seeking to effectively articulate a new *raison d'être* to their existing and potential audiences, their masters, and — perhaps most importantly — themselves. The pressure of competition and the swiftness with which changes continue to come does not leave them with the luxury of much time in which to do so, either.

Is there any wonder, then, that many of the changes put in place appear less than well thought out, or are withdrawn or altered almost as quickly as they are implemented, or that some simply look at the situation and decide they simply cannot compete?

■ More Challenges for Broadcasters

For most of its existence, international broadcasting has been available to its audi-



Broadcasters must decide (1) what can the audience afford? (2) what programming is important enough that they will listen? (Courtesy BBC)

ence only via the medium of shortwave radio. More recently, however, broadcasters find themselves with other alternatives that can be used to deliver their product. Dr. Kim Andrew Elliott of the Voice of America has identified four such methods or technologies. They are:

- shortwave
- satellite
- local placement
- Internet audio

Each of these has its own advantages and disadvantages and is still in a period of evolution as a means of delivering international broadcasting. To illustrate, consider the following examples.

The use of satellite technology in conjunction with international broadcasting began as a means of delivering programs to shortwave relay transmitters with better quality and more reliability than had been possible using short-

wave sideband feeders. Satellite has evolved today into a direct-to-receiver broadcast vehicle on its own. But to date, the bulkiness and expense of owning receiving equipment limit its applicability to fixed locations in relatively affluent areas.

Local placement has also been around for some time, beginning with the transcription services of various international broadcasters which supply programs on tape or disc to local AM and FM stations. Today, satellite technology is also used to deliver this programming. The clear advantage to the international broadcaster is in delivering its product to listeners in a seamless way on receivers conveniently available and used by nearly everyone. But one disadvantage in a country like the United States is the virtually impossible task of replicating this process literally thousands of times to provide coverage over the entire nation.

The Internet is the newest delivery mechanism on Dr. Elliott's list. It adds some nice convenience features with its ability to digitally store programs, enabling the listener to hear programs "on-demand" and enabling the creation of program archives that can serve as a sort of reference library. But at this early stage of development, the Internet also has some significant drawbacks. For one, the equipment to access it is expensive. In addition, telephone line and access charges can be high, thereby inhibiting use.

The added challenge for the international broadcaster, over and above what it is already faced with, is to tailor the use of each technology to a targeted audience. This is a continuing task, because all four technologies are dynamic. Each also has uses for which it is seems best suited and each has advantages and disadvantages vis-a-vis the others. Both the technologies and their interrelationships will continue to change and evolve with time.

WHO IS THE AUDIENCE?

When it comes to audiences, it seems that the "traditional" shortwave listener (SWL) is not the prime — nor even a desirable — target for international broadcasters today. "Radio freaks" was a term used by Deutsche Welle's Director General Dieter Weirich at the recent Challenges V Conference in Ottawa to describe the type of listener DW was *not* seeking. To be fair, Mr. Weirich used the term more descriptively than derisively, and it was used to illustrate his view that most of the traditional SWLs were interested in listening to station programs and content only to the extent necessary to earn a QSL (verification) card.

Given the challenges being experienced by stations like DW today, Herr Weirich's sentiments are understandable and even reasonable. Stations do not exist for hobbyists; they exist for listeners. The listener an international broadcaster seeks is one who is involved with the station because he or she is interested in what the station has to say. When such a listener communicates with the station, it will be on topics like program content, the listener's interests, or his or her opinions on what was heard on the station. It makes far less difference to the station how the listener accessed that content, whether via shortwave, satellite, the Internet or *CBC Overnight*. If the listener's focus is content, the station is interested in hearing from him or her. But if that focus is confined to running up verification numbers, that relationship is not likely to be very welcome.

police, fire and EMS headquarters. TV media especially can be guilty of "sensationalizing" the facts (or lack thereof) to increase their audience share.... (ratings count)! Don't laugh...I have seen this firsthand on several occasions. You should depend upon the media *only* to augment what you can glean from other sources.

■ Bare Necessities

Your second line of defense is a good quality handheld scanner that also works on "AA" batteries. Minimum coverage should include: Lo/Hi VHF, UHF, UHF-T, 800 MHz and NOAA weather frequencies. If your municipality or county has gone to an 800 MHz trunked system, then procure the necessary equipment to monitor them. Keeping track of what is happening on these frequencies will yield a much clearer understanding of the overall situation than listening to the news media alone. An accurate, up-to-date frequency list for your scanner is a must.

Radio amateurs need to ensure that they can get on and stay on the air for extended periods to move critical emergency traffic into and out of an affected area. Most hams think of emergency communications as grabbing the old HT (hand-held transceiver) and heading out the door. **WRONG!**

First, contact the Amateur Radio Relay League (ARRL) ¹ or your local ham radio club and find out who is in charge of the county Radio Amateur Civil Emergency Service (RACES) or Amateur Radio Emergency Service (ARES) chapter. Then, join up! Participate in the RACES/ARES drills and hone your skills as an emergency communicator. If you are untrained, you will be more of a hindrance than a help.

As for radio gear for the well dressed RACES/ARES ham, dual band HTs are the only way to go. Two meters and 70 cms are the two primary bands used by both RACES and ARES. Lots and lots of spare "AA" battery packs should be included, too. Nickel-Cadmium batteries are fine, but they tend to fail just when you need them the most. "AA" alkalines are plentiful and you can reload spent battery packs on the fly.

For HF, most rigs manufactured over the last 20 years will run off of 12 volts dc. With an eye toward portability, choose an HF rig that will provide SSB and CW communications along with HF packet capability. (Note: contrary to popular belief, you do not need 100 or 1000 watts of RF power to make

contacts and pass traffic on HF during an emergency. Five to twenty watts of RF output will suffice nicely, greatly reducing the power drain on batteries, not to mention the size and weight of the radio gear.)

My recommendation for an emergency HF rig: The SGC-2020, a no frills 20 watt CW/SSB transceiver that is rugged and very compact. SGC has an outstanding name in the commercial HF radio field and the SGC-2020 shows its heritage.

I have recently added an Alinco DJ-C1 "credit card" HT to my emergency kit. This neat little device is about the overall size of a credit card and about 3/16 of an inch thick. Its small size make it great for concealment and portability, as opposed to a bulky HT.

The DJ-C1 features 20 memory channels, receive coverage from 118 to 174 MHz (the 118 to 136 MHz range automatically switches into the AM mode to hear civil air traffic), with transmit coverage from 144 to 148 MHz. Programmable CTCSS (PL) tone encoding is included and the repeater offset is standard at +/- 600 kHz, but can be expanded to 9.99 MHz, if needed. The little rig can function as a regular handheld transceiver and/or miniscanner. Power output is only 330 milliwatts, but it is powerful enough for me to access many of the local repeaters in the Wilkes-Barre, Pennsylvania, area.

In addition to the AM aircraft band, this rig also can tune the NOAA weather radio stations, greatly enhancing its worth to the emergency communicator. These tiny radios are being sold for around \$80 by various ham radio outlets and Tech America. There is a UHF version called the DJ-C4 that is the same size and overall specifications (except for frequency coverage) and sells for the same price.

Until next time: Hope for the best, plan for the worst, and remember to always **Keep It Simple.**

FOOTNOTES:

¹ RACES/ARES information is available from Rick Palm, K1CE, Field Services Manager at ARRL Headquarters, 225 Main St, Newington, CT 06111 (e-mail: rpalm@arrl.org) (Tel: 860-594-0261)

² Military Surplus equipment: Fair Radio Sales, 1016 E. Eureka, PO Box 1105, Lima, OH 45902-1105 (Tel: 419-227-6573)

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Mastering the Grove FCC Database

I drool over flexible and lightly protected frequency databases. All the better if they serve multiple needs and applications. The all-new Grove FCC Database on CD-ROM in version 6.2 knocks on the door of my fantasies. Not only can the Grove database serve as a simple frequency directory, but also it's directly compatible with the memory file requirements of WinRADIO and indirectly compatible with many more file formats and computer-controlled radios.

The Grove database can feed the voracious memory requirements of today's computer-controlled radios. It easily creates foundations for AutoProgrammer files (*.APF) for the CE-232 Scanner/Computer Interface, and probably for most other non-proprietary file formats as well.

John Catalano will do his own assessment of the Grove FCC Database, but here we dig into the innards of the Grove database for its ability to be more than a frequency directory.

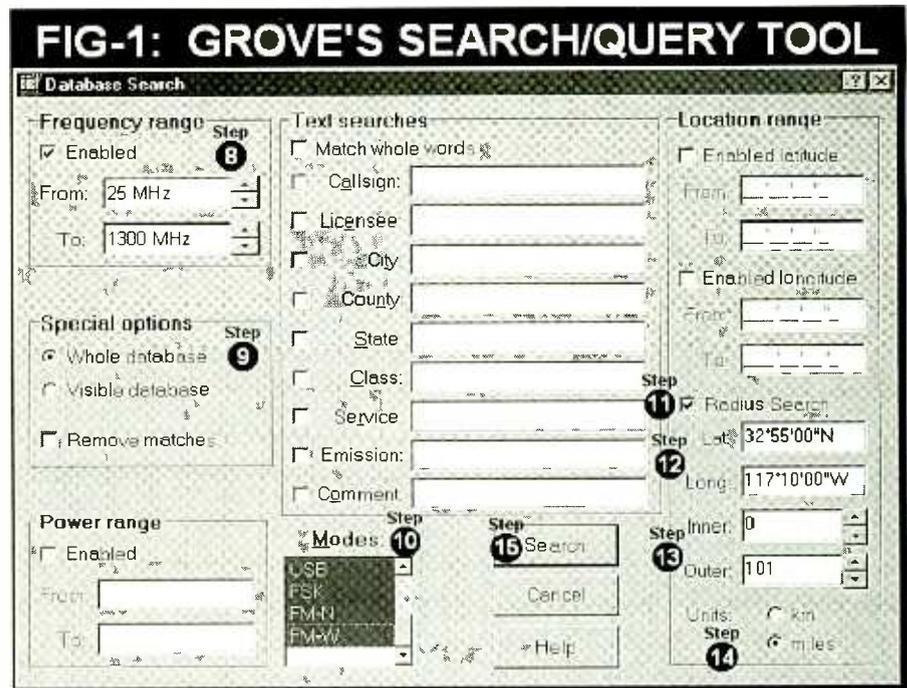
■ First Things First

For better performance, it is a good idea to copy the main database file (the huge file called *Fecdb_ro.fdb*) from the CD to the operating directory on your hard drive (Grove's default operating directory is *C:\Program Files\FCC Database Manager*). The file is over 638 MB, so it may take 15-30 minutes to copy, depending on your system. Patience! The wait is worth it.

You *can* copy *Fecdb_ro.fdb* to any directory so long as there is enough free space, but create a special directory for it if you copy it anywhere other than to the database operating directory.

If hard drive free space isn't at least 700 MB, then don't attempt to copy it — the Grove FCC Database is designed to be operated straight from the CD. If free space resources are marginal, but adequate, copy the file anyway. You can delete it later.

Why are we doing this? The Grove FCC Database holds over 3.4-million records, a most unwieldy number; frankly, you are interested in less than 1% of those records. For example, do you really want frequencies beyond the detection range of your receiver? The VHF-UHF receiving range at most locations is 20-100 miles. A good antenna system installed high above ground gets the max, while back-of-set and rubber-duckie antennas get the least. This means only a few hundred frequencies for rural monitoring posts to maybe 60,000 for top re-



ceiving sites in congested metro areas.

Our objective is to extract only frequencies of immediate interest and put them into a smaller file that is easily managed by a PC and data management programs. After that, we can delete the monstrous file from the hard disk and still access it as needed from the CD-ROM.

■ Culling Just the Right Records

The Grove FCC Database offers a powerful search (query) engine that extracts just those frequency records of interest. This can be done in a variety of ways, but the focus for now is to extract all frequency records for your reception area. Thanks to Grove's "radius search," it doesn't get much easier. Here are the steps:

1. Install the Grove FCC Database on your PC. The installer is self-guiding.
2. Take time to play with the database and get familiar with its major features and attractions. Check out the *Help* menu and be patient as you fumble around. (Yes, I fumbled, too!)
3. Proceed to Step 4 if your hard drive doesn't have at least 700 MB free space. If it has the free space, then copy the *Fecdb_ro.fdb* file from the CD to a directory on the hard drive. (See above discussion.)
4. When the database is first installed, it automatically points to the *Fecdb_ro.fdb* file on the CD. If you copied the file to your hard drive,

then eject the CD so it can't be used. If you didn't, then use the CD as normal.

5. Run the *FCCDBMGR.exe* program from wherever it was installed in Step 1.
6. If the *Fecdb_ro.fdb* file (with its 3,403,954 records) doesn't automatically come up in the Grove database window, click *File* and *Open* and select it from your hard disk if you copied it there, otherwise from the CD.
7. Click *Navigate* on the menu bar, and then click *Search* on the drop-down menu. You should see a new window appear that looks like Figure 1. This is Grove's powerful search/query window!
8. In its upper-left corner, click *Enabled* under *Frequency Range*, and enter the *From:* and *To:* limits of the desired spectrum.
9. Check the *Whole Database* button, but not *Power Range*.
10. Don't select anything in the *Text Searches* area at this time, but do select and highlight everything under the *Modes* menu. Just click on *None* and drag down until all modes are highlighted.
11. Click the *Radius Search* button, but don't enter anything in the *Location range* area.
12. Enter your approximate latitude in the *Lat:* box under *Radius Search*. Enter your approximate longitude in the *Long:* box.

Note: You can estimate your approximate latitude and longitude from most any *Rand-*

Even shortwave broadcast engineers are experimenting with digital transmission modes which, if successfully implemented, would improve the audio quality, reliability and cost-effectiveness of this venerable technology.

■ **Does Shortwave Have a Future?**

Absolutely! While at first glance shortwave may seem to be old technology that has existed virtually unchanged since the beginning, this is untrue. Receiver technology alone has improved markedly over the decades. Transistors, digital frequency readout, selectable sideband synchronous detection and digital signal processing have made today's receivers much more portable, user friendly, and aurally stable than their earlier counterparts.

The use of relay transmitters — whether station-owned, leased or cooperatively shared — have provided listeners with stronger and more reliable signals than "home-bound" transmitters ever could. And, as mentioned above, the coming introduction of digital transmission techniques offer the promise of further improvements for both the broadcaster and the listener.

At the same time, though, the development of other methods and technologies of reach-



Broadcasters find themselves experimenting with new modes and methods of delivery. Pictured is a new 2-button Digital Radio from BBC.

ing listeners means that the use of shortwave by international broadcasters will change and evolve in new ways. Some of these will result from the fact that the broadcasters' need to identify and reach new audiences will demand that the broadcaster efficiently and effectively use every possible means to do so. Some of that audience would undoubtedly never have been reachable by just using shortwave.

Making predictions can be a foolhardy practice. But it is clear from what has already transpired that this will be a more than short-term trial and error process for both broadcasters and listeners.

■ **What of the Future of International Broadcasting?**

Is it possible to conceive that the world, which has been made ever smaller by communications and technology, might contemplate the end of any mass media as long as it is useful to get messages across? The broadcasters themselves seem confident that they have a future (see "Challenges" sidebar). If anything, there are more points of view, more need for cross-cultural understanding, more commerce to be conducted, more corners of the world vying for attention than ever before. There is more need for communications than there ever has been. And there is more need for it all to be put in some context wider than one's individual or ethnocentric experience will allow.

While many of the details — public service vs. private, the interplay of technologies and more — may be in question, it is that need and desire for a wider context that will ultimately ensure and define the future for international broadcasting.

John Figliozzi is "Programming Spotlight" editor for *MT* and author of *Radio Shack's Worldwide Shortwave Listening Guide*.

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Flying and Scanning by GPS

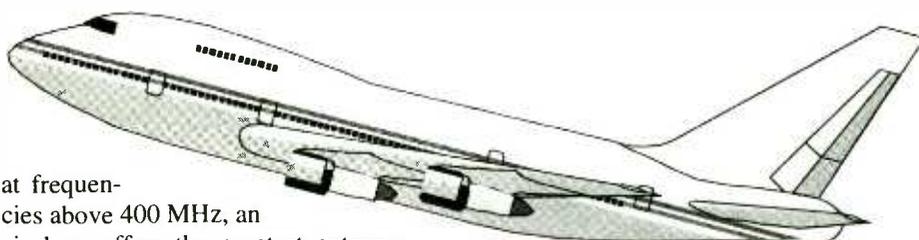
In a recent column we asked the question, “wouldn’t it be great if you could use a GPS (Global Positioning System) receiver on a plane, track your position, and program your scanner based upon your position?”

It’s something this editor always wanted to do, but never thought was possible. GPS receivers rely on a network of satellites that were initially designed for use by the military. When your GPS receiver has a lock on a minimum number of satellites, you can pinpoint your exact location anywhere on the globe. The question remained, however: would one be able to see enough satellites out the tiny fuselage window to actually work?

The issue of whether you could scan at 35,000 feet had long ago been answered. Yes, it certainly is possible to scan while on a commercial jet with a few key caveats. First, you must first determine whether the airline you are about to fly permits the use of scanners. From our cursory investigation, most airlines do not, but Delta is a notable exception. “VHF Scanner” is specifically listed in the Delta’s in-flight *Sky* magazine as a permissible electronic device (I don’t think they would quarrel with a scanner which also included UHF and 800 MHz, although if you’re concerned you can always ask the captain).

The second caveat is that you can forget about receiving VHF low-band signals and many high-band signals as well. You just don’t hear anything under 100 MHz and signals between 100 and 200 MHz are not reliably received. It has been suggested that the reason for this is that the longer wavelengths of these frequencies cannot penetrate the small opening of the window. The “skin” of the plane serves as a shield to RF (radio frequencies). Your only window on the ether is literally your cold, scratchy little seat-side peephole. (Absolutely make sure you get a window-seat if you want any chance of successful monitoring.)

There is one final caveat. Particularly



at frequencies above 400 MHz, an airplane offers the greatest antenna (and a mobile one at that) of all time! So what’s the caveat? The reception is actually *too* good. We estimate that you can monitor signals in a more than 200 mile radius. If you’re trying to listen to a particular city’s police department on 460.500, you may hear four different cities talking over one another at the same time.

It’s fun, but it’s frustrating. I remember one night I was flying home to Boston from Atlanta. While over southwestern Connecticut I attempted to listen to New York City Police’s exciting SOD (Special Operations Division) channel of 470.8375, but I actually heard my old hometown city police department of Newton, Massachusetts! They share the same frequency, but this is the first time I ever heard them interfere with one another!

OK, but what about perceiving where you are so you know what to program into your scanner? You can’t rely on the captain. Either he rarely informs the passengers of your location or you can’t understand him over that blasted public address system. GPS is the answer. While some international flights provide a GPS positioning map for everyone to view, we’re talking here about domestic flights.

■ Readers Weigh In

When I asked the question about GPS use on planes, I had no idea that it would generate more e-mail than any other topic about which I’ve ever written! I received dozens of letters. The few below provide some valuable insight into GPS use on airliners. And the great news is: you can run GPS on most planes and it works like an absolute charm. Here’s the mail.

• An old acquaintance, Dave Lounsbury, wrote:

“In your last *MT* column you ask “Wouldn’t it be great if you could operate a GPS unit on a plane?” In some cases you can, and I have often linked my Garmin 12XL with my Powerbook 540 and displayed my position on the flight. It’s particularly nice on transatlantic flights to know how far you are from your destination, and also if your flight gets rerouted or held, since it allows you to have some idea of how much longer you have to go.

“I use the excellent program GPSy, (<http://www.gpsy.com/>) which can either use scanned maps or interface with DeLorme Street Atlas maps. I have also loaded waypoints for major airports into my GPS so I can get an approximate location without using my computer by using the unit’s “Nearest Waypoints” function.

“It’s important to note that not all airlines allow the use of GPS. There’s a list of those who do at <http://joe.mehaffey.com/airgps.htm>. In all cases, GPS use is at the pilot’s discretion, so ask an attendant before firing up.”

• An anonymous contributor wrote:

“My father is a commercial/military pilot who owns a Garmin 195 GPS with a self-contained moving map (aeronautical) display. He recently flew as a passenger from California to Georgia tracking his progress via GPS all the way, except during take-offs and landings. The Garmin had no problem tracking enough satellites to maintain a ‘3D’ fix, (latitude, longitude, and altitude). He used a window mounted

antenna. (His GPS could also be integrated with a laptop using a moving map display.)

"The airline had no problem with the GPS. They were however disturbed when he donned his 'noise canceling' Bose headset (complete with boom mic) for some peace and quiet. (The noise canceling portion runs off a self-contained 9 volt battery, not the radio it plugs into.)

"During the 50s and 60s my father had a copilot who was also a ham. They listened to all kinds of AM/FM stuff using an assortment antennas, including a very long trailing wire antenna at 35,000 ft. I have also flown with an older 8 channel hand held unit, but the unit could not acquire more than two satellites solidly enough to give me a fix."

• **Doug Findlay weighed in with this:**

"I read your article in *Monitoring Times*. The part that caught my eye was the 'Wouldn't it be great if you could operate a GPS unit on a plane?' Well, it *is* great, and you *can* (on some airlines). I have a Garmin 12XL, 12 channel paralleled receiver with an external (active) antenna.

"You are partially right in saying that a good 'view of the sky' is sometimes hard for a positive satellite lock. It depends, but in most instances, you can get a lock. I turn mine on and get a lock on the ground, even before boarding the plane. It makes it easier to get a subsequent lock. Then, above 10,000 feet altitude, for the airlines that will allow you to use one, I turn it on and get a lock. It's fun to see you going along at 550 mph! I usually preprogram the navigational aids and other cities along the route since my GPS is an old one without the built-in data base."

• **Randy, WA2AGE, reports:**

"I just finished reading your column about GPS. I have used my Garmin GPS III many times on airplanes. It usually takes 5 to 10 minutes to get locked, but once it is locked, it works great. I like having the maps to show what roads and towns I am flying over. I have also used the GPS III interface to a laptop running Street Atlas 5 while on a train trip from LA to Orlando; that combination gave me much more detailed maps for the trip. And, with the scanner, I can listen to the railroad comms. I have tried the same operations using an older Garmin GPS 45, which is a

single channel receiver, and had much poorer performance than the GPS III. When viewing of the sky out of a window, the receiver sees fewer satellites. The parallel receivers work much better! Good Fun!!"

• **Peter Noeth provided some additional insight:**

"I have on several occasions used my GPS onboard commercial airliners. I have used the Garmin GPS 12lx with just the built-in 'patch' antenna. The reported positional error is usually between 100-200 ft, which is amazing considering the narrow 'viewing angle' the GPS can see when pointed out the window. I usually am able to track six to eight satellites, which is enough.

"I connect the GPS to my HP200 palmtop PDA running a program that allows me to track my position on electronic 'paper maps' in the .PCX file format. With this setup, I can track my flight with whatever detail level I want to prepare maps to. I also have a program that is a full blown flight planner, which allows you to enter flight parameters, source and destination airports, and will show on a map when you enter and leave controlled airspaces, which frequencies to tune for navigational beacons, tower and ground control, etc. Altitude information is the item most affected by the Selective Availability degrading that is imposed by the Air Force, but lat/long is accurate enough to know how you are progressing over land/water."

■ **Seeing is Believing**

After reading this mail I was rarin' to go on my next trip with a Garmin III. Because I fly so often I was lucky enough to upgrade to First Class. Having the space of a first class seat helped immensely. When you've got your laptop out and opened, the GPS out and wired-up, your scanner, and perhaps a frequency guide in front of you ... well, you get the picture and it's not a pretty one.

If you can't upgrade, ask for the exit row which also provides additional space (although if you're seated over a wing you'll have a hard time seeing the ground.). Whether you're in first or in coach, though, you generally have two windows that you control. This is perfect as you'll have one window to look out and one window to mount the antenna.

The antenna initially had me befuddled. A Garmin accessory is a remote antenna which is approximately the size of a box of matches. A thin coax runs to the GPS and snaps on with a BNC connector. I didn't have any double-sided tape to mount the antenna in the window (and it's not appropriate to do so anyhow), and I found that the antenna couldn't rest at the bottom of the window and receive the satellites. It had to be mounted in or near the center of the opening.

My solution arrived when we were asked us to lower our window-shades halfway for better movie viewing. I realized I could stick the small antenna between the shade and the window. It was a perfect fit and it held the antenna in place in the center of the window. It also became less noticeable. It's not that I was trying to be secretive, as using a GPS, according to our sources, is allowable on many major airlines. But why draw attention to yourself or make others uptight about what you're doing?

Another Garmin accessory is the serial cable which runs from the receiver to a laptop. While a laptop isn't required, by running mapping software you'll have a far superior screen on which to view your position. Andy Sturtevant from the DeLorme company read the October article and offered me a copy of their latest *Topo USA* software to try. Who was I to turn him down?!

Once I had the antenna mounted, I turned on the Garmin unit, acquired a satellite lock on six to eight "birds" and began tracking our position almost immediately. I then fired up the laptop, popped in the DeLorme northeast CD-ROM, and

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I have used my Garmin GPS III many times on airplanes. It usually takes 5 to 10 minutes to get locked, but once it is locked, it works great. I like having the maps to show what roads and towns I am flying over.

-Randy, WA2AGE



watched in full color as we traversed New England on our way to Los Angeles (you will have to swap out a couple of CD's during a long flight).

I could look out the window, see a small town or river, then take a look at my Gateway's screen and know exactly where we were. I was riveted. I could also watch the Garmin receiver as it ticked off our airspeed and heading. (We were traveling some 510 mph on average when cruising going east to west, but when heading back home we had the jet stream giving us a lift and our airspeed was closer to 640 mph!)

But there was more fun yet to be had. I brought two scanners along for the ride: a Uniden BC-235 Trunktracker and an AOR-8000. I like the 8000 because it has a VFO which makes it easy to sit back and tune around to find activity. The 235 was going to be my main monitoring tool, though.

As we were passing over Altoona, Pennsylvania, according to the DeLorme software, I thought I saw smoke down below. I opened a copy of *Police Call* and I programmed 460.575 and 460.625 into my scanner. Sure enough, I began hearing apparatus responding. (You can also use either the Grove or Percon FCC databases on CD-ROM, although I preferred running the mapping software full-screen all the time. Also, you would have to download the entire FCC CD to your hard drive, or

load a customized database ahead of time, as you need the CD drive for the DeLorme program.) I continued to monitor (using an earphone, of course) off and on throughout the flight.

On the way into Los Angeles, I decided to try tracking the San Bernardino County trunked system. I thought I was going to have to load the 235 with the 20-odd frequencies for the system, but something very interesting happened. I selected a bank to trunk and found I was instantly trunking, even though I had done no programming for the region. It turns out that systems I had programmed for Dallas and Boston were working fine over southern California. I might not have had all the frequencies correct, but it was close enough. You can hear so many data channels at five miles up that it doesn't matter what 800 MHz frequency you have programmed. I was hearing county sheriffs on one bank and businesses using an SMR on another.

A couple of final points to consider. Your CD drive will be spinning practically the entire flight. Make sure you have at least a second battery with you for your laptop, depending on how long you'll be in the air. Of course you cannot operate any electronic device during takeoff or landing or whenever flight personnel request that you turn it off. It's also helpful to know Morse code. Many agencies continue to

transmit their call sign via Morse and you can identify to whom you're listening by snagging the call via the code.

■ **But is it a good idea?**

There remains some controversy regarding the use of GPS receivers, scanners, laptops and other electronic devices on planes. One contributor helped me to put together the following information for all concerned.

A good review of the RF hazards on planes can be found at: <http://joe.mehaffey.com/gpsrfi.htm>. *Aviation Week & Space Technology* (Sep, 1996) offers a report on the SC-177 team that is studying the situation.

You can also check out the following web pages:

www.usatoday.com/life/cyber/tech/ct327.htm (news to excite you)

www.rvs.uni-bielefeld.de/~ladkin/Incidents/EMI.html (anecdotal info plus summaries of other studies)

The current FAA guidance is in Advisory Circular 91.21-1, 8/20/93. RTCA document: (from their web site www.rtca.org) "DO-233 Portable Electronic Devices Carried on Board Aircraft"

This document addresses the potential interference to installed aircraft electrical and electronic systems from Portable Electronic Devices (PEDs) carried aboard by passengers. It defines the potential interference phenomena; outlines the risk potential from interference events; provides test methods to determine whether or not a potential for interference exists for certain PEDs, aircraft and combinations thereof; and addresses acceptable levels of interference. The report also recommends modification of Federal Aviation Regulation 91.21, continued PEDs testing to identify and better define the possibility of interference to aircraft electronic systems, increased public awareness of the potential for interference from PEDs, and the development and use of devices to detect spurious PEDs emissions. (US/Canada/Mexico \$60. All other countries \$75.00.)

Thank you to everyone who wrote in and supplied the impetus and experience to entice me to try GPS by plane. Thank you, too, to Bob Grove, for lending me one of his Garmin III units. I loved the device so much that I bought it! Grove Enterprises sells the Garmin units and I can't recommend it highly enough.

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Bearcat®235XLT-A TrunkTracker

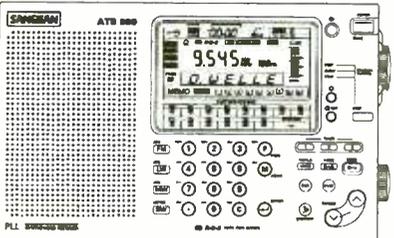
Mfg. suggested list price \$429.95/CEI price \$269.95
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RELM MPV32D-A 5 watt VHF handheld transceiver \$299.95
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Hugh Stegman, NV6H
driver8@netcom.com



Rescue Coordination 1999



One-niner-niner-niner. Has a nice ring, doesn't it? The new year is always a good time to finally do what you've been putting off. That said, here are a few things we've been meaning to talk about.

■ RCC Halifax

RCC stands for "Rescue Coordination Center" ("Centre" in the Canadian spelling). Canada has three of these. Besides the one in Halifax, Nova Scotia, the others are in Trenton, Ontario, and Victoria, British Columbia. All three are tasked with the coordination of search and rescue (SAR) responses to air and maritime incidents in Canada or its waters. RCC will also support, upon request, local and provincial SAR.

As the Global Maritime Distress and Safety System (GMDSS) becomes compulsory for large vessels in February of this year, the worldwide RCCs are essential. While Canada has decided to continue its guard of 2182 kHz and VHF channel 16 (156.800 MHz) for the near future, automated distress calls will increase. Canada plans a watch for digital calls on the international frequency of 2187.5.

Unlike RCCs in the United States, the Canadian ones are staffed both by Air Force and Coast Guard personnel. Each one covers a huge geographic area. Halifax frequencies are very busy with interesting traffic.

For example, Halifax RCC worked the Swissair 111 crash. This disaster received more than passing interest from "spook" fans,

due to the nature of the flight involved. Flight 111, from New York to Switzerland, is practically an unofficial diplomatic shuttle. It's popular with United Nations personnel, anyone moving a lot of cash, gold, or jewelry, and spies of all persuasion. While foul play has never been seriously considered here, one dead passenger was widely suspected of working for the Central Intelligence Agency (CIA).

A lot of activity related to this crash was heard on 5717 kHz, with a secondary of 3047. Both are great frequencies any time. Halifax Military was also active, on 6715. Since these are usually joint operations, any SAR near the border will probably also involve US Coast Guard on 5696 or 8983 kHz, their own safety-of-flight channels. Maryanne Kehoe of Atlanta, Georgia, emailed this column to report quite a bit of crash-related activity on 5696. All of these frequencies are upper sideband (USB).

I'd keep 5717 in the memory all the time. Along with 5696, it's one of the best "what's-happening" frequencies for all "those in peril upon the sea."

■ CAP West 41

I received a nice verification letter from a Civil Air Patrol (CAP) station heard checking in with NNN0VUV on the US government's SHARES (Shared Resources) coordination frequency of 14396.5 kilohertz (kHz). NNN0VUV, a US Navy MARS (Military Affiliate Radio System) callsign, is the new SHARES Coordination Station, West.

The CAP station was using the callsign CAP West 41, assigned to the Southwest Region in New Mexico, US. CAP is an auxiliary of the US Air Force, although it's actually older. Its current missions are aerospace education, cadet programs, and emergency service. We'd be lost in disaster-prone L.A. without these dedicated people.

The operator on my intercept was Major James "Ric" Sohl, the Assistant Director of Communications for this region, which covers CAP "wings" in Arizona, New Mexico, Texas, Oklahoma, Louisiana, and Arkansas. There are seven other regions. All frequencies appear in Table One.

Civil Air Patrol requires its SHARES stations, which are only ten per cent of the total,

to cover 3 to 30 megahertz (MHz), transmit and receive. In other words, they must have the capability to come up anywhere in the high-frequency (HF) band.

Broadband radios are getting common enough, but antennas take some thought for such a wide range. Cap West 41 solved the problem with that fabled ham radio antenna, the extended double Zeppelin (Zepp).

The Zepp, originally an end-fed wire hung from Zeppelins, was never the world's smallest antenna. The extended double version — a gain antenna with two parallel, double Zepps fed out of phase — is downright awesome. The design in ham radio magazines, which covers all HF amateur bands when used with a tuner, uses something like 360 feet, and is suspended from high poles.

CAP West 41 uses two of these, oriented in different directions. Operators can wear a 900 MHz stereo headphone to hear the receivers when working anywhere on the five acre antenna farm. No wonder I heard this fine station in L.A. Good stuff!

■ World Wide Web

This isn't a computer column, but I've found the Internet helpful for finding frequencies and information on utility stations. There's much too much good stuff out there for a monthly page or two, so I've started making large files and links available on the official, Utility World web page. The URL (a file's address on the Web) is in Table II.

If you get e-mail, you'll want to check out the Worldwide Utility News, WUN, pronounced like the number "one." It's very timely, and free. They, too, have a web page, with good files and instructions on how to join their mailing list. I hope everyone has a happy new year, and one full of sunspots!

Table 1: CAP Frequencies

Carrier frequencies are given. Dial frequency may be 1.5 kHz higher. All are USB and packet (digital) unless noted.

National Calling & Emergency	4582 7635
National Packet Channel	7341
All regions	2371 2374 7920 14902 20873
	26617 26620
Alaska	18205

4 MHz Regional Channels:			
Reg. #	Area	Pri	Alt
1	Northeast	4466	4469
2	Middle East	4585	4582
3	Great Lakes	4604	4601
4	Southeast	4469	4466
5	N. Central	4506	4509
6	Southwest	4627	4630
7	Rocky Mtn.	4601	4604
8	Pacific	4585	4582

Table II: Useful Web Links

European Utility Newsletter: <http://members.aol.com/aibold/EUNL.htm>
 Utility World on the Web: <http://www.primenet.com/~rffwatts/uteworld/uteworld.html>
 Worldwide Utility News: <http://www.gem.net/~berri/wun/>

Hugh Stegman

Abbreviations used in this column

AFB	Air Force Base	ID	Station identification
AM	Amplitude Modulation	MARS	Military Affiliate Radio System, US
ANDVT	Advanced Narrowband Digital Voice Terminal	MFA	Ministry of Foreign Affairs
AR	CW procedural signal: "end of message"	MHz	Megahertz
ARQ	Synchronous transmission and automatic repetition teleprinter system	NAS	Naval Air Station
Camslant	Coast Guard Area Master Station, Atlantic	NASA	US National Aeronautics and Space Administration
Camspac	Coast Guard Area Master Station, Pacific	NATO	North Atlantic Treaty Organization
CAP	Civil Air Patrol	PETRA	Jordan News Agency
CG	Coast Guard	RSA	Republic of South Africa
CP	Command Post	RTTY	Radio Teletype
CW	Morse code telegraphy ("Continuous Wave")	SAM	Special Air Mission, US Air Force VIP flight
DE	CW procedural signal: "from"	SHARES	Shared Resources, US government traffic network
DSN	Defense Switched Network	UHF	Ultra High Frequency
ENIGMA	European Numbers Information Gathering and Monitoring Association	UK	United Kingdom
FEMA	US Federal Emergency Management Agency	Unid	Unidentified
GHFS	US Air Force Global High Frequency System	US	United States
HMAS	Her Majesty's Australian Ship	SK	CW procedural signal: "end of work"
		V, VVV	CW signal: "testing"
		VIP	Very Important Person
		VOLMET	Flying Weather, loosely from French

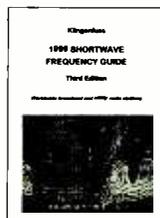
- DE 6PXJ" in strong CW, parallel on 3440 and 6785 at 1040. (Yamaguchi, Japan)
- 5692.0 Coast Guard 1500-US Coast Guard HC130, in patch through CAMSLANT to Elizabeth City Air, regarding CG 1716, another HC130 with wing flap problems over a search at 1430. (Perron, MD)
- 5696.0 Rescue 1719-US Coast Guard HC130, declaring inflight emergency to CAMSLANT Chesapeake and returning to Clearwater, FL. (Perron, MD) Coast Guard Rescue 6004-US Coast Guard HH60 from Clearwater, FL, telling Camslant that he had picked up two survivors near Freeport, Bahamas. Possibly tropical storm Mitch. (Allan Stern, FL)
- 6717.0 Air Force Two-US Air Force SAM 86971 with vice-president aboard, patch through Andrews on "F875," at 0008. (Paul Bunyan, MO)
- 6765.0 Unid-Station sending 5-letter CW groups, ending "AR AR SK SK," at 1236. (CastilloPanama) I'm almost certain that you've run across the Cuban cut number station (ENIGMA code M8) on or about 6768. Hugh WJ-UJ-US Army Corps of Engineers, control for regular Friday net checks, called it "Channel 7" at 1502. (Bunyan, MO)
- 6785.0 Gantsec-Greater Antilles Section, US Customs Service, aircraft tracking with Victor Echo, Sierra Hotel, Whiskey Zulu, and aircraft P5F. Sent P5F to US Coast Guard frequencies 8240 and 8764 at 0139. Whiskey Juliet, French accented English, gave Whiskey Golf a UHF frequency of 311.0 MHz at 2312. GANTSEC, telling Whiskey Zulu "in the red" (clear) to move Shark 33 to same area as Shark 06, as per Customs. Shark 619 working Victor Echo with info for Omaha 42 at 2316. Whiskey Juliet working Victor Echo, in French, with information about Shark 619 and Omaha 42 at 2330. Shark 619 with position report for Sierra Hotel, returning to Roosevelt Roads, PR at 2350. (Perron, MD)
- 6830.0 Unid-Station sending 5letter CW groups, ending "AR AR SK SK," at 1039. (Camillo Castillo, Panama) *Same spooks as 6765, probably on 6826. Hugh*
- 6830.5 PETRA-Jordan News Agency, Amman, with new broadcast of daily

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

- 2749.0 Halifax-Canadian Coast Guard, with Notices To Mariners for Nova Scotia and Bay of Fundy at 0150. (Ron Perron, MD)
- 3250.0 Unid-North Korean female "numbers" voice, strong AM signal, also on 657, 6250, and 6400 at 1500. (Takashi Yamaguchi, Japan)
- 3270.0 KPA 2-Mossad, Israel, no message, just ID for a half hour, parallel on 4665 and 5629 1500. (Yamaguchi, Japan)
- 3455.0 "New York"-NY Radio, North Atlantic route control with Britannia 057B and American 112 at 0220. (Perron, MD)
- 3651.0 Russian Air Defense, with coded CW message at 2257. (Ary Boender, Netherlands)
- 3838.0 Russian Air Defense, with coded CW message at 2002. (Boender, Netherlands)
- 4051.0 Unid-Out of band fishing boats, in English and Scandinavian language at 2325. (Perron, MD)
- 4111.0 Russian Air Defense, with coded CW message at 2213. (Boender, Netherlands)
- 4372.0 "A1G"-Probably US or NATO military, in aircraft tracking net with 9U, 6F, Alpha Bravo, and Quebec 2 at 2019. (Perron, MD)
- 4466.0 Penn CAP 10-Pennsylvania Civil Air Patrol, with info on Red Dragon 37 sorties for Penn CAP 17 at 1445. (Perron, MD)
- 4725.0 "Capitan Perez"-Otherwise unid male working another military station in Spanish at 0339. (Perron, MD)
- 4742.0 Architect-Royal Air Force, UK, with airfield "color" information at 0255. (Perron, MD)
- 5230.0 KPA 2-Mossad, Israel, repeated callsign for over two hours, no message, parallel on 6745. Unid Chinese female with numbers, different day at 1850. (Yamaguchi, Japan)
- 5238.0 Unid-Female with 3/2 number groups in English at 1610. (Gil Woodside, RI)
- 5390.0 Unid-French speaking Canadians, taking data, probably Canada Bell Quebec at 0117. (Perron, MD)
- 5600.06 PXJ-Unknown station heard nightly in Asia, repeating marker "V ABYZ

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- news headlines in English, RTTY at 1702. (Bob Hall, RSA)
- 6908.0 YTDL-Unknown CW station repeating call or message "V 8IDZ DE YTDL," - also different day on 6918, both at 0940. (Yamaguchi, Japan)
- 7693.0 Nightwatch 01-US Air Force E4 airborne CP, working Andrews on "F264" at 0742. (Bunyan, MO)
- 7765.0 Freedom Star and Liberty Star-NASA Booster Recovery Vessels, working Cape Radio in STS-91 mission at 0429. (BunyanMO) STS95 used 5246. Hugh
- 8010.0 Unid-Station sending CW cut numbers, ended "AR AR SK SK" at 1136. (CastilloPanama) *Same Cuban spooks, possible new frequency. Hugh*
- 8058.0 Air Force Two-US Air Force VIP aircraft with vice-president aboard, radio check with Andrews on "F054," at 0654. (Bunyan, MO)
- 8122.0 Unid-two Spanish speaking military stations, with administrative messages, mentioned Santa Margarita at 0228. Darwin Control (Royal Australian Navy) calling Mike Zulu Kilo, then working *HMAS Cessnock* at 1112. Canberra Control (Australian Navy) taking position report from *HMAS Brunei* at 1143. Canberra working *HMAS Bendigo* at 1242. Two unid tuna boats discussing catch at 1307. (Perron, MD)
- 8662.0 TAH-Istanbul Radio, Turkey, CW marker at 1920. (Yamaguchi, Japan)
- 8816.0 HLJ-Seoul Radio, S. Korea, with chirpy CW marker on new frequency at 1253. (Yamaguchi, Japan)
- 8849.0 Beijing-Beijing VOLMET, China, with flight weather observations in heavily accented English, parallel on 13285 at 0138. (Yamaguchi, Japan)
- 8971.0 Screw Top 02-US Navy E-2C, working various tracking aircraft and stations in Caribbean antidrug net. Other players often using pro sports team names for callsigns. Bears, Steelers, Marlins and Devil Rays heard. (Perron, MD)
- 8983.0 CAMSPAC-US Coast Guard, Point Reyes, CA, taking target's coded position report from aircraft E3S at 0108. CAMSLANT Chesapeake relaying traffic from Gantsec (Greater Antilles Sector, PR), to Coast Guard Air Station Borinquen, PR, probably working around circuits damaged by hurricane Georges. (Perron, MD)
- 8992.0 Gear 92-US Air Force, patch to Avalanche Ops via Andrews, will be stopping at St. Croix and Dominican Republic before return, possible Georges relief at 0255. Gopher 06-Minnesota Air National Guard, patch to "Prop Shop" through Andrews regarding wiring problems, went to 11175 at 1614. (Roger Roth, US) "Papa Alpha Foxtrot"-Portuguese Air Force, working aircraft 03 Bravo in Portuguese at 2312. (Perron, MD)
- 8996.0 Foxtrot Tango-US Navy tracking net with Alpha, Charlie, Golf, Whiskey, November, and Romeo at 2015. (Perron, MD)
- 9010.0 Canforce 1733-Canadian Forces aircraft, working Vancouver Military at 1616. (Bunyan, MO)
- 9016.0 WAR 46-US military Joint Alternate CP, telling WAR 46 Mobile that he's had no communication with Nightwatch 01 (airborne CP) at 1441. (Haverlah, TX)
- 9017.0 SPAR 06-US Air Force VIP aircraft, with patch to Andrews Metro (meteorological office) for weather at Ellington Field (Houston, TX), given KHOU (Houston Hobby), apparently close enough at 0022. (Haverlah, TX)
- 9134.0 Unid-Chinese female numbers, in LSB at 1238. (Yamaguchi, Japan)
- 10018.0 Bombay-Bombay Aeradio, India, working Pakistan 824 on regional air route channel at 1307. (Yamaguchi, Japan)
- 10066.0 Ankara-Ankara Aeradio, Turkey, working various aircraft at 1500. (Yamaguchi, Japan)
- 10162.7 DOR-MFA, Sofia, Bulgaria, with news in Bulgarian, RTTY at 1635. (Hall, RSA)
- 10204.0 Nightwatch 01-US Air Force airborne CP, with patch to Nightwatch 02 via WAR 46 for circuit check at 1859. (Haverlah, TX)
- 10253.5 WGY 908-FEMA alternate control station, CO, chatting with Navy MARS station NNNQAJK at 1544. (Bunyan, MO)
- 10352.0 VLB 2-Mossad, Israel, AM, repeated ID for over two hours, no message, parallel on 12747 at 1845. (Yamaguchi, Japan)
- 10588.0 WGY 901-FEMA, MA, testing voice and Baudot RTTY with WGY 912 (control in Berryville, VA), on "Foxtrot 27" at 1404. (Bunyan, MO)
- 10648.0 YHF-Mossad, Israel, numbers with strong AM signal, parallel on 5820 and 7918 at 1600. (Yamaguchi, Japan)
- 10780.0 Cape Radio-US Air Force, Cape Canaveral Air Force Station, working Ascension at 0112. (Bunyan, MO)
- 11175.0 Navy Lima Delta 287-US Navy aircraft with patch via Andrews to Golden Hawk. DSN prefixes sound like Brunswick NAS, ME. (Perron, MD) Bone 21 calling MacDill. (Roth, US) MacDill Global is gone, but many still make this boner. Hugh
- 11181.0 Pacom 01-US Air Force, patch to Hickam CP via Elmendorf GHFS at 0150. (Bunyan, MO)
- 11271.0 Air Force Darwin-Royal Australian Air Force, working Rescue 251 and 252, aircraft over yacht *Atlanta* as it rescued Steve Fossett when his balloon crashed off Queensland in unsuccessful circumnavigation. 251, an Orion, fired illumination flares at 1101. Royal New Zealand Navy warship *Endeavour* arrived at 1200, set up rendezvous for 1600, but lost contact with *Atlanta*. Tried this frequency (the "Golf" channel) and 5680 until 2030, raising *Atlanta* but reporting transmitter problems to Darwin at 2104. (Noel Jones, NZ)
- 11445.0 SAM 90300-US Air Force VIP aircraft, patch via Andrews on "F490," at 1829. (Bunyan, MO)
- 11494.0 WAR 46-US Joint Alternate CP, MD, in net with Nightwatch, Reindeer, Excellent, and Waldorf. Mentioned that "Strawberry Peak" was looking for Excellent at 1951. (Roth, US)
- 12070.0 Nightwatch 01-US Air Force airborne CP, calling Red Wagon, no joy at 2128. (Haverlah, TX)
- 12075.0 8BY-French Intelligence, St. Assise, France, CW callup with 3-number groups, parallel on 7668, 10248, and 14931 at 1940. (Yamaguchi, Japan)
- 12216.0 WGY 906-FEMA alternate control strn., TX, testing with WGY 912 on "Foxtrot 34," at 1606. (Bunyan, MO)
- 12790.0 TAH-Istanbul Radio, Turkey, CW channel marker at 0117. (Castillo, Panama)
- 13200.0 Teal 42-US Air Force Reserve WC130 "Hurricane Hunter," with patch to The Weather Channel via Andrews regarding flight through eye of Mitch at 2052. (Haverlah, TX)
- 13204.0 Teal 42-US Air Force Reserve hurricane hunter, patch on discrete frequency via Ascension for a "Nightline" TV interview during Bonnie at 0230. (Bunyan, MO)
- 13218.0 Trout 99-US Air Force calling Abnormal 20, no joy at 0112. Aria 1 calling Abnormal 20 at 1807, also no joy at 1807. (Bunyan, MO)
- 13866.0 Unid-Numbers station with 5-number groups in English female voice, on Tuesday at 1339. (Bunyan, MO) *This one is the British Cherry Ripe, from Guam, beamed at Asia. Hugh*
- 14000.0 "Frank Young Peter"-Phonetic "numbers" station of "Nancy Adam Susan" family, repeating ID at 1400. (Yamaguchi, Japan) *The German ham intruder watch says this one comes from Egypt, near Cairo, and a complaint has been requested. Coded messages are sometimes heard. Hugh*
- 14396.5 AFA3HY-US Air Force MARS/ SHARES Coordination Station, Central, in regular weekly net with AAA0HY, AAA0USA, WGY914, KGD34, WUG3, AAR1DD, KNR33, and NNNOVUV, starting at 1650. (Woodside, RI)
- 14787.0 Unid-Numbers station with 5-number groups in English male voice, AM, on Friday at 1651. (BunyanMO) *Form suggests a Russian intelligence transmission, though the time and freq are new. Hugh*
- 14815.5 Interpol, possibly Japan, weak ARQ at 0653. (Hall, RSA)
- 15031.0 German Air Force 429-Aircraft working Trenton Military (Canadian Forces) at 1820. (Bunyan, MO)
- 15733.0 Teal 42-US Air Force Reserve hurricane hunter, using discrete frequency for phone patch interview with WFTV (Orlando, FL) via Andrews, during Bonnie at 0141. (Bunyan, MO)
- 16995.0 VRX81-Victoria Harbour Radio, Hong Kong, with maritime CW channel marker at 1100. (Castillo, Panama)
- 17050.0 4XZ-Haifa Radio, Israel, CW marker at 1143. (Yamaguchi, Japan)
- 17053.0 XSX-Keelung Radio, Taiwan, CW marker at 0848. (Yamaguchi, Japan)
- 17091.0 XSQ-Gangzhou Radio, China, CW marker at 0851. (Yamaguchi, Japan)
- 17175.2 A9M-Bahrain Radio, Saudi Arabia, CW marker at 0858. (Yamaguchi, Japan)
- 18594.0 Unknown-New scrambling scheme heard on this US Customs frequency, not ANDVT but sounding more "like dolphins talking underwater," at 2235. Again the next day, on 10242 at 2235. (Perron, MD)
- 19715.0 EZI-Mossad, Israel, with numbers, parallel on 15980 and 17410 at 1100. (Yamaguchi, Japan)
- 20496.0 8BY-French Intelligence, St. Assise, France, CW callup with 3-number groups, parallel on 14931 and 18415 at 1345. (Yamaguchi, Japan)



Who's on Where?

Welcome to a new chapter for the Digital Digest column. With the retirement of Bob Evans from "Digital Digest" two new authors fill in to provide information on those elusive digital signals. Your new editors are Stan Scalsky and Mike Chace. Some of you may recognize those names from the Internet's World Utility News "WUN" shortwave listeners club, where we have been active from its creation, and the Digital Signals FAQ, which we write and maintain.

In the last issue the column covered "Who Uses Digital Modes?" For the purposes of identification, a more complete question might be "Who Uses *What* Digital Modes?" Let's take a look at some reasons why this is relevant.

When it comes to digital signals you may as well assume that when you first encounter a new signal you will not be able to decode it. How to discover information about the signal that will let you identify the mode, the user and maybe the transmitter location are topics we intend to cover in future columns. We also plan to cover some of the hardware and software tools and tips and techniques that are available to listeners to help in this work.

■ What about the other 30 percent?

In the October '98 issue, Larry Van Horn covered many of the signals commonly heard all over the HF bands. These signals will cover about 70% of most logs. Now what about the other 30%? Who uses all those other "odd" modes? The short answer is that police, military, diplomatic, government, non-government and intelligence organizations are the source of the bulk of this portion of utility signals.

Table 1 is a short list of some of the major players around the world and some of the more esoteric modes that they use.

With a little practice, patience and some modest equipment, these enigmatic signals are in many cases easy to identify and



Who uses the more obscure modes to be heard on shortwave? Often it's diplomatic or governmental business. Pictured are the antennas on top of the Russian embassy in Washington, D.C. (above), and antennas at a BFST site in Husum, Germany (right).

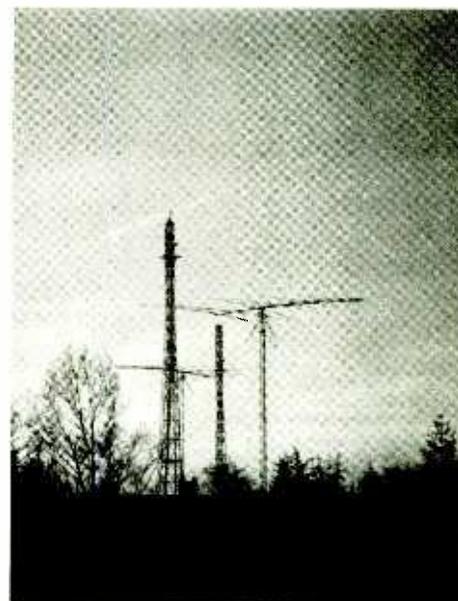


Photo Credit: Nils Schiffhauer

decode to an extent that at least allows the source to be established. For many utility listeners, being able to recognize those odd new sounds, analyze and decode them, opens up a fascinating new world that once went unnoticed.

■ Don't get too comfortable!

Just as the more traditional and simpler signals like CW, Baudot and SITOR/ARQ are on the decline, new and unknown signals appear regularly. You can rest assured that we'll try to bring you these up-to-the-minute developments, tell you where to find them, and provide the "inside scoop" on where they are coming from whenever we can. We'll also let you know when the equipment manufacturers update their offerings to cover these developments.

If you'd like to know more about these kinds of signals, consult a copy of The Digital Signals FAQ, which can be found by pointing your browser at <http://www.gem.net/~berri/wun>. The FAQ is where we document our research, and best of all, it's free and dares to go where some other guides don't!

Table 1

Major User	Digital Modes
Algeria	Coquelet-8, Coquelet-8 FEC
Belgium	Coquelet-13
Bosnia	Clover
Bulgaria	IRA-ARQ
Cuba	81-81
Denmark	TWINPLEX
France	ARQ-E, ARQ-E3, ARQ-M2, ARQ6-90, FEC-A
Germany	RS-ARQ, ARQ-E, FEC-A, VFT
Hungary	DUP-ARQ, HNG-FEC
Indonesia	FEC-S
Ireland	ARQ, Clover, G-TOR
Italy	RS-ARQ, ARQ-E, PSK, POL-ARQ
Netherlands	TWINPLEX
Nigeria	FEC-A
Norway	TWINPLEX, DUP-ARQ-2/ARTRAC II
Pakistan	TWINPLEX
Poland	POL-ARQ
Russia	CIS-11/14/27, CROWD-36, PSK, TORG, BEE, 81-81/81-29
Saudi Arabia	ARS-Guard
Serbia	FEC-A, VFT
Spain	TWINPLEX
Sudan	Packet Radio
Sweden	SWE-ARQ
Switzerland	ARQ, PacTOR, SUI-FEC
Turkey	FEC-A, RS-ARQ-2
UK	Piccolo-6, Piccolo-12, VFT
United States	VFT/BR6028, PSK

Glenn Hauser, P.O. Box 1684-MT, Enid, OK 73702
 E-mail: <ghauser@hotmail.com>; fax: (580) 233-2948, ATT: Hauser

Update On HCJB Pifo Site Problem

Concern about the present airport began when a military plane crashed in Quito near the HCJB studios in 1974. Land began to be purchased for a new airport at Yaruquí, near Pifo. HCJB found that the axis of the main runway pointed exactly (as confirmed by GPS) at HCJB's tallest antenna tower, so HCJB told the authorities this could be a physical problem, not just an electronic interference problem. On May 8, 1997, the Director of Civil Aviation told HCJB to begin studies on relocating its antennas, but there was no deadline or definite order to move.

Now there is a new airport commission under the vice-presidency, but not much has happened. Things heated up with the Cuban crash a few months ago, but nothing of substance has been done. A contract to build the new airport has not been announced, but several bids have been made.

HCJB has looked seriously at two new pieces of land. They would like to keep direct access to HCJB's Papallacta hydro plant now powering Pifo, but this does not seem possible at alternate sites, due to residential development. On the other hand, relying on the national grid would mean losing power whenever it does.

HCJB has been using the big-gun approach, with more distant targets than most other international broadcasters, but this will have



Photo Credit: Ed Soomre

to change. HCJB has already been reorganized into regional subdivisions, so different target areas are yielded to people in the regions, rather than directing the broadcasts from Quito. For example, HCJB will no longer broadcast direct to Europe, but will use relays as have already started via UKoGBaNI to Russia/CIS. Programming would still be produced in Quito, depending on staffing;

in the case of Russian, staff is now in Russia rather than Quito. But German is still in Quito, as this language also serves South America (Glen Volkhardt, HCJB Broadcasting Director, on HCJB *DX Partyline* Oct 18 via gh)

A member of the German service of HCJB told me they will stay in Ecuador even after they have to move the antenna and transmitter site currently at Pifo. But it is very likely that they will split their operations in the future: a site for reaching Europe will stay up in the mountains, not far away from their hydro-electric plant. A second site will be built in the coast region of Ecuador for putting a better signal into the Americas. Another option is to build a SW station somewhere in Africa, together with the Society for International Ministries (SIM). Kenya was a possible location for this at one stage, but nothing has been decided. (Harald Kuhl, Germany, *NU* via *Radio Nuevo Mundo*)

ABKHAZIA R. Abkhazia, Sukhumi, 9489.75, *0329 Oct 18. Tuned around in the vicinity looking for a weak signal, then parked here for a moment; and got completely blown away by huge S9 carrier, interval signal thrice, and sign on by woman including *Govorit Sukhum* ID. Used electronic pop music theme *Children* by Robert Miles, then into presumed news by man. I have a RealAudio G2 sample of the Abkhazia reception at [ftp://itre.ncsu.edu/pub/radio/samples/abkhazia.rm](http://itre.ncsu.edu/pub/radio/samples/abkhazia.rm) — it's quite sensational (Jay Novello, NC)

AFGHANISTAN V. of Shariah back on 60m, 4772-4774v drifting upward instead of nominal 4775 to 1735* including English 1700-1715 but poor readability (Vladimir G. Titarev, Ukraine, *DSWCI DX Window*)

ALBANIA R. Tirana announced new schedule in English: 2015-2030 Eu 7180, 9650; 2230-2300 Eu 7160; 0245-0300 NAM 6115; 0330-0400 NAM 6115, 7160 (Ivan Grishin, Ont., *Review of International Broadcasting*)

AUSTRALIA There appears to be no chance of Darwin reopening, due to "government policy," but RA will be relayed from Taiwan to mainland China (John Westland, RA director of English programming via ARDXC) Mediumwave?

AZERBAIJAN V. of Azerbaijan, thanks to Chuck Rippel tip of a few weeks ago, noted at sign-on Oct. 27 at 0315 on 9165. Interval signal on organ (or harmonium?), repeated 3 times. Sign-on announcement by man mentioned "Baki" and "Azerbaijan," and was followed by a lengthy choral anthem. Into presumed newscast 0325 with man and woman alternating. Good signal strength and decent audio levels, though music distorted at times. Choppy, fluttery propagation. Excellent chance for North Americans to hear a rather rare country (Randy Stewart, MO, *Review of International Broadcasting*) Strong carrier on as early as 0300, off at 0400*, strong but distorted (George Maroti, NY, *Cumbre DX*)

BELARUS [non] R. Baltic Waves, 6235, tested from Lithuania in Nov at 0800-2200; estab-

lished to bring uncensored news to Belarus (Rimantas Pleikys, Lithuania, *hard-core-dx*) Was 2.5 kW, to be 5 kW perhaps from February or March, 48 meter band daytime, 75m night, and plans for 20 kW (Pleikys, via Martin Elbe, *DSWCI DX Window*)

BELGIUM Both as R. Vlaanderen Int'l (RVI) address and name of mailbag program, P O Box 26 is replaced by Brussels 1043 (gh) Strange and too bad that the new 2230 relay via Bonaire on 13670 does not start with a newscast (Joe Hanlon, PA) No one works that late at the station (Frans Vossen, RVI *Radio World*) Tsk, tsk, why not? Or at least play back the last newscast from earlier! (gh)

Radio-Television Belge de la Communauté Française (RTBF) plans to resume SW, from January to CAf, Mediterranean in French (Wian Stienstra, *DSWCI DX Window*) They regret having sold their transmitters at a very good price to RVI, and don't like RVI, the Flemish doing the only French SW from Belgium. My guess is they'll use Jülich, Germany (Frans Vossen, RVI *Radio World*)

BOLIVIA SIM says it will soon go on the air with R. Mosoj Chaski from Cochabamba, to serve the entire nation in Quechua; licensing of 10 kW transmitter had been delayed (Colin Miller, Ont., *BC-DX*) Now licensed for 3310 kHz at 0900-1300 and 2100-0100 UTC (Paul Bentley and Eldon Porter, RMC, via Hans Johnson (*Cumbre DX*))

BURMA [non] Democratic V. of Burma registrations for B-98. 1245-1345 UTC: 7490 and 13820 kHz via Tajikistan; 15330 via Germany; 5945 via Khabarovsk, Russia; 5910 unknown. 1430-1455 UTC: 11850 Norway, 13820 and 7490 Tajikistan, 15635 Germany, 5945 Khabarovsk (via Wolfgang Büschel, Germany)

CANADA [non?] François Michaud has been looking into the Radio Asia Canada situation for several months. Both he and I wrote letters to various government departments inquiring whether or not they were aware of the Radio Asia Canada station, and their use of the name "Radio

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 or B-98=Winter season; [non] = Broadcast to or for the listed country, but not necessarily originating there.

Voice of Canada" and their possible link to the Tigers. Cordial replies didn't say much. But it was not long after that the station seemed to disappear, their phone lines disconnected and their website shut down. Any connection?

François called me to take a look at <http://www.tamilnation.org> This takes you to links and websites, one category dealing with radio. One leads you to: <http://www.ctbc.com> This is a group called Canadian Tamil Broadcasting Corporation. They seem to be located in Toronto, with telephone and fax numbers, plus e-mail. There is a listener comment section also, with comments from Norway, Thailand, Malaysia, Australia, etc. plus many others. This service appears to operate a 24 hour a day broadcast on the Internet. Are they connected in any way with the Radio Asia Canada people? We don't know (Sheldon Harvey, Quebec, Oct 23)

CENTRAL AFRICAN REPUBLIC R. Minurca, the temporary UN station from Bangui, finally began on Nov 9 on 9900 kHz. Heard from tune-in at 1730 UTC. Weak signal but improving after 2000 to a fair signal. I spoke to someone who has been in touch with Radio Minurca in Bangui, and they said that the signal was propagating very well to the various regions. They were flying by helicopter to different places of the Central African Rep. and asking people whether they could hear the station — and they all said YES. (Stig Hartvig Nielsen, *hard-core-dx*) Looked for it, but no trace of a signal on 9900 here (gh, OK)

COLOMBIA Clandestine on 6239.80, LV de la Resistencia, 1059 UTC Nov 9, strong and clear with vocal anthem mentioning "compañeros," straight into musical selections. Voiceover during anthem said "Transmite La Voz de la Resistencia." These guys play some nice cumbias — shame about the telco-quality audio. 1051 Nov 10, came on with a Spanish-language version of "Seasons in the Sun" (of all things), then one other LAm popular song, then "Compañeros de la FARC" anthem. Male announcer with s/on sequence just before 1100, giving schedule as 6:00 to 7:30 in the morning and 4:30 to 6:00 in the evening on 6240. Then back into music. (Jay Novello, NC) (.ra clip at <http://itre.ncsu.edu/radio/samples/LVResistencia.rm>)

COSTA RICA 2840, (harmonic, 2 x 1420), TIRP Radio Pampa, Nicoya, 0000-0031 Prayers, ID as "Mantenga la sintonía de 1420 kHz, Radio Pampa, primer lugar." Then into program "Escuela Para Todos." SINPO 35322 (Elmer Escoto, Honduras, *The Four Winds*)

CUBA The communist authorities in the island suspended the constant jamming of Radio Martí during Hurricane Georges' trek throughout the region. Approximately 24 hours after the hurricane went to the easternmost region, the interference was renewed during the regular broadcast of Radio Martí. While the hurricane was bearing down in this area, the station constantly broadcast news of the hurricane: its position, strength, and the damage which it caused along its path. It's the preferred radio station of Cubans and, of course, the most hated by the Cuban regime (Yero via Armando F. Mastrapa via Ullis Fleming, *Cumbre DX*)

R. Martí has become a "mecca of shoddy reporting" since Herminio San Román took over in March 1997, quickly replaced personnel and transformed it into an approximation of Miami's Cuban-exile AM stations, which emit a profusion of anti-Castro commentary and rhetoric tempered with little objective journalism, according to an FIU study (Kathy Glasgow, Miami *New Times* via *Clandestine Radio Watch*)

Arnie Coro on *DXers Unlimited* Nov 10 invited people to send in broadcast harmonic loggings to be posted on his website. It will be interesting to see if any about RHC itself appear! (gh)

CZECH REPUBLIC R. Prague in English at 1400-1430 is excellent on 21745, including *Saturday Concert* (Ivan Grishin, Ont., *Review of International Broadcasting*)

[non] Sorry, everyone, but the new WRMI relay over R. Prague is a farce, as expected. UT Mon Oct 26 at 0401, WRMI 9955 had fair strength, but the Cuban jammers were at least equal, often overpowering. One might understand 67% of R. Prague if one wanted to put up with the noise, but why should we? Here's our advice: try a new frequency — one never used before, and don't carry any Cuban exile programming, or to be safer, nothing in Spanish at all (gh)

ECUADOR *DX Partyline* has a new contributor, Dr. Rich Olson, N6NR, who will answer technical questions. HCJB has had problems with the RealAudio site, but plans to add new segments, such as Don Moore's talk on DXing harmonics (*DXPL* via gh)

ERITREA On 7175, V. of the Broad Masses of Eritrea, *0325 lively guitar melody interspersed with short, muffled echo announcements, man and woman alternating. Finally at 0329, clear Arabic ID *Huna Asmara, idha'at saut al-jamahir al-iritriyya*, and continued with talk in Arabic. Very strong; no doubt running full listed 100 kW. Nothing audible on any other known VOBME frequencies, though (Bob Hill, MA, *NU* via *BDXC Communication*)

New 7100, V. of the Broad Masses of Eritrea, Nov 4, 1815-1830*, new freq. instead of 7085, mostly talk in vernacular, //6190 - fair (I could not find a //freq to 7175, very like new one in use now instead of 7395 and also in the 41 meter

band (Mikhail Timofeyev, Russia, *DSWCI DX Window*)

ETHIOPIA [non] R. Rainbow in Amharic, B-98 via DeutscheTeleKom (DTK) Germany: Sun 1000-1100 5910 Eu; Thu 1600-1700 11840 Eaf; Sat 0100-0200 6155 NAm (*PanView*, Bulgaria)

FINLAND Finland's YLE is asking its listeners to send in recollections of YLE external broadcasting over the years. The first YLE shortwave transmission was on June 2, 1938, so like Radio Sweden, Radio Finland celebrated its 60th anniversary in 1998. The best entries will be awarded shortwave radios. The closing date is February 15, and entries can be in Finnish, Swedish, English, German, French, or Russian: YLE Radio Finland, Contest, Pb 78, 00024 Helsinki, Finland (Juhani Niinistö, YLE Radio Finland, via *SCDX/MediaScan*)

FRANCE I am glad to inform you that, from October 25th 1998, France will significantly contribute to the reduction of the HF spectrum's congestion. Thanks to the "emergence of new technologies" and maybe to the limited confidence of the french programme society in analog HF broadcasting (+ resulting budget constraints), we have been urged to drastically reduce the number of transmitting-hours.

On a rough basis, in Winter 98, the number of transmitting-hrs will be 30% lower than in Summer 98, Issoudin, France, and French Guiana included. French-speaking programmes are mainly concerned. Listeners complaining that they are no more able to tune in their programmes as usual are or will be invited to tune in local FM relay stations (quite obvious), Internet, satellites (Astra, Intelsat, Panamsat, Echostar, Palapa, Asiasat) ... while waiting for a wide spreading of low-price WorldSpace receivers. They might also tune in other stations...

Further progress could be decided in the coming weeks or from 1-01-1999, but they are not known (by me at least) for the time being. Air-time to let might be a large part of our next schedule. (Daniel Bochent, TDF, via Larry Magne)

Fortunately, still relaying English at 1200 to us via French Guiana, on 15530 ex-13625 (George Thurman, Mike Cooper, gh)

Hahahaha! Calling service cutbacks "spectrum conservation" is like a computer company terminating telephone product support and calling it "customer self-determination enhancement." (Al Quaglieri, NY)

HONDURAS Following November's flood disaster, the SW stations still heard were La Voz Evangélica, Tegucigalpa, on 4819.1, and R. Internacional, San Pedro Sula, on 4930.6, both active around 1200 with messages, and more or less normal programming (gh)

ICELAND RUV heard at 1215-1300 on 13865, 15775; 1410-1453 on 11402, 13860. All but 11402 were actually 40 Hz high (Wolfgang Büschel, Germany)

INDIA AIR Urdu service on 11930, great music all evening 0100-0430, consistently good with wide filters, and could easily be the vehicle for a NAm service (Tom Sundstrom, NJ)

IRAN [non] Farsi service of RFE/RL began same date as R. Free Iraq, Oct 30: 1600-1700 UTC 6040 Biblis, 9680 Kavala, 11730 Lampertheim, 12025 Woofferton; 0430-0530 UTC 6025 and 9585 Lampertheim, 6150 and 9850 Kavala (Kai Ludwig, Germany) Iran then recalled its ambassador to Prague, and declared economic sanctions against the Czech Republic (Karel Honzik, *hard-core-dx*)

IRAQ R. Baghdad in Arabic on new 4920, 2025-2100+ (Tony Rogers, British DX Club) Also 2325-0010+ (Jay Novello, NC)

[non] R. Free Iraq, the US-sponsored surrogate service, began Oct 30, in Arabic: 1600-1700 UTC 6130 Kavala, 9540 and 11915 Woofferton, 9850 Lampertheim; 0300-0400 UTC 5965, 7110 and 7275 Kavala, 9740 Lampertheim (*Clandestine Radio Watch*) No jamming heard at the outset; 7110 was best (Hans Johnson, FL, *Cumbre DX*) Frequency choices must have been rushed, as many have co- or adjacent-channel interference (Wolfgang Büschel, Germany)

KAZAKHSTAN [non] Kazakh Radio via Kiyev, nice at 1205 with strumming and solo male vocals //11720. And Kazakh Radio 2 on 9505 //11720 at 1240-1300 with same (Jay Novello, NC)

DX Listening Digest

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KUWAIT R. Kuwait's new morning English is at 0500-0800 on 15110 (Erik Kjøe, Denmark, *BC-DX*) 500 kW, 100° beam (*PanView*, Bulgaria)

LATVIA RLI, 5935, weekday-only 5-minute English newscast audible at 2130-2135*, but poor with QRM from 5940, so best on LSB (Harold T. Sellers, Ont.)

LIBERIA Star Radio was ordered by the government to cease posting news on internet and close down shortwave, but could continue on FM, per the Committee to Protect Journalists (Hans Johnson, *Cumbre DX*) Later allowed back on internet

R. Veritas, 5470, 0640 with tapping sounds, 0644 opening, 0645 English news, poor (Harold Sellers, Ont. *DXpedition*)

LIBYA V. of Africa is the new name for V. of the Greater Arab Homeland; 15435 with Arabic news at 1715. Change was due to the break of the UN flight sanction over Libya by some African presidents, not the case by Arab countries (Tarek Mostafa Zeidan, Egypt, *Cumbre DX*)

Tripoli heard in English on Oct 18 from 2040 on 15415 and 15235. Announcer promoted telephone numbers in Tripoli for callers - then ID'd as the "Voice of Africa" before going into news, with lead item about relations between Libya and Uganda. Signals OK but bad modulation. Went into French around 2048. Libya's leader Gaddafi has apparently switched his ambitions from leadership of the Arab world to Africa - clearly, these broadcasts and the station name reflect these aspirations. (Matt Francis, Canberra, *hard-core-dx*) Also at 1630 on 15235, 15415, 15435 (Mikhail Timofeyev, Russia) 2038 also on spur 15455 (Paul Ormandy, New Zealand) English at 1138-1144 on 15235 (Fyodor Brazhnikov, Russia, *DSWCI DX Window*)

MEXICO XEOI, R. Mil, 6010, suffers from economical problems which may cause a temporary closure of its SW (Julian Santiago, *DSWCI DX Window*)

MOLDOVA [non] RMI surely wants to do something about terrible audio on their broadcasts, but they don't have power to do so. Romania refuses to use a better transmitter (Michiel Schaay, Netherlands, *DSWCI DX Window*)

NETHERLANDS RN Media Network Newsletter is now available by e-mail. For more details see: http://www.rnw.nl/en/prog_medianw.htm (Curt Swinehart, SCDX/MediaScan)

PERU Tuned in 5678 when reception was quite good: 1042 horoscope, 1045 ad for Prostatal, a capsule for all that ails you, especially the obvious; bits of Andean music and time checks 1-2 minutes fast, ads mentioning Cutervo, 1059 yelling promo with several mentions of "Radio Ilucán de Cutervo"; fading a bit after 1100. So this is the latest easy-to-remember frequency for one of the best-heard Peruvians (gh) a regular on 5678.0 in the mornings and especially the evenings. It's one of my "beacon" Peruvians, in fact — if it's not there, then that's a good suggestion that propagation is below average from the south (Jay Novello, NC)

5760.2. R. Sorocucho, 1015-1050, new station from Sorocucho, Provincia de Celendin, Dpto de Cajamarca. Announced nominal frequency 5305 (Rafael Rodríguez R., Bogotá, Colombia)

6674.8 R. Impacto, 1120-1200, reactivated with new name Radio Impacto, ex- Radio Ondas del Rio Marañon. QTH is in Aramango, Pvcia de Bagua, Dpto de Amazonas, Peru. Announced 6675 (Rodríguez R., Colombia)

5981.4, Radio Chaski is still here and still signing on at 1100 with their distinct interval signal. It is a bit easier to hear them now that Union Radio from Guatemala is off (Hans Johnson, FL, Oct 24, *Cumbre DX*)

PHILIPPINES 17310, DZMM Metro Manila, 2309 UTC being relayed by utility station between traffic, interesting ads in English and Tagalog, including "Eveready Batteries" and "Johnson's Baby Powder." (Paul Ormandy, New Zealand)

ROMANIA RRI reception in our evenings may be the pits, but relatively good at 1300-1355, in decreasing quality order: 17805, 15335, 17745, 15390 kHz (gh, OK)

ST. HELENA The 1998 R. Saint Helena Day may have been the last one, as financing may not be available for further broadcasts on SW and the old C&W transmitter's status cannot be guaranteed (via John Ekwall, Sweden)

SERBIA R. Yugoslavia B-98 English to us: 0100-0130 UTC except Sun on 7115 kHz, 0200-0230 on 7130; also 2200-2230 on 6100, 6185 (Ivan Grishin, Ont.) New time for the Pacific, 1330-1400 on 11835, must be for insomniacs — 2:30 am in NZ, 12:30 am in eastern Australia (Paul Ormandy, NZ)

SPAIN Radio Exterior de España (REE) has a new English broadcast to Africa, M-F 1700-1900 on 15375; Sat/Sun 1800-1900 on 15170 (*BDXC-UK Communication*)

SWEDEN Contrary to previous version of their sked, R. Sweden English to NAm at 1230 is actually on 17870, 21810, same as at 1430. 17870 is co-channel to something in French (gh)

SWITZERLAND The closed-down Lenk station's horizontal square dipole was to be dismantled within a matter of days. The fate of the underground transmitters is unclear at this point, but it is suspected they will go the way of the old Sarnen transmitter: to the junk yard. It was a good station, and we "old timers" are sorry to see it go. I heard it everywhere from India to Arizona. Really good engineering.

It is the sad end of another era (Bob Zanotti, Switzerland, *Review of International Broadcasting*)

SYRIA R. Damascus, including English 2005-2205 on 13605 co-channel Abu Dhabi, ex-13610 (*PanView*, Bulgaria)

TIBET [non] V. of Tibet, via Tajikistan, 1220-1255 on new 7465 (Jay Novello, NC) A few days earlier on 7470 //11520 (*PanView*, Bulgaria)

UKoGBANI BBCWS journalists went on a 3-hour strike in October over pay (Paul Balster, England; British Press Association via Dave Alpert)

[non] Deutsche Welle has used 6185 before, but this season it's BBC via Delano in the 0200-0500 period, badly mixing with R. Educación, México, on its only fixed frequency. The Big Boys pretend the low-power Mexicans and Canadians don't exist, to everyone's detriment! (gh)

A website survey on "what do you think of the new Merlin One on shortwave?" gave these results: Great - 8%; It's OK - 2%; Lousy - 31%; Who cares - 60%. A total of 311 participated, and it was possible to vote more than once, but who would? (Hermod Pedersen, Nordic SW Center)

UNITED NATIONS [non] Start of UN Radio broadcasts via Germany was delayed awaiting approval of the General Assembly. The new UN-Radio service will work in cooperation with VoA, BBC and DW. These stations will provide slots on short- and mediumwave for nothing or reduced rents, our reporter says. Furthermore, the Jülich outlets will seemingly not remain the only ones (Kai Ludwig, Germany) BBC says it would be contrary to their policy to carry such broadcasts, and VOA says it knows nothing about such an arrangement (*VOA Communications World*)

UN Radio scheduled already via Vatican Radio, languages not given: Asia Thu 1550-1605 on 11640, 9875; 0140-0155 on 7335; Tue-Fri 1730-1735 on 11625, 13765; Af 2000-2005 on 15570, 0310-0315 on 7365, 9660; 0500-0505 on 11625; 0630-0635 on 7365 (Karl Kruger, England, *EDXP*)

USA *World of Radio* should be on WGTG UT Sun 0030 on 6890-USB if not 5085; and Sun 1800 on 9400-USB; on WWCR Thu 2130 9475, Sat 1300 and 2330 5070, Sun 0730 and 1030 5070, Mon 0600 3210, Tue 1330 15685 (gh)

WBCQ replaced Pastor Pete Peters with Jeff Baker. If possible, Baker was much more hateful than Peters, the whole hour filled with ranting hatred which makes Peters sound like an altar boy and scholar (Tim Hendel, AL) Big Steve Cole is back on SW, with *A Different Kind of Oldies Show* Sat 2300-2400 on 7415; advance playlists are available. One show featured novelties and parodies, the next great American composers (gh)

VOA had been using 7415 from Botswana long before WBCQ existed, and we assumed usage of the frequency would have been coordinate—but it wasn't, and both clashed in the 0300-0500 period. WBCQ asked for interference reports from outside the USA, since it doesn't matter if they clash for US listeners (gh)

RadioMemphis [*sic*] has begun broadcasting four hours a week of music via World Radio Network, Saturdays and Sundays following NPR *Weekend Edition*; plans to add internet, shortwave and FM (Tom Walter, Memphis *Commercial Appeal* via Mike Cooper)

URUGUAY SW stations active as of Oct: 6125 SODRE, 6140 R. Montecarlo, 9595 R. Montecarlo, 9650 Emisora Ciudad de Montevideo, 11735 R. Oriental. Inactive: 6045, 6075, 9620, 11835, 15275. Possibly returning: 6035, 6055, 6075, 6155, 9620, 15230 (Horacio Nigro, Uruguay, *DSWCI DX Window*)

VATICAN [non] Radio Vaticana uses now a CIS transmitter 1450-1610 on 11695 for Hindi, Tamil, Malayalam and English. (Klaus Lieberwirth via Ludwig) I checked it today and indeed found at 1440 on 11695 the unmistakable marker tones, at 1447 switched into Radio Vaticana interval signal, followed by programming from 1450. (Kai Ludwig, Germany, Oct 18) That is from Alma Ata, Kazakhstan // Vatican 13765, 15500. Plans to use Tashkent, Uzbekistan, instead during the summer (Victor Goonetilleke, Sri Lanka, RN *Media Network*)

VIETNAM Best time to hear V. of Vietnam in English now is 1230-1300 direct on 9840, 12020, since the 0100 and 0230 broadcasts via Russia in winter are on 5940, masked by WWCR-5935 (Ivan Grishin, Ont., *Review of International Broadcasting*)

9875 is the new all-day freq for VoV Home Service Program 1 (x-10060). (Alan Davies, Alor Setar, Malaysia, *BC-DX*)

Another longtime out-of-band freq is no longer. VoV has left 10060 in favor of 9875. Schedule 2300-1600, except for the 1400-1500 time slot when moves to 9930 in order to interfere with Radio Free Asia's Vietnamese programming. The 2330-0030 program of RFA might also be interfered with, but I don't have possibilities to monitor at that time. Curiously, at sign-on 2300, RFA Tibetan collides with VoV on 9875, making the signal all but unusable. In short, the tentative schedule now reads 2300-1400 on 9875, 1400-1500 on 9930, 1500-1600 on 9875. (Hans van den Boogert, Taiwan, *BC-DX*)

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

Gayle Van Horn

0046 UTC on 7160

ALBANIA: Radio Tirana Intl. National news to item on World Bank representative being in Albania seeking reforms. Monitored past 0130. (Howard Moser, Lincolnshire, IL)

0045 UTC on 5522

PERU: Radio Sudamerica. Spanish. Listener's call in program to local time checks and IDs, poor signal. (Elmer Escoto Romero, San Pedro Sula, Honduras/Four Winds)

0101 UTC on 9925

CROATIA: Croatian Radio. News of bill on national pension funds, and U.S. Ambassador Montgomery visits. (Moser, IL) Croatian news on 5900 at 1800. (Zacharias Liangas, Thessoliniki, Greece/Hard Core DX)

0105 UTC on 21740

AUSTRALIA: Aussie Labour Party emphasises improved training to cure unemployment. Report on Parliament and forthcoming elections. Commonwealth Games coverage on 17715 at 0358. (Moser, IL) Report on the national banking system at 1150 on 9580. (Bob Fraser, Cohasset, MA; Eric M. Walton, Vancouver BC, Canada)

0110 UTC on 6725.5

PERU: Radio Satélite. Spanish. Sports report to commercial segments, to 0120+. (Lee Silvi, Mentor, OH) Peru's **Radio Huancabamba** on 6535.8 at 0135-0147, **Radio Altura** on 6479.7 at 0124-0135 with Andean vocals, talk and text. (Harold Frodge, Midland, MI)

0113 UTC on 7250

VIETNAM: Voice of. Report on amnesty for prison terms of gamblers and racketeers, Asian overview on consequences from overtimbering and expectations of economic growth. (Moser, IL; Walton, CAN) Russian relay noted on 5940 at 0230. (James Boynton, Newton, MA)

0130 UTC on 7448

GREECE: Voice of. News of Greek ship inspections by the British and new tunnel being built in western Greece. (Moser, IL; Walton, CAN.)

0133 UTC on 4773

AFGHANISTAN: Voice of Shariah. Very weak with recital of Koran and subsequent talks of Kabul and Afghanistan. Loss of signal at 0157. (possibly a sign-off) Check of 7197 noted poor quality, for a few minutes then faded out as VOA dominant. (Mahendra Vaghee, Rose Hill, Mauritius/Cumbre DX)

0140 UTC on 9665

RUSSIA: Voice of. Feature on wildlife preserves short of financial support, as well as student grants and credits for advanced studies. (Moser, IL) *Outlook* program featuring local folk singer, fair signal. (Fraser, MA; Walton, CAN) 0300 on 5940. (Boynton, MA)

0230 UTC on 9165

AZERBAIJAN: Radio Dada Gorgud. Strong signal for male/female newscast to station ID, followed by discussion about Azerbaijan. Station abruptly left the air without sign-off. (Vaghjee, MAU/Cumbre DX) Station's open carrier at 0300 to 0314 interval signal. Station's ID sign-on into choral anthem. News items to musical bridges. Middle Eastern music as transmitter abruptly off the air at 0400. Strong signal but distorted. (George Maroti, NY/Cumbre DX)

0248 UTC on 8098

ARGENTINA: Radio Rivadavia. Spanish. American oldies tunes in Spanish. Station ID spots with Peter Gunn music. (Frodge, MI)

0300 UTC on 6085

GERMANY: Bayerischer Rundfunk. German. Station audible under **Deutsche Welle's** North American service to 0400. Moderately strong on subsequent night 0200-0255. DJ's old German pop tunes to commercials and tuba style interval signal, alternating announcement "Bayern Ein." Clear and strong signal quality with slight polar flutter. (John Mac Donald, Poulsbo, WA/HCDX)

0300 UTC on 7375

BULGARIA: Radio. News into Bulgarian folk music. Mailbag show, *Answering Your Letters*, noted on // 9485. (Boynton, MA)

0301 UTC on 9475

EGYPT: Radio Cairo. Interview with popular music group, interspersed with music segments. (Moser, IL) General program # 1 with news on Kurdistan and Arab songs at 1915 on 4900. Signal continues also after 2100, with minimal interference from **China's Haixia # 2** on same frequency. (Liangas, GRC/HCDX; Walton, CAN)

0706 UTC on 6110

GERMANY: Sunrise Radio. Fair signal with commercial program mix of ads and pop tunes. Heard 0830 with talks in Asian vernacular. Germany's **Sudwestfunk** at 2345 on 7265 with pop music. (Karl Ludwig, Germany/Cumbre DX)

1145 UTC on 17870

SWEDEN: Radio Sweden. *Sounds Nordic* program of pop music, heard on // 15235. (Fraser, MA; Walton, CAN)

1220 UTC on 9945

CHINA: China Radio Int'l. Snapshots program featuring trees in Beijing, heard on // 11980. All fair signals with flutter. (Fraser, MA; Walton, CAN)

1228 UTC on 15545

BELGIUM: Radio Vlaanderen Int'l. English to North America from 1228-1257. RVI's **Bonaire** relay noted on 13670, 2230-2300. (Silvi, OH; Walton, CAN)

1245 UTC on 7185

BANGLADESH: Bangladesh Betar. Eastern style music, announcer in English to 1300*. Signal very weak with amateur radio interference. (Dave Tomasko, IL/Cumbre DX)

1420 UTC on 17675

SOUTH AFRICA: Channel Africa. Political developments in Uganda to news on the World Bank, signal fading. (Moser, IL) *Newswatch* program from 1800-1830 on 17870. French from 1830 to 1854*. (Silvi, OH)

1628 UTC on 5010

MADAGASCAR: Radio Malagasy. Male/female host in regional language, with introductory type comments before an audience, followed by hymns. (Liangas, GRC/HCDX)

1637 UTC on 3365

INDIA: All India Radio, Delhi. Classical music program including musical interpretations to 1730, closing with station ID. (Liangas, GRC/HCDX) **AIR, Delhi** also noted on 4860 at 1231-1235. (Frodge, MI) AIR noted 1758 at 15200 in English and music from Ravi Shankar. (Liangas, GRC/HCDX) AIR on 11620 at 1800. (Fraser, MA)

1709 UTC on 5005.3

NEPAL: Radio Nepal. Native music to announcer's Nepalese text. Station ID, newscast format at 1710, presumed national anthem to sign off. (Mark Veldhuis, Borne, Netherlands/HCDX)

1720 UTC on 5050

CHINA: Voice of the Strait. Chinese ballad to male speaker in presumed Chinese. Instrumental interludes. Slightly stronger on // 5050. **China Radio Int'l** noted on 5145 at 1318-1324. (Veldhuis, NLD/HCDX)

1735 UTC on 15230

LIBYA: Radio Jamahiriya. Five minutes of English news into Arabic service. Strong signal, badly distorted, noted on 15415 // 15435. (Boynton, MA)

2015 UTC on 15500

MALI: China Radio Int'l relay. Report on the scarcity of drinking water in northern China and solutions to the problem. (Fraser, MA)

2030 UTC on 17735

ECUADOR: HCJB. *Inspirational Classics* featuring Sir William Walton's movie music for Battle of Britain and Henry V. (Fraser, MA; Walton, CAN)

2030 UTC on 9680

THAILAND: Radio Thailand. English news to Thai music and commentary. Fair signal quality. (Boynton, MA)

2106 UTC on 4450

SOUTH KOREA: Voice of National Salvation (tentative). Male/female host in Korean, carrier noted on lower sideband +500 kHz, great to hear this station after two years. (Liangas, GRC)

2131 UTC on 11954.7

ANGOLA: Radio Nacional. Portuguese speech coverage to 2134. Brief announcement segment to lite pop tunes. Time pips at 2200 into newscast. (Frodge, MI) Tentative logging on 11954.75 at 1957. (Randy Stewart, Springfield, MO)

2245 UTC on 9737

PARAGUAY: Radio Nacional. Noted station audible up to 0100 or 0200 depending on over modulation from HCJB or Deutsche Welle. Mostly music with Spanish announcements. "Radio Nacional de Paraguay" to music program, good signal. (Silvi, OH)

2300 on 11710

NORTH KOREA: Radio Pyongyang. English news, commentary and music. Poor signal, noted on // 11335, 15130, 13760 to 2355. (Boynton, MA)

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.

The Best That's Ever Been ...Or Ever Will Be?

If you are a regular visitor to newsgroups or to hobby clubs' and shortwave broadcasters' websites, you have no doubt encountered sites that are the best, as well as those that are a waste of your valuable internet time!

One website, **Nordic Shortwave Center**, claims their website is "probably the best DX site in the world." Is it really the best that's ever been, the best there is, or the best that ever will be? You be the judge and see for yourself at: <http://www.nordicdx.com/>

Nordic Shortwave Center opens with DX news, including schedules and medium wave updates, product previews and an interesting article on the *World Radio TV Handbook* empire.



Links on *Andes DX* include Bolivia, Ecuador and Peru and an *LA QSL List* of veri signers, and email addresses to hundreds of Latin American stations.

The secrets on how to become a first class DXer are at the *DX Lab* link, and the *DX Window* informs you of all the hot stuff on shortwave radio from the Danish Shortwave Club.

Antenna information, mediumwave DXing, and the Top 10 web source recommendations are found along with Thorsten Koch's famous guide to radio stuff in cyberspace.

The best DX site in the world ... or the best that ever will be? You decide.

CANADA

Gander Radio, 10051 kHz. Full data prepared card signed by Glen Locke, plus station info sheet. Received in five weeks for an English utility report and three Canadian mint stamps. Station address: c/o Telecommunications Area Mgr., Transport Canada, 89 Edinburgh Ave., Gander NFLD, Canada A1V 1C9. (Bill Wilkins, Springfield, MO)

CYPRUS

BBC East Mediterranean Relay Station, 21470 kHz. Full data letter on Merlin Communications letterhead signed by Hild Mylebust-Team Assistant. Received in two weeks for an English report and two IRCs. No reply via Cyprus address, report sent to; Merlin Communications, Scheduling & Frequency Management, 724 NE Wing, Bush House, P.O. Box 76, Strand, London WC2B 4PH, United Kingdom. (Wilkins, MO)

ECUADOR

Radio Oriental, 4780 kHz. Full data *QSL Certificate* letter signed by Mr. Luis Enrique Espinoza-Gerente Propietario. Station stickers, letter and postcard enclosed. Received in 77 days for a Spanish report. Station address: Casilla 260, Tena, Provincia del Napo, Ecuador. (E. Escoto., Honduras/*Cumbre DX*)

ETHIOPIA

Radio Fana (Radio Torch) 6210 kHz. Full data green logo card, signed by Mulugeta Gesee-General Manager, plus a frequency schedule. Received via registered mail in 59 days after two registered follow-up reports and one U.S. dollar. Station address: P.O. Box 30702, Addis Ababa, Ethiopia. (J.D. Stevens, *AL/Cumbre DX*)

JAPAN

Heihachidounishi Marine Lighthouse, 1670.5 kHz. Full data card and station brochure on Japanese Safety Agency. Souvenir postcards, 8-1/2" x 13" map and photos of several lighthouse stations. Noted station is 50 watts. Lighthouse # 2 verified, Japan QSL # 104. Received in 22 days for a taped report. Station address: Yonafu Kourohyoushiki, Jimushiyo, Heihachidounishi, Ryomitsuyanagi, Yonago Shi, Tottori Pref., 683-0853 Japan. (Patrick Martin, Seaside, OR)

Hegura Beacon Station, 1670 kHz. Full data QSL verified. Received in 28 days for a taped report. Station address: c/o Hegura Beacon Office, Wajima City, Ishikawa Pref., 928, Japan. (Martin, OR)

Shakotann Beacon Station, 1670 kHz. Full data QSL signed by Akiko Murai. Station souvenirs enclosed. Received in 27 days for a taped report. Station address: c/o Shakotann Beacon Office, Shakotann-chu, Shakotann-gunn, Hokkaido-046-03, Japan. (Martin, OR)

MEDIUM WAVE

WGY, 810 kHz AM. Full data verification on station letterhead, signed by Bob Blanchard-Chief Engineer. Station bumper stickers and business card enclosed. Received in ten days for an AM report and mint stamps. Station address: 1 Washington Square, NY 12205. Ph: 518-452-4800; Fax: 518-452-4855. (Benjamin Loveless, USA) 21 days for a taped report. (Martin, OR)

WNML, 1670 kHz AM. Partial data verification on station letterhead, signed by Richard W. Hamilton-Engineer. Station address: 7080 Industrial Hwy., Macon, GA 31206. (Harold Frodge, Midland, ;Wilkins, MO)

WOWO, 1190 kHz AM. Partial data verification on station letterhead, signed by Jack Didier-Director of Engineering. Night coverage map and souvenir magnet enclosed. Received in 30 days for an AM report and mint stamps. Station has recently changed ownership and studio location. Station address: 2915 Maples Rd., Ft. Wayne, IN 46816. Ph: 219-447-5511; Fax: 219-447-7546. (Loveless, USA)

WQSN, 1660 kHz AM. Partial data verification letter signed by Bill Wertz-Vice President. Received in five days for an AM report and a self addressed stamped envelope (SASE). Station address: 4200 W. Main St., Kalamazoo, MI 49006. (Frodge, MI)

WTDY, 1670 kHz AM. Partial data verification on station letterhead signed by Mark Grantin. Received in 50 days for an AM report, two mint stamps and address label (both used for reply). Station address: P.O. Box 2058, Madison, WI 53701. (Wilkins, MO)

PIRATE

Voice of the Twilight Alehouse, 6955 kHz. Full data VOTA studio orchestra card (with Lee Harvey Oswald on vocals) signed by The Supernatural Anesthetist. Received in 29 days for three mint stamps. One of the stamps returned with a personal letter. QSL maildrop: P.O. Box 28413, Providence, RI 02908 (Frodge, MI)

KNBS, 6955 kHz USB. Full data green cannabil leaves card, unsigned. Received in 135 days for a pirate report and three mint stamps. QSL maildrop: P.O. Box 1, Belfast, NY 14711. (Wilkins, MO)

Tangerine Radio Int'l, 6955 kHz USB. Full data orange hand and world card signed by R.R. Received in 35 days for a pirate report, three mint stamps and an address label. QSL maildrop: Belfast, NY. (Wilkins, MO)

TANZANIA

Radio Tanzania, 5050 kHz. Full data QSL card signed by Andrew Kisaica-Director of Broadcasting. Received in four and a half years and ten follow up reports (each with a dollar). Station address: P.O. Box 9191, Dar es Salaam, Tanzania. (Robert Brossell, Pewaukee, WI) Full data card signed by N. Nyamwocha, for one U.S. dollar and souvenir postcard. (Richard Jary, Sydney, Australia)

UNITED STATES

WBCQ-The Planet, 7415 kHz. Full data The Planet globe and rainbow QSL card signed by Elayne Star-Office Manager, logo button enclosed. Received in 23 days for an English report and an SASE. (Bob Lewallyn, Atlanta, GA) Received in 15 days for an SASE (used). (Frodge, MI); Nine days (Ed Lindley, Biddeford, ME); 10 days. (Wilkins, MO)

NEW AND POTENT— THE AR7000 WIDEBAND RADIO

Sleek in style and operated both from its simple front panel or from its remote control, the new AR7000 covers 100 kHz through 2000 MHz (less cellular except on government models). Its brilliant, colored LCD display shows not only frequency and other functions, but becomes an 80-channel spectrum display unit (SDU) as well.



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HOW TO USE THE SHORTWAVE GUIDE

1: Convert your time to UTC.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

HOT NEWS

COMPILED BY JIM FRIMMEL

PROGRAM CHANGES IN A NEW BROADCASTING SEASON

Here's a summary of new programs and program name changes that occurred after the changeover to standard time on October 25th. All of these changes took us by surprise.

- Swiss Radio International pulled a fast one on us. Last month we listed their programs without knowing that they were changing their news analysis program from *Newsnet* to *World Radio Switzerland*.
- Radio Prague changed the name of its Wednesday history program from *From the Archives* to *History Czech*. Another change was Friday's mailbag program from *Between You and Us* to *Postbag*. A new program is *The Magic Carpet*, a program of classical music from the Czech Republic and neighboring countries. *Spotlight* focuses on life in the Czech Republic.
- Radio Bulgaria introduced a program called *Keyword Bulgaria*, which appears to be a

rehash of *Plaza Bulgaria*. A new offering is *Art and Artists*, a look at current cultural events in Bulgaria.

- Radio Vlaanderen International's mailing address for listener letters changed so they had to change the name of their mailbag program from *PO Box 26* to *Brussels 1043*.
- Radio Netherlands International had to fill the void left by the loss of Dheera Sujana's *Siren Song* and came up with *Europe Unzipped* for its Saturday schedule. Dheera returned to India for a six-month sabbatical after three years as a program producer. *Europe Unzipped* presents a round-up of the past week's news in Europe, including unusual items which may not have made it in the headlines.
- World Radio Network introduced a program called *Health Watch* on Sunday at 1715 UTC in its WRN-1 internet schedule to North America. This is a weekly BBC-produced

program on health-related matters that is underwritten by the SmithKline Beecham pharmaceutical corporation. WRN itself now produces a five-minute information program called *Network Plus* that is used as a filler between relayed broadcasts. Also new to WRN are *The Way Ahead* and *New Horizons* (0630 UTC Saturdays), two programs produced by London's World Radio Service.

- Polish Radio Warsaw is now producing a program called *Europe East*, a very interesting program that reports on life in the countries in eastern Europe, both now and in the past.

Poland is difficult, if not impossible, to hear in the western hemisphere but you can hear it at 0400, 0700 and 2130 UTC via World Radio Network's WRN-1. *Europe East* is on at 0400 Sunday and 2130 Saturday.

- Radio Australia added a couple of new programs to its 24-hours-a-day lineup, namely

Week's End and *Pacific Review*.

- Radio Taipei International introduced *Great Wall Forum* (comparing Taiwan with mainland China) and *Trends* (what's new in Taipei).
- BBC America is now being carried by EchoStar's Dish Network and is a freebie to those who subscribe to the Top 100 CD package. BBC America has their own web site at www.bbcamerica.com, where you can find all the program info.
- DX/Media Programs Via WRN-1 on the Internet can provide good audio:

0630	Sun	0600-0659
		World of Radio
1500	Sun	1500-1559
		Communications World
1534	Sun	1500-1559
		Radio World
1907	Sun	1900-1959
		Radio World
1955	Thu	1900-1959
		Media Network
0025	Fri	0000-0059
		Media Network
1700	Sat	1700-1759
		World of Radio

FREQUENCIES

0200-0300	Anguilla, Caribbean Beacon	6090am				0200-0300 vl	Solomon Islands, SIBC	5020do			
0200-0300 twhta	Argentina, RAE	11710am				0200-0300	South Korea, R Korea Intl	7275am	11725am	11810am	15575am
0200-0300 vl	Australia, ABC/Katherine	5025do				0200-0300	Sri Lanka, Sri Lanka BC	6005as	9730as	15425as	
0200-0300 vl	Australia, ABC/Tent Creek	4910do				0200-0300	Taiwan, Radio Taipei Intl	5950na	7130as	9680na	11740am
0200-0300	Australia, Radio	9660pa	12080as	15240pa	15415as			11745va	11825pa	15345as	
		15510pa	17715pa	17750as	21725pa						
0200-0210	Bangladesh, Bangla Betar	4880as				0200-0300	UK, BBC World Service	5970sa	5975am	6175na	6185am
0200-0300	Canada, CBC N Quebec Svc	9625do						9410as	9605as	9770af	9915sa
0200-0300	Canada, CFRX Toronto	6070do						11955as	15280as	15310as	15360as
0200-0300	Canada, CFVP Calgary	6030do				0200-0300	UK, Merlin Network One	3985eu	9560na		
0200-0300	Canada, CHNX Halifax	6130do				0200-0300	USA, KAIJ Dallas TX	5810am			
0200-0300	Canada, CKZN St John's	6160do				0200-0300 vl	USA, KJES Mesquite NM	7555am			
0200-0300	Canada, CKZU Vancouver	6160do				0200-0300	USA, KTBN Salt Lk City UT	7510am			
0200-0259	Canada, R Canada Intl	6155am	9535am	9755am	9780am	0200-0300	USA, KWHR Naalehu HI	17510as			
		11865am				0200-0300	USA, Voice of America	7115as	7200as	9740as	9850as
		6975am	15050am	21460am				11705as	15250as	15300as	17740as
0200-0205	Croatia, Croatian Radio	9925na				0200-0300	USA, WBCQ Monticello ME	7415na			
0200-0300	Cuba, Radio Havana	6000na	9820na	13605na		0200-0300	USA, WEWN Birmingham AL	5825va			
0200-0300	Ecuador, HCJB	9745na	12015na	21455va		0200-0300 stwhfa	USA, WGTG McCaysville GA	5085am	6890na		
0200-0300	Egypt, Radio Cairo	9475na				0200-0300	USA, WHRA Greenbush ME	7395af			
0200-0250	Germany, Deutsche Welle	6035as	7225as	7285as	9615as	0200-0300	USA, WHRI Noblesville IN	7315am			
		9765as	9815as			0200-0300 twhtas	USA, WHRI Noblesville IN	5745am			
		11660as				0200-0300 sm	USA, WHRI Noblesville IN	5755am			
0200-0300	Germany, Overcomer Minist	3290do	5950do			0200-0300	USA, WJCR Upton KY	7490na	13595as		
0200-0300	Guyana, GBC/Voice of	6135na	9835na			0200-0300 vl	USA, WRMI/R Miami Intl	9955ca			
0200-0230	Hungary, Radio Budapest	6200do				0200-0300	USA, WRNO New Orleans LA	7355am			
0200-0300	Ireland, Unt Christian BC	4935do				0200-0300	USA, WSHB Cypress Crk SC	5850na	7535am		
0200-0300	Kenya, Kenya BC Corp	7295do				0200-0300	USA, WWBS Macon GA	11905na			
0200-0300	Malaysia, Radio	7185do				0200-0300	USA, WWCR Nashville TN	3215na	5070na	5935na	7435na
0200-0250	Myanmar, Radio	3270af	3289af			0200-0300	USA, WYFR Okeechobee FL	6065na	9505na		
0200-0300 vl	Namibia, NBC	17675pa				0215-0220	Nepal, Radio	3230as	5005as		
0200-0300	New Zealand, R NZ Intl	9675do				0230-0245	Pakistan, Radio	9470as	11975as	15485as	
0200-0300 vl	Papua New Guinea, NBC	15450as				0230-0300 vl	Philippines, R Pilipinas	11885as	15120as	15270as	
0200-0300	Philippines, FEBC/R Intl	5990na	9570na	11740as	11830na	0230-0300	Sweden, Radio	7280am	9455am		
0200-0300	Romania, R Romania Intl	11940as	15380as			0230-0257	Vietnam, Voice of	5940na			
		7180na	9865na	9875na	12020na	0245-0300	Albania, R Tirana Intl	6115na	7160na		
0200-0300	Russia, Voice of Russia WS	7130na				0250-0300 sf	Greece, Voice of	7430na	7450na	9375na	9420na
0200-0230	Serbia, Radio Yugoslavia	6150do				0250-0300	Vatican State, Vatican R	7305ca	9605am		
0200-0300	Singapore, R Corp Singapore										

SELECTED PROGRAMS

Sundays

- 0200 Costa Rica, R Peace Intl: World of Radio. Glenn Hauser's essential program for the shortwave listener.
- 0200 Ecuador, HCJB Quito (am): Solstice. A musical program from HCJB-Australia for young people.
- 0200 South Korea, R Korea Intl: News. Seven or ten minutes of world and regional news.
- 0210 South Korea, R Korea Intl: News Commentary. Opinion on developments in Korea and worldwide.
- 0215 South Korea, R Korea Intl: Music Trap. The most popular music of South Korea.
- 0230 Costa Rica, R Peace Intl: RFPI's Mailbag. The latest news and happenings at RFPI and responses to listener letters.
- 0230 Philippines, FEBC Manila: World News.
- 0230 Sweden, Radio: Special Feature (24th). See S 0130.
- 0230 Sweden, Radio: Spectrum (3rd, 17th). See S 0130.
- 0230 Sweden, Radio: Sweden Today (4th). See S 0130.
- 0240 South Korea, R Korea Intl: From Us to You. Listener letters, questions, comments, Q&A Corner and Music Request.

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.pitalaska.net/~kmxt/mge.htm for weekly topics.
- 0200 Ecuador, HCJB Quito (am): Radio Reading Room. Readings from new Christian books.
- 0230 Costa Rica, R Peace Intl: Every Living Thing. See S 0000.
- 0230 Ecuador, HCJB Quito (am): L'Abri Lectures. Dr. Francis Schaeffer is the speaker.
- 0230 Philippines, FEBC Manila: World News.
- 0230 Sweden, Radio: In Touch with Stockholm (4th). See S 1230.
- 0230 Sweden, Radio: Sounds Nordic (4th, 18th). See S 1230.
- 0230 Sweden, Radio: Weekend (18th). See S 1230.
- 0230 UK, BBC London (AF): Planet 2000 (4th, 11th). See M 1430.

Tuesdays

- 0200 Ecuador, HCJB Quito (am): Simply Worship. See S 1400.
- 0230 Costa Rica, R Peace Intl: Hightower Radio. A commentary by Jim Hightower, the provocative progressive voice from Texas, on national issues.

- 0230 Ecuador, HCJB Quito (am): Let My People Think. See S 1530.
- 0230 Philippines, FEBC Manila: World News.
- 0230 Sweden, Radio: Sixty Degrees North. See M 1230.
- 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.
- 0247 Sweden, Radio: SportScan. See M 1242.

Wednesdays

- 0200 Costa Rica, R Peace Intl: RadioNation. See S 0500.
- 0200 Ecuador, HCJB Quito (am): Vital Signs. Join Karen Schmidt for a journey through the world of
- 0215 Ecuador, HCJB Quito (am): The Book and the Spade/Words for Women. New program - no information available.
- 0230 Ecuador, HCJB Quito (am): Unshackled. Pacific Garden Mission's radio drama.
- 0230 Philippines, FEBC Manila: World News.
- 0230 Sweden, Radio: Sixty Degrees North. See M 1230.
- 0246 Sweden, Radio: MediaScan (6th, 20th). See T 1246.

Thursdays

- 0200 Costa Rica, R Peace Intl: Second Opinion. See S 0100.
- 0200 Ecuador, HCJB Quito (am): Rock Solid! A new one-hour program of contemporary (rock) Christian music.
- 0230 Costa Rica, R Peace Intl: Hightower Radio. See T 0230.
- 0230 Philippines, FEBC Manila: World News.
- 0230 Sweden, Radio: Sixty Degrees North. See M 1230.
- 0230 UK, BBC London (AS): Watershed (7th, 14th, 21st). See T 0330.
- 0232 Costa Rica, R Peace Intl: Earthwatch Radio. See S 2355.
- 0234 Costa Rica, R Peace Intl: Earth and Sky. See S 2357.
- 0240 Costa Rica, R Peace Intl: Midwest Today Radio Edition. Timely general interest topics from America's heartland.
- 0245 Costa Rica, R Peace Intl: Along the Color Line. Commentaries relevant to contemporary African-American issues featuring Dr. Manning Marable.

Fridays

- 0200 Costa Rica, R Peace Intl: Global Community Forum/Far Right Radio Review. See M 0630.
- 0200 Ecuador, HCJB Quito (am): Radio Reading Room. See M 0200.
- 0230 Ecuador, HCJB Quito (am): Inspirational Classics. Scott and Judy Gillen of New Zealand with a program of sacred classical music. (<http://iconz.co.nz/~gillen/ic.html>)

- 0230 Philippines, FEBC Manila: World News.
- 0230 Sweden, Radio: Sixty Degrees North. See M 1230.
- 0230 UK, BBC London (AF): Tying the Knot (1st, 8th). See M 0530.
- 0246 Sweden, Radio: GreenScan (8th). See H 1246.
- 0246 Sweden, Radio: Horizon (29th). See H 1246.
- 0246 Sweden, Radio: Nordic Report (1st). See H 1246.
- 0247 Sweden, Radio: HeartBeat (15th). See H 1247.

Saturdays

- 0200 Costa Rica, R Peace Intl: Making Contact. See S 0330.
- 0200 Ecuador, HCJB Quito (am): Inside HCJB. Paul Bell gives you an inside look at the Voice of the Andes.
- 0230 Costa Rica, R Peace Intl: Hightower Radio. See T 0230.
- 0230 Ecuador, HCJB Quito (am): Walkin' in the Sunshine. Ben Cummings serves as your host for this
- 0230 Philippines, FEBC Manila: World News.
- 0230 Sweden, Radio: Sixty Degrees North. See M 1230.
- 0235 Costa Rica, R Peace Intl: Earthwatch Radio. See S 2355.
- 0235 Sweden, Radio: Review of the Nordic Newsweek. See F 1235.
- 0240 Costa Rica, R Peace Intl: Earth and Sky. See S 2357.
- 0245 Costa Rica, R Peace Intl: UN Perspective. See T 2300.

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FREQUENCIES

0600-0700	Anguilla, Caribbean Beacon	6090am				0600-0700 vl	Sierra Leone, SLBS	3316do			
0600-0700 vl	Australia, ABC/Katherine	5025do				0600-0700	Singapore, RCorp Singapore	6150do			
0600-0700 vl	Australia, ABC/Tent Creek	4910do				0600-0700 vl	Solomon Islands, SIBC	5020do			
0600-0700	Australia, Radio	9660pa	12080as	15240pa	15415as	0600-0700	UK, BBC World Service	3955eu	5975am	6005af	6175am
		15510pa	17715pa	17750as	21725pa			6180eu	6190af	6195eu	7145pa
0600-0700 vl	Botswana, Radio	4820do	4830do	7255do				7160af	7325eu	9410eu	9740as
0600-0700 vl	Canada, CBC N Quebec Svc	9625do						11760me	11765af	11940af	11955pa
0600-0700	Canada, CFRX Toronto	6070do						12095eu	15310as	15360as	15420af
0600-0700	Canada, CFVP Calgary	6030do						15565eu	15575as	17640af	17760as
0600-0700	Canada, CHNX Halifax	6130do						17790as	17885af	21660as	
0600-0700	Canada, CKZU Vancouver	6160do				0600-0700	UK, Merlin Network One	6110eu	13720pa		
0600-0629 mtwhf	Canada, R Canada Intl	6090va	6150va	9740af	9760va	0600-0700	USA, KAIJ Dallas TX	5810va	9815am		
		11905va				0600-0700	USA, KTBN Salt Lk City UT	7510am			
0600-0700 vl	Chile, R Voz Cristiana	11690am				0600-0700	USA, KWHR Naalehu HI	17780as			
0600-0700	Costa Rica, RF Peace Intl	6975am	15050am			0600-0630	USA, Voice of America	5970af	6035af	6080af	7170af
0600-0610 mtwhf	Croatia, Croatian Radio	6235eu	7305eu	9830eu	13820au			7285af	11805af	11825eu	11905af
0600-0700	Cuba, Radio Havana	9550na	9820na	9830na				12080af	15205me	15600af	
0600-0700	Ecuador, HCJB	9745na	12015na	21455va		0600-0700	USA, WBCQ Monticello ME	7415na			
0600-0650	Germany, Deutsche Welle	6045af	7225af	9565af	11785af	0600-0700	USA, WEWN Birmingham AL	5825va			
		17820af	21695af			0600-0700	USA, WHRA Greenbush ME	7435af			
						0600-0700	USA, WHRI Noblesville IN	5755am	7315am		
0600-0700	Germany, Overcomer Minist	13810as				0600-0700 sm	USA, WHRI Noblesville IN	5755am			
0600-0700 vl	Ghana, Ghana BC Corp	3366do	4915do			0600-0700	USA, WINB Red Lion PA	11950am			
0600-0700	Guyana, GBC/Voice of	3290do	5950do			0600-0700	USA, WJCR Upton KY	7490na	13595as		
0600-0700	Ireland, Unt Christian BC	6200do				0600-0700 mtwhf	USA, WMLK Bethel PA	9465va			
0600-0700 vl	Italy, IRRS	3985va				0600-0700 mtwhf	USA, WRMI/R Miami Intl	9955ca			
0600-0700	Japan, Radio/NHK	5975eu	7230eu	9835na	11740as	0600-0700	USA, WRNO New Orleans LA	7395am			
		11840as	11850pa	15590as		0600-0700	USA, WSHB Cypress Crk SC	7535af	9835eu		
0600-0700	Kenya, Kenya BC Corp	4885do	4935do			0600-0700	USA, WWCR Nashville TN	2390na	3210na	5070na	5935na
0600-0700 vl	Kuwait, Radio	15110as				0600-0700	USA, WYFR Okeechobee FL	5985na	7355eu		
0600-0700 vl	Lesotho, Radio	4800do				0600-0700 vl	Vanuatu, Radio	4960do			
0600-0700	Liberia, Radio Veritas	5470do				0600-0620	Vatican State, Vatican R	4005eu	5880eu	7250eu	
0600-0700	Liberia, LCN/R Liberia Intl	5100do				0600-0700	Yemen, Radio Aden	9780do			
0600-0700	Malaysia, Radio	7295do				0600-0700	Zambia, Christian Voice	3330af	6065af		
0600-0700	Malaysia, RTM Sarawak	7160do				0600-0700	Zambia, Natl BC Corp	6165do	6265do		
0600-0700	Malaysia, Voice of	6175as	9750as	15295au		0600-0700 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
0600-0700 vl	Namibia, NBC	3270af	3289af			0605-0700	Swaziland, Trans World R	6100af	9500af		
0600-0700	New Zealand, R NZ Intl	17675pa				0630-0700	Austria, R Austria Intl	6015na			
0600-0700 vl	Nigeria, Radio/Ibadan	6050do				0630-0700 mtwhf	Malta, VO Mediterranean	7155eu	9850eu		
0600-0700 vl	Nigeria, Radio/Kaduna	4770do				0630-0700	Switzerland, Swiss R Intl	6165eu			
0600-0700	Nigeria, Radio/Lagos	3326do				0630-0700 mtwhf	UK, BBC European Service	3955eu	6195eu		
0600-0700	Nigeria, Voice of	7255af	15120va			0630-0700 as	UK, BBC World Service	3955eu	6195eu		
0600-0700 vl	Papua New Guinea, NBC	9675do				0630-0700	USA, Voice of America	5995af	7170af	11825eu	11950af
0600-0700	Romania, R Romania Intl	9510na	11940na					15205me			
0600-0700	Russia, Voice of Russia WS	15460au	15470au	15525au	17570au	0630-0700 as	USA, Voice of America	5970af	6035af	6080af	7285af
		21790au						11805af	12080af	15600af	
0600-0630	S Africa, Channel Africa	15215af				0630-0645	Vatican State, Vatican R	9660af	11625af	13765af	
0600-0635	S Africa, Trans World R	11735af				0641-0656	Romania, R Romania Intl	9550eu	9625eu	9665eu	11885eu

SELECTED PROGRAMS

Sundays

- 0600 Costa Rica, R Peace Intl: Disability Radio Worldwide. Jean Parker with issues, events, political analysis and interviews.
- 0600 Ecuador, HCJB Quito (am): Solstice. See S 0200.
- 0600 New Zealand, R NZ Intl: RNZ News. See S 0500.
- 0606 New Zealand, R NZ Intl: Sounds Historical with Jim Sullivan. History and comment from NZ's past.
- 0615 UK, BBC London (AF): On Your Behalf. See S 0130.
- 0630 Costa Rica, R Peace Intl: Vietnam Veterans Radio Network. Bringing to light the real stories behind the Vietnam War.

Mondays

- 0600 Costa Rica, R Peace Intl: UNESCO. A feature program of the United Nations focusing on world educational, scientific, or cultural matters.
- 0600 Ecuador, HCJB Quito (am): Mountain Meditations. See S 1330.
- 0600 New Zealand, R NZ Intl: RNZ News. See S 0500.
- 0607 New Zealand, R NZ Intl: Checkpoint. See M 0507.
- 0630 Costa Rica, R Peace Intl: Global Community Forum/Far Right Radio Review. The program takes a critical look at radical, reactionary, right-wing organizations and their spokespeople on shortwave and other mediums.
- 0630 Ecuador, HCJB Quito (am): Words to Live By. See S 1230.
- 0630 New Zealand, R NZ Intl: Ears. See S 0506.

Tuesdays

- 0600 Costa Rica, R Peace Intl: New Dimensions Radio. See M 0330.
- 0600 Ecuador, HCJB Quito (am): Psychology for Living. Clyde Narramore of California gives Christian advice on issues of today.
- 0600 New Zealand, R NZ Intl: RNZ News. See S 0500.
- 0607 New Zealand, R NZ Intl: Checkpoint. See M 0507.
- 0615 Ecuador, HCJB Quito (am): Stories of Great Christians.

- Radio drama with Christian theme from the Moody Bible Institute. (www.moody.edu)
- 0630 Ecuador, HCJB Quito (am): Nightsounds. Christian music and thoughtful words from Bill Pearce.
- 0630 New Zealand, R NZ Intl: Ears. See S 0506.

Wednesdays

- 0600 Costa Rica, R Peace Intl: Voices of Our World. Maryknoll missionary Steve De Mott hosts this social justice magazine program that brings stories from the people who have lived them.
- 0600 Ecuador, HCJB Quito (am): Psychology for Living. See T 0600.
- 0600 New Zealand, R NZ Intl: RNZ News. See S 0500.
- 0607 New Zealand, R NZ Intl: Checkpoint. See M 0507.
- 0615 Ecuador, HCJB Quito (am): Stories of Great Christians. See T 0615.
- 0630 Costa Rica, R Peace Intl: University of the Air. Self-directed and participatory learning of a variety of courses.
- 0630 Ecuador, HCJB Quito (am): Nightsounds. See T 0630.
- 0630 New Zealand, R NZ Intl: Ears. See S 0506.

Thursdays

- 0600 Ecuador, HCJB Quito (am): Psychology for Living. See T 0600.
- 0600 New Zealand, R NZ Intl: RNZ News. See S 0500.
- 0607 New Zealand, R NZ Intl: Checkpoint. See M 0507.
- 0615 Ecuador, HCJB Quito (am): Stories of Great Christians. See T 0615.
- 0630 Costa Rica, R Peace Intl: University of the Air. See W 0630.
- 0630 Ecuador, HCJB Quito (am): Nightsounds. See T 0630.
- 0630 New Zealand, R NZ Intl: Ears. See S 0506.

Fridays

- 0600 Costa Rica, R Peace Intl: Vietnam Veterans Radio Network. See S 0630.
- 0600 Ecuador, HCJB Quito (am): Psychology for Living. See T 0600.
- 0600 New Zealand, R NZ Intl: RNZ News. See S 0500.

- 0607 New Zealand, R NZ Intl: Checkpoint. See M 0507.
- 0615 Ecuador, HCJB Quito (am): Stories of Great Christians. See T 0615.
- 0630 Costa Rica, R Peace Intl: University of the Air. See W 0630.
- 0630 Ecuador, HCJB Quito (am): Nightsounds. See T 0630.

Saturdays

- 0600 Costa Rica, R Peace Intl: Steppin' Out of Babylon. See T 0530.
- 0600 Ecuador, HCJB Quito (am): Psychology for Living. See T 0600.
- 0600 New Zealand, R NZ Intl: RNZ News. See S 0500.
- 0615 Ecuador, HCJB Quito (am): Stories of Great Christians. See T 0615.
- 0630 Costa Rica, R Peace Intl: University of the Air. See W 0630.
- 0630 Ecuador, HCJB Quito (am): Nightsounds. See T 0630.
- 0645 New Zealand, R NZ Intl: Story Time. Stories from around the world for children.

HAUSER'S HIGHLIGHTS ISRAEL: KOL ISRAEL

B-98 in English:

UTC	kHz
0500-0515	7465, 9435, 21620
1130-1135	15640, 17535
1500-1530	15640, 17535
1645-1700	9435, 11605, 15650
2000-2025	7465, 9435, 11605, 15640

(via Doni Rosenzweig and John Norfolk)

FREQUENCIES

0700-0800	Anguilla, Caribbean Beacon	6090am			
0700-0800 vl	Australia, ABC/Katherine	5025do			
0700-0800 vl	Australia, ABC/Tent Creek	4910do			
0700-0800	Australia, Radio	9660pa	12080as	15240pa	15415as
		15510pa	17715pa	17750as	21725pa
		4820do	4830do	7255do	
0700-0800 vl	Botswana, Radio	6070do			
0700-0800	Canada, CFRX Toronto	6030do			
0700-0800	Canada, CHNX Halifax	6130do			
0700-0800	Canada, CKZU Vancouver	6160do			
0700-0800	Costa Rica, RF Peace Intl	6975am	15050am		
0700-0800	Ecuador, HCJB	9640pa	9775eu	21455va	
0700-0800 as/vl	Eq Guinea, R East Africa	15186af			
0700-0800 mtwhf	Eq Guinea, Radio Africa	15186af			
0700-0800	Germany, Sunrise Radio	6110va			
0700-0800 s	Germany, Good News World R	13740as			
0700-0800	Germany, Overcomer Ministr	13810as			
0700-0800 vl	Ghana, Ghana BC Corp	3366do	4915do		
0700-0715 f	Greece, Voice of	7430eu	7450eu	9375eu	9420eu
		9775au			
0700-0800	Guyana, GBC/Voice of	3290do	5950do		
0700-0800	Ireland, Unt Christian BC	6200do			
0700-0730 vl	Italy, IRRS	3985va			
0700-0800	Kenya, Kenya BC Corp	4885do	4935do		
0700-0800	Kuwait, Radio	15110as			
0700-0800 vl	Lesotho, Radio	4800do			
0700-0800	Liberia, Radio Veritas	5470do			
0700-0715	Liberia, LCN/R Liberia Int	5100do			
0700-0800	Malaysia, Radio	7295do			
0700-0800	Malaysia, RTM Sarawak	7160do			
0700-0800	Malaysia, Voice of	6175as	9750as	15295au	
0700-0800	Myanmar, Radio	9730do			
0700-0715 vl	Namibia, NBC	3270af	3289af		
0700-0705	New Zealand, R NZ Intl	17675pa			
0700-0800 vl	Nigeria, Radio/Ibadan	6050do			
0700-0800 vl	Nigeria, Radio/Kaduna	4770do			
0700-0800 vl	Nigeria, Voice of	7255af	15120va		
0700-0800	Palau, KHBN/Voice of Hope	9965as	9985as	13840as	15725as
0700-0730 vl	Papua New Guinea, NBC	9675do			
0700-0800	Romania, R Romania Intl	17735af	21480af		
0700-0800	Russia, Voice of Russia WS	15460au	15470au	15525au	17495au
		17570au	21790au		
0700-0800 vl	Sierra Leone, SLBS	3316do			
0700-0800	Singapore, RCorp Singapore	6150do			
0700-0730	Slovakia, R Slovakia Intl	11990au	15460au	21705au	
0700-0800 vl	Solomon Islands, SIBC	5020do			
0700-0705	Swaziland, Trans World R	4775af	6100af	9500af	
0700-0800	Taiwan, Radio Taipei Intl	5950na			
0700-0800	UK, BBC World Service	5975am	6005af	6175am	6180eu
		6190af	6195eu	7145pa	7325eu
		9410eu	9740as	11760me	11765af
		11835af	11940af	11955pa	12095eu
		1531015	15360as	15485eu	15565eu
		15575as	17640eu	17760as	17790as
		17830af	21660as		
0700-0730 as	UK, BBC World Service	17885af			
0700-0800	UK, Merlin Network One	6110eu	9915eu	13720pa	17630eu
		21550af			
0700-0800	USA, KAIJ Dallas TX	5810va	9815am		
0700-0800	USA, KTNB Salt Lk City UT	7510am			
0700-0800	USA, KWHR Naalehu HI	11565as	17780as		
0700-0800	USA, WBCQ Monticello ME	7415na			
0700-0800	USA, WEWN Birmingham AL	5825va			
0700-0800	USA, WHRA Greenbush ME	7435af			
0700-0800	USA, WHRI Noblesville IN	5755am	7315am		
0700-0800 sm	USA, WHRI Noblesville IN	5755am			
0700-0800	USA, WINB Red Lion PA	11950am			
0700-0800	USA, WJCR Upton KY	7490na	13595as		
0700-0800 mtwhfa	USA, WMLK Bethel PA	9465va			
0700-0800 mtwhf	USA, WRMI/R Miami Intl	9955ca			
0700-0800	USA, WRNO New Orleans LA	7395na			
0700-0800	USA, WSHB Cypress Crk SC	7535af	9835eu		
0700-0800	USA, WWCR Nashville TN	2390na	3210na	5070na	5935na
0700-0745	USA, WYFR Okeechobee FL	7355eu	9455va	9985eu	
0700-0800 vl	Vanuatu, Radio	4960do			
0700-0800	Zambia, Christian Voice	6065af			
0700-0800	Zambia, Natl BC Corp	6165do	6265do		
0700-0800 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
0706-0800	New Zealand, R NZ Intl	9700pa			
0710-0715 s	Kyrgyzstan, Kyrgyz Radio	4010do	4050do		
0715-0800 vl	Namibia, NBC	6060af	6175af		
0730-0800	Finland, YLE/R Finland	9840va	21670as		
0730-0800	Georgia, Georgian Radio	11910eu			
0730-0740	Greece, Voice of	7430eu	7450eu	9375eu	9420eu
		9775as			
0730-0800 vl	Papua New Guinea, NBC	4890do			
0730-0800	Switzerland, Swiss R Intl	9885af	11860af	13635af	
0730-0800 as	UK, BBC World Service	17885af			
0730-0745 mtwhf	Vatican State, Vatican R	4005va	5880va	6185va	7250va
		9645va	11740va	15595va	

0740-0800	Guam, TWR/KTWR	15200as
0745-0800 s	Albania, Trans World R	9685eu
0745-0755 as	Monaco, Trans World Radio	9870eu
0755-0800 mtwhf	Monaco, Trans World Radio	9870eu

0800 UTC

0800-0900	Albania, Trans World R	9685eu			
0800-0900	Anguilla, Caribbean Beacon	6090am			
0800-0830 vl	Australia, ABC/Katherine	5025do			
0800-0830 vl	Australia, ABC/Tent Creek	4910do			
0800-0900	Australia, Radio	5995pa	9580pa	9710pa	12080as
		15415as	15510pa	17750as	21725pa
		4820do	4830do	7255do	
0800-0900 vl	Botswana, Radio	6070do			
0800-0900 vl	Canada, CBC N Quebec Svc	6030do			
0800-0900	Canada, CFRX Toronto	6070do			
0800-0900	Canada, CFPV Calgary	6030do			
0800-0900	Canada, CHNX Halifax	6130do			
0800-0900	Canada, CKZU Vancouver	6160do			
0800-0900 vl	Chile, R Voz Cristiana	11890am			
0800-0900	Costa Rica, RF Peace Intl	15050am			
0800-0827	Czech Rep, R Prague Intl	11640eu	15260eu		
0800-0900	Ecuador, HCJB	9640pa	9775eu	21455va	
0800-0900 as/vl	Eq Guinea, R East Africa	15186af			
0800-0900 mtwhf	Eq Guinea, Radio Africa	15186af			
0800-0900	Germany, Sunrise Radio	6110va			
0800-0900	Germany, Overcomer Ministr	13810as			
0800-0900	Guam, TWR/KTWR	15200as	15330as		
0800-0900	Guyana, GBC/Voice of	3290do	5950do		
0800-0900	Indonesia, Voice of	9525as	11765as	15510as	
0800-0900	Ireland, Unt Christian BC	6200do			
0800-0900 as	Italy, IRRS	7120va			
0800-0900	Kenya, Kenya BC Corp	4885do	4935do		
0800-0900 vl	Lesotho, Radio	4800do			
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 vl	Malaysia, RTM KotaKinabalu	5980do			
0800-0900	Monaco, Trans World Radio	9870eu			
0800-0830	Myanmar, Radio	9730do			
0800-0900	N Mariana Is, KHBI Saipan	15665eu			
0800-0900 vl	Namibia, NBC	6060af	6175af		
0800-0900	New Zealand, R NZ Intl	9700pa			
0800-0900 vl	Nigeria, Radio/Ibadan	6050do			
0800-0900 vl	Nigeria, Radio/Kaduna	4770do			
0800-0900	Nigeria, Radio/Lagos	3326do			
0800-0900	Palau, KHBN/Voice of Hope	9985as	13840as	15725as	
0800-0900 vl	Papua New Guinea, NBC	4890do			
0800-0900	Russia, Voice of Russia WS	9905au	15470au	15525au	17495au
		21790au			
0800-0830 vl	Sierra Leone, SLBS	3316do			
0800-0900	Singapore, RCorp Singapore	6150do			
0800-0900	South Korea, R Korea Intl	9570au	13670eu		
0800-0900	UK, BBC World Service	7145pa	7325eu	9410eu	9740as
		11940af	11955pa	12095eu	15310as
		15360as	15400af	15485eu	15565eu
		17640eu	17760as	17790as	17830af
		21660as			
0800-0900 as	UK, BBC World Service	15575as	17885af		
0800-0900	UK, Merlin Network One	9915eu	13660eu	13720pa	17630eu
		21550af			
0800-0900	USA, KAIJ Dallas TX	5810va	9815am		
0800-0900	USA, KNLS Anchor Point AK	7365as			
0800-0900	USA, KTNB Salt Lk City UT	7510am			
0800-0900	USA, KWHR Naalehu HI	9930as	11565as		
0800-0900	USA, WBCQ Monticello ME	7415na			
0800-0900	USA, WEWN Birmingham AL	5825va			
0800-0900	USA, WHRI Noblesville IN	5755am	7315am		
0800-0900	USA, WHRI Noblesville IN	5755am			
0800-0900	USA, WJCR Upton KY	7490na	13595as		
0800-0900 mtwhfa	USA, WMLK Bethel PA	9465va			
0800-0900 mtwhf	USA, WRMI/R Miami Intl	9955ca			
0800-0900	USA, WRNO New Orleans LA	7395am			
0800-0900	USA, WSHB Cypress Crk SC	7535eu	9835eu	9845au	
0800-0900	USA, WWCR Nashville TN	2390na	3210na	5070na	5935na
0800-0900 vl	Vanuatu, Radio	4960do			
0800-0900	Zambia, Christian Voice	6065af			
0800-0900	Zambia, Natl BC Corp	6165do	6265do		
0800-0900 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
0805-0810	Pakistan, Radio	11975as			
0815-0900 f	Seychelles, FEBA Radio	15540as			
0830-0900 vl	Australia, ABC/Alice Spgs	2310do			
0830-0900 vl	Australia, ABC/Katherine	2485do			
0830-0900 vl	Australia, ABC/Tent Creek	2325do			
0830-0900	Austria, R Austria Intl	6155eu	13730eu	17615as	21765au
0830-0856	Belgium, R Vlaanderen Int	9925eu	9940au		
0830-0900 vl	Solomon Islands, SIBC	5020do			
0830-0900	Switzerland, Swiss R Intl	9885as	13685as		

FREQUENCIES

0900-0920	Albania, Trans World R	9685eu			
0900-1000	Anguilla, Caribbean Beacon	6090am			
0900-1000 vl	Australia, ABC/Alice Spgs	2310do			
0900-1000 vl	Australia, ABC/Katherine	2485do			
0900-1000 vl	Australia, ABC/Tent Creek	2325do			
0900-1000	Australia, Radio	6080as	9580pa	11880as	17750as
0900-1000 vl	Botswana, Radio	4820do	4830do	7255sk	
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 vl	Chile, R Voz Cristiana	6070am	11890am		
0900-0956	China, China Radio Intl	15210pa	17755pa		
0900-1000	Costa Rica, RF Peace Intl	15050am			
0900-0910 s	Croatia, Croatian Radio	6165eu	7185eu	9830eu	13820au
0900-1000	Ecuador, HCJB	9640pa	21455va		
0900-1000 as/vl	Eqt Guinea, R East Africa	15186af			
0900-1000 mtwhf	Eqt Guinea, Radio Africa	15186af			
0900-0950	Germany, Deutsche Welle	6160as	9565af	11775as	12055as
		15145af	15410af	17800af	17820as
		21600af			
0900-1000	Germany, Sunrise Radio	6110va			
0900-1000	Germany, Overcomer Ministr	5965eu			
0900-1000 vl	Ghana, Ghana BC Corp	3366do	4915do		
0900-0915	Guam, TWR/KTWR	15200as	15330as		
0900-1000	Guyana, GBC/Voice of	3290do	5950do		
0900-1000	Ireland, Unt Christian BC	6200do			
0900-1000 as	Italy, IRRS	7120va			
0900-1000	Kenya, Kenya BC Corp	4935do			
0900-1000 vl	Lesotho, Radio	4800do			
0900-1000	Liberia, Radio Veritas	5470do			
0900-0915	Liberia, LCN/R Liberia Int	5100do			
0900-1000	Malaysia, Radio	7295do			
0900-1000 vl	Malaysia, RTM KotaKinabalu	5980do			
0900-1000 s	Malta, VO Mediterranean	11770eu	11830eu		
0900-0950 s	Monaco, Trans World Radio	9870eu			
0900-1000 twhf	N Mariana Is, KHBI Saipan	9355as	15665as		
0900-1000 vl	Namibia, NBC	6060af	6175af		
0900-1000	New Zealand, R NZ Intl	9700pa			
0900-1000 vl	Nigeria, Radio/Ibadan	6050do			
0900-1000 vl	Nigeria, Radio/Kaduna	4770do			
0900-1000	Nigeria, Radio/Lagos	3326do			
0900-1000 vl	Papua New Guinea, NBC	4890do			
0900-1000	Russia, Voice of Russia WS	9905au	15470au	15525au	17495au
0900-1000	Singapore, RCorp Singapore	6150do			
0900-1000 vl	Solomon Islands, SIBC	5020do			
0900-1000	Tanzania, Radio	5050af			
0900-1000	UK, BBC World Service	6065as	6190af	6195as	9410eu
		9580as	9740as	11760me	11765pa
		11940af	11945as	11955as	12095eu
		15190sa	15310as	15360as	15400af
		15485eu	15565eu	15575as	17640eu
		17705eu	17760as	17790as	17830af
		17885af	21660as		
0900-1000	UK, Merlin Network One	9915eu	13660eu	17630eu	21550af
0900-1000	USA, KAIJ Dallas TX	5810va	9815am		
0900-1000	USA, KTNB Salt Lk City UT	7510am			
0900-1000	USA, KWHR Naalehu HI	9930as	11565pa		
0900-1000	USA, WBCQ Monticello ME	7415na			
0900-1000	USA, WEWN Birmingham AL	5825va			
0900-1000	USA, WHRI Noblesville IN	5755am	7315am		
0900-1000 sm	USA, WHRI Noblesville IN	5755am			
0900-1000	USA, WJCR Upton KY	7490na	13595as		
0900-1000 mtwhf	USA, WRMI/R Miami Intl	9955ca			
0900-1000	USA, WRNO New Orleans LA	7395am			
0900-1000	USA, WSHB Cypress Crk SC	7395sa	7535eu	9455sa	9835eu
0900-1000	USA, WWCR Nashville TN	2390na	3210na	5070na	5935na
0900-1000	Zambia, Christian Voice	6065af			
0900-1000	Zambia, Natl BC Corp	6165do	6265do		
0900-1000 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
0915-0930	Guam, TWR/KTWR	15330as			
0915-0945 as	UK, BBC World Service	6195as	9740as	11765pa	15360pa
		17760as	21660as		
0920-0935 as	Albania, Trans World R	9685eu			
0920-0930 t	Kyrgyzstan, Kyrgyz Radio	4010do	4050do		
0930-1000	Austria, R Austria Intl	17615as	21765au		
0930-1000	Canada, CKZN St John's	6160do			
0930-1000	Georgia, Georgian Radio	11910eu			
0930-1000	Guam, TWR/KTWR	9865as			
0930-1000	Italy, AWR Europe	7230eu			
0930-1000	Netherlands, Radio	7260as	9820au	12065as	
0930-1000	Philippines, FEBC/R Intl	11635as			
0935-0950 s	Albania, Trans World R	9685eu			
0945-1000 smtwhf	UK, BBC Slow Speed News	6065as	9580as	11945as	11955as
		15280as			
0945-1000 a	UK, BBC World Service	6065as	9580as	11945as	11955as
		15280as			
1000-1100	Anguilla, Caribbean Beacon	11775am			
1000-1030	Armenia, Voice of	4810eu	15270eu		
1000-1100 vl	Australia, ABC/Alice Spgs	2310do			
1000-1100 vl	Australia, ABC/Katherine	2485do			
1000-1100 vl	Australia, ABC/Tent Creek	2325do			
1000-1100	Australia, Radio	6080as	9580pa	11880as	17750as
1000-1100 vl	Botswana, Radio	4820do	4830do	7255do	
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 vl	Chile, R Voz Cristiana	6070am	11890am	15375am	
1000-1056	China, China Radio Intl	15210pa	17755pa		
1000-1100	Costa Rica, RF Peace Intl	15050am			
1000-1030	Czech Rep, R Prague Intl	17485af	21745as		
1000-1100	Ecuador, HCJB	9640pa	21455va		
1000-1100 as/vl	Eqt Guinea, R East Africa	15186af			
1000-1100 mtwhf	Eqt Guinea, Radio Africa	15186af			
1000-1100	Germany, Sunrise Radio	6110va			
1000-1100 a	Germany, Good News World R	5910eu			
1000-1100	Germany, Overcomer Ministr	5965eu			
1000-1030	Guam, AWR/KSDA	11660as			
1000-1100	Guam, TWR/KTWR	9865as			
1000-1100	Guyana, GBC/Voice of	3290do	5950do		
1000-1100	India, All India Radio	11585as	13700as	15040as	17387au
		17840as			
1000-1100	Ireland, Unt Christian BC	6200do			
1000-1100 as	Italy, IRRS	7120va			
1000-1100	Japan, Radio/NHK	9695as	11850pa	15590as	
1000-1100	Kenya, Kenya BC Corp	4935do			
1000-1100 vl	Lesotho, Radio	4800do			
1000-1100	Malaysia, Radio	7295do			
1000-1100 vl	Malaysia, RTM KotaKinabalu	5980do			
1000-1030 s	Malta, VO Mediterranean	11770eu	11830eu		
1000-1100 twhf	N Mariana Is, KHBI Saipan	9355as	15665as		
1000-1100 vl	Namibia, NBC	6060af	6175af		
1000-1100	Netherlands, Radio	7260as	9820au	12065as	
1000-1015	New Zealand, R NZ Intl	9700pa			
1000-1100 vl	Nigeria, Radio/Ibadan	6050do			
1000-1100 vl	Nigeria, Radio/Kaduna	4770do			
1000-1100 vl	Nigeria, Voice of	7255af	15120va		
1000-1100 vl	Papua New Guinea, NBC	4890do			
1000-1100	Philippines, FEBC/R Intl	11635as			
1000-1030	Singapore, RTE Radio	11740as			
1000-1100	Singapore, RCorp Singapore	6150do			
1000-1100 vl	Solomon Islands, SIBC	5020do			
1000-1030	Tanzania, Radio	5050af			
1000-1100	UK, BBC World Service	6190af	6195va	9410eu	9740as
		11760me	11765pa	11940af	12095eu
		15310as	15360pa	15485eu	15565eu
		15575as	17640eu	17705eu	17760as
		17790as	17885af	21660as	
1000-1100 as	UK, BBC World Service	15190sa	15400af	17830af	
1000-1100	UK, Merlin Network One	9915eu	13660eu	17630eu	21550af
1000-1100	USA, KAIJ Dallas TX	5810va	9815am		
1000-1100	USA, KTNB Salt Lk City UT	7510am			
1000-1100	USA, KWHR Naalehu HI	9930as	11565pa		
1000-1100	USA, Voice of America	5985pa	7405ca	9590ca	
		11720as	15425as		
1000-1100	USA, WBCQ Monticello ME	7415na			
1000-1100	USA, WEWN Birmingham AL	5825va			
1000-1100 mtwhf	USA, WGTG McCaysville GA	9400am			
1000-1100	USA, WHRI Noblesville IN	6040am	9495am		
1000-1100	USA, WJCR Upton KY	7490na	13595as		
1000-1100 mtwhf	USA, WRMI/R Miami Intl	9955ca			
1000-1100	USA, WRNO New Orleans LA	7395am			
1000-1100	USA, WSHB Cypress Crk SC	6095am	7395am	9455sa	
1000-1100	USA, WWCR Nashville TN	2390na	3210na	5070na	5935na
1000-1100	USA, WYFR Okeechobee FL	5950na			
1000-1025	Vietnam, Voice of	5940as	7270as	7400as	9839as
		12019as	15009as		
1000-1100	Zambia, Christian Voice	6065af			
1000-1100	Zambia, Natl BC Corp	6165do	6265do		
1000-1100 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
1015-1100 occsnal	New Zealand, R NZ Intl	9700pa			
1030-1100	Georgia, Georgian Radio	11910eu			
1030-1100	Guam, AWR/KSDA	11660as	11795as		
1030-1100	Malaysia, RTM Sarawak	7160do			
1030-1100	South Korea, R Korea Intl	11715am			
1030-1100	Sri Lanka, Sri Lanka BC	11835as	17850as		
1030-1100 as	Tanzania, Radio	5050af			
1030-1100	UAE, Radio Dubai	13675eu	15370eu	15395eu	21605eu

FREQUENCIES

1500-1600	Anguilla, Caribbean Beacon	11775am				1500-1600	Palau, KHBN/Voice of Hope	9955as	9965as	9985as	
1500-1600 vl	Australia, ABC/Alice Spgs	2310do				1500-1600 vl	Papua New Guinea, NBC	4890do			
1500-1600 vl	Australia, ABC/Katherine	2485do				1500-1600	Philippines, FEBC/R Intl	11995as			
1500-1600 vl	Australia, ABC/Tent Creek	2325do				1500-1600	Russia, Voice of Russia WS	6030eu	7440eu	9775as	9800as
1500-1600	Australia, Radio	5995pa	9500as	9580pa	11660as			11500as			
1500-1600 vl	Botswana, Radio	4820do	4830do	7255do		1500-1530	S Africa, Channel Africa	17870af			
1500-1600 vl	Canada, CBC N Quebec Svc	9625do				1500-1600	Seychelles, FEBA Radio	11600as			
1500-1600	Canada, CFRX Toronto	6070do				1500-1600	Singapore, RTE Radio	15360as	15625as		
1500-1600	Canada, CFVP Calgary	6030do				1500-1600	Singapore, RCorp Singapore	6150do			
1500-1600	Canada, CHNX Halifax	6130do				1500-1600	Sri Lanka, Sri Lanka BC	9730as	15425as		
1500-1600	Canada, CKZN St John's	6160do				1500-1600 as	Tanzania, Radio	5050af			
1500-1600	Canada, CKZU Vancouver	6160do				1500-1600	Uganda, Radio	4976do			
1500-1600 s	Canada, R Canada Intl	9640am	13650am	17715am		1500-1600	UK, BBC World Service	6190af	9410af	9515na	9590na
1500-1600	China, China Radio Intl	7160as	7405na	9785as	13685af			11860af	11940af	12095eu	15220na
		15125af						15400af	15420af	15485eu	1556eu
1500-1600	Ecuador, HCJB	12005am	15115am	21455va				17705eu	17830af	17840am	21470af
1500-1600 as/vl	Eq Guinea, R East Africa	15186af				1500-1600 mtwhf	UK, BBC World Service	21490af			
1500-1600	Germany, Sunrise Radio	6110va				1500-1600 as	UK, BBC World Service	5975as	11750as	15310as	
1500-1530	Germany, Voice of Hope	15715as				1500-1600	UK, Merlin Network One	5990as	6195as	9740as	
1500-1600	Germany, Overcomer Minist	6015eu	13810me			1500-1600	USA, KAIJ Dallas TX	9915eu	13680eu	17630eu	21550af
1500-1600 vl	Ghana, Ghana BC Corp	4915do				1500-1600	USA, KJES Mesquite NM	13815va			
1500-1600	Guam, TWR/KTWR	12015as				1500-1600	USA, KTBN Salt Lk City UT	11715na			
1500-1600	Guyana, GBC/Voice of	3290do	5950do			1500-1600	USA, KWHR Naalehu HI	7510am			
1500-1600	Ireland, Unt Christian BC	6200do				1500-1600	USA, Voice of America	9930as	11565pa		
1500-1530	Israel, Kol Israel	15650va	17535va					6110as	7125as	7215as	9575me
1500-1600	Japan, Radio/NHK	7200as	9505na	9750as	11730as			9645as	9760as	12040as	15205me
1500-1600	Jordan, Radio	11690eu						15395as			
1500-1600	Kenya, Kenya BC Corp	4935do				1500-1600	USA, WEWN Birmingham AL	11875na	15745eu		
1500-1600 vl	Lesotho, Radio	4800do				1500-1600 mtwhfa	USA, WGTG McCaysville GA	9400am			
1500-1510	Liberia, LCN/R Liberia Int	5100do				1500-1600	USA, WHRI Noblesville IN	13760am	15105am		
1500-1600	Malaysia, Radio	7295do				1500-1600	USA, WJCR Upton KY	7490na	13595as		
1500-1600	Malaysia, RTM Sarawak	7160do				1500-1600 as	USA, WRMI/R Miami Intl	9955ca			
1500-1600 vl	Malaysia, RTM Kotakinabalu	5980do				1500-1600	USA, WRNO New Orleans LA	7395am			
1500-1530	Mexico, Radio Mexico Intl	9705na				1500-1600	USA, WWCR Nashville TN	9475na	12160na	13845na	15685na
1500-1530	Mongolia, Voice of	11790as	12085as			1500-1600	USA, WYFR Okeechobee FL	11830na	17760na		
1500-1600	Myanmar, Radio	5986do				1500-1600	Zambia, Christian Voice	6065af			
1500-1600 vl	Namibia, NBC	6060af	6175af			1500-1600	Zambia, Natl BC Corp	6165do	6265do		
1500-1600	Netherlands, Radio	12090as	13755as	15585as		1500-1600 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
1500-1600 occsnal	New Zealand, R NZ Intl	6105pa				1515-1530 mtwhf	UK, BBC World Service	5975as	11750as	15310as	
1500-1600 vl	Nigeria, Radio/Ibadan	6050do				1530-1540	Bangladesh, Bangla Betar	4880as	15520as		
1500-1600 vl	Nigeria, Radio/Kaduna	4770do				1530-1600	Guam, AWR/KSDA	11625as	11925as		
1500-1600 vl	Nigeria, Voice of	7255af	15120va			1530-1600	Iran, VOIRI	7215as	9780as	13695as	
1500-1600	North Korea, R Pyongyang	3560as	9640va	9975me	11335am	1530-1600	Tanzania, Radio	5050af			
		11735am	13650va			1545-1600 sh	Bangladesh, Bangla Betar	4880as	15520as		
						1550-1600 a	Vatican State, Vatican R	11640as	13765as		

SELECTED PROGRAMS

Sundays

- 1500 Ecuador, HCJB Quito (am): Encounter. Expository biblical preaching by Stephen Olford.
- 1500 Philippines, FEBC Manila: The Back to God Hour.
- 1515 UK, BBC London (AS): On Your Behalf. See S 0130.
- 1530 Ecuador, HCJB Quito (am): Let My People Think. Addressing questions of today's thinking Christians.
- 1530 Philippines, FEBC Manila: Guidelines.
- 1535 Philippines, FEBC Manila: The Way to Life.
- 1540 Philippines, FEBC Manila: Focus on Bible Lands.
- 1555 Philippines, FEBC Manila: Preview of Tomorrow's Programs.

Mondays

- 1500 Ecuador, HCJB Quito (am): Back to the Bible. A mix of music and daily Bible study. (www.gospelcom.net/bttb/)
- 1500 Philippines, FEBC Manila: The Haven of Rest.
- 1525 Ecuador, HCJB Quito (am): Joni and Friends. See S 1200.
- 1530 Ecuador, HCJB Quito (am): Thru the Bible. J. Vernon McGee presents a book-by-book study of the Bible.
- 1530 Philippines, FEBC Manila: World News Update.
- 1535 Philippines, FEBC Manila: The Way to Life.
- 1540 Philippines, FEBC Manila: See the World.
- 1555 Philippines, FEBC Manila: Preview of Tomorrow's Programs.
- 1558 Ecuador, HCJB Quito (am): Parent Talk Tip. See M 1358.

Tuesdays

- 1500 Ecuador, HCJB Quito (am): Back to the Bible. See M 1500.
- 1500 Philippines, FEBC Manila: The Haven of Rest.
- 1525 Ecuador, HCJB Quito (am): Joni and Friends. See S 1200.
- 1530 Ecuador, HCJB Quito (am): Thru the Bible. See M 1530.
- 1530 Philippines, FEBC Manila: World News Update.
- 1535 Philippines, FEBC Manila: The Way to Life.
- 1540 Philippines, FEBC Manila: The Storyteller.
- 1555 Philippines, FEBC Manila: Preview of Tomorrow's Programs.

- 1558 Ecuador, HCJB Quito (am): Parent Talk Tip. See M 1358.

Wednesdays

- 1500 Ecuador, HCJB Quito (am): Back to the Bible. See M 1500.
- 1500 Philippines, FEBC Manila: The Haven of Rest.
- 1525 Ecuador, HCJB Quito (am): Joni and Friends. See S 1200.
- 1530 Ecuador, HCJB Quito (am): Thru the Bible. See M 1530.
- 1530 Philippines, FEBC Manila: World News Update.
- 1535 Philippines, FEBC Manila: The Way to Life.
- 1540 Philippines, FEBC Manila: Bible Adventures.
- 1555 Philippines, FEBC Manila: Preview of Tomorrow's Programs.
- 1558 Ecuador, HCJB Quito (am): Parent Talk Tip. See M 1358.

Thursdays

- 1500 Ecuador, HCJB Quito (am): Back to the Bible. See M 1500.
- 1500 Philippines, FEBC Manila: The Haven of Rest.
- 1525 Ecuador, HCJB Quito (am): Joni and Friends. See S 1200.
- 1530 Ecuador, HCJB Quito (am): Thru the Bible. See M 1530.
- 1530 Philippines, FEBC Manila: World News Update.
- 1535 Philippines, FEBC Manila: The Way to Life.
- 1540 Philippines, FEBC Manila: A Story for You.
- 1555 Philippines, FEBC Manila: Preview of Tomorrow's Programs.
- 1558 Ecuador, HCJB Quito (am): Parent Talk Tip. See M 1358.

Fridays

- 1500 Ecuador, HCJB Quito (am): Back to the Bible. See M 1500.
- 1500 Philippines, FEBC Manila: The Haven of Rest.
- 1515 UK, BBC London (AE): Small Worlds. See A 0130.
- 1515 UK, BBC London (AS): On Your Behalf. See S 0130.
- 1525 Ecuador, HCJB Quito (am): Joni and Friends. See S 1200.
- 1530 Ecuador, HCJB Quito (am): Thru the Bible. See M 1530.
- 1530 Philippines, FEBC Manila: World News Update.
- 1535 Philippines, FEBC Manila: The Way to Life.
- 1540 Philippines, FEBC Manila: Mailbag.
- 1555 Philippines, FEBC Manila: Preview of Tomorrow's Programs.
- 1558 Ecuador, HCJB Quito (am): Parent Talk Tip. See M 1358.

Saturdays

- 1500 Ecuador, HCJB Quito (am): Words of Hope. David Bass provides the message.
- 1500 Philippines, FEBC Manila: Radio Bible School.
- 1530 Ecuador, HCJB Quito (am): Songtime Weekend. Evangelical teachings and music from Boston.
- 1530 Philippines, FEBC Manila: World News Update.
- 1535 Philippines, FEBC Manila: The Way to Life.
- 1540 Philippines, FEBC Manila: Far East Forum.
- 1555 Philippines, FEBC Manila: Preview of Tomorrow's Programs.

HAUSER'S HIGHLIGHTS HUNGARY: R. BUDAPEST

B-98 English:

UTC	KHz	To
2000-2030	3975, 6025	Eu
2200-2230	3975, 7250	Eu
0200-0230	6135, 9835	NAm
0330-0400	9835, 11990	NAm

(R. Budapest via John Norfolk)

Also first station this cycle to be scheduled on 11 m, 1100-1300 UTC in Hungarian to Australia on 25700 (Bob Padula, Australia)

Confirmed, daily except Sunday audible here (Dave Kenny, England)

FREQUENCIES

1600-1700	Algeria, R Algiers Intl	11715af	15160me	1600-1700	Russia, Voice of Russia WS	730me	4940me	4975me	7210me
1600-1700	Anguilla, Caribbean Beacon	11775am		1600-1700 sm	Russia, Voice of Russia WS	6005me			
1600-1700 vl	Australia, ABC/Alice Spgs	2310do		1600-1630	S Africa, Channel Africa	6000af			
1600-1700 vl	Australia, ABC/Katherine	2485do		1600-1700	South Korea, R Korea Intl	5975as	9515va	9870as	
1600-1700 vl	Australia, ABC/Tent Creek	2325do		1600-1630	Sri Lanka, Sri Lanka BC	9730as	15425as		
1600-1700	Australia, Radio	5995pa	9500as	1600-1700	Swaziland, Trans World R	9500af			
1600-1700 vl	Botswana, Radio	4820do	4830do	1600-1615	Switzerland, Swiss R Intl	9575as	15185as		
1600-1700 vl	Canada, CBC N Quebec Svc	9625do	9580pa	1600-1700	Tanzania, Radio	5050af			
1600-1700	Canada, CFRX Toronto	6070do	7255do	1600-1645	UAE, Radio Dubai	13630eu	13675eu	15395eu	21605eu
1600-1700	Canada, CFVP Calgary	6030do		1600-1700	Uganda, Radio	4976do			
1600-1700	Canada, CHNX Halifax	6130do		1600-1700	UK, BBC World Service	3915as	5975as	5990as	6190af
1600-1700	Canada, CKZN St John's	6160do		1600-1700		6195va	7160as	9410eu	9515na
1600-1700	Canada, CKZU Vancouver	6160do		1600-1700		9740as	11750as	11940af	12095eu
1600-1659 s	Canada, R Canada Intl	9640am	13650am	1600-1700		15310as	15400af	15485eu	15565eu
1600-1656	China, China Radio Intl	7190af	9565af	1600-1700		17830af	17840am	21470af	21660af
1600-1700	Ethiopia, Radio	7165af		1600-1700	UK, Merlin Network One	6185eu	21550af		
1600-1700	France, Radio France Intl	9485af	11615af	1600-1700	USA, KAIJ Dallas TX	13815va			
		15210af	15530af	1600-1700	USA, KTBN Salt Lk City UT	15590am			
1600-1645	Germany, Deutsche Welle	6170as	7225as	1600-1700	USA, KWHR Naalehu HI	9930as	6110as	7125as	7215as
1600-1630	Germany, Deutsche Welle	7120af	9735af	1600-1700	USA, Voice of America	6035af	9575me	9645as	9760as
		15145af	17800af	1600-1700		12040af	13600af	13710af	15205me
		6110va		1600-1700		15225af	15395as	15410af	
1600-1700	Germany, Sunrise Radio	11840af		1600-1700	USA, WEWN Birmingham AL	11875na	13615na	15745eu	
1600-1630 s	Germany, Universal Life	11840va		1600-1700 mtwhfa	USA, WGTG McCaysville GA	9400am			
1600-1700 a	Germany, Good News World R	6015eu	13810me	1600-1700	USA, WHRI Noblesville IN	13760am	15105am		
1600-1700	Germany, Overcomer Ministr	4915do		1600-1700	USA, WJCR Upton KY	7490na	13595as		
1600-1700 vl	Ghana, Ghana BC Corp	11980as		1600-1700 as	USA, WRMI/R Miami Intl	9955ca			
1600-1700	Guam, AWR/KSDA	12015as		1600-1700	USA, WRNO New Orleans LA	15420am			
1600-1630	Guam, TWR/KTWR	3290do	5950do	1600-1700	USA, WSHB Cypress Crk SC	18910af			
1600-1700	Guyana, GBC/Voice of	7215as	9780as	1600-1700	USA, WWCR Nashville TN	9475na	12160na	13845na	15685na
1600-1630	Iran, VOIRI	6200do	13605as	1600-1700	USA, WYFR Okeechobee FL	11830na	15215na	15695eu	17555eu
1600-1700	Ireland, Unt Christian BC	11690eu		1600-1610 a	Vatican State, Vatican R	11640as	13765as		
1600-1700	Jordan, Radio	4935do		1600-1625	Vietnam, Voice of	5940eu	7270eu	7400eu	9839eu
1600-1700	Kenya, Kenya BC Corp	9960me				12019eu	15009eu		
1600-1700	Lebanon, Voice of Hope	4800do		1600-1700	Zambia, Christian Voice	3330af	4965af		
1600-1700 vl	Lesotho, Radio	7295do		1600-1700	Zambia, Natl BC Corp	6165do	6265do		
1600-1700	Malaysia, Radio	9705na		1600-1630 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
1600-1630 smtwha	Mexico, Radio Mexico Intl	6060af	6175af	1615-1700 as	UK, BBC World Service	9515na	11860af		
1600-1700 vl	Namibia, NBC	12090as	13755as	1630-1657	Canada, R Canada Intl	6140as	7150as		
1600-1625	Netherlands, Radio	6105pa		1630-1700	Egypt, Radio Cairo	15255af			
1600-1650 occsnal	New Zealand, R NZ Intl	6050do		1630-1700 mtwhf	Eq Guinea, Radio Africa	7190af	15186af		
1600-1700 vl	Nigeria, Radio/Ibadan	4770do		1630-1700 s	Seychelles, FEBA Radio	11665as			
1600-1700 vl	Nigeria, Radio/Kaduna	7255af	15120va	1630-1700 vl	Zimbabwe, Zimbabwe BC	3306do	4828do		
1600-1700 vl	Nigeria, Voice of	11570me	15170af	1645-1700	Israel, Kol Israel	9435va	11605va	15650va	
1600-1630	Pakistan, Radio	17720af		1645-1700	Tajikistan, Radio	7245as			
1600-1700	Palau, KHBN/Voice of Hope	9955as	9965as	1650-1700 mtwhf	New Zealand, R NZ Intl	6145pa			
1600-1700 vl	Papua New Guinea, NBC	4890do							

SELECTED PROGRAMS

Sundays

- 1600 South Korea, R Korea Intl: News. See S 0200.
- 1610 South Korea, R Korea Intl: Echoes of Korean Music. See S 1110.
- 1636 South Korea, R Korea Intl: Multiwave Feedback. See S 1136.

Mondays

- 1600 South Korea, R Korea Intl: News. See S 0200.
- 1610 South Korea, R Korea Intl: News Commentary. See S 0210.
- 1615 South Korea, R Korea Intl: Seoul Calling. See M 1115.
- 1640 South Korea, R Korea Intl: Economic News Briefs. See M 1140.
- 1645 South Korea, R Korea Intl: Notes of Nostalgia. See M 1145.
- 1650 New Zealand, R NZ Intl: Bellbird. RNZI's famous interval signal.
- 1655 New Zealand, R NZ Intl: Karanga/Reading/Hymn. Vespers at the beginning of transmission.

Tuesdays

- 1600 South Korea, R Korea Intl: News. See S 0200.
- 1610 South Korea, R Korea Intl: News Commentary. See S 0210.
- 1615 South Korea, R Korea Intl: Seoul Calling. See M 1115.
- 1640 South Korea, R Korea Intl: Economic News Briefs. See M 1140.
- 1645 South Korea, R Korea Intl: Cultural Promenade. See T 1145.
- 1650 New Zealand, R NZ Intl: Bellbird. See M 1650.
- 1655 New Zealand, R NZ Intl: Karanga/Reading/Hymn. See M 1655.

Wednesdays

- 1600 South Korea, R Korea Intl: News. See S 0200.
- 1610 South Korea, R Korea Intl: News Commentary. See S 0210.
- 1615 South Korea, R Korea Intl: Seoul Calling. See M 1115.
- 1640 South Korea, R Korea Intl: Economic News Briefs. See M 1140.
- 1645 South Korea, R Korea Intl: Reaching Forward. See W 1145.
- 1650 New Zealand, R NZ Intl: Bellbird. See M 1650.
- 1655 New Zealand, R NZ Intl: Karanga/Reading/Hymn. See M 1655.

Thursdays

- 1600 South Korea, R Korea Intl: News. See S 0200.
- 1610 South Korea, R Korea Intl: News Commentary. See S 0210.
- 1615 South Korea, R Korea Intl: Seoul Calling. See M 1115.
- 1615 UK, BBC London (AS): Planet 2000 (7th, 14th). See M 1430.
- 1640 South Korea, R Korea Intl: Economic News Briefs. See M 1140.
- 1645 South Korea, R Korea Intl: Tales from Korea's Past. See H 1145.
- 1650 New Zealand, R NZ Intl: Bellbird. See M 1650.
- 1655 New Zealand, R NZ Intl: Karanga/Reading/Hymn. See M 1655.

Fridays

- 1600 South Korea, R Korea Intl: News. See S 0200.
- 1610 South Korea, R Korea Intl: News Commentary. See S 0210.
- 1615 South Korea, R Korea Intl: Sites and Sounds. See S 1115.
- 1615 UK, BBC London (AE): On Your Behalf. See S 0130.
- 1630 South Korea, R Korea Intl: Let's Learn Korean!. See F 1130.
- 1645 South Korea, R Korea Intl: Globalizing Korea. See M 1243.
- 1650 New Zealand, R NZ Intl: Bellbird. See M 1650.
- 1655 New Zealand, R NZ Intl: Karanga/Reading/Hymn. See M 1655.

Saturdays

- 1600 South Korea, R Korea Intl: News. See S 0200.
- 1610 South Korea, R Korea Intl: News Commentary. See S 0210.
- 1615 South Korea, R Korea Intl: Music Trap. See S 0215.
- 1640 South Korea, R Korea Intl: From Us to You. See S 0240.

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FREQUENCIES

1900-2000	Anguilla, Caribbean Beacon	11775am			2000-2100	Canada, CHNX Halifax	6130do	CKZN St John's	6160do
1900-2000 vl	Australia, ABC/Katherine	2485do	ABC/Tent Creek	2325do	2000-2100	Canada, CKZU Vancouver	6160do		
1900-2000	Australia, Radio	6080as	7240pa	9500as	2000-2100 vl	Chile, R Voz Cristiana	6070am	17680am	21500am
		9660as	11880pa		2000-2056	China, China Radio Intl	5220eu	6950eu	21550am
		4820do	4830do				9920eu	11840af	9440af
1900-2000 vl	Botswana, Radio	15265eu			2000-2100	Costa Rica, RF Peace Intl	15050am	21460am	15500af
1900-1920	Brazil, R Nacional Bras	6070do	CFVP Calgary	6030do	2000-2100	Ecuador, HCJB	15115eu	21455am	
1900-2000	Canada, CFRX Toronto	6130do	CKZN St John's	6160do	2000-2100 mtwhf	Eqt Guinea, Radio Africa	7190af	15186af	
1900-2000	Canada, CKZU Vancouver	6160do			2000-2030	Finland, YLE/R Finland	6135eu		
1900-1956	China, China Radio Intl	6955af	9440af	9600af	2000-2050	Germany, Deutsche Welle	7285eu		
1900-2000	Costa Rica, RF Peace Intl	15050am	21460am		2000-2100	Germany, Voice of Hope	5840eu		
1900-2000	Ecuador, HCJB	15115eu	21455am		2000-2100	Germany, Overcomer Ministr	11925me		
1900-2000 mtwhf	Eqt Guinea, Radio Africa	7190af	15186af		2000-2100 vl	Ghana, Ghana BC Corp	3366do	4915do	
1900-1950	Germany, Deutsche Welle	9640af	9765af	11785af	2000-2100	Guatemala, Adv World R	5980am		
		13690af	15275af		2000-2100	Guyana, GBC/Voice of	3290do	5950do	
		5840eu			2000-2030	Hungary, Radio Budapest	3975eu	6025eu	
1900-2000	Germany, Overcomer Ministr	11925me			2000-2100	Indonesia, Voice of	9525as	11765as	15510as
1900-2000 vl	Ghana, Ghana BC Corp	3366do	4915do		2000-2030	Iran, VOIRI	7160eu	7260eu	9022eu
1900-1910	Greece, Voice of	7500eu	9375eu		2000-2100	Ireland, Unt Christian BC	6200do		
1900-2000	Guatemala, Adv World R	5980am			2000-2025	Israel, Kol Israel	7465eu	9435eu	11605va
1900-2000	Guyana, GBC/Voice of	3290do	5950do		2000-2100	Italy, IRRS	3985va		
1900-1945	India, All India Radio	7410va	9650af	9950va	2000-2020	Italy, RAI Intl	5970eu	7120eu	
		11935af	13780af	15075af	2000-2100	Kenya, Kenya BC Corp	4885do	4935do	
		6200do			2000-2100	Kuwait, Radio	11990am		
1900-2000	Ireland, Unt Christian BC	3985va			2000-2100	Lebanon, Voice of Hope	9960me		
1900-2000	Italy, IRRS	4885do	4935do		2000-2100 vl	Lesotho, Radio	4800do		
1900-2000	Kenya, Kenya BC Corp	11990am			2000-2100	Liberia, Radio Veritas	5470do		
1900-2000	Kuwait, Radio	9960me			2000-2055	Liberia, LCN/R Liberia Int	5100do		
1900-2000	Lebanon, Voice of Hope	4800do			2000-2100	Malaysia, Radio	7295do		
1900-2000 vl	Lesotho, Radio	5470do			2000-2100	Malta, VO Mediterranean	7440eu		
1900-2000	Liberia, Radio Veritas	5100do			2000-2030	Mexico, Radio Mexico Intl	9705na		
1900-1915	Liberia, LCN/R Liberia Int	7295do			2000-2100	N Mariana Is, KHBI Saipan	13840pa		
1900-2000	Malaysia, Radio	9355eu	9385va		2000-2100 vl	Namibia, NBC	3270af	3289af	
1900-2000	N Mariana Is, KHBI Saipan	6020af	9605af	9895af	2000-2025	Netherlands, Radio	6020af	9605af	11655af
1900-2000	Netherlands, Radio	15310af			2000-2100	New Zealand, R NZ Intl	17675pa		
		11675pa			2000-2015 vl	Niger, Voice du Sahel	5019do		
1900-1951 smtwh	New Zealand, R NZ Intl	11675pa			2000-2100 vl	Nigeria, Radio/Ibadan	6050do		
1900-1958 fas	New Zealand, R NZ Intl	6050do			2000-2100 vl	Nigeria, Radio/Kaduna	4770do		
1900-2000 vl	Nigeria, Radio/Ibadan	4770do			2000-2100	Nigeria, Radio/Lagos	3326do		
1900-2000 vl	Nigeria, Radio/Kaduna	3326do			2000-2100	Nigeria, Voice of	7255af	15120va	
1900-2000	Nigeria, Radio/Lagos	7255af	15120va		2000-2100 vl	Papua New Guinea, NBC	5940eu	5965eu	7340eu
1900-2000	Nigeria, Voice of	9600va	9975af		2000-2100	Russia, Voice of Russia WS	9890eu		9480eu
1900-1930 vl	North Korea, R Pyongyang	6520va							
1900-1930 m-a/vl	Papua New Guinea, NBC	4890do			2000-2005	S Africa, Voice of Hope	6290af		
1900-1930	Philippines, R Pilipinas	11720me	11890as	15190as	2000-2100 vl	Sierra Leone, SLBS	3316do		
1900-2000	Russia, Voice of Russia WS	5920eu	5940eu	5965eu	2000-2100 vl	Solomon Islands, SIBC	5020do		
		7310eu	9480eu	9745af	2000-2100 mtwhf	Spain, R Exterior Espana	9595af	9680eu	
		3316do			2000-2100	Sri Lanka, Sri Lanka BC	6005as		
1900-2000 vl	Solomon Islands, SIBC	5020do			2000-2015	Swaziland, Trans World R	3200af		
1900-2000	South Korea, R Korea Intl	5975as	7275as		2000-2030	Switzerland, Swiss R Intl	6165eu	9620af	9885af
1900-2000	Sri Lanka, Sri Lanka BC	6005as			2000-2100	Turkey, Voice of	9630as	9655va	
1900-2000 a	Sri Lanka, Sri Lanka BC	6010eu			2000-2100	Uganda, Radio	4976do		
1900-2000	Swaziland, Trans World R	3200af			2000-2100	UK, BBC World Service	3255af	3955eu	5975pa
1900-1930	Tanzania, Radio	5050af			2000-2100	UK, BBC World Service	6180eu	6190af	6005af
1900-2000	Thailand, Radio	9535eu	9655eu	11905eu	2000-2100	UK, BBC World Service	6180eu	6190af	6005af
1900-2000	Uganda, Radio	4976do					9740pa	11835af	12095af
1900-2000	Uk, BBC World Service	3255af	3955eu	6005af	2000-2100	UK, Merlin Network One	11985eu		
		6180eu	6190af	9410eu	2000-2100	USA, KAJL Dallas TX	13815va		
		11980me	12095eu	17830af	2000-2100	USA, KTBN Salt Lk City UT	15590am		
		6125eu			2000-2100	USA, KWHR Naalehu HI	15405as		
1900-2000	UK, Merlin Network One	13815va			2000-2100	USA, Voice of America	6035af	6095me	7415af
1900-2000	USA, KAJL Dallas TX	15385as			2000-2100	USA, WBCQ Monticello ME	11975af	13710af	15410af
1900-2000	USA, KJES Mesquite NM	15590am			2000-2100	USA, WEWN Birmingham AL	9385eu		
1900-2000	USA, KTBN Salt Lk City UT	9930as			2000-2100 mtwhfa	USA, WGTG McCaysville GA	9400am		
1900-2000	USA, KWHR Naalehu HI	7415af	9525pa	9760me	2000-2100	USA, WHRA Greenbush ME	15400af		
1900-2000	USA, Voice of America	11920af	13710af	11870pa	2000-2100	USA, WHRI Noblesville IN	9495am	13760am	
		4950af			2000-2100	USA, WINB Red Lion PA	13790am		
1900-1930 a	USA, Voice of America	11875na	13615na	15745eu	2000-2100	USA, WJCR Upton KY	7490na	13595as	
1900-2000	USA, WEWN Birmingham AL	9400am			2000-2100	USA, WMLK Bethel PA	9465va		
1900-2000 mtwhfa	USA, WGTG McCaysville GA	17655af			2000-2100 a	USA, WRM/R Miami Intl	9955ca		
1900-2000	USA, WHRA Greenbush ME	15400af			2000-2100	USA, WRNO New Orleans LA	15420am		
1900-2000	USA, WHRI Noblesville IN	9495am	13760am		2000-2100	USA, WSHB Cypress Crk SC	9355eu	11550eu	13770eu
1900-2000	USA, WINB Red Lion PA	13790am			2000-2045	USA, WWCR Nashville TN	9475na	12160na	13845na
1900-2000	USA, WJCR Upton KY	7490na	13595as		2000-2100 vl	USA, WYFR Okeechobee FL	5810eu	7355eu	15665af
1900-2000	USA, WMLK Bethel PA	9465va			2000-2100	Vanuatu, Radio	4960do		
1900-2000	USA, WRM/R Miami Intl	9955ca			2000-2100	Zambia, Christian Voice	3330af	4965af	6265do
1900-2000	USA, WRNO New Orleans LA	15420am			2000-2100 vl	Zambia, Natl BC Corp	6165do	6265do	4828do
1900-2000	USA, WSHB Cypress Crk SC	9355eu	15665af	17510af	2005-2100	Zimbabwe, Zimbabwe BC	12085eu	13605af	11625af
1900-2000	USA, WWCR Nashville TN	9475na	12160na	13845na	2010-2030	Syria, Radio Damascus	11625af	13765af	
1900-1945	USA, WYFR Okeechobee FL	5810eu			2015-2030	Vatican State, Vatican R	7180eu	9650eu	
1900-2000 vl	Vanuatu, Radio	4960do			2015-2030 vl	Albania, R Tirana Intl	15235va	15415va	15435va
1900-1925	Vietnam, Voice of	12019eu	7270eu	7400eu	2020-2100	Libya, Voice of Africa	13720eu	13750eu	
		4965af			2025-2045	Cuba, Radio Havana	7175af	9670af	11715af
		6165do			2030-2100 th	Italy, RAI Intl	7210eu		
		4828do			2030-2100	Belarus, R Belarus Intl	7105eu		
		11910eu			2030-2100	Egypt, Radio Cairo	15375af		
1900-2000	Zambia, Christian Voice	3330af			2030-2100	Georgia, Georgian Radio	11760eu		
1900-2000	Zambia, Natl BC Corp	6165do			2030-2100	Germany, AWR Europe	9640af		
1900-2000 vl	Zimbabwe, Zimbabwe BC	3306do			2030-2055	Moldova, R Moldova Intl	7520eu		
1930-2000	Georgia, Georgian Radio	11910eu			2030-2100	Mongolia, Voice of	11790eu	12085eu	
1930-2000	Iran, VOIRI	7160eu	7260eu	9022eu	2030-2100	Poland, Polish R Warsaw	6035eu	6095eu	7285eu
1930-2000	Serbia, Radio Yugoslavia	6100eu			2030-2100	S Africa, AWR Africa	9745af		
1930-2000	Slovakia, R Slovakia Intl	5775eu			2030-2100	Sweden, Radio	6065va	13830va	
1930-2000	Turkey, Voice of	9630as			2030-2045	Thailand, Radio	9535eu	9655eu	11905eu
1935-1955	Italy, RAI Intl	5970eu			2030-2100 as	USA, Voice of America	4950af		
1952-2000	New Zealand, R NZ Intl	17675pa			2030-2100	USA, Voice of America	7105eu	9540eu	9540eu
1956-2000	S Africa, Voice of Hope	6290af			2030-2055	Uzbekistan, R Tashkent	5940eu	7270eu	7400eu
					2030-2100	Vietnam, Voice of	12019eu	15009eu	9839eu
					2045-2100	India, All India Radio	7410eu	9650eu	9910eu
					2045-2100	USA, WYFR Okeechobee FL	5810eu	7355eu	15565va
					2050-2100	Vatican State, Vatican R	4005eu	5880eu	7250eu
									9645eu

2000 UTC

2000-2100	Algeria, R Algiers Intl	11715af	11750af		2045-2100	India, All India Radio	7410eu	9650eu	9910eu
2000-2100	Anguilla, Caribbean Beacon	11775am			2045-2100	USA, WYFR Okeechobee FL	5810eu	7355eu	15565va
2000-2100 vl	Australia, ABC/Alice Spgs	2310do	ABC/Katherine	2485do	2050-2100	Vatican State, Vatican R	4005eu	5880eu	7250eu
2000-2100 vl	Australia, ABC/Tent Creek	2325do							9645eu
2000-2100	Australia, Radio	9500as	9660as	11880pa					
2000-2100 vl	Botswana, Radio	4820do	4830do	12080as					
2000-2100	Bulgaria, Radio	5850eu							
2000-2100	Canada, CFRX Toronto	6070do	CFVP Calgary	6030do					

FREQUENCIES

2100-2200	Anguilla, Caribbean Beacon	11775am			
2100-2130 vl	Australia, ABC/Alice Spgs	2310do			
2100-2130 vl	Australia, ABC/Katherine	2485do			
2100-2200 vl	Australia, ABC/Katherine	5025do			
2100-2130 vl	Australia, ABC/Tent Creek	2325do			
2100-2200	Australia, Radio	7240as	9500pa	9660pa	11880pa
		12080as		21740pa	
2100-2200 vl	Botswana, Radio	4820do			
2100-2200 vl	Canada, CBC N Quebec Svc	9625do			
2100-2200	Canada, CFRX Toronto	6070do			
2100-2200	Canada, CFVP Calgary	6030do			
2100-2200	Canada, CHNX Halifax	6130do			
2100-2200	Canada, CKZN St John's	6160do			
2100-2200	Canada, CKZU Vancouver	6160do			
2100-2159	Canada, R Canada Intl	7235va	7235va	9725va	9805va
		11945va	13650va	13690va	15150va
		17820af			
2100-2200 vl	Chile, R Voz Cristiana	6070am	11745am	17680am	21550am
2100-2156	China, China Radio Intl	6950eu	7170af	9440af	9920eu
		11840af	11975af	15500af	
2100-2200	Costa Rica, RF Peace Intl	15050am	21460am		
2100-2130	Cuba, Radio Havana	13720eu	13750eu		
2100-2127	Czech Rep, R Prague Intl	5930eu	7345va		
2100-2200	Ecuador, HCJB	15115eu	21455am		
2100-2200	Egypt, Radio Cairo	15375af			
2100-2200 mtwhf	Eq Guinea, Radio Africa	7190af	15186af		
2100-2150	Germany, Deutsche Welle	9615af	9670as	9690af	9765as
		11785af	11865af	15275af	
2100-2200	Germany, Voice of Hope	6000eu			
2100-2200	Germany, Overcomer Ministr	11840as			
2100-2200 vl	Ghana, Ghana BC Corp	3366do	4915do		
2100-2200	Guyana, GBC/Voice of	3290do	5950do		
2100-2200	India, All India Radio	7410eu	9650eu	9910au	9950eu
		11620va	11715au		
2100-2200	Iraq, Radio Iraq Intl	11785va			
2100-2200	Ireland, Unt Christian BC	6200do			
2100-2200 vl	Italy, IRRS	3985va			
2100-2200	Japan, Radio/NHK	6035pa	9725eu	11850pa	13630na
2100-2130	Kenya, Kenya BC Corp	4885do	4935do		
2100-2200 vl	Lesotho, Radio	4800do			
2100-2200	Liberia, Radio Veritas	5470do			
2100-2115	Liberia, LCN/R Liberia Int	5100do			
2100-2200	Malaysia, Radio	7295do			
2100-2130 smtlf	Mexico, Radio Mexico Intl	9705na			
2100-2200 vl	Namibia, NBC	3270af	3289af		
2100-2200	New Zealand, R NZ Intl	17675pa			
2100-2200 vl	Nigeria, Radio/Ibadan	6050do			
2100-2200 vl	Nigeria, Radio/Kaduna	4770do			
2100-2200	Nigeria, Radio/Lagos	3326do			
2100-2200	North Korea, R Pyongyang	4405as	6575eu	9335eu	11710am
		13760am			
2100-2200 vl	Papua New Guinea, NBC	9675do			
2100-2125	Poland, Polish R Warsaw	6035eu	6095eu	7285eu	9525eu
2100-2200	Romania, R Romania Intl	7105eu	9550eu	9690eu	
2100-2200	Russia, Voice of Russia WS	5940eu	5965eu	7300eu	7340eu
		9890eu			
2100-2200 vl	Sierra Leone, SLBS	3316do			
2100-2200 vl	Solomon Islands, SIBC	5020do			
2100-2130	South Korea, R Korea Intl	3970eu	6480eu		
2100-2200	South Korea, R Korea Intl	15575eu			
2100-2130	Sri Lanka, Sri Lanka BC	6005as			
2100-2200	Syria, Radio Damascus	12085na	13605na		
2100-2200	UK, BBC World Service	3255af	3915as	3955eu	5965as
		5975va	6005af	6110as	6180eu
		6190af	6195va	7325eu	9410eu
		9740pa	11835af	12095sa	15400af
2100-2200	USA, KAIJ Dallas TX	13815va			
2100-2200	USA, KTVN Salt Lk City UT	15590am			
2100-2200	USA, Voice of America	6035af	6040me	6095me	7415af
		11870pa	11975af	13710af	15185pa
		15410af	15580af	17725af	17735pa
2100-2200	USA, WBCQ Monticello ME	7415na			
2100-2200	USA, WEWN Birmingham AL	9385eu			
2100-2200 mtwhfa	USA, WGTG McCaysville GA	9400am	11875na	13615na	
2100-2200	USA, WHRA Greenbush ME	15460af			
2100-2200	USA, WHRI Noblesville IN	5755am	9495am		
2100-2200 sm	USA, WHRI Noblesville IN	5755am			
2100-2200	USA, WINB Red Lion PA	13790am			
2100-2200	USA, WJCR Upton KY	7490na	13595as		
2100-2200 smtwhf	USA, WMLK Bethel PA	9465va			
2100-2200	USA, WRNO New Orleans LA	15420am			
2100-2200	USA, WWSB Cypress Crk SC	9355eu	11550eu	13770eu	15665af
2100-2200	USA, WWSB Cypress Crk SC	9475na	11580af	12160na	13845na
		15655af	15685na		
2100-2200	USA, WYFR Okeechobee FL	7355eu	11580af	15565va	
2100-2200 vl	Vanuatu, Radio	4960do			
2100-2110	Vatican State, Vatican R	4005eu	5880eu	7250eu	9645eu
2100-2200	Zambia, Christian Voice	3330af	4965af		
2100-2200	Zambia, Natl BC Corp	6165do	6265do		
2100-2200 vl	Zimbabwe, Zimbabwe BC	3306do	4828do		
2115-2145 mtwhfa	Armenia, Voice of	4810va	9965va		
2115-2200	Egypt, Radio Cairo	9900eu			
2115-2130 mtwhf	UK, BBC Caribbean Report	5975ca	15390ca	17715ca	
2130-2200 vl	Australia, ABC/Tent Creek	4910do			

2130-2200 th	Belarus, R Belarus Intl	7105eu	7210eu		
2130-2200	Guam, AWR/KSDA	15610as			
2130-2200	Iran, VOIRI	6025au	6165pa	6175au	
2130-2135 mtwhf	Latvia, Radio Latvia Intl	5935eu			
2130-2155	Moldova, R Moldova Intl	7520eu			
2130-2200	Turkey, Voice of	9525va			
2130-2145 tf	UK, BBC Calling Falklands	11680sa			

2200 UTC					
2200-2300	Anguilla, Caribbean Beacon	6090am			
2200-2300 vl	Australia, ABC/Katherine	5025do			
2200-2300 vl	Australia, ABC/Tent Creek	4910do			
2200-2300	Australia, Radio	17715pa	17795pa	21740pa	
2200-2300	Bulgaria, Radio	7535eu	7545eu		
2200-2300	Canada, CBC N Quebec Svc	9625do			
2200-2300	Canada, CFRX Toronto	6070do			
2200-2300	Canada, CFVP Calgary	6030do			
2200-2300	Canada, CHNX Halifax	6130do			
2200-2300	Canada, CKZN St John's	6160do			
2200-2300	Canada, CKZU Vancouver	6160do			
2200-2229	Canada, R Canada Intl	5995va	7235va	9735va	9805va
		11705as	11945va	13690va	15150va
2200-2256	China, China Radio Int'l	7170eu			
2200-2300	Costa Rica, RF Peace Intl	15050am	21460am		
2200-2245	Egypt, Radio Cairo	9900eu			
2200-2300 mtwhf	Eq Guinea, Radio Africa	7190af	15186af		
2200-2300	Germany, Voice of Hope	6000eu			
2200-2300	Germany, Overcomer Ministr	11840as			
2200-2300 vl	Ghana, Ghana BC Corp	3366do	4915do		
2200-2300	Guyana, GBC/Voice of	3290do	5950do		
2200-2230	Hungary, Radio Budapest	3975eu	7250eu		
2200-2230	India, All India Radio	7410eu	9650eu	9910au	9950eu
		11620va	11715au		
2200-2230	Iran, VOIRI	6025au			
2200-2300	Ireland, Unt Christian BC	6200do			
2200-2300 vl	Italy, IRRS	3985va			
2200-2225	Italy, RAI Intl	5990as	9675as	11900as	
2200-2215	Liberia, LCN/R Liberia Int	5100do			
2200-2300	Malaysia, Radio	7295do			
2200-2225	Moldova, R Moldova Intl	7520eu			
2200-2300 vl	Namibia, NBC	3270af	3289af		
2200-2300	New Zealand, R NZ Intl	17675pa			
2200-2300 vl	Nigeria, Radio/Ibadan	6050do			
2200-2300 vl	Nigeria, Radio/Kaduna	4770do			
2200-2300	Nigeria, Radio/Lagos	3326do			
2200-2230	Papua New Guinea, NBC	9675do			
2200-2230	Serbia, Radio Yugoslavia	6100eu	6185eu		
2200-2300 vl	Sierra Leone, SLBS	3316do			
2200-2300 vl	Solomon Islands, SIBC	5020do			
2200-2300 as	Spain, R Exterior Espana	9595af	9680eu		
2200-2205	Syria, Radio Damascus	12085na	13605na		
2200-2300	Taiwan, Radio Taipei Intl	5810eu	9985eu		
2200-2230	Turkey, Voice of	9525va			
2200-2300	UK, BBC World Service	3955eu	5965as	5975am	6175na
		6195va	7110as	7385as	9590na
		9660as	9915sa	11835af	11955as
		12080pa	12095sa	15400af	
2200-2300	UK, Merlin Network One	7170eu	9835na		
2200-2300	Ukraine, R Ukraine Intl	4820eu	5905eu	6020eu	6080eu
		7150na	7205eu	7380eu	7420eu
		9560eu			
2200-2300	USA, KAIJ Dallas TX	13815va			
2200-2300	USA, KTVN Salt Lk City UT	15590am			
2200-2300	USA, Voice of America	7215as	9770as	9890as	11760as
		15185as	15290as	15305as	17735pa
		17820as			
2200-2230 mtwhf	USA, Voice of America	6035af	7415af	11975af	12080af
		13710af			
2200-2300	USA, WBCQ Monticello ME	7415na			
2200-2300	USA, WEWN Birmingham AL	5825na	5850eu	13615na	
2200-2300 mtwhfa	USA, WGTG McCaysville GA	6890na	9400am		
2200-2300	USA, WHRA Greenbush ME	13760af			
2200-2300	USA, WHRI Noblesville IN	5755am	9495am		
2200-2300 sm	USA, WHRI Noblesville IN	5755am			
2200-2300	USA, WINB Red Lion PA	13790am			
2200-2300	USA, WJCR Upton KY	7490na	13595as		
2200-2300 as	USA, WRMI/R Miami Intl	9955ca			
2200-2300	USA, WRNO New Orleans LA	15420am			
2200-2300	USA, WWSB Cypress Crk SC	9355eu	115285as		
2200-2300	USA, WWSB Cypress Crk SC	9475na	11580af	12160na	13845na
2200-2245	USA, WYFR Okeechobee FL	7355eu	11580af	15565va	
2200-2300 vl	Vanuatu, Radio	4960do			
2200-2210	Zambia, Natl BC Corp	6165do	6265do		
2230-2300	Zambia, R Tirana Intl	7160eu			
2230-2300	Austria, R Austria Intl	5945eu	6155eu	13730af	
2230-2300	Belgium, R Vlaanderen Int	13670na			
2230-2300	Cuba, Radio Havana	9550am			
2230-2257	Czech Rep, R Prague Intl	7345na	9435na		
2230-2300	Sweden, Radio	6065va			
2240-2250	Greece, Voice of	9420au	11645au		
2245-2300	India, All India Radio	7410as	9705as	9950as	11620as
2245-2300	USA, WYFR Okeechobee FL	11740na			
2245-2300	Vatican State, Vatican R	7305au	9600au	11830au	

FREQUENCIES

2300-0000	Anguilla, Caribbean Beacon	6090am				2300-0000	Singapore, R Corp Singapore	6150do			
2300-0000 vl	Australia, ABC/Katherine	5025do				2300-0000 vl	Solomon Islands, SIBC	5020do			
2300-0000 vl	Australia, ABC/Tent Creek	4910do				2300-0000	Turkey, Voice of	7280eu	9655va		
2300-0000	Australia, Radio	9660pa	12080as	17715pa	17795pa	2300-0000	UK, BBC World Service	3955eu	5965am	6035as	6175na
		21740pa						6195va	7110as	9590na	9915sa
2300-0000	Canada, CBC N Quebec Svc	9625do				2300-0000	UK, Merlin Network One	3985eu	7170eu	9835na	
2300-0000	Canada, CFRX Toronto	6070do				2300-0000	USA, KALJ Dallas TX	13815va			
2300-0000	Canada, CFPV Calgary	6030do				2300-0000	USA, KTBN Salt Lk City UT	15590am			
2300-0000	Canada, CHNX Halifax	6130do				2300-0000	USA, Voice of America	7215as	9770as	9890as	11760as
2300-0000	Canada, CKZN St John's	6160do						15185as	15290as	15305as	17735pa
2300-0000	Canada, CKZU Vancouver	6160do						17820as			
2300-2329	Canada, R Canada Intl	5960am	6040am	9535am	9755am	2300-0000	USA, WBCQ Monticello ME	7415na			
		11865am				2300-0000	USA, WEWN Birmingham AL	5825na	5850eu	13615na	
2300-0000 vl	Chile, R Voz Cristiana	6070am	11745am	15375am	21550am	2300-0000	USA, WGTG McCaysville GA	5085am	6890am		
2300-0000	Costa Rica, RF Peace Intl	6975am	15050am	21460am		2300-0000	USA, WHRA Greenbush ME	13760af			
2300-2330	Cuba, Radio Havana	9550am				2300-0000	USA, WHRI Noblesville IN	5755am	9495am		
2300-0000	Egypt, Radio Cairo	9900am				2300-0000	USA, WHRI Noblesville IN	5755am			
2300-2350	Germany, Deutsche Welle	5990as	6045as	6130as	7235as	2300-0000	USA, WINB Red Lion PA	13790am			
		15360as				2300-0000	USA, WJCR Upton KY	7490na	13595as		
2300-0000 s	Germany, Good News World R	9405sa				2300-0000 s	USA, WRMU/R Miami Intl	9955ca			
2300-0000	Germany, Overcomer Ministr	11840as				2300-0000	USA, WRNO New Orleans LA	7355am			
2300-0000 vl	Ghana, Ghana BC Corp	3366do	4915do			2300-0000	USA, WSHB Cypress Crk SC	7510eu	15285sa		
2300-2330 as	Guam, AWR/KSDA	11775as				2300-0000	USA, WWCR Nashville TN	5070na	7435na	9475na	13845na
2300-0000	Guyana, GBC/Voice of	3290do	5950do			2300-2345	USA, WYFR Okeechobee FL	11740na			
2300-0000	India, All India Radio	7410as	9705as	9950as	11620as	2300-0000 vl	Vanuatu, Radio	4960do			
2300-0000	Ireland, Unt Christian BC	6200do				2315-0000 vl	Libya, Voice of Africa	15235va	15415va	15435va	
2300-2315	Liberia, LCN/R Liberia Intl	5100do				2330-2359 as	Canada, R Canada Intl	6040am	9535am	11865am	
2300-0000	Malaysia, Radio	7295do				2330-2359 mtwhf	Canada, R Canada Intl	5960am	9755am		
2300-2325	Moldova, R Moldova Intl	7520eu				2330-0000 mtwhf	Guam, AWR/KSDA	11775as			
2300-0000 vl	Namibia, NBC	3270af	3289af			2330-0000 vl	Guatemala, Radio Cultural	3300do			
2300-0000	New Zealand, R NZ Intl	17675pa				2330-0000	Malaysia, RTM Sarawak	7160do			
2300-2330 vl	Nigeria, Radio/Ibadan	6050do				2330-0000	Netherlands, Radio	6165na	9845na		
2300-2330 vl	Nigeria, Radio/Kaduna	4770do				2330-0000	USA, KWHR Naalehu HI	17510as			
2300-2330	Nigeria, Radio/Lagos	3326do				2330-2355	Vietnam, Voice of	5940af	7270af	7400af	9839af
2300-0000	North Korea, R Pyongyang	11335am	13760am	15130am				12019af	15009af		
2300-0000 vl	Papua New Guinea, NBC	9675do				2335-2345	Greece, Voice of	7450am	9400am	9420am	11645am
2300-0000	Romania, R Romania Intl	6130eu	7195eu	9570na	11830na	2345-0000 mtwhf	UK, BBC World Service	3915as			
2300-0000 vl	Sierra Leone, SLBS	3316do									

SELECTED PROGRAMS

Sundays

- 2300 Costa Rica, R Peace Intl: World of Radio. See S 0200.
 2300 New Zealand, R NZ Intl: Midday Report. New Zealand news from National Radio.
 2315 New Zealand, R NZ Intl: Business News. A quarter-hour of financial, business and markets reports.
 2330 New Zealand, R NZ Intl: NZ Long Range Weather Forecast. Five-day weather forecast with warnings for mariners.
 2333 New Zealand, R NZ Intl: Rural News. Farming and agricultural news.
 2345 Costa Rica, R Peace Intl: RFPI Reports. Daily news program of Latin American and Caribbean topics not generally heard in the mainstream media.
 2355 Costa Rica, R Peace Intl: Earthwatch Radio. This informative, succinct two-minute feature explores almost every imaginable environmental topic.
 2357 Costa Rica, R Peace Intl: Earth and Sky. A short earth science and astronomy feature.

Mondays

- 2300 Costa Rica, R Peace Intl: The Neumaier Report. Poughkeepsie NY columnist, Dr John Neumaier, comments on a wide variety of socially relevant issues.
 2300 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.
 2300 New Zealand, R NZ Intl: Midday Report. See S 2300.
 2315 Costa Rica, R Peace Intl: UN Daily News. A daily news feed from the United Nations News Service reporting on UN activities around the world.
 2315 New Zealand, R NZ Intl: Business News. See S 2315.
 2330 Costa Rica, R Peace Intl: Earthwatch Radio. See S 2355.
 2330 New Zealand, R NZ Intl: NZ Long Range Weather Forecast. See S 2330.
 2332 Costa Rica, R Peace Intl: Earth and Sky. See S 2357.
 2333 New Zealand, R NZ Intl: Rural News. See S 2333.
 2335 Costa Rica, R Peace Intl: RadioNation. See S 0500.

Tuesdays

- 2300 Costa Rica, R Peace Intl: UN Perspective. A weekly program of political, economic and social issues.
 2300 New Zealand, R NZ Intl: Midday Report. See S 2300.
 2310 New Zealand, R NZ Intl: National Radio or Sport. Regular programming is preempted for sports events.

- 2315 Costa Rica, R Peace Intl: UN Daily News. See M 2315.
 2330 Costa Rica, R Peace Intl: Earthwatch Radio. See S 2355.
 2330 New Zealand, R NZ Intl: RNZ News. See S 0500.
 2332 Costa Rica, R Peace Intl: Earth and Sky. See S 2357.
 2335 Costa Rica, R Peace Intl: A Public Affair. Discussions of international issues, women's and children's issues, media and propaganda, covert actions/government secrecy and the environment.
 2335 New Zealand, R NZ Intl: NZ Long Range Weather Forecast. See S 2330.
 2340 New Zealand, R NZ Intl: Rural Report. See S 2333.
 2355 New Zealand, R NZ Intl: International Business News. Five minutes of commercial news.

Wednesdays

- 2300 Costa Rica, R Peace Intl: Women. A program for and about women from United Nations Radio.
 2300 New Zealand, R NZ Intl: Midday Report. See S 2300.
 2310 New Zealand, R NZ Intl: National Radio or Sport. See T 2310.
 2315 Costa Rica, R Peace Intl: UN Daily News. See M 2315.
 2330 Costa Rica, R Peace Intl: Earthwatch Radio. See S 2355.
 2330 New Zealand, R NZ Intl: RNZ News. See S 0500.
 2332 Costa Rica, R Peace Intl: Earth and Sky. See S 2357.
 2335 Costa Rica, R Peace Intl: Alternative Radio. See M 0100.
 2335 New Zealand, R NZ Intl: NZ Long Range Weather Forecast. See S 2330.
 2340 New Zealand, R NZ Intl: Rural Report. See S 2333.
 2355 New Zealand, R NZ Intl: International Business News. See T 2355.

Thursdays

- 2300 Costa Rica, R Peace Intl: UN Scope. A news program about the United Nations and its related agencies.
 2300 New Zealand, R NZ Intl: Midday Report. See S 2300.
 2310 New Zealand, R NZ Intl: National Radio or Sport. See T 2310.
 2315 Costa Rica, R Peace Intl: UN Daily News. See M 2315.
 2330 Costa Rica, R Peace Intl: Earthwatch Radio. See S 2355.
 2330 New Zealand, R NZ Intl: RNZ News. See S 0500.
 2332 Costa Rica, R Peace Intl: Earth and Sky. See S 2357.
 2335 Costa Rica, R Peace Intl: Our Americas. See T 0100.
 2335 New Zealand, R NZ Intl: NZ Long Range Weather Forecast. See S 2330.
 2340 New Zealand, R NZ Intl: Rural Report. See S 2333.

- 2355 New Zealand, R NZ Intl: International Business News. See T 2355.

Fridays

- 2300 New Zealand, R NZ Intl: Top of the Morning with Brian Edwards. A National Radio program.
 2315 Costa Rica, R Peace Intl: UN Daily News. See M 2315.
 2330 Costa Rica, R Peace Intl: Earthwatch Radio. See S 2355.
 2332 Costa Rica, R Peace Intl: Earth and Sky. See S 2357.
 2335 Costa Rica, R Peace Intl: Millennium Dreams. See S 0400.

Saturdays

- 2300 Costa Rica, R Peace Intl: This Way Out. A lesbian and gay radio magazine.
 2300 New Zealand, R NZ Intl: RNZ News. See S 0500.
 2312 New Zealand, R NZ Intl: This Week in Parliament. A report on New Zealand legislation and government activities.
 2330 Costa Rica, R Peace Intl: The World in Review. Recapping the news from the UN during the preceding week.
 2330 New Zealand, R NZ Intl: NZ Long Range Weather Forecast. See S 2330.
 2333 New Zealand, R NZ Intl: Spectrum. People, places and events in New Zealand.
 2345 Costa Rica, R Peace Intl: RFPI Reports. 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.

PROPAGATION FORECASTING

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Worldwide Reception Areas and Broadcasting Conflicts

At least twice a year, the various international broadcasters change their schedules and their transmitting frequencies to better serve their audiences. These changes are necessary to primarily accommodate the change in the OWF (Optimum Working Frequency) along the various paths to the targets as the seasons change and also because the solar flux is changing. Also, the broadcasters have to take into account the change in time from standard time to daylight-saving time and vice-versa that occurs in many countries.

In many cases the stations themselves choose the frequencies; in some cases they rely on the work performed by some specialized engineering firms to write up the "menus" of frequencies that they will be using during the next season.

As the frequencies used for broadcasting are of a finite number, it becomes necessary for the broadcasters to coordinate their schedules and frequency use to avoid conflicts. Conflicts occur when two stations transmit simultaneously on the same frequency to the same or a contiguous area of the world. These conflicts are more prevalent at the bottom of the sun cycle when everybody tries to utilize the 49 and 41 meter bands — then it becomes a zoo! Try to remember what it has been like on these bands for the previous two winters.

In order to avoid as many conflicts as possible, the broadcasters or their representatives meet regularly and try to resolve these conflicts *before* the broadcasting seasons start. Most of the time, these conflicts are resolved, but sometimes they still occur when it becomes impossible to change frequency and/or transmission time to accommodate everybody. At times these conflicts can also develop during the broadcasting season when someone punches the wrong button or "wants to try" something new.

So that everyone talks the same language, the world has been divided into 85 well-defined reception zones, and the broadcasters use these zones to indicate clearly where their broadcasts are aimed at. These zones are often referred as "CIRAF" zones and cover all the world, including areas where there are few or no inhabitants. I have no idea how the boundaries of these areas were determined! I have a feeling that in many cases (looking at the shape of these zones), the boundaries were determined for political reasons.

CIRAF allows the broadcasters to talk about the same area when they discuss and try to resolve the possible conflicts that might occur during the next shortwave season. In some

OPTIMUM WORKING FREQUENCIES (MHz) For the Period 15 January to 14 February 1999 Flux=167 SSN=129 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	28	27	23	19	17	15	14	13	13	12	11	11	10		18	27	29	29	29	29	30	30	30	30	30
WESTERN EUROPE	11	11	10	9	9	9	9	9	10	9	9				11	16	22	26	24	20	17	15	14	12	
EASTERN EUROPE (P)	9	9	9	9	9	10	11	10	10					9	9	13	19	15	12						
MEDITERRANEAN	16	15	15	14	14	13	12	12	11						13	19	25	25	24	20	18	17	16	16	
MIDDLE EAST (P)	11	11	11	12	16	13	11							9	9	12	17	14	13	12			11	11	
CENTRAL AFRICA	23	22	21	17	15	12	12	11							16	24	26	25	24	22	23	25	25	24	
SOUTH AFRICA	17	16	15	13	12	12	12	12							19	25	25	25	24	24	22	21	19	18	
SOUTH EAST ASIA (P)	23	29	27	24	19	15				10	10	10	10	9	10	13	19	18	16	14				13	
FAR EAST	29	27	25	22	18	14	12	11	10	10	10	9	9	9	9	11	10	10				16	24	28	
AUSTRALIA	23	24	24	25	23	20	18	16	14	13	13	12	11	10	9	10	18	16	16	16	19	22	22	23	
TO/FROM US MIDWEST																									
SOUTH AMERICA	25	21	18	16	14	13	12	12	11	10	9	10	15	23	28	27	27	27	27	27	27	27	28	27	
WESTERN EUROPE	14	13	12	11	11	10	10	11	11	12	11	11	11	14	21	26	29	30	27	24	21	18	16	15	
EASTERN EUROPE	8	8	8	8	8	9	11	11	11	10	10		10	11	15	21	20	16	13					8	
MEDITERRANEAN	16	15	14	13	13	12	13	12	12					15	22	27	30	27	24	20	19	18	17	16	
MIDDLE EAST (P)	11	11	11	12	14	13	12							11	15	20	19	15	14	12	12	12	12	12	
CENTRAL AFRICA	23	22	18	16	14	13	13	13						17	25	26	26	26	24	23	23	26	26	25	
SOUTH AFRICA	17	16	15	13	12	13	13	12						19	26	25	25	25	24	24	23	21	19	18	
SOUTH EAST ASIA (P)	21	26	22	18	15					10	10	9	9	10	14	20	18	16	15	14	12			12	
FAR EAST	28	26	23	19	15	13	11	11	10	10	10	10	10	9	10	11	11	11				16	25	29	
AUSTRALIA	23	24	24	22	19	16	14	13	13	12	12	11	10	10	11	20	18	16	16	16	19	22	22	23	
TO/FROM US EAST COAST																									
SOUTH AMERICA	18	16	14	13	12	12	11	10	9	9	8	9	15	22	26	25	24	24	24	24	24	24	24	24	22
WESTERN EUROPE	12	11	11	10	10	9	9	9	10	11	11	11	16	23	27	29	28	27	25	22	19	16	15	13	
EASTERN EUROPE	9	9	8	8	8	9	11	11	11	11	10	10	13	21	25	24	21	18	15	13	11	10	9	9	
MEDITERRANEAN	16	15	14	13	11	11	12	12	12				18	26	29	30	29	26	24	21	19	18	17	16	
MIDDLE EAST (P)	12	12	12	14	13	13	12					12	16	23	26	24	21	17	15	13	13	13	13	12	
CENTRAL AFRICA	20	19	17	16	15	14	13	13					17	25	26	26	27	27	25	23	24	26	27	23	
SOUTH AFRICA	17	16	15	13	12	13	14	13					16	24	27	26	25	25	24	24	23	21	20	19	
SOUTH EAST ASIA (P)	17	19	16	15	14					11	11	12	16	21	23	19	17	15	15	14	12	11	11		
FAR EAST	26	23	19	16	14	13	12	12	12	11	11	11	11	12	12	12	12	12				12	15	23	29
AUSTRALIA	23	23	19	16					12	12	12	11	11	10	14	20	20	17	16	15	16	19	21	22	23

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

cases, these CIRAF zones are further subdivided into smaller areas to better circumscribe a specific area that a broadcaster wishes to cover.

Broadcasters have been known to transmit via the long path to a specific zone in order to avoid interfering with another broadcaster's transmission on the short path. For example, some programs transmitted from a Scandinavian country and targeted to Australia are aimed along the long path across North America to avoid "bounces of their transmissions" in Europe and Asia where other broadcasters are

simultaneously aiming programs on the same frequencies.

With the use of antennas that can be finely directed in azimuth and elevation, it is possible to avoid many, but not all, conflicts between international broadcasters. So if you are listening to a program and hear another one at the same time and on the same frequency, it is a conflict that has not been resolved or has been created since the coordination meetings.

Enjoy your DX See the *MonitoringTimes* website at www.grove-ent.com for a list of CIRAF target areas!

Learning to Fish - Lesson 1

There is a proverb that goes something like this: "Give a man a fish, he eats for a day; teach a man to fish, he eats for a lifetime." Well, that proverb could easily apply to obtaining information about shortwave programming. Although both this column and the Selected Program Guide pages give you programming help, each month is different. To tailor your listening to your interests, it would be useful for you to know how and where to get this information for yourself.

Getting program information from international broadcasters, however, can be a very frustrating exercise. Even when asked, some broadcasters simply don't respond. Others provide only frequency information. (Programming? What's that?) A listener can waste considerable postage trying to obtain this much sought after information. So, which stations' schedules are actually...

■ ...worth writing for?

The BBC World Service provides a free program schedule poster for the stream targeted to your area of the world. It also publishes the monthly *On Air* magazine which is available by paid subscription at \$30US per year. The latter gives the most comprehensive advance details of programs available from a shortwave broadcaster.

China Radio International has a free bi-monthly magazine titled *The Messenger**, which includes information about China and Chinese broadcasting, along with some selected advance program information.

Radio Budapest* also has a small bi-monthly magazine with full daily program schedules, selected advance programming information and some national current events and cultural information.

Radio Netherlands* publishes a free bi-annual full-color pamphlet which includes advance information on some programs — including the popular *Documentaries* series — and a wealth of information and pictures designed to give you as much behind the scenes information as possible about RN.

Radio for Peace International uses its program guide, titled *Vista*, to encourage contributions from listeners to support their broadcasts. (Think of it as an international public radio station.) \$40US gets the listener a one-year subscription to the quarterly *Vista*, which provides a comprehensive schedule and description of programs and some advance details of programming with news about the station and the activities of its staff.

The following broadcasters provide the names of individual programs that they broadcast as

part of their program schedule booklets: Deutsche Welle, Far East Broadcasting Corporation, HCJB, Polish Radio Warsaw, Radio Australia, Radio Austria International*, Radio Cairo, Radio Canada International*, Radio France International, Radio Habana Cuba (barely makes the cut with incomplete program details), Radio Japan, Radio Jordan, Radio Korea International, Radio Kuwait, Radio Mexico International, Radio New Zealand International, Radio Prague, Radio Romania International, Radio Sweden*, Radio Taipei International, Radio Vlaanderen Internationaal*, Swiss Radio International*, Trans World Radio Swaziland, Voice of Russia*, Voice of Turkey, Voice of Vietnam, WEWN*, WHRI (including WHRA and KWHR), WWCR, YLE Radio Finland.

[The ones marked with an * will put you on a mailing list, at least for a while, so you won't have to write in for a new one every season. Please note that we have *not* included in this listing stations which provide a program guide containing time and frequency information, but *without* program content information.]

■ Don't write, but do listen!

For Spanish Foreign Radio's program schedule there's no need to write. Just listen between 0055 and 0100. It's such a practical concept, how come almost no one else does it?

The Voice of America publishes the bi-monthly *VOA Guide*. But if you live in the United States just you try and get one, pal! (Hint: you can only get one if you're not a stateside listener.)

The Voice of Nigeria has a great and richly detailed program schedule booklet, but the mail service there is so abominable there's almost no chance you'll get it. So listen Mondays at 0600 for fifteen minutes of each week's program previews.

Vatican Radio* has a nice booklet with no program information. But some advance program information can be had by listening to *On the Air* at approximately 0258 Sundays.

Next month, we'll look at the web sites worth your time and bookmark. Until then, good listening!

ADDRESSES

BBC World Service Bush House Strand London WC2B 4PH UK	Radio Cairo English Service P.O. Box 566 Cairo, Egypt	Radio Romania International English Service 60-62 Berthelot St. P.O. Box 111 R-70756 Bucharest, Romania
BBC "On Air," Dept. Sub Room 207 NW, Bush House Strand, London WC2B 4PH UK	Radio Canada International P.O. Box 6000 Montreal, Canada H3C 3A8	Radio Sweden SE-105 10 Stockholm, Sweden
China Radio International English Dept. Beijing, China 100040 Radio Budapest H-1800 Brody Sandor u. 5-7, Hungary	Radio France Internationale English Service B.P. 9516 Paris, France	Radio Taipei International P.O. Box 24-38 Taipei 106, Taiwan Republic of China
China Radio International English Dept. Beijing, China 100040 Radio Budapest H-1800 Brody Sandor u. 5-7, Hungary	Radio Habana Cuba P.O. Box 6240 Habana, Cuba 10600	Radio Vlaanderen Internationaal P.O. Box 26 B-1000 Brussels, Belgium
Radio Netherlands English Service P.O. Box 222 Hilversum J.G, The Netherlands	Radio Japan English Service 2-2-1 Jinnan Shibuya-ku Tokyo 150-8001, Japan	Swiss Radio International CH-3000 Berne 15, Switzerland
Radio for Peace International Apartado 88 Santa Ana, Costa Rica	Radio Jordan P.O. Box 909 Amman, Jordan	Trans World Radio Swaziland P.O. Box 64 Manzini, Swaziland
Deutsche Welle English Service 50588 Cologne, Germany	Radio Korea International English Service 18 Yoido-dong Youngdungpo-gu Seoul, Republic of Korea	Voice of Russia ul. Pyatnitskaya 25 Moscow 113326, Russia
FEBC Radio International P.O. Box 1, Valenzuela Metro Manila, Philippines 0560	Radio Kuwait P.O. Box 397 13004 Safat, Kuwait	Voice of Turkey P.K. 333 Ankara, Turkey
HCJB English Service Casilla 17-17-691 Quito, Ecuador	Radio Mexico International - XERMX Instituto Mexicano de la Radio Apartado Postal 21-300 04021- Mexico 21 D.F., Mexico	Voice of Vietnam 58 Quan Su Hanoi, Vietnam
Polish Radio Warsaw External Service P.O. Box 46 PL-00-977 Warsaw, Poland	Radio New Zealand Int'l P.O. Box 123 Wellington, New Zealand	WEWN P.O. Box 100234 Birmingham, AL 35210
Radio Australia GPO Box 428G Melbourne 3001, Australia	Radio Prague English Service Czech Radio Vinohradská 12 12099 Prague, Czech Republic	WHRI/WHRA/KWHR LeSea Broadcasting P.O. Box 12 South Bend, IN 46624
Radio Austria International A-1136 Vienna, Austria		WWCR F.W. Robbert Broadcasting Co. 1300 WWCR Ave. Nashville, TN 37218
		YLE Radio Finland Box 78 FIN-00024 Helsinki, Finland

SATELLITE RADIO GUIDE

AUDIO SUBCARRIERS

By Robert Smathers, roberts@nmia.com

An audio sub-carrier requires the presence of a video carrier to exist. If you take away the video carrier, the audio sub-carrier disappears as well. Most TVRO satellite receivers can tune in audio subcarriers and they can be found in the range from 5.0 to 9.0 MHz in the video carrier.

Audio frequencies in MHz, all satellites/transponder coordinates are C-band unless otherwise noted. DS=Discrete Stereo, N=Narrowband, W=Wideband

Classical Music

SuperAudio-Classical Collections	G5, 21	6.30/6.48 (DS)
WFMT-FM (98.7) Chicago, IL-Fine Arts	G5, 7	6.30/6.48 (DS)
WQXR-FM (96.3) New York, NY	S4, 14	6.20/6.80 (DS)

Satellite Computer Services

Superguide	G5, 7	5.48
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Contemporary Music

KOCY-FM (105.3) Hoxie, Arkansas	G6, 6	7.30
Radio Desjardins 1	T5, 14	6.80
Radio Desjardins 2	T5, 14	6.20
SuperAudio-Light and Lively Rock	G5, 21	5.96, 6.12 (DS)
WBES-FM (94.5) "Charleston's Soft Rock B94.5" Charleston, WV	GE1, 12	5.90
WPHZ-FM (96.9) Bremen, IN (South Bend market)	G6, 15	6.48, 7.30 (DS)

Country Music

SuperAudio-American Country Favorites	G5, 21	5.04/7.74 (DS)
WSM-AM (650) Nashville, TN	C4, 24	7.38, 7.56

Easy Listening Music

Iam Music	G6, 6	7.72
FCC mandated safe-harbor program audio-easy listening music	G3R, 9	6.80
	G5, 2	6.80
SuperAudio-Soft Sounds	G5, 21	5.58/5.76 (DS)
United Video-easy listening music	C4, 8	5.895 (N)

Foreign Language Programming

Antenna Radio (Greek)	S4, 14	7.80
Apna Sangeet Radio India	GE1, 16	7.38
Arab Network of America radio network	GE2, 22	5.80
La Cadena CNN Radio Noticias (CNN Radio News in Spanish)	G5, 17	7.56
KAZN-AM (1300) Pasadena, CA- Radio Chinese (Chinese)	GE1, 22 (Ku-band)	5.80
Radio Maryja-religious programming (Poland)	G7, 10	8.00
Radio Maria - religious programming (Italian)	G7, 10	5.80
Radio Tropical	GE1, 4	7.60
SRC AM Network	E2, 1	7.38
SRC FM Network	E2, 1	5.41/5.58 (DS)
Unidentified Los Angeles area ethnic radio station	GE-1, 22 (Ku-band)	7.78
WCRP-FM (88.1) Guyama, PR-religious (Spanish)	G6, 6	6.53
XEX-AM (101.7) "Vox FM" Mexico City, Mexico (Spanish)	SD2, 17	7.38

Jazz Music

KLON-FM (88.1) Long Beach, CA., ID-Jazz-88	G5, 2	5.58/5.76 (DS)
Superaudio-New Age of Jazz	G5, 21	7.38/7.56 (DS)

News and Information Programming

Broadcast News	E2, 1	5.78
Cable Radio Network	G5, 2	7.24 (N)
CNN Headline News	G5, 22	7.58
CNN Radio News	GE3, 9	5.62
	G5, 5	7.58
	G5, 5	6.30
	G5, 22	6.30
USA Radio Network-news, talk and information	GE3, 13	5.01, 5.20
WCBS-AM (880) New York, NY-news	G7, 19	7.38
WCCO-AM (830) Minneapolis, MN	GE3, 6	6.20

Religious Programming

Ambassador Inspirational Radio	GE3, 15	5.96, 6.48
Brother Staire Radio	G5, 6	6.48

KHCB-FM (105.7) Houston, TX	C1, 10	7.28
	C1, 9	7.28
LDS Radio Network	C1, 6	5.58
Salem Radio Network	GE3, 17	5.01, 5.20
Trinity Broadcasting radio service	G5, 3	5.58/5.78 (DS)
WHME-FM (103.1) South Bend, IN, ID-Harvest FM	G6, 15	5.58/5.78 (DS)
WROL-AM (950) Boston, MA (occasional Spanish)	GE3, 3	6.20

Rock Music

KRLA-AM (1150) Los Angeles, CA - Oldies format	C1, 7	7.38
SuperAudio-Classic Hits-oldies	G5, 21	8.10/8.30 (DS)
SuperAudio-Prime Demo-mellow rock	G5, 21	5.22/5.40 (DS)
WOKI-FM (100.3) Oak Ridge-Knoxville, TN.	E2, 5	6.20

Shortwave Broadcasters via Satellite

C-SPAN Audio 1: Various shortwave broadcasters	C3, 7	5.20
C-SPAN Audio 2: British Broadcasting Corporation (BBC)	C3, 7	5.41
Deutsche Welle	GE1, 22	7.38, 7.56, 7.74
Radio Dubai United Arab Emirates (Arabic)	G7, 10	7.48
RAI Satelradio Italy (Italian)	G7, 14	7.38
WEWN-Worldwide Catholic Radio, Vandiver, AL	G1R, 11	5.40 (English), 5.58 (Spanish)
WHRA Africa/Middle East-World Harvest Radio, South Bend, IN	G6, 15	7.82
WHRI Americas-World Harvest Radio, South Bend, IN	G6, 15	7.46
WHRI Europe-World Harvest Radio, South Bend, IN	G6, 15	7.55
KWHR Asia-World Harvest Radio, South Bend, IN	G6, 15	7.64
KWHR South Pacific-World Harvest Radio, South Bend, IN	G6, 15	7.73
World Radio Network: WRN1 North America	G5, 6	6.80
World Radio Network: WRN2 North America	G5, 6	6.20 (Multi-lingual)

Sports

KRLA-AM (1150) Los Angeles, CA/ L.A. Kings Hockey Radio Network	C1, 7	7.38
Madison Square Garden Network (MSG) Spanish Language S.A.P. (occ)	C4, 6	6.20

Specialty Formats

Aries In Touch Reading Service	C4, 10	7.87
	C3, 10	7.87
Colorado Talking Book Network	C1, 3	5.60
Ozarkana Satellite Network	G6, 6	7.96
SuperAudio-Big Bands (Sun 0200-0600 UTC)	G5, 21	5.58/5.76 (DS)
Weather Channel-background music	C3, 13	7.78
Wisdom Radio Network	GE1, 12	7.10
Yesterday USA-nostalgia radio	G5, 7	6.80

Talk Programming

American Freedom radio network	S4, 19	5.80
Amerinet Broadcasting	G1R, 17	5.58
For the People radio network	C1, 6	7.50
Friday Night Live (Friday 9-10 p.m.ET) (Friday 3 p.m. - midnight ET)	SBS6, 3 Upper (Ku-band)	6.20
	S4, 16	5.80
Orbit 7 Radio Network	C1, 14	7.48
Radio America Network	C1, 2	5.58
Republic Radio International	G7, 14	7.70
Talk America Radio Network #1-talk programs	GE3, 9	6.80
Talk America Radio Network #2-talk programs	GE3, 9	5.41
Truth Radio	S4, 19	7.56
TVRO.NET (featuring Keith Lamonica)	S4, 16	5.80
United Broadcasting Network	C1, 2	7.50
WOKIE Network-tech talk (network active when Megabingo is transmitting Monday-Friday 9 - 10 p.m. ET)	SBS6, 3 Upper (Ku-band)	6.20
WWTN-FM (99.7) Manchester, TN-news and talk	G5, 18	7.38, 7.56

Variety Programming

CBM-AM (940) Montreal, PQ Canada-variety/fine arts	E2, 1	6.12
KBVA-FM (106.5) Bella Vista, AR., ID-Variety 106.5	G6, 6	5.58/5.76 (DS)
WCBS-FM (101.1) New York, NY (when TVRO.NET is not on the air with technical programming)	S4, 16	5.80
West Virginia Public Radio	GE1, 12	7.74
WNMX-FM (106.1) "Mix 106" Waxhaw, NC	G1R, 17	7.92
WUSF-FM (89.7) Tampa-St. Petersburg, FL (Public Radio)	C4, 10	8.26
	C3, 10	8.26

AUDIO SUBCARRIERS / SCPC SERVICES

FM SQUARED (FM²) AUDIO GUIDE

GE-3 Transponder 13 (C-band)

Ambassador Inspirational Radio	1.41, 4.47 and 4.65 MHz
Blank audio carriers	1.05 and 3.57 MHz
Focus on the Family	1.23 MHz
Information Radio Network	3.39 MHz
International Broadcasting Network (IBN)	4.83 MHz
USA Radio Network	4.30, 5.01 and 5.20 MHz
Various Religious Programs (no common ministry)	.33 and 3.75 MHz
VCY/America (channel 1)	51 MHz
VCY/America (channel 2)	78 MHz

GE-3 Transponder 17 (C-band)

Blank audio carriers	1.28 and 3.57 MHz
Data Transmission	.80, 1.21, and 2.06 MHz
Focus on the Family	1.05 and 1.40 MHz
In-Touch Ministries	4.47 MHz
Salem Satellite Network	4.65, 4.84, 5.01, and 5.20 MHz
SRN News	.33 MHz
USA Radio Network	1.77 MHz

Galaxy 3R Transponder 3 (Ku-band)

Blank Audio Carriers	2.06, 3.25, 3.62, and 4.20 MHz
Data transmissions	.06, 2.93, 3.07 and 3.17 MHz
AP Network News	3.53 MHz
In-Store audio network ads (various companies)	.71, .81, .91, 1.05, 1.15, 1.26, 3.44, 3.70, 3.80, 3.88 and 3.97 MHz
Muzak Services	.15, .27, .39, .51, .98, 1.36, 1.48, 1.60, 1.72, 1.84, 1.96, 2.19, 2.31, 2.44, 2.56, 2.68, 2.80, 3.34, 4.08, 4.34, and 4.45 MHz

Galaxy 3R Transponder 16 (Ku-band)

Data transmissions	.50, .64, 1.95, 2.18, 2.40, 2.52, 2.73, 2.82, 2.92, 3.20, 3.24, 3.47, 3.73, 3.97, 4.03, and 4.14 MHz
In-Store audio networks	.15, .27, .39, .75, .87, .99, 1.11, 1.23, 1.35, 1.47, 1.59, 1.71, 1.83 and 2.07 MHz

SBS 6 Transponder 13 (Ku-band)

Data Transmissions	.06, .15, .25, .30, .35, .47, .51, .57, .65, .71, .74, .76, .84, .89, .93, .96, 1.05, 1.12, and 1.22 MHz
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Telstar 5 Transponder 6 (Ku-band)

Data Transmissions	.06, .15, .23, .30, .35, .38, .47, .57, .65, .71, .74, .76, .84, .89, .93, .96, 1.05, 1.12, and 1.22 MHz
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Anik E1 Transponder 6 (Ku-band)

Nova Network FM Squared Services

Single Channel Per Carrier (SCPC) Services

By Robert Smathers
roberts@nmia.com

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

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

GE-2 Transponder-Horizontal 12 (C-band)

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

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

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

1204.25 (55.75)	Wisconsin Voice of Christian Youth (VCY) America Radio Network—religious programming
1204.00 (56.0)	SRN (Salem Radio Network) News
1201.50 (58.5)	Wisconsin Voice of Christian Youth (VCY) America Radio Network—religious programming
1201.30 (58.7)	Wisconsin Voice of Christian Youth (VCY) America Radio Network—religious programming

Galaxy 6 Transponder 1-Horizontal (C-band)

1443.80 (56.2)	Voice of Free China (International Shortwave Broadcaster) Taipei, Taiwan
1443.60 (56.4)	KBLA-AM (1580) Santa Monica, CA—Radio Korea
1443.40 (56.6)	Voice of Free China (International Shortwave Broadcaster) Taipei, Taiwan
1438.30 (61.7)	WWRV-AM (1330) New York, NY—Spanish religious programming and music, ID—Radio Vision Christiana de Internacional
1436.50 (63.5)	West Virginia Metro News—network news feeds

Galaxy 6 Transponder 3-Horizontal (C-band)

1404.80 (55.2)	KOA-AM (850)/KTLK-AM (760) Denver, Colo.—news and talk radio/Denver Broncos NFL radio network/Colorado college sports
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<p>1404.60 (55.4) WGN-AM (720) Chicago, IL—news and talk radio/Northwestern college sports/Chicago Bears NFL radio network</p> <p>1404.40 (55.6) Illinois News Network—network news feeds/W MVP-AM (1000) Chicago, IL—talk/Chicago Blackhawks NHL radio network</p> <p>1404.20 (55.8) Tribune Radio Networks/Wisconsin Radio Network</p> <p>1402.70 (57.3) WLAC-AM (1510) Nashville, TN—news and talk/Road Gang trucker program (overnight)/Tennessee college sports</p> <p>1402.20 (57.8) NorthWest Ag News Network - Agriculture info for the Pacific Northwest</p> <p>1402.00 (58.0) Occasional audio/Clemson college sports</p> <p>1401.50 (58.5) USA Radio Network</p> <p>1399.50 (60.5) Occasional audio</p> <p>1399.20 (60.8) Occasional audio</p> <p>1399.00 (61.0) Sports Byline USA/Sports Byline Weekend</p> <p>1398.50 (61.5) Occasional audio</p> <p>1398.30 (61.7) WSB-AM (750) Atlanta, GA— news/talk/Georgia college sports</p> <p>1398.00 (62.0) Occasional audio</p> <p>1397.80 (62.2) Occasional audio/Colorado Avalanche NHL radio network</p> <p>1397.50 (62.5) Minnesota Talking Book Radio Network—reading service for the blind</p> <p>1397.10 (62.9) Wisconsin Radio Network/Green Bay Packers NFL radio network/Wisconsin college sports</p> <p>1396.90 (63.1) Occasional audio</p> <p>1396.70 (63.3) Radio America Network</p> <p>1396.40 (63.4) Georgia News Network (GNN)—network news feeds</p> <p>1396.00 (64.0) WHO-AM (1040) Des Moines, IA—talk radio/Iowa News Network—network news feeds/Iowa college sports</p> <p>1395.80 (64.2) WTMJ-AM (620) Milwaukee, WI—talk radio/Green Bay Packers NFL radio network/Wisconsin college sports</p> <p>1395.60 (64.4) WGST-AM/FM (640/105.7) Atlanta, GA ID Planet Radio—news and talk radio/Atlanta Falcons NFL radio network</p> <p>1395.40 (64.6) Michigan News Network—network news feeds/Michigan college sports</p> <p>1395.00 (65.0) Occasional audio</p> <p>1394.70 (65.3) WJR-AM (760) Detroit, MI—news and talk radio/Michigan News Network</p> <p>1394.50 (65.5) XEPRS-AM (1090) Tijuana, Mexico—Spanish language programming</p> <p>1394.30 (65.7) Michigan News Network/Michigan State college sports</p> <p>1385.40 (74.6) WDUQ-FM (90.5) Pittsburgh, PA – Jazz format</p> <p>1384.60 (75.4) WDUQ-FM (90.5) Pittsburgh, PA – Jazz format</p> <p>1384.40 (75.6) KOA-AM (850)/KTLK-AM (760) Denver, CO—news and talk radio/Colorado college sports/Denver Broncos NFL radio network</p> <p>1384.20 (75.8) WSB-AM (750) Atlanta, GA – news/talk/Georgia college sports</p> <p>1383.70 (76.3) Motor Racing Network (occasional audio) NASCAR racing</p>	<p>1383.10 (76.9) KIRO-AM (710) Seattle, WA—news and talk radio/Seattle Seahawks NFL radio network</p> <p>1382.90 (77.1) Michigan News Network—network news feeds</p> <p>1382.60 (77.4) Soldiers Radio Satellite (SRS) network—U.S. Army information and entertainment radio/Army college sports</p> <p>1382.00 (78.0) Westwood One College Sports feeds/Occasional audio</p> <p>1381.60 (78.4) KEX-AM (1190) Portland, OR—news and talk radio</p> <p>1381.40 (78.6) Occasional audio</p> <p>1381.20 (78.8) KJR-AM (950) Seattle, WA— sports talk radio/Washington State college sports</p> <p>1377.10 (82.9) In-Touch—reading service</p> <p>1376.00 (84.0) Kansas Audio Reader Network—reading service</p> <p>1375.40 (84.6) USA Radio Network/Agrinet Agriculture news service</p> <hr/> <p style="text-align: center;">Galaxy 6 Transponder 4-Vertical (C-band)</p> <p>1376.00 (84.0) Data Transmissions</p> <hr/> <p style="text-align: center;">Galaxy 6 Transponder 6-Vertical (C-band)</p> <p>1347.00 (53.0) WCRP-FM (88.1) Guayama, PR—Spanish language religious programming</p> <hr/> <p style="text-align: center;">Anik E2 Transponder 1-Horizontal (C-band)</p> <p>1446.00 (54.0) Canadian Broadcasting Corporation (CBC) Radio—North (Quebec) service</p> <hr/> <p style="text-align: center;">Anik E2 Transponder 7-Horizontal (C-band)</p> <p>1326.00 (54.0) Canadian Broadcasting Corporation (CBC) Radio—North (Eastern Arctic) service</p> <hr/> <p style="text-align: center;">Anik E2 Transponder 13-Horizontal (C-band)</p> <p>1206.00 (54.0) Canadian Broadcasting Corporation (CBC) Radio—North (MacKenzie) service</p> <p>1205.00 (54.5) Canadian Broadcasting Corporation (CBC) Radio—Occasional feeds/events</p> <hr/> <p style="text-align: center;">Anik E2 Transponder 17-Horizontal (C-band)</p> <p>1126.00 (54.0) Canadian Broadcasting Corporation (CBC) Radio—North (Western Arctic) service</p> <p>1125.50 (54.5) Canadian Broadcasting Corporation (CBC) Radio—North (Newfoundland and Labrador) service</p> <hr/> <p style="text-align: center;">Anik E2 Transponder 23-Horizontal (C-band)</p> <p>1006.00 (54.0) Societe Radio-Canada (SRC) Radio—AM Network</p> <p>1005.50 (54.5) Canadian Broadcasting Corporation (CBC) Radio—North (Yukon) service</p> <hr/> <p style="text-align: center;">Solidaridad 1 Transponder 1-Vertical (C-band)</p> <p>1447.90 (52.1) Antenna Radio Noticias</p> <p>1447.60 (52.4) Antenna Radio Noticias</p>	<p>1447.20 (52.8) La Grande Cadena Raza</p> <p>1447.00 (53.0) XEMZA-AM 560, Manzanillo, Mexico</p> <hr/> <p style="text-align: center;">Anik E1 Transponder 21-Horizontal (C-band)</p> <p>1036.70 (63.3) In-store music</p> <p>1037.00 (63.0) In-store music</p> <p>1037.50 (62.5) In-store music</p> <hr/> <p style="text-align: center;">SBS5 Transponder 2-Horizontal (Ku-band)</p> <p>1013.60 (80.4) Wal-Mart in-store network</p> <p>1013.20 (80.8) Wal-Mart in-store network</p> <p>1012.80 (81.2) Sam's Wholesale Club in-store network</p> <p>1004.50 (89.5) Wal-Mart in-store network</p> <p>1004.00 (90.0) Wal-Mart in-store network</p> <p>1003.60 (90.4) Sam's Wholesale Club in-store network</p> <p>1003.20 (90.8) Wal-Mart in-store network</p> <hr/> <p style="text-align: center;">SBS5 Transponder 12-Vertical (Ku-band)</p> <p>1095.00 (91.0) Russian-American Radio Network</p> <hr/> <p style="text-align: center;">RCA C5 Transponder 3-Vertical (C-band)</p> <p>1404.80 (55.2) RFD Radio Service</p> <p>1404.60 (55.4) Wyoming News Network—network news feeds/Northern Sports Network/Wyoming college sports</p> <p>1400.60 (59.4) Learfield Communications/Indiana college sports</p> <p>1400.40 (59.6) Learfield Communications/MissouriNet/St. Louis Rams NFL radio network</p> <p>1400.20 (59.8) Occasional audio/Data transmissions</p> <p>1400.00 (60.0) Learfield Communications/Purdue college sports</p> <p>1396.60 (63.4) Kansas Information Network/Kansas Agnet—network news feeds/Southwest Missouri State college sports</p> <p>1396.20 (63.8) MissouriNet/Illinois college sports</p> <p>1396.10 (63.9) Occasional audio/Illinois college sports</p> <p>1395.90 (64.1) Western Montana Radio Network/Red River Farm Network/Montana college sports</p> <p>1395.70 (64.3) MissouriNet/Kansas State college sports</p> <p>1386.40 (73.6) Learfield Communications/Kansas City Chiefs NFL radio network</p> <p>1386.20 (73.8) Radio Iowa/Iowa college sports</p> <p>1386.00 (74.0) United broadcasting Network—talk radio</p> <p>1384.60 (75.4) Capitol Radio Network/Tennessee Oilers NFL radio network/North Carolina State college sports</p> <p>1384.00 (76.0) Occasional audio/ABC Direction Network—network news feeds</p> <p>1383.80 (76.2) Occasional audio/Syracuse college sports</p> <p>1383.40 (76.6) Capitol Radio Network/North Carolina college sports</p> <p>1382.90 (77.1) MissouriNet/Missouri college sports</p> <p>1382.50 (77.5) Virginia News Network—network news feeds</p> <p>1382.10 (77.9) Learfield Communications/MissouriNet/Illinois college sports</p>
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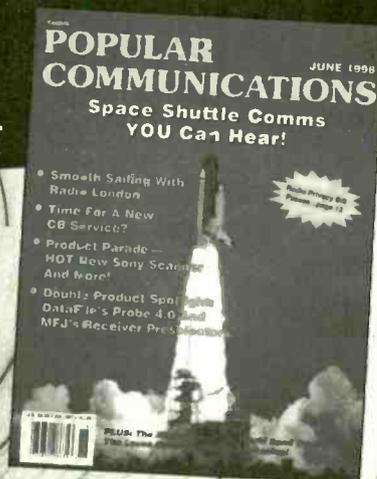
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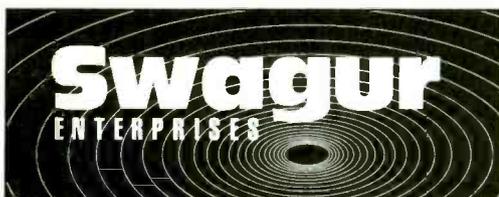
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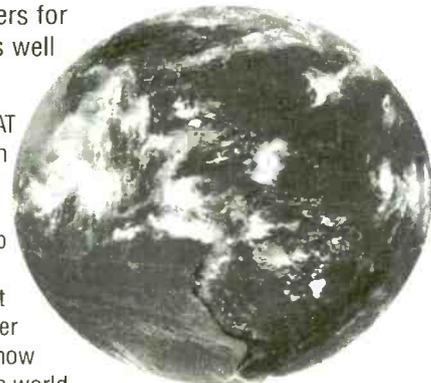


Image captured with Apt. Dwellers System

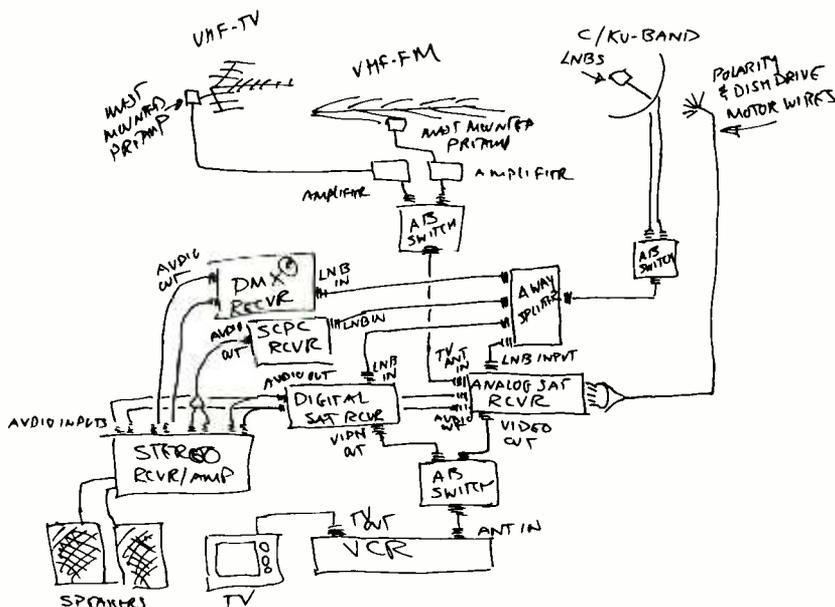
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Is This Mess Necessary?

There comes a time in the life of every hobbyist when everyone in the family has to come to terms with your obsession. Certain rules of order and standards of neatness will simply have to be suspended. Now, I want you to take a close look at State's Exhibit "A" (see photo so labeled) and ask yourself, "What level of cheerfulness may I expect from my spouse when he/she is confronted with *this!*"

In my defense I will tell you that I showed the alleged photograph to a battery of professionals at the Institute for the Study of Electronic Hobbyists and Assorted Disorders, which consisted of a psychiatrist, a psychologist, and a trained chimpanzee. The psychiatrist believed it indicated an acute sense of confusion resulting from being dropped on my head as a child; the psychologist declined to offer an opinion but billed me anyway; and the trained chimpanzee correctly identified the source of on-screen interference I was getting as a result of improper connections on the third set of visible coaxial switches.

So, I say to you, "Yes, ladies and gentlemen, every single connection box, every inch of coax, indeed, every receiver and electronic gizmo depicted in this picture is of the upmost



Do-it-yourself Mess is also the solution to all your video/audio problems.

importance. And, that without all of *that* none of *this* would be necessary!" I was, of course, acquitted on the grounds that, as my mother has said, "Kenneth, I don't understand hardly anything that you've ever written."

■ Do-It-Yourself Mess

If you're just starting out in satellite communications monitoring you may want to give some consideration to how and where various lead-in cables will enter your home. I suggest about 10 minutes, or however long it takes to quaff your favorite beverage. Don't dwell on it long because it really won't matter. You'll find that over the years so many things will change that it's not worth trying to reason out a "master plan."

If you're trying to run four satellite receivers off two or three dishes and bring in UHF and VHF over-the-air antenna signals, as well as routing all the audio through your stereo and speakers, you'll soon find yourself in the same predicament I'm in. The only thing you need to know is what switches and connectors you'll need and where you can get them.

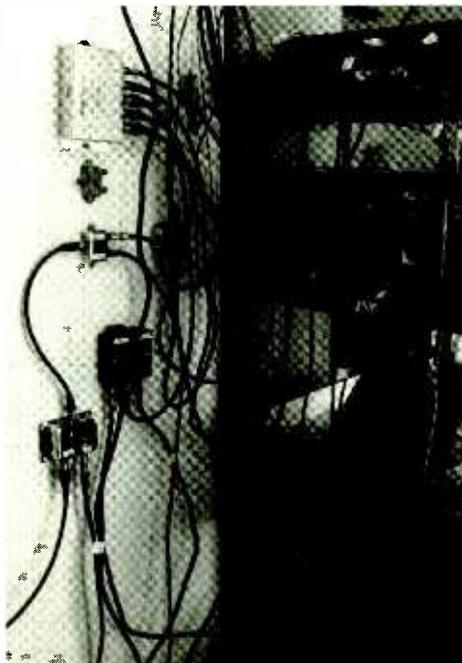
It might be helpful to study the block diagram above to get an idea of what it is we're doing and how we do it. First, I'll start with the off-air antennas. I recommend separate UHF and VHF-FM antennas if you're in

any kind of fringe area. If you live in a major city, a small UHF/VHF/FM antenna will do fine.

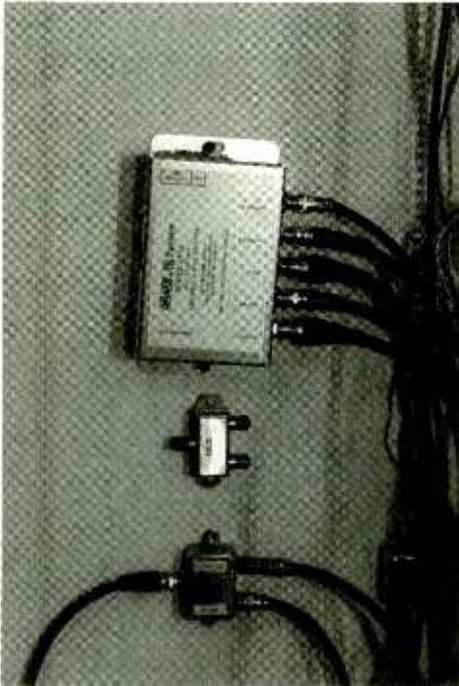
For best reception the antennas should be mast mounted outside the house and controlled by a rotator. You'll find that transmitters in most cities are quite a few miles apart, which can mean several degrees difference in aiming the antenna. Over-the-air antennas should be amplified using a mast-mounted preamp with indoor power supply unless, again, you're in the city, in which case you would overdrive the signal and create more reception problems than you had to start with.

Look for amplifiers with the highest dB gain (20 to 30 dB is typical). Mast mounted preamps deliver about twice as much gain as indoor amplifiers. Because I use separate UHF and VHF-FM antennas, I use separate amplifiers for them. I also use RG-6 coax cable for all antenna feed lines because, even at FM band radio frequencies, the signal loss per hundred feet of RG-6 is less than half that of RG-58 and at UHF frequencies RG-6 performs even better. RG-6 is not that much more expensive, and you'll really see the difference!

For satellite signals, the usual practice is to have a C-band and Ku-band LNB (Low Noise Block Downconverter) on the same feed horn of the same dish but fed with separate feeds of



State's Exhibit "A" (Photo courtesy The Accused)



Drake Amplified four-way splitter which replaces the two-way splitter below it. (Photo courtesy the Guilty Party)

RG-6. I use a heavy duty "A-B" switch (RS cat. #15-1249) to switch between C and Ku-bands and feed the output of that into a Drake power divider (model #2613 available from Universal Electronics). To this I connect an analog satellite TV receiver, a DVB digital satellite receiver, a Universal SCPC-200 SCPC (Single Channel Per Carrier) receiver, and a DMX® digital satellite audio receiver.

The audio output of the DMX® receiver goes into the stereo receiver as does the audio output of the SCPC receiver (using a "Y" mono to stereo adapter). The audio output from the digital and analog satellite receiver goes into the stereo receiver as well. I can now listen to the audio of any four sources just by pressing the appropriate auxiliary button on the stereo.

The video signals from the two over-the-air antenna amplifiers go into a simple "A-B" switch the output of which is fed into the antenna input of the analog satellite receiver. By toggling the TV/SAT button on the analog receiver's remote control I can receive either over-the-air or satellite signals. The video output of the analog and digital satellite receivers go into another "A-B" switch, the output of which goes into the VCR. By flipping that "A-B" switch I can watch either the digital or analog satellite receiver; the audio comes out of the stereo speakers.

■ Nothing to It!

Well, almost nothing to it. There are a few

details I left out of the diagram because I knew it would be confusing enough as it is. But, for those who must know, I split the output of the VCR into two different runs of coax going in different directions.

On one run, to another part of the house, I use an infra-red remote extender which allows me to change channels on either the analog or digital satellite receiver as well as operate the VCR or DMX® receiver from that remote location. I use a small FM transmitter which gets its input from the headphones jack of the stereo and transmits that audio to any FM radio within a 50 ft. radius of the transmitter (which is to say, all over the house). And, there's a Universal SC-50 satellite radio receiver which tunes the audio subcarriers of analog satellite channels as well as FM² signals using the baseband output of the analog satellite receiver.

If you just stick to the diagram as depicted you'll be prepared for reception in virtually every television band and mode of transmission there is. The important thing is to label all of your splitters and wires. If, for any reason, you need to rearrange your setup you'll save yourself countless hours of frustration by having labeled everything. Put labels on the polarizer and dish drive wires, too, as this makes it easy to connect and disconnect everything when thunderstorm season is upon us.

■ Now, let's go to the Mailbag

First, a brief apology to those who were trying to contact me via the E-mail address which wasn't listed at the top of the column. Oops! Sorry about that; well, it's there now and you'll notice it's different from the one listed previously in *ST*. Those who responded to the old address may want to resend to this new address. At any rate you can always reach me via the U.S. Post Office address for this magazine.

• Ralph Siebert, K1TV of Georgia, wants to know about new MPEGII digital receivers on the horizon and noticed that in the November column picture of the dish farm I wasn't using any LNB covers on any of the dishes.

Well, Ralph, there's always been divided opinion on the use of LNB covers. One camp believes that the covers extend the operating life of the feed horn components by protecting them from the elements and preventing rain and moisture from getting into the feed line, LNB and feed horn. The other camp believes that the excess heat generated inside the usually black plastic covers increases the ambient noise temperature and degrades the performance of the components.

Manufacturers build these components to take a beating in the great outdoors and you'll notice that most commercial installations don't use LNB covers. My experience is that the components have a better chance of becoming obsolete before the weather gets to them. As to new MPEGII receivers, watch this space next month for a review of the new Samsonics MPEGII digital receiver.

• Tom Deal writes via the Internet that he noticed that digital receivers indicate transponder or channel numbers which are considerably over the number of transponders on the satellites. What gives?

The age of digital satellite transmissions has turned our understanding of a lot of things upside down. Digital transmissions are grouped in what are called "bouquets." There may be one or 10 program channels in a bouquet depending on the programmer. Since each transponder is actually two channels (vertical and horizontal polarity) the twenty four "channels" usually found on a satellite, if converted to digital could end up being as many as 240 channels. Ten such satellites could add up to 2,400 channels! No wonder commercial entities are so anxious to develop a digital connection!

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Around the World Yet Again

Well, we have come to the edge of the millennia. I guess now we can really "party like it's 1999." I expect that more than a few beginners found new receivers under their Christmas trees. What better way to start the new year that is moving ever closer to a new peak in the sunspot cycle?

One reader recently reminded me of a column I did many years ago where I took beginning monitors on a quick world tour as a way of giving all those new receivers a workout. Well, given that over the years receivers have improved, the solar cycle come around to our way of thinking, and many stations have gone through radical changes, that's a great idea.

What we are going to do is sit down with that new receiver that Santa brought and run through a whirlwind world tour in about eighty minutes. We proved that this could be done way back in 1993, so we're out to show all you "newer" newcomers that it can be done again! This will also serve to acquaint many beginners with a broad notion of what is out there to be heard.

Of course, serious listening will require that you spend a bit more time monitoring each station, especially if your goal is to collect enough information to seek confirmation by way of a QSL card or verification letter. If you are listening around and something catches your ear, please don't be afraid to stop and listen for awhile. You can try for fifteen countries in eighty minutes some other night. This is supposed to be fun, remember?

0140 UTC / 8:40 PM EST
GERMANY
6040 KHZ

Our first stop takes us across the ocean to the European continent. **Deutsche Welle** in the Federal Republic of Germany broadcasts on 104 frequencies in 31 languages. Deutsche Welle is a station you will want to return to listen to more frequently. They are known throughout the broadcasting world for their excellent, balanced news service. The programming will be in progress, but this is how we'll start so we can squeeze the maximum number of stations into the legendary eighty minutes.

0145 UTC / 8:45 PM EST
GREECE
9420 KHZ

Since it's pretty cold in Germany this time of year let's head down to the Mediterranean

for a bit. **The Voice of Greece** broadcasts to the world over 24 frequencies in 16 languages. Since it targets North America at this time of night (0130-0150 UTC) this is a good time to grab this country for a few minutes. If you are a student of music or if you are simply fond of Greek melodies, you will find this station worth an extended listen, since the majority of the programming beamed toward the United States is musical.

0150 UTC / 8:50 EST
SPAIN
6055 KHZ

Now we can swim the Mediterranean eastward and lock our receivers onto **Radio Exterior de España**, Spanish Foreign Radio. Best known for its news programs, REE uses 32 frequencies to talk to the world in seven languages. If you have someone in your household who is struggling through Freshman Spanish you may want to bring them over to the radio. But not tonight, because we are on the move once again.

0155 UTC / 8:55 EST
UNITED STATES OF AMERICA
6130 KHZ

Let's touch down back home for a second and tune into **The Voice of America**. Technically, VOA does not broadcast to folks here in the United States, but they really can't do much about it if we hear them. This station broadcasts a variety of programming. Perhaps the best thing about US based world band broadcasters is that you can send a reception report for regular surface postage and get your verification back in about a week.

0200 UTC \ 9:00 PM EST
ECUADOR
9745 KHZ

In spite of my near jingoistic patriotism, we must now move on to yet another country in our quest. Down in South America you will find **La Voz de Los Andes**, better known as HCJB. HCJB stands for Heralding Christ Jesus Blessings. Needless to say this is one of the world's more powerful religious broadcasters using 18 frequencies to spread the gospel in 15 lan-



guages. Take time to listen in because they also broadcast some enjoyable secular programming. Many radio monitors' first QSL card came from this station.

0205 UTC \ 9:05 PM EST
BREAK TIME

Look, your tuning fingers must be a little cramped. You have five minutes to run cold water over them before we take the big push. If you simply must keep tuning your receiver, at this point why not slip over to 5000 or 10000 kHz and check your watch against time signal station **WWV** in Fort Collins, Colorado? Better yet, tune 7335 kHz and set your watch using **CHU**, Ottawa, Canada, and grab yourself a bonus country.

0210 UTC \ 9:10 PM EST
CHINA (REPUBLIC OF TAIWAN)
5950 KHZ

Okay, you purists out there are going to call this country a bit of a cheat. The International Service of the Broadcasting Corporation of China's **Radio Taipei International** (which used to be called Voice of Free China) broadcasts on 27 frequencies in 14 languages. However, 10 of these signals, including the one listed above, are relayed by way of the transmitters of **WYFR** in Florida, USA.

This is something that beginners need to be aware of. Many international broadcasters use

relay stations to get their signal into parts various parts of the world. When seeking accurate confirmation of your monitoring, you should check with a source publication such as *Passport to Worldband Radio* or *The World Radio TV Handbook* which can be purchased from many of the advertisers found in *MT*. RTI offers news and lifestyle programs.

**0215 UTC \ 9:15 PM EST
RUSSIA
7105 KHZ**

The first time I heard this country it was still the U.S.S.R. and the signals came from Radio Moscow. Still the big signal from this part of the world, it is known as **The Voice of Russia**. Even though not up to the standards of the glory days of communism, they can still be heard on gazzillions of frequencies in just about any language that is worth talking in, at any time of the day or night. The tough economic times in Russia continue to take their toll on even the country's flagship station. The Voice of Russia will probably always be there; it may just become harder to hear as the years go by.

**0230 UTC \ 9:30 PM EST
SWEDEN
7280 KHZ**

Radio Sweden uses 26 frequencies to talk to the world in six languages. They schedule a great deal of programming dealing with helping the world to understand various aspects of Scandinavian life.

**0225 UTC \ 9:25 PM EST
EGYPT
9475 KHZ**

The Voice of Africa from Cairo, more commonly called **Radio Cairo**, broadcasts on 39 frequencies in 32 languages. Most of their English language programming centers on news and commentary. At the risk of stating the obvious, this station is a great source of music from the Arabic world. Also, given the general volatility of the Middle East, this is a good station to keep an ear on from time to time.

**0230 UTC \ 9:30 PM EST
ENGLAND
5975 KHZ**

More properly called The United Kingdom of Great Britain and Northern Ireland (UKoGBaNI if you're Glenn Hauser), this is the home of the one and only **British Broadcasting Corporation**. Old Uncle Skip just can't get through the day without an hour or two of the "Beeb's" excellent programming. The BBC looks at the world and then tells the world about it on 67 frequencies in over 41 languages. This is another station that makes wide use of relay

stations in various parts of the world. The BBC is likely to become a fixture in your listening plans. The sun may have set on the British Empire, but it never sets on the BBC.

**0235 UTC \ 9:35 PM EST
ROMANIA
9570 KHZ**

Radio Romania International uses 43 frequencies broadcast to the world in 15 languages. They are best known for their broadcasts of Romanian folk music. Many of their programs are very entertaining, stressing tourism.

**0240 UTC \ 9:40 PM EST
AUSTRIA
9655 KHZ**

Swinging around a bit, we run across **Radio Austria International**. They use 12 frequencies to broadcast in seven languages. This is another station that uses a number of relays, so you need to pay close attention when tuning in to be sure you're not really listening to Canada again.

**0245 UTC \ 9:45 PM EST
ALBANIA
7160 KHZ**

You folks who are just getting started in world band radio really missed something. The external service of Radiotelevision Shqiptar, **Radio Tirana**, used to use its 24 frequencies and eight languages in unique ways. Albania was the little country with great big transmitters that seemed to have it in for everybody. During its communist period it even attacked fellow communist countries for not living up to Marxist ideals.

They were one of the last countries to experience the fall of international communism, but their programming indicates they enjoy the new world order. When listening in you will hear new commentary and unique Albanian music. Now that they like everybody, they are also stressing tourism in their broadcasts. They have many economic problems that don't always seem to make it into their programming. (Shades of the good old days of controlled state radio.)

**0250 UTC \ 9:50 PM EST
VATICAN CITY STATE
9605 KHZ**

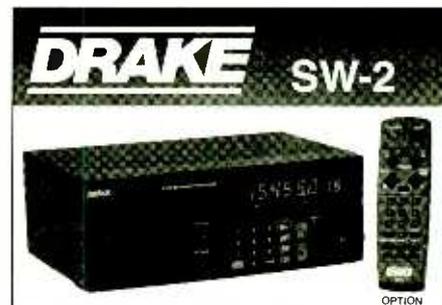
The hub of the Roman Catholicism, The Vatican is a country within a country. Think of it as a few blocks in downtown Rome, Italy. **Vatican Radio** broadcasts on 40 frequencies in over 33 languages (including Esperanto). One of its main tasks is to provide religious services in the Roman Catholic tradition worldwide. If

you are interested in church music you will hear some of the best broadcasts here.

**0255 UTC \ 9:55 PM EST
CUBA
6000 KHZ**

Well, now we are back, only 90 or so miles offshore of the good old U.S.A. Cuba remains one of the last bastions of communism. Many people speculate that Cuba is about to become a very interesting place, taking bets on whatever power vacuum forms behind the aging Fidel Castro. It's easy to hear and it brings us to a total of 15 countries in 80 minutes.

It was fun to do a reprise of this subject. I enjoyed noting the changes from the first time we tried this some six years ago. For example, Radio Portugal and Radio Nederland have shifted their programming away from our 80 minute window. Russia and Albania's one time powerhouse transmitters have grown more dim. And guess what? Despite rumors of its death, shortwave radio is still alive and kicking and the programming is better than ever. And we're still having fun!



The **Drake SW-2** provide continuous coverage from 100 to 30000 kHz in AM, LSB and USB modes. Tuning is easy via manual knob, up-down buttons or 100 memories. The sideband selectable synchronous tuning stabilizes fading signals. Other refinements include: RF gain, tuning bar graphs, huge 100 Hz LED readout, keypad and dimmer. The optional remote (shown) lets you operate this radio from across the room (Order #1589 \$48.95). All Drake receivers are proudly made in Ohio, U.S.A. and feature a one year limited warranty.
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The **Drake SW-1** broadcast receiver also covers 100 to 30000 kHz, but in AM mode only. Features include: 1 kHz LED readout, keypad, RF Gain and 32 memories. Both models operate from 12 VDC or via the supplied AC adapter. A great starter radio!
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Wild and Woolly Weather

Autumn 1998 will go down in British weather history as one of the wettest and stormiest for decades. Even so, it does not reach the levels experienced during the hurricane season in America. Whenever I am able to do so, I use my METEOSAT WEFAX (weather facsimile) system to monitor live image transmissions from GOES-8 - rather than monitor the infrequent images transmitted by Meteosat-7, the geostationary WXSAT (weather satellite) positioned over Europe. Weather dramas in and near the Gulf of Mexico can be clearly followed in the GOES images.

■ Operational WXSATS

As anticipated, the Russian Meteor 3-5 weather satellite resumed active operations in mid-October, though Meteor 2-21 was left transmitting for a further day or two before being switched off. Pictures from Meteor 3-5 are much better than those of 2-21, though they are far from perfect. Detailed examination sometimes shows slightly different line lengths, resulting in image anomalies. With just one spectral image in the transmitted APT (automatic picture transmission), resolution is good and much detail can be seen. Figure 1 from Meteor 3-5, shows a rare glimpse of Iceland appearing briefly from its long periods of cloud cover.



FIG 1: Meteor 3-5 image of Iceland on November 3 at 1400UTC.

■ NOAA WXSATS - status change

With the successful commissioning of NOAA-15, we can expect the status of NOAA-12 to be changed to stand-by in the next few weeks. NOAA-15 is the latest of NOAA's environmental satellites. Launched on May

13, it has successfully completed engineering tests and instrument calibration. The Commerce Department's National Oceanic and Atmospheric Administration has announced that it will replace NOAA-12, launched in 1991.

As well as the imaging package, the satellite also carries search and rescue instruments, used internationally in locating ships and aircraft in distress. According to the latest figures, such use has been instrumental in saving about 9000 lives since the inception of the Search and Rescue Satellite-aided Tracking (SARSAT) system.

■ RESURS update

The two operational Russian RESURS earth resources satellites have problems. The last recorded APT transmissions from RESURS-01 #4 were received on August 11 on 137.40 MHz. Paula Bohm, Marketing assistant at the Swedish Space Corporation Satellitbild's Solna office tells me that the following is the latest status:

RESURS-01 #3: "Both of the X-band transmitters on-board seem to be out of order, and the only possibility to use the satellite is to use the 460 MHz band. When we tried this during the 80s we had trouble in Sweden due to the mobile telephone traffic on the 450 MHz band. Since most of this traffic has been transferred to the GSM-band it might work better now. We haven't decided yet whether or not to go ahead."

RESURS-01 #4: "The first transmitter on board the satellite has failed and we have jumped to the second one. The on-board systems including scanners are still undergoing tests and so far all instruments are working fine. Information will be placed on the RESURS homepage."

<http://www.ssc.se/sb/resurs>

■ GOES-8 hiccups

We are used to getting a continuous stream of telemetry from GOES and NOAA WXSATS, and any break in the flow of data sees us checking out our own equipment before wondering whether the satellite has failed. GOES-8 was out of service on Tuesday, Octo-

ber 27, from 02:40 a.m. to 9:45 p.m. EST, following a large attitude disturbance which forced satellite controllers to command the spacecraft to "sun pointing safe hold mode." While the exact cause of the anomaly could not be determined, spacecraft telemetry data strongly suggested that the disturbance was the result of an Electro Static Discharge (ESD) event in the controlling Earth sensor.

GOES-8 was commanded back to normal on-orbit mode at approximately 7 p.m. EST on Tuesday, October 27, following successful completion of a series of engineering tests with the redundant earth sensor and the on board Attitude and Orbit Control Electronics (AOCE) which showed nominal performance. The instruments were turned back on at approximately 8:45 p.m. EST. GOES-8 began imaging and sounding operations at 9:45 p.m. in a post-maneuver recovery imaging and sounding schedule. Kathy Kelly is the Manager at the Satellite Operations Control Center, NOAA/NESDIS, and kindly provided this 'in-house' background information.



FIG 2: GOES-8 antenna at NASA-GSFC (courtesy Goddard Space Flight Center)

■ Fall weather brings the storms to UK and US

During October and early November, a succession of depressions crossed Britain bringing storms and heavy rain, producing flood levels not seen for many decades. One such storm is shown in figure 3, an image from NOAA-15 received during a morning pass. I enhanced the image because of the low

contrast now seen in unprocessed visible-light images during mid-fall.



FIG 3: NOAA-15 image from November 2 at 0900UTC showing another storm crossing Britain.

When combined with a low-noise preamp, my 1691 MHz Yagi receives some reasonable WEFAX images from the GOES-8 WXSAT, despite the latter being only three degrees above my western horizon. For quality pictures, however, I visit the States! During an early November weekend, a vigorous low pressure system moved eastward from the plains where it produced flooding rains in Oklahoma, Kansas and Missouri. Figure 4 is a multi-channel color composite from 1945 UTC on November 1. The original channel data includes visible light of 1km resolution, IR2 at 4 km and IR4 at 4 km.



FIG 4: GOES-8 image November 1, 1998, courtesy Operational Significant Events Team

The latest imagery of severe weather can be obtained from the OSEI site:
<http://www.osei.noaa.gov/Events/>

Another source of current GOES-8 imagery is Roger Beale's commercial VAS-Data Acquisition Systems, Inc site. This has recently been re-vamped and now provides more up-to-date imagery.

<http://www.vas-das.com/Goes8/realtime8.htm>

■ Satellite tracking software upgrade

David Ransom's DOS program *STS Orbit Plus* has been available for about six years and the latest version 9838 (week 38 of 1998) was issued recently. The program comes as two zipped file suites (*SOP9838a.zip* and b), but for users already running earlier versions, an upgrade program (*SOP9838u.zip*) is also available. Although originally written to display the current position of the shuttle, the software includes a large database of satellites, the Keplerian elements of which can be updated by downloading from the Internet — see later.

David tells me that *STS Orbit Plus* is very accurate when used with current two-line elements. The program has been qualified by the USAF and meets the requirement of placing a satellite within 0.5 km over a 24-hour time span from the epoch time of the 2-line elements. It is used daily at the USAF Central Computer Complex at Cape Canaveral, by the DOD C-Band Radar Network at their worldwide radar sites, and at half a dozen NASA and aerospace control centers around the country. Astronaut training programs at NASA, ESA, and RSA also use *STS Orbit Plus*. ESA astronaut Thomas Reiter took the program on the *Mir* space station for six months in 1995/96.

The program is made available to schools through NASA Spacelink and the NASA Teacher Resource Centers. Numerous schools and amateur radio enthusiasts have made contact with the space shuttle and *Mir* space station via amateur radio while using *STS Orbit Plus*.

David is considering upgrade options such as moving some functions into a different .exe file, and possibly upgrading to 32-bit compilers. David also wrote the satellite tracking software for NASA for a new radar dish at Dryden (Edwards AFB in the California desert) in 32-bit Fortran this past summer. My thanks to David for providing this information.

David's web pages can be found at:
<http://www.dransom.com>
<http://tie.jpl.nasa.gov/dransom/>

An updated version of the program *Satfoot*, (originally written to run on the early 1980s BBC computer, an all-British machine), has been compiled by Les Hamilton, of the UK's Remote Imaging Group. Les has updated the program to run under Windows, and kindly provided me with an early copy. The program

has been designed to be lightning-fast and boots up with a World Map carrying the footprint of a selected satellite. Different satellites can be selected rapidly, and their footprints followed over the globe at advanced speed as the *Satellite Time* clock advances. There are also pull-down tables of AOS (acquisition of signal) and ephemeris data. This version runs on low specification computers and can be obtained from:
<http://www.riglib.demon.co.uk>

■ Kepler element sources

All satellite tracking programs require recent Kepler elements to ensure the accuracy of their predictions. Several sites act as mirrors around the world for widespread dissemination of NORAD elements. I find two sites particularly effective in providing the very latest element sets:

Dr T S Kelso's web site provides access to several series of Kepler elements, together with tracking software and documentation:
<http://celestrak.com/NORAD/elements/weather.txt>

The Orbital Information Group (OIG) has a homepage from which the selection *downloadable files* leads to a series of zipped files. The option *special interest TLEs* provides the file *grouptle.zip*, (about 80kb) that includes a collection of separate TLE files for the WXSATS, amateur radio and other satellite groups. The files are updated every three or so days.

<http://oigsysop.atsc.allied.com/>

FREQUENCIES	
NOAA-14 transmits APT on 137.62 MHz	
NOAA-12 and -15 transmit APT on 137.50 MHz	
NOAAs transmit beacon data on 137.77 or 136.77 MHz	
METEOR 3-5 transmits APT on 137.85 MHz when in sunlight	
RESURS-01#4 may transmit APT during tests on 137.40 MHz	
OKEAN-4 and SICH-1 sometimes transmit APT briefly on 137.40 MHz	
GOES-8 and GOES-10 use 1691 MHz for WEFAX	

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Monitoring the E-8 Joint STARS

One of the more elusive targets for milcom monitors to hear on military frequencies is the U.S. Air Force E-8C aircraft. The silver gray E-8C or Joint Surveillance Target Attack Radar System (Joint STARS) is an airborne platform equipped with a long-range, air-to-ground surveillance system designed to locate, classify and track ground targets in all weather conditions.

Joint STARS consists of an airborne platform – an E-8C aircraft with a multi-mode radar system – and U.S. Army mobile ground station modules that work in concert to become battlefield commanders’ “eyes of the night.”

The E-8C, a modified Boeing 707, carries a phased-array radar antenna in a 26-foot canoe-shaped radome under the forward part of the fuselage. The radar is capable of providing targeting and battle management data to all Joint STARS operators, both in the aircraft and to ground station modules. These operators, in turn, can call on aircraft, missiles or artillery for fire support.

Using slow, oval-shaped orbits in friendly airspace, the refuelable Joint STARS aircraft can look deep behind hostile borders to detect and track ground movements in both forward and rear areas for up to 20 hours. It has a range of more than 155 miles (250 kilometers). Wide area surveillance and the moving target indicator are the radar’s fundamental operating modes. These modes are designed to detect, locate and identify slow-moving targets. Using advanced signal processing, Joint STARS can differentiate between wheeled and tracked vehicles.

Comprised of people from a multitude of military commands and locations, Joint

STARS is a true joint operations platform with a battle staff of 20 to 40 Air Force and Army members. They work from 18 computer consoles squeezed into the back of the E-8 aircraft.

During Operation Joint Endeavor over the skies of Bosnia in 1995-1996, the Joint STARS gave ground commanders a bird’s-eye view of their area of responsibility. “We provided a big picture to the ground commander, allowing him to see the lines of communication and flow of general traffic,” said Capt. Tara Krautkramer of the 4500th Joint STARS

squadron (provisional).

Both the aircraft and the ground station modules have access to moving imagery, which to the untrained eye resembles an old PAC Man game gone haywire. Small green and yellow dots — which are moving vehicles — bounce back and forth across computer screens. These images are captured by a belly-pod-mounted radar that operates in three modes: wide-area surveillance, sector search and synthetic-aperture mode. The first two identify moving targets, while the latter recognizes fixed targets.

JOINT STARS CALLSIGNS

Callsign	Service	Comments
Apache	93ACW Robins AFB	Supervisor of Flying
JStars #	93ACW Robins AFB	Front end staff
JStars 3	Joint STARS Test Force (Melbourne, FL-Grumman)	E-8A Test bed aircraft front end staff
Nightstar #	93ACW/12ACCS Robins AFB	12 ACCS mission crew
Ranger ##	93ACW Robins AFB	E-8C Callsign
Razor 01	93ACW Robins AFB	93ACW Commander onboard
Razor 02	93ACW	Robins AFB 93ACW Vice Commander onboard
Razor 03	93ACW Robins AFB	93OG Commander onboard
Razor 2X	93ACW/12ACCS Robins AFB	12ACCS flight
Razor 3X	93ACW Robins AFB	93 Training Squadron flight
Star ##	93ACW Robins AFB	US Army Common Ground Stations (formerly GSMs)
Stargate	93ACW/93TS Robins AFB	93 Training Squadron Mission Crew
Wizzard	Stars Test Force (Melbourne, FL-Grumman)	JStar 3 Test bed aircraft mission crew

JOINT STARS TACTICAL FREQUENCIES (MHZ)

141.850* 225.450 225.650 225.850 225.95 226.150 226.250 227.725 227.875 227.950 228.050
228.150 228.225* 228.475 228.650 228.725* 228.850 228.975* 229.075 229.725 235.150
236.150* 236.550 236.650 238.350* 271.100* 308.850* 394.775*

* indicates confirmed usage based on monitoring

Other Possible E-8C aircraft frequencies

118.275 138.775 139.775 142.175 143.775 150.350 246.150 278.325 303.850 313.650 322.250
338.450 342.150 363.025 375.150 387.225

Robins AFB Frequencies (MHz)

93ACW Supervisor of Flying Robins AFB: 321.0
Air Force Reserve Command (AFRC) Command Post: 252.1 (callsign Gunrunner)
Air Logistics Command (ALC) Command Post: 240.150 (callsign Gaslight)
Air Mobility Command (AMC) Command Post: 311.0 (callsign Black Knight)
Atlanta Center (Approach/Departure services after hours): 134.5/360.750
Automatic Terminal Information Service: 127.725 273.825
Ground Control: 121.850/275.8
Macon Approach/Departure Control: 119.6/388.2 124.2/279.6 124.8/324.3
Maintenance Control Center (Robins ALC): 225.925 (callsign Eagle Control)
Metro (weather inflight weather briefings): 344.6 (callsign Robins Metro)
Pilot to Dispatcher: 134.1 372.2
Tower: 126.2/320.1

I would like to thank Clay Gibbs in south Georgia for his assistance in preparing this profile of the E-8C Joint STARS aircraft.



The radar, which can "see" on either side of the plane, normally tracks 80 to 250 kilometers (128-155 miles) at a time, but can home in on an area as small as four kilometers (6.4 miles) from 30,000 feet in the air. And in its wide-area search mode, the radar can track more than a thousand moving targets.

The system also is capable of providing a smaller, more detailed picture. By simply punching a key, an operator can capture a specific target within a small white box. As the operator zooms in, individual vehicles became clearer.

The radar can update the territory inside the box quicker than the area around it," according to Captain Keith Jones of the 4500th. The data collected by crewmembers are downlinked to mobile ground station modules, which are the crucial link to Army commanders. The medium and light modules are mounted either on five-ton trucks or Humvees, and are equipped with VHF and UHF radios. One module receives the initial data and then sends it to other stations within the theater.

For all practical purposes, ground station soldiers can operate from the module as if they were in the Joint STARS plane. "We are essentially an extension of the aircraft," said Army Sgt. David Fife.

The Air Force Joint STARS aircraft calls Robins Air Force Base home and are assigned to the 93rd Air Control Wing. The first operational aircraft arrived in March 1995, and the wing will continue to receive two or three aircraft per year until the Air Force has 19 Joint STARS by 2004.

■ Spectrum Holes

On of the more interesting aspects of military monitoring is discovering new frequencies being used in your listening area. Over the years of searching and putting together active frequencies, quite a few "spectrum holes" have revealed themselves, based on actual monitoring by milcom listeners around the country. Several years ago I published a list of these holes in *Monitoring Times*

Since that original list appeared in *MT* a lot has changed in the military aircraft radio spectrum, including the widespread use of 25 kHz spacing between channels. So to give you, our readers, some new targets to shoot for, here is our first installment of 225-400 MHz spectrum holes based on 25 kHz spacing. Plug these frequencies in the old scanner and let us know what you are hearing on them. You can reach us at our mail address: Milcom, P.O. Box 98, Brasstown, NC 28902 or via email at larry@grove-ent.com. We will post any information we receive here in the *Milcom* column.



A U.S. Army specialist operates a radar ground terminal that is receiving information from the airborne Joint

"HOLES" IN MILITARY COMMUNICATIONS LOGS

225.075	225.125	225.175	225.200	225.225
225.575	225.625	225.775	225.925	225.975
226.025	226.075	226.175	226.225	226.475
226.825	226.875	226.925	226.975	227.025
227.075	227.175	227.225	227.275	227.325
227.375	227.425	227.475	227.525	227.575
227.625	227.675	227.775	227.925	228.025
228.075	228.125	228.175	228.325	228.425
228.525	228.575	228.675	228.775	228.875
228.925				

■ New Jersey Shore Mil Freqs

MT reader Pete Monaco dropped us a note and shares the following information on the **Warren Grove Gunnery Range** in New Jersey.

Primary	286.200*
Secondary	296.20
Alternates	139.625 (on request)
	258.2 32.35 (on request)

According to Pete there are four primary types of aircraft that use the range. The attack A-10 Thunderbolt II (Warthog) is the most frequent. Also the fighter aircraft (F-16 Fighting Falcon, F-15 Strike Eagle, and US Navy F/A-18 Hornet and F-14 Tomcats) also use the range. On occasion visitors will see several types of helicopters and US Air Force transport aircraft.

The range supports eight full time military units. These include A-10 Air National Guard units from Barnes, Massachusetts, and Bradley, Connecticut; two units from Willow Grove (A-10/CH-54); two F-16 units from Virginia; and the F-16 and F/A-18 units from Andrews AFB, Maryland.

There are three types of weapons used at the range: bombs, rockets, and bullets (all practice munitions). No live ordnance is dropped at Warren.

Here is a list from Pete of some of the interplane (air-to-air) frequencies used by the various units that journey to the Warren Range:

WARREN RANGE AIR-TO-AIR FREQUENCIES

34.150*	FM	Bradley Intl Airport (103FW)/Barnes Muni (104FW) (151.400 MHz PL noted)
34.175	FM	Barnes
34.400	FM	Andrews AFB
34.550*	FM	Barnes/Willow Grove
34.750*	FM	Bradley/Willow Grove
36.350*	FM	Unknown unit (found quite recently) [Andrews units have used this for air-to-air operations-ed]
36.800	FM	Andrews/Hancock
38.650*	FM	Barnes
38.850*	FM	Willow Grove
40.100	FM	New Jersey National Guard
40.650*	FM	Bradley/Barnes
41.050*	FM	New Jersey National Guard (Picatinny Arsenal helicopters)
41.450*	FM	Barnes/Andrews
41.950	FM	Barnes/Andrews/Hancock
46.650*	FM	Bradley
46.750*	FM	Barnes/Willow Grove
46.850*	FM	Hancock/Willow Grove
49.750*	FM	Bradley/Andrews/Willow Grove
49.850*	FM	Bradley units
141.675*	AM	Bradley units
141.800*	AM	Hancock/Willow Grove units
141.900*	AM	Bradley (Shark Operations)
143.800	AM	Martin (MD)/Andrews/Hancock/Willow Grove Enterprises, Inc.
241.000	AM	National Guard/Army Common
242.400	AM	New Jersey National Guard helicopters (primary)
242.700	AM	New Jersey National Guard helicopters (secondary)
273.000	AM	Willow Grove Operations
283.000	AM	Willow Grove Command Post
291.700*	AM	Warren Range West (ATC)
349.700*	AM	Bradley Operations
381.600*	AM	Warren Range Exit North

* - indicates very active frequency at the Warren Grove Range.

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More HF Control Frequencies

Happy New Year and welcome aboard! This month we will continue our listing of HF Major World Air Route Area (MWARA) control station frequencies. Last time we covered the continent of Africa: this month we'll add the Middle East, Europe, and North Central Asia. North American monitors are unlikely to hear these distant communications except during the early morning or evening hours of the winter months. These official Department of Defense maps do not include all areas, since several of them are not often overflown by Western aircraft!

INO-1 (Indian Ocean): Antanarivo, Beira, Blantyre, Bombay, Cocos Island, Columbo, Dares Salaam, Harare, Jeddah, Johannesburg, Kigali, Lilongwe, Lusaka, Madras, Mahajanga, Male, Mauritius, Moroni, Nairobi, Perth, Seychelles, St.

Denis, Toamasina: 3476, 5634, 8879, 13306, 17961.

SEA-1, 2, 3 (South East Asia-1, 2, 3): Bali, Bangkok, Cocos Islands, Calcutta, Colombo, Darwin, Denpasar, Dhaka, Guangzhou, Hanoi, Ho Chi Minh, Hong Kong, Jakarta, Kathmandu, Kuala Lumpur, Kota Kinabalu, Kunming, Madras, Male, Manila, Perth, Seoul, Singapore & Yangon, Tokyo, Ujung Pandang, Vientiane: 3470, 3485, 5649, 5655, 6556, 8942, 10066, 11396, 13309, 13318, 17907.

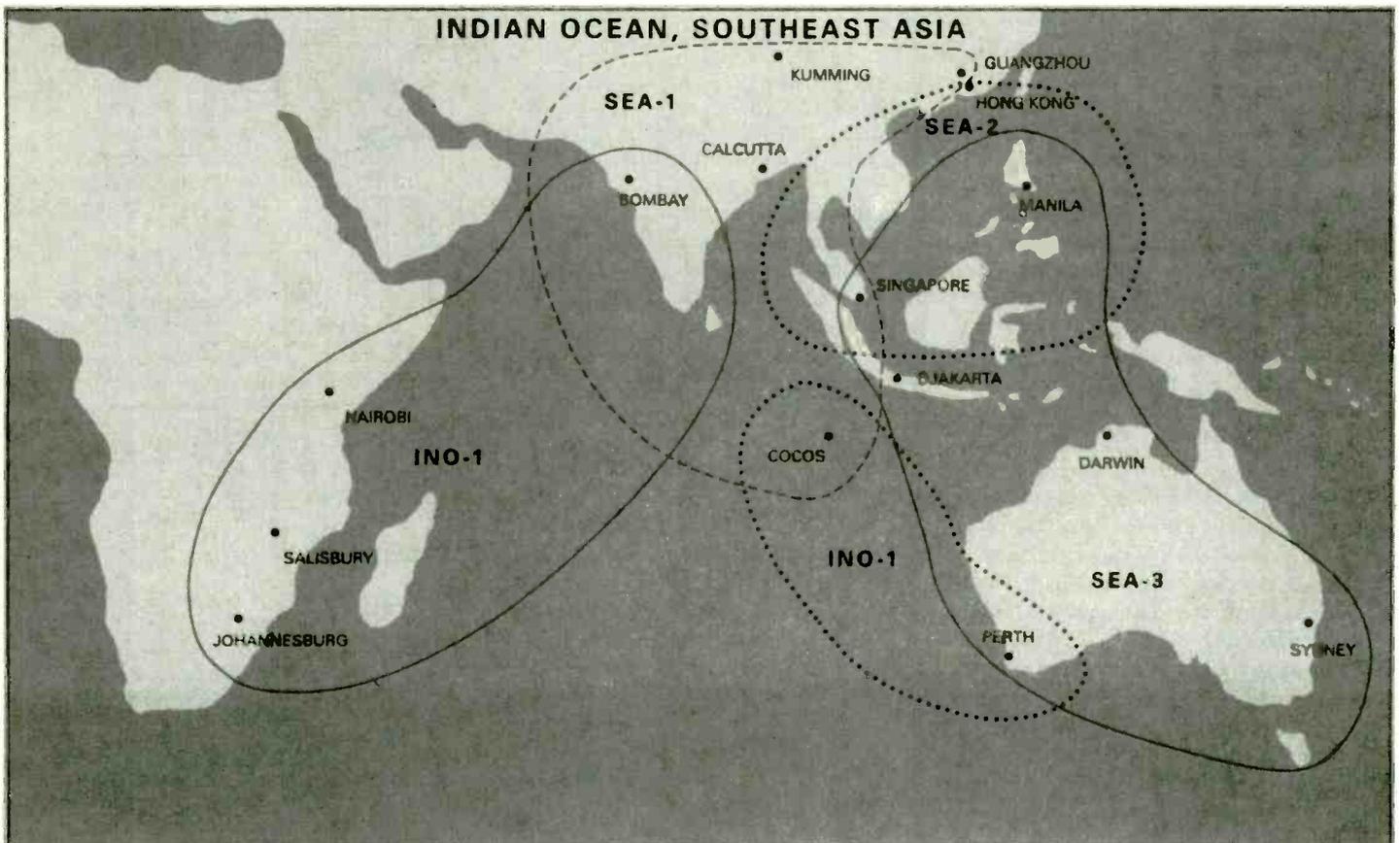
EUR-A (Europe-A): Arkhangelsk, Beirut, Bucharest, Budapest, Kiev, Leningrad, Lvov, Minsk, Moscow, Murmansk, Odessa, Riga, Simferopol, Sofia, St. Petersburg, Syktyvkar, Tunis, Valetta, Velikiye, Vitebsk, Vilnius, Vologda: 3479, 5661, 6598, 10084, 13288, 17961.

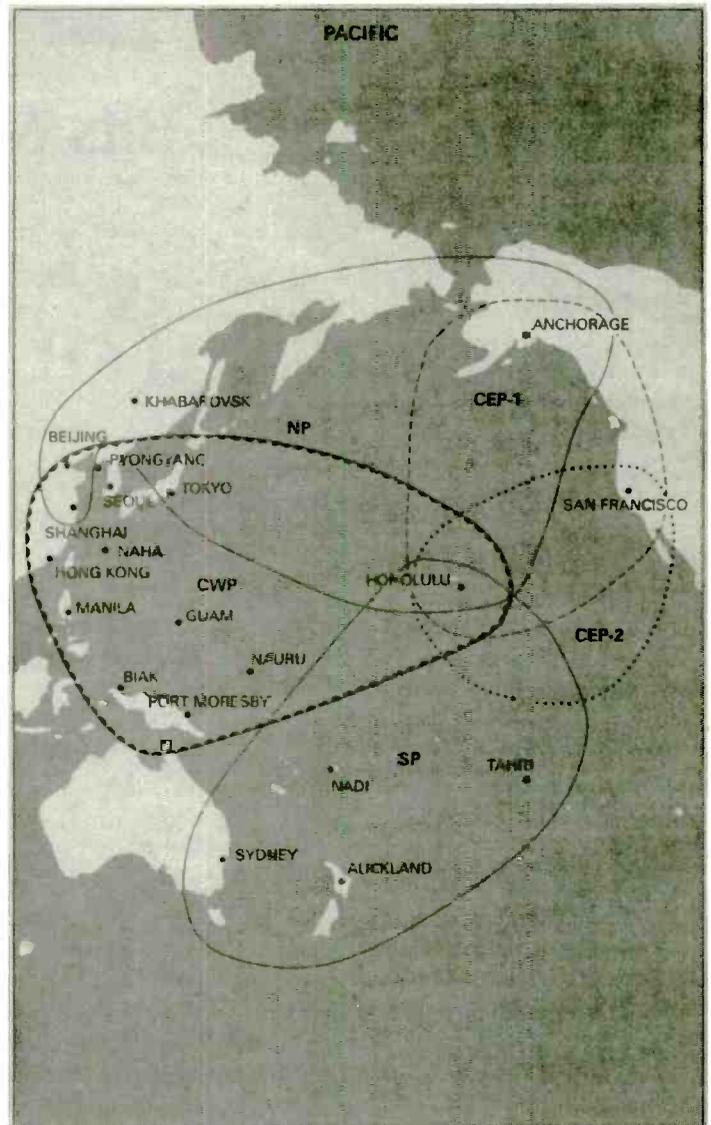
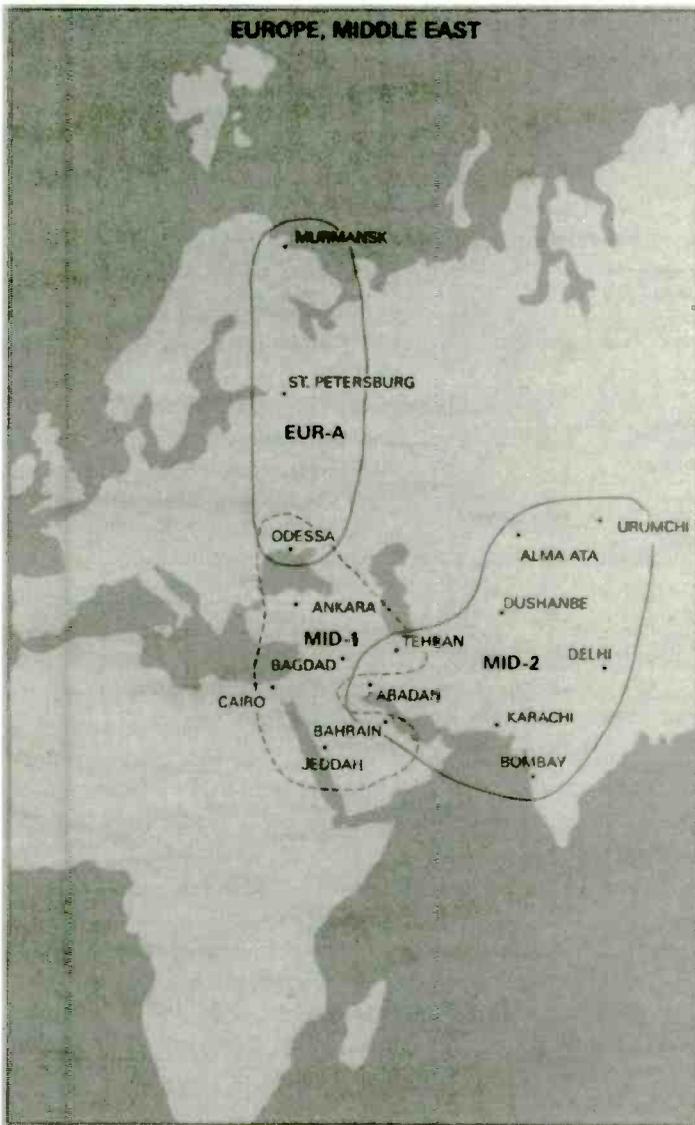
MID-1, 2, 3 (Middle East 1, 2, 3):

Abadan, Alma Ata, Aden, Amman, Ankara, Aktyubinsk, Baghdad, Basrah, Beirut, Bombay, Cairo, Damascus, Delhi, Dushanbe, Frunze, Jeddah, Kuwait, Kabul, Karachi, Kathmandu, Kuybyshev, Kuwait, Kzyl-Orda, Lahore, Male, Manama, Moscow, Muscat, Odessa, Samarkand, Seychelles, Sanaa, Simferopol, Tashkent, Tehran, Tbilisi, Uralsk, Urumqi, Yerevan: 2992, 3467, 4669, 5667, 6631, 8951, 11375, 13288, 17961.

EA-1 & 2 (East Asia-1 & 2): Beijing, Canton, Hailar, Irkutsk, Jinan, Kunming, Lanzhou, Pyongyang, Shanghai, Shenyang, Taegu, Ulan Baator, Urumqi, Wuhan, Zhengzhou: 3016, 3485, 5649, 5655, 6571, 8897, 8942, 10042, 11396, 13309, 17907, 17958.

NCA-1, 2, 3 (North Central Asia-1, 2, 3): Barnul, Chita, Chulman, Ekimchan, Irkutsk, Ivdel, Kirensk, Khabarovsk, Kolpashevo,





Khanty Mansiysk, Krasnoyarsk, Novosibirsk, Podkamennaya, Pyongyang, Surgut, Ulan Baatar, Ulan Ude, Yeniseysk: 2851, 3004, 3019, 4678, 5646, 5664, 6592, 10039, 10096, 13315, 17958.

8915, 8951, 10048, 13273, 13339, 17904, 5643, 8867, 13273, 17904, 17946, 21925.

SP-6 & 7 (South Pacific-6 & 7): Auckland, Nandi, Pascua, Papaete, Port Vila, Raratonga, Sydney, Wallis: 3467,

Next month we'll pick up the North Atlantic and South American MWARAs. Until then, 73 and out.

■ Pacific Monitoring

More accessible to monitors in the western hemisphere are the Pacific Ocean MWARAs, as follows.

CEP (Central East Pacific): San Francisco: 2869, 3413, 5547, 5574, 6673, 8843, 10057, 11282, 13354, 17904.

CWP-1 & 2 (Central West Pacific 1 & 2): Guam, Hong Kong, Manila, Naha, Port Mosesby, Seoul, Taipei, Tokyo: 2998, 4666, 6532, 6562, 8903, 11384, 13300, 17904, 21985.

NP-3 & 4 (North Pacific-3 & 4): San Francisco, Tokyo: 2932, 5628, 5667, 6655,

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Bits & Pieces

The mailbox has been stuffed this month! I'm a rather disorganized person so rather than let the correspondence sit around and get lost, I figured I'd put my planned article for this month on hold and go straight to the reader mail.

A few months ago, I reported on the AM Stereo Page at www3.ns.sympatico.ca/lettuce/home.htm. An item from *Radio World*, sent by Kevin Klein of Wisconsin, notes two more AM stereo sites on the Web. www.stereoam.com is mostly a place to buy AM stereo receivers. A third page at ourworld.compuserve.com/homepages/kevtronics is loaded with links to lists of AM stereo stations and radios.

Edouard Provencher of Maine has been busily DXing the expanded band, and collecting confirming "QSL" cards to prove it. Some of the cards in his collection include WJDM-1660, WMDM-1690, WCMQ-1700, and WKPW-1610.

WKPW is a traveler's information station operated by the Maine Turnpike Authority at Portland. It provides weather, road conditions, and construction advisories to travelers between York and Augusta, Maine, on the Turnpike, also known as Interstate 95. If you log WKPW, you can write for a verification from:

Maine Turnpike Authority Highway Advisory Station
Attn. Margaret A. Trueworthy,
Director of Public Safety
430 Riverside Street
Portland, ME 04103

Three more expanded-band stations have appeared in the last few months. KCJJ-1630 Iowa City seems to be the loudest of the bunch. KCJJ plays rock music and frequent call letter IDs. Some DXers have reported them soliciting DX reports by telephone. If you're thinking of doing that, be aware that they're playing their voice mail



KCJJ-1630 is one of the new crop of expanded-band stations. They say things grow big in Iowa, and that sure applies to KCJJ's signal!

back live on the air when the DJs come in at 6am — if you don't want your phone number broadcast across North America, don't give it to KCJJ's voice mail! Personally, I hope KCJJ's format lasts awhile; it takes me back to my teenage years in Milwaukee in the mid-1970s, going to bed with WLS, KAAZ, or CKLW playing on the clock radio...

The other two new expanded-band operations are both in the Western Michigan area. WQSN-1660 is an all-sports station at Kalamazoo. WBHD-1680 is the first expanded-band station to be licensed to a different city than its regular band operation. Their regular station is WMHG-1600 Muskegon, but WBHD is licensed to Ada, about 10 miles east of Grand Rapids and roughly 50 miles from Muskegon. WBHD airs a rap music format. (Some DXers say it's playing the *same* rap record over and over again; presumably just testing)

The CBC AM stations in Toronto and Montreal were supposed to go off the air on October 20, but they didn't. Mark Henning in New York State wrote to let us know all four stations are still on, as of the end of October. The word from Toronto is that the 90.5 FM transmitter at Crystal Beach wasn't ready and 740 would remain on the air until 90.5 comes on.

But now, I'm hearing rumors from Canada that the CBC is considering starting a third radio service. I've not heard anything about what they plan to program in Toronto, but the rumor in Montreal is of a French-language all-news operation. Mind you, these are just rumors; don't yell at me if all four CBC AM outlets disappear before you read this!

Digital TV sets are now available for sale, if you're in the right place. Eight firms are offering sets with screens between 34" and 65" in size for prices on the order of \$7,500. Panasonic and Sharp are also offering converters (to watch digital broadcasts on a regular analog TV set) for about \$1,800. Expect both of these prices to come down as more equipment is sold.

I like a stuffed mailbox: maybe if enough of you write, there won't be enough room for bills and advertising flyers. (Yeah, I'm dreaming!) Please keep writing, at Box 98, Brasstown NC 28902-0098, or by email at w9wi@bellsouth.net.

DTV SCORECARD

83 permits have been issued for digital TV stations. Here are the channels for which applications have been filed in the 10 largest cities:

City	ABC	CBS	Fox	NBC	PBS	Other stations
New York	45	56	44			
Los Angeles	53	60	65	36	59	31, 42, 66, 68
Chicago	52	3	31			
Philadelphia	64	26	42	67		
San Francisco	24	29	56	57	30	45
Boston	20	30	31	42	19	23, 29, 43
Washington	39	34	36	48	27	
Dallas	9	19	35	41	14	
Detroit	41	44	58	45		
Atlanta	39	19	27	10		

Four Shortwave Pirates Busted by FCC

The Federal Communications Commission shut down four high frequency pirate radio stations on 6955 kHz over Halloween weekend. FCC News Media spokesman David Fiske said that the busts took place in widely dispersed locations in Massachusetts, Texas, Illinois, and California. The FCC did not release names of alleged operators of the stations.

Fiske told *MT* that the FCC was not releasing station identifications of the busted pirates, maintaining that this would give away the names of station operators, even though this month's list of pirates heard by *Outer Limits* readers reveals absolutely nothing about the identity or location of any station transmitter or operator.

From other sources in the FCC and the pirate community, *Monitoring Times* has learned that one of the busted stations was the hyperactive **Voice of the Pig's Ear**, who failed to acquire an address and thus made few friends in the pirate community. Another station was playing a tape of **Rock-It Radio** at the time when it was closed down. The identity of the other two victims has not yet been confirmed.

The four busts, obviously part of a coordinated enforcement effort by the FCC, were the first shortwave visits from "Uncle Charlie" in over three years within the United States. Various FCC sources declined comment on the reason for the sudden action after the longest lull in bust activity for at least two decades. A November 9 News Release from the FCC claimed that, "In extreme cases, illegal HF broadcast stations have the potential to interfere with vital aircraft, ship, and government communications, as well as aeronautical radio navigation channels, in a manner that may endanger the safety of life."

6955 kHz is not in or near any aircraft or maritime utility station band. The frequency typically is vacant when not in use by pirates. The FCC's claim that 43 meter pirates can endanger "safety of life" has generated considerable skepticism in the monitoring hobby community. Despite inquiries from *Monitoring Times*, the FCC failed to produce any evidence backing their claim.

Word of the busts spread quickly. The volume of pirate broadcasts has diminished significantly in the short run, although some of this month's loggings reflect post-bust station activity. We can expect more caution and greater unpredictability from North American pirates for a while.

Meanwhile, busts of FM micropirate stations continued during fall 1998, including FCC actions against La Maquina Musicale on 95.9 MHz in Detroit and Radio Carson on 91.7 MHz in Pittsburgh.

Joe Mama Killed

Bill Keith of Jefferson City, MO, better known in the pirate radio world as Joe Mama of **Radio Nonsense**, was tragically killed in a motorcycle accident October 30. Many pirate DXers heard the final **Radio Nonsense** broadcast late in October. Bill's shows were always well produced and entertaining, so he will be missed. *Monitoring Times* and its readers extend sympathy to Bill's family.

Metallica Transmitter

Our photo pictures the amazing 15 kilowatt transmitter used by Dr. Tornado and Señor El Niño for broadcasts at **Radio Metallica Worldwide**. Their rock music, comedy, and risqué discussions have literally been heard all over the world, given the powerful signal that this equipment generates. If you'd like to see more, the <http://www.frn.net/> Free Radio Network web site has an interesting collection of equipment photos from this shortwave powerhouse, which still holds the record for most power used by a North American pirate.



The amazing 15 kW Radio Metallica transmitter

Shortwave Pirate Activity

Despite the FCC busts, *MT* readers heard plenty of pirates last month, using frequencies within 500 kHz of 6955 kHz unless otherwise noted, typically from two hours before sunset until at least 0500 UTC. Programming formats and contact maildrops (when known) are listed here. Given the volume of important news this month, we're temporarily abbreviating station formats.

Reception reports to pirate stations require 3 first class stamps for USA maildrops or \$2 US to foreign addresses. Send your letters to PO Box 1, Belfast, NY 14711; PO Box 28413, Providence, RI 02908; PO Box 109, Blue Ridge Summit, PA 17214; PO Box 146, Stoneham, MA 02180; PO Box 5617, Ventura, CA 93025;

PO Box 24, Nula, GA 30554; and PO Box 293, Merlin, Ontario NOP 1W0.

- Betty Boop Radio**- 1940's music. (Providence)
- Blind Faith Radio**- Rock. (Merlin)
- Jerry Rigged Radio**- Rock and dramas. (Providence)
- KORN**- Rock and parodies. (Providence)
- Microdot Radio**- Rock with sound effects. (None)
- Mystery Radio**- Complex new age rock. (Stoneham)
- New Voice of the Purple Pumpkin**- Halloween material. (None)
- Partial India Radio**- All India Radio parody. (Stoneham)
- Radio Eclipse**- Rock. (Providence)
- Radio Eurogeek**- Shortwave and St. Helena parody. (Providence)
- Radio Free Euphoria**- Marijuana advocacy. (Belfast)
- Radio Free Speech**- Comedy and libertarianism. (Belfast)
- Radio Goon**- Rock, comedy, and novelty music. (alt.radio.pirate)
- Radio Halloween**- Halloween dramas. (Belfast)
- Radio Nonsense**- Rock and comedy. (Belfast)
- Radio Metallica Worldwide**- Rock and risqué discussions. (Blue Ridge Summit)
- Radio USA**- Punk, comedy, and pirate advocacy. (Belfast)
- RBCN**- Rock and comedy; welcome back, Radio Bob! (Nula)
- Rock-It Radio**- Rock. (Ventura)
- Voice of Bizzaro World**- Backwards dramas. (logs in ACE)
- Voice of Hell**- Satanic and Halloween dramas. (None)
- Voice of the Pig's Ear**- Rock and conservative politics. (None)
- WACK Radio**- Rock and 800 number. (None)
- WKND**- Rock and pirate advocacy. (Blue Ridge Summit)
- WMPR**- Techno dance music. (None)
- WSRR, Solid Rock Radio**- Soul. (Belfast)

Thanks!

Your input is always welcome via PO Box 98, Brasstown, NC 28902, or via the e-mail address atop the column. We appreciate material sent in this month by: John Arendt, Oswego, IL; Shawn Axelrod, Winnipeg, Manitoba; Ranier Brandt, Hofer, Germany; Dean Burgess, Manchester, MA; Tim Cooper, UK; Ross Comeau, Andover, MA; Joe Filipkowski, Providence, RI; Harold Frogde, Midland, MI; Kevin Graniero, No QTH; Joel Gosse, Lake Oswego, OR; Paul Griffin, San Francisco, CA; William Hassig, Mt. Prospect, IL; Rich and Talea Jurens, Katy, TX; Kevin Klein, QTH missing; Robert Koba, Sandy Hook, NJ; Paul Lautzenheiser, Wooster, OH; Zacharias Liangas, Italy; Chris Lobdell, Stoneham, MA; Peter Lautzenheiser, Wooster, OH; Ben Loveless, Bloomfield Hills, MI; Bill McClintock, Minneapolis, MN; Greg Majewski, Oakdale, CT; David Martin, Australia; Armando Mastrapa, Miami, FL; Kevin Nauta, Grand Rapids, MI; Gary Neal, Sugar Land, TX; Ira Paul, Royal Oak, MI; Mike Prindle, New Suffolk, NY; Al Quaglieri, Albany, NY; Martin Schoech, Merseburg, Germany; Lee Silvi, Mentor, OH; DJ Stevie, Basel, Switzerland; Niel Wolfish, Toronto, Ontario; and David Zantow, Janesville, WI.

Nipping the Noise

"Noise" is the biggest complaint I hear from newcomers to the longwave band. It keeps *some* people from even exploring the band in the first place. Indeed, fluorescent lights, motors, computers, and natural static can all combine to make the band a rather harsh environment for DXing.

Longwave is especially prone to noise because of its position in the radio spectrum. It's a fact that sparks (whether they be from lightning or an AC motor) generate most of their energy on the lower frequencies. In general, the lower you go, the worse the problem becomes.

This knowledge was put to practical use when radio pioneers began sending signals in the early 1900s. At that time, spark transmitters were all the rage, and most of the transmitted energy from them was concentrated on the low frequencies. As such, users generally selected the lowest possible frequency to carry their message. "The longer the wavelength, the greater the range," was the thinking of the day.

Today we know better, and spark transmitters were banned years ago. We now despise any source of noise that might appear on the radio dial. While we can't eliminate all forms of interference, there are proven steps you can take to improve the noise level at almost any location.

■ Cleaning House

The first step to curing noise problems is to identify the source. Try briefly turning off notorious offenders one at a time to see if the problem disappears. Suspects include: fluorescent lights, "touch" lamps, TVs, computers, furnace motors, electric fences, and switching power supplies. An "acid test" for determining whether or not the noise originates from your home is to switch off the main circuit breaker while running your longwave receiver on batteries. If the problem goes away, you'll at least know the problem is "on-site," thereby limiting your search.

Another method for locating noise is to use a portable AM radio as a "sniffer." Set it to a frequency where the noise can be heard and scout around your property listening for peaks in the signal. Quite often, you'll be able to isolate the problem to an area or even a particular device. For close-in searches, you may

need to tune elsewhere in the band to reduce the level of noise pickup. When you find the offending device, you may be able to move it to another location, add a filter to lessen the noise (manufacturers often provide interference tips on request), or you may be able to simply shut the device off when you're tuning the low bands.

Grounding a static-generating device can also help in some cases. Refer to the product manual for grounding recommendations. I once eliminated the static from a furnace motor by attaching the motor's case to a ground point with heavy copper wire.

■ Beyond Your Control

The foregoing assumes that the noise originates from your own property. This may not always be the case. The trouble could be at a neighbor's house and may require a degree of diplomacy to resolve. For obvious reasons, I recommend that you do *not* alter a neighbor's equipment unless you are on excellent terms with them *and* are certain you won't cause any harm to the equipment.

Faulty power lines are another possibility. I once found a sparking insulator on a wooden power pole that caused static over a mile away. To find these problems, you may have to use the AM radio trick discussed earlier, but from your car.

Power companies are usually very cooperative when you report a problem with their lines. For one thing, a spark means money to them, as it represents wasted power. For another, it may lead to eventual failure of the line and require repairs under less than ideal conditions (during a storm, for example). By finding the problem, you've probably already saved them considerable time and money. Be sure to note the pole number before calling.

■ Beyond Your Control

Suppose you've tried all these things and still can't find the problem, or cannot reduce the noise to an acceptable level? Now it's time to look at your receiving station. Start by grounding the chassis of your receiver. It may sound simple, but I've seen this step have a dramatic effect on reducing longwave static. Grounding my Drake R8, in fact, drops the noise level by several "S" units when I'm listening below 60 kHz.

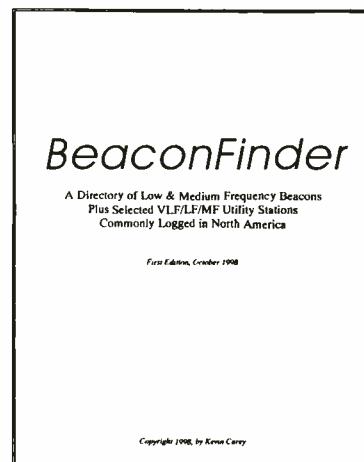
Speaking of antennas, what type are you using? Remember that bigger is not always better on longwave. In an urban setting for example, a "longwire" antenna is generally a poor choice, and usually becomes a big noise collector.

You are better off using an LF active whip antenna or a loop. (Loops have the added benefit of being able to null out offending signals.) Using the proper antenna will also help cure "hash" type overload from nearby AM broadcasters—another common form of longwave interference.

Don't give up on local noise problems! They can be solved in a majority of cases, and when you succeed, you're likely to discover a world of interesting signals you never knew existed.

■ Beacon Directory

Since introducing the *BeaconFinder* in early October, I've been kept busy filling orders for the book. For now, I'm going to keep the price at \$9.95 (postpaid in N. America, U.S. funds). While this narrowly covers production and mailing costs, I believe it offers an inexpensive alternative for those just entering the hobby of beacon chasing. To obtain a copy, orders may be sent to Kevin Carey, P.O. Box 56, West Bloomfield, NY 14585.



The BeaconFinder lists the majority of longwave stations likely to be heard in North America. It includes government and commercial utility stations, as well as Lowfer/Medfer experimenters. (See text for more information.)

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The SP-200 also comes equipped with a stereo/mono headphone jack for private listening and an automatic tape activator so that you never have to miss anything.

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"Doomsday Radio"

Last July's column dealt with emergency and survival communications and generated lots of e-mail from readers. One of the most common questions asked was, "What type of radio do you recommend?" My answer to that is, "Whatever works!"

Some might consider that a flippant non-answer, but that's not my intent. My concern is that all too often we get caught up in the hardware end of things and fail to look at the big picture. This column will focus on what I call "Doomsday Radio" — the bare essentials necessary to get on the air and stay on the air when the fertilizer hits the deflection shields.

With our opulent lifestyles, it is hard for most of us to visualize the need to be prepared for a manmade or natural disaster of significant magnitude. Nonetheless, several times in my research for this series on emergency communications, I have run

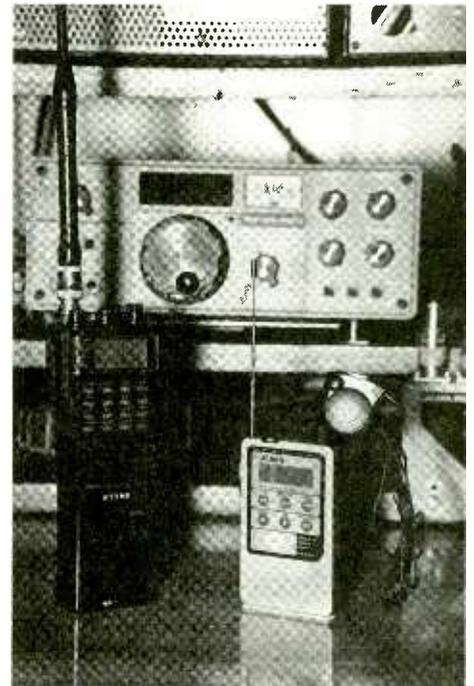
across the statement that America is only 30 days away from starvation. Don't believe it? Take a look around your home and draw up a list of food stuffs you have on hand. Using this list, plan how many meals you can prepare before you are out of food and have to run to the supermarket? If you are like me (and the great percentage of America) you will find you *might* have enough food available for three meals per day for about ten days. Cut that to two meals per day and you may be able to stretch it to almost three weeks.

We in the communications hobby/business tend to think much the same way regarding our tactical and strategic communications systems. We think that our satellites will keep us afloat during a major disaster. The local EMS/fire/police repeaters, along with our cellular telephone sites, will be available and everyone can communicate just fine during a disaster.

Think again: One of the first things to happen is the loss or severe overload of the local phone system. Cell sites are the worst. With literally millions of cellular phones in the hands of the public, cell sites in an affected area can become overloaded in a matter of minutes. Telephone companies also implement a procedure called Line Load Control in which the telephone company controls the access to major trunk lines, interrupting service to specific areas in order to reduce the overload on their switching equipment. All this means that your precious little cell phone is about as useful as a screen door in a submarine!

Commercial public safety repeaters are just about as bad. Ask anyone involved in Hurricanes Andrew and Hugo. Had it not been for ham radio operators who unselfishly responded after these devastating hurricanes, the local EMS, fire and police agencies would have been talking to each other with semaphore flags!

Face it: We take a lot for granted in our daily lives. When our lives are suddenly interrupted due to a disaster situation, you can be prepared for the crisis or you can panic and mill around like the majority of the population.



The Alinco DJ-C1 is on the right and my trusty Icom IC-24AT is on the left (for size comparison). The DJ-C1 has the optional speaker mic attached. This little HT does double duty as a 2 meter rig and a VHF scanner with air band.

■ Be Prepared

The first step in preparing to combat a communications crisis is to accept that it can happen. Once you deal with that aspect it is a simple step to start planning to ensure that you will be on the air (if you are a ham operator) or at least capable of monitoring the action and keep abreast of the unfolding situation.

Your first line of defense is to have a way to obtain information about the crisis. Therefore, your first piece of gear should be a good quality AM/FM broadcast radio capable of operating on "AA" cells. You might also consider adding a small TV set, like the "Watchman-type" TVs that have become popular in the last few years.

A word to the wise: Local news media are as much in the dark as the rest of us when it comes to the initial phase of any disaster. They only know what they hear on their scanners and through their "sources" at

Abbreviations

AM	Amplitude modulation
ARES	Amateur Radio Emergency Service
ARRL	Amateur Radio Relay League
CTCSS	Continuous tone controlled squelch system
CW	Continuous wave (Morse code)
EMS	Emergency medical service
FM	Frequency modulation
HF	High Frequency (3 - 30 MHz)
HT	Handi-talkie or handheld transceiver
MHz	Megahertz
NOAA	National Oceanographic and Atmospheric Administration
PL	Private line
RACES	Radio Amateur Civil Emergency Service
RF	Radio Frequency
SSB	Single sideband (voice)
UHF	Ultra High Frequency (300 MHz - 3000 MHz)
UHF-T	UHF television channels used in some areas for public safety
VHF	Very High Frequency (30 - 300 MHz)

McNally Road Atlas or other maps where grid coordinates are usually given at 1° or 2° intervals.

13. Enter "0" in the *Inner:* box under Radius Search. Enter the desired radius of coverage in miles (or kilometers) in the *Outer:* box. Be slightly liberal. If you think your signal detection radius is 30-miles, then enter 50. Don't be extravagant and enter much over 100-miles without good reason.

14. Click the desired *Units:* (miles or kilometers)

15. Click the *Search* button and go grab a sandwich. Search takes about 10-mins on a Pentium 90 under Windows NT 4.0 with the database copied to the hard drive. Your mileage will vary.

16. When Search is done, you'll see a new database window with a fraction of the initial 3.4-million records. Save it by clicking *File*, then *Save As*. Give it a new filename and ensure the save location is your database operating directory on the hard drive. Then click *Save* and go grab another sandwich. The Save operation takes about as long as the Search.

17. Click *File*; click *Open*; highlight your new file; click *Open* again.

18. Click *File* on the menu bar; click *Close*; highlight the monster *Fccdb_ro.fdb* file; and click the *OK* button.

Congratulations! You've just created a smaller, but more useful and faster database file just for your region. You can now (optionally) delete the *Fccdb_ro.fdb* file from your hard drive, if you copied it there.

You can, at this point, venture off on your own, using the Grove database program to display and manipulate your new file. You don't need other software! Note that this file has the **.fdb* file extension, which means that it's expressly for the Grove program. With a few more steps, you can change it to work with most any spreadsheet or other database programs and most computer-controlled radios. Here's how:

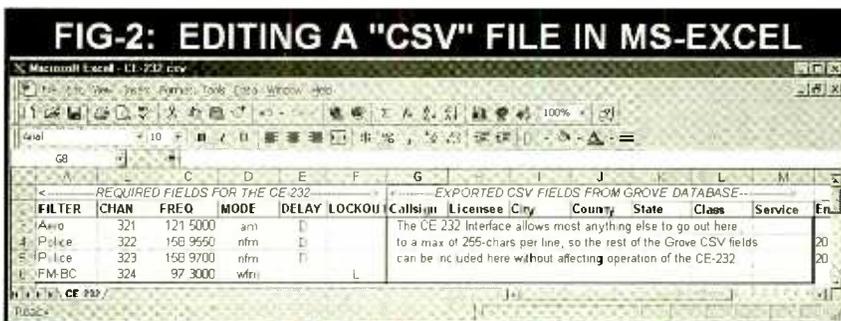
19. Click *File*, then click *Save As*

20. Scroll the *Save As Type:* box at the bottom of the *Save Current Database* window, and choose the file type that meets your needs. Your choices are:

1. FCC Database Manager (*.fdb)
2. WiNRADiO Memory File (*.wrm)
3. CSV (comma delimited)(*.CSV)
4. Formatted Text (*.txt)

You've already saved the new file as a **.fdb* file, so don't select it. But if you want a WiNRADiO memory file, choose that one. If you want a printout, then choose the Formatted Text option that makes the columns line up.

If you want to use a spreadsheet such as MS Excel or a more powerful database engine like MS Access or even MS Works, then choose the CSV option. If you are preparing a CE-232 AutoProgrammer (*.APF) file, use the CSV



option. Most other computer-programmable radios can also take advantage of the CSV option. Highlight your choice and click *Save*. Now go grab another sandwich.

■ The Finer Points

CSV stands for "comma separated values," the format of which is instantly recognized by MS Excel and most other spreadsheets and database programs. After your new file has been loaded into a spreadsheet or other database, you can manipulate columns and formatting to meet the needs of external applications.

For instance, the Grove database exports frequencies in Hz without a decimal. 530 kHz appears as "530000"; 158.970 MHz appears as "158970000". This format is consistent, so if you need frequencies in MHz, use the spreadsheet or database to divide the frequency field by 1,000,000. For kHz, divide by 1,000.

Exports of latitude and longitude in Grove CSV files are in decimal values; not DD°MM'SS". This is usually okay, but if you need DDMMSS, then multiply just the decimal by "60" to get minutes. Then multiply any decimal left over in the minute value by "60" to get seconds. Ex: 32.56167 = 32° and .56167 x 60 = 33.7000' and .7000 x 60 = 42" for a conversion value of 32°33'42". Spreadsheets and database managers can do this kind of stuff automatically and quickly!

If you need *.APF files for the CE-232 Interface, create and arrange the first six fields or columns to resemble Figure 2. Then add/delete additional fields from the CSV file to the right. The first six fields are important to the CE-232, but it doesn't care what comes after the sixth field. When done, save this file as a *.CSV file, but with a different name. Close the spreadsheet or database program and then rename this file to *.APF for the CE-232.

If you want to use this new file in a spreadsheet or other database program, leave it as a *.CSV file and import it into the program of choice. Then save it in native format (*.xls for MS Excel; *.mdb for MS Access; *.wdb for MS Works, *.dbf for dBase, FoxPro, etc.)

Most non-proprietary file formats for computer-controlled radios can be prepared in a similar manner, consistent with the specific requirements of each.

■ A Warning and a Plea

The Grove FCC Database is copyrighted. Courts have long ruled that raw information generally isn't copyrightable, but the format in which it's presented is! This means you cannot legally extract a file of records for your pals. On the other hand, if your buddy asks for the frequency of the local McDuck's hamburger joint, hey...give it to him and feel good about it. Even extracting and giving away a few records in their original format is probably legal under "fair use" provisions of copyright law, so long as you render credit to the source.

You cannot legally extract and give away more than a very few records, however. If you do it anyway, no, you're not likely to get "caught," but you will give solid substance to why CD-ROM publishers usually make it impossible to use their data for much more than a lookup directory. <Gack!> So please respect the Grove FCC Database and the owner's intellectual property rights. If you do, they may give us even more power in future editions!

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

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The Half Square: A Great "New," Old Antenna Design

Lately ham radio operators have been giving a lot of attention to a small antenna known as the "half-square beam" (fig. 1A). And with good reason; this beam is a great DX performer, costs very little for parts, is easy to erect, and can fit into most back yards!

I became aware of the growing popularity of the half square when a friend, Tom Parks, W7EGN, gave a talk about it at our local ham club. He really piqued my interest with claims that, when a band was just opening, the antenna often put him into many foreign countries ahead of other hams using yagi beams and quad beams (unless those beams were on a really tall mast). I was even more intrigued when he mentioned that his transmitter power was only 100 watts as compared to 1000 to 1500 watts used by some of the other hams.

The reason that the half square is an excellent DX antenna is its strong low-angle radiation and reception (R&R) patterning. The pattern responds less well to closer-in (non-DX) signals; this reduces the amount of interference received from these closer-in signals.

The half-square is actually a full wavelength of wire folded into the shape of an inverted letter "U" (fig. 1A). It is relatively narrow-banded, so design it for the frequency where you want it to perform. The antenna is

fed at a low-impedance point on the antenna, and functions somewhat as an upside-down groundplane beam. The horizontal portion contributes little to the antenna's R&R pattern, just as the groundplane's radials contribute little to its patterning.

The R&R pattern is a broad, bi-directional figure eight (fig. 1B). Because of this you can build two of them, set at right angles to each other, and pretty well cover the globe. Add to all these features the fact that these antennas seem to be very quiet in terms of noise pickup, and you've got a winning DX antenna.

Let's Make One

The half-square antenna is simple to make. Here's how:

1. Two pieces of wire are required: a vertical quarter wavelength piece ($240/f$ in fig. 1), and a three-quarters wavelength piece which is composed of one vertical quarter wavelength section ($240/f$) and the horizontal half wavelength section ($492/f$).

Cut these wires a few inches longer than the equations indicate so as to have extra length to wrap into the insulator (or socket, see step 2) where the two sections join. If you use insulators at the bottom end of the vertical

wires (see step 6 below) leave a few inches for connecting them, too.

2. Connect the antenna's two lengths of wire together with an insulator, or with a feedline socket mounted on a piece of plastic as in fig. 1A. The center conductor of the coax connects to the horizontal section, and the vertical section connects to the coax shield. When the antenna is hung, this insulator (or socket) will be at one corner of the antenna (fig. 1A). Seal the coax or socket against weather with coax sealant or plastic tape.

3. Slip the half wavelength section of wire through one end of an insulator. This insulator will support one corner of the antenna when the antenna is hung up (fig. 1A).

4. Erect the antenna, the higher the better. But the low ends of the antenna can come almost to ground level if that's the highest you can get it.

5. Lead the feedline away from the antenna horizontally as far as practical (see fig. 1A).

6. To keep the downward-hanging ends of the antenna's quarterwave vertical elements pointing downward, you can attach some light weights to them or put stakes into the ground beneath them and tether them with heavy cords. If you use cords it is probably best to add an insulator between the antenna ends and the cord (which may conduct when damp).

7. Don't forget lightning-induced damage protection. The simplest type is never use an outdoor antenna during weather likely to produce lightning, and disconnect and ground the antenna when it is not in use.

If you'd like more info on this antenna, check the web with a search engine (Tom recommends "dejanews"). There's a good bit there on the half square. Happy DXing!

An Excellent Book for Your Radio-Communications Library

Antennas and Techniques for Low-Band DXing (by John Devoldere, \$20.00 plus postage from ARRL, 225 Main St., Newington CT, 06111) contains

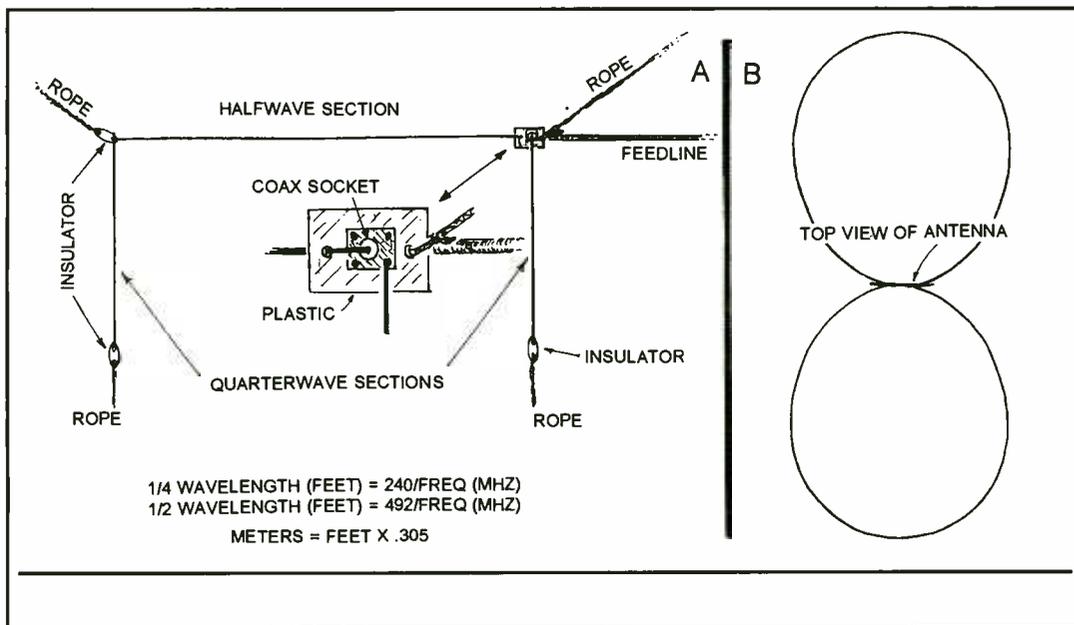


FIG. 1. A half-square beam antenna (A). The antenna's horizontal radiation-reception pattern (B).

a wealth of technical and practical information. Although the book is written with hams in mind, much of this information is also directly applicable to the needs of shortwave listeners, and, to a lesser extent, broadcast band DXers.

This excellent book covers not only a large number of antennas useful on the 160, 80 and 40 meter bands; it also has clearly presented and useful discussions on signal propagation, operating techniques, and equipment. A chapter on receiving antennas is primarily devoted to various types of Beverage antennas, but also includes a discussion of variants of the infamous snake antenna, and a short discussion of low horizontal antennas.

Devoldere, a practicing engineer, is qualified by both training and experience to write such a book. Yet he brings not only his own experience to the task, but covers broadly information gleaned from the experiences of many others as well.

Although the title indicates correctly that the book was written with the "low-band" (160, 80, and 40 meters) DXer in mind, *Antennas and Techniques for Low-Band DXing* is an excellent resource for the person seriously wanting to learn more about antennas and radio communications on the medium-frequency to high frequency bands (300 kHz to 30 MHz).

RADIO RIDDLES

Last Month:

I said: "You know what an antenna is, right? But what is 'antenna effect?'"

Well, this term refers to the fact that some portion of an antenna may act independently as an antenna in a manner not intended by the antenna's designer. This may occur to the extent that the unintended "antenna" contributes significantly to the R&R pattern of the intended antenna. This may present a problem if the designer intended for the antenna to have a specific pattern; the antenna-effect signal may cause a distortion of that pattern.

As an example: the highly-directional nulls in the R&R patterns of small loop antennas are a desirable feature for rejecting interference at times. When these loops are unshielded or unbalanced, the loop may act as a whip (antenna effect) rather than as a loop, thus defeating the loop's directional properties.

This Month:

When we change from a lower-gain antenna to an antenna with higher gain, we may

find an increase in signal strength for stations we receive. And when a station to which we are listening increases its output power we should find an increase in the strength of its signals. In many situations we can get the same amount of signal-strength increase from either a higher-gain antenna, or from increasing the power of the final stage of the transmit-

ter. This latter increase in signal strength comes from additional current supplied by the transmitter's power supply. From where does the increase in signal strength due to increased antenna gain come?

You'll find an answer for this month's riddle, and much more, in next month's issue of *Monitoring Times*. 'Til then Peace, DX, 73

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You Can Bet on This Bob-Tail

40 meter DX has really been hot so far this season, but I have not had a lot of success working into the Pacific area in spite of having a full wave 40 meter loop aimed at VK. A thorough examination of the loop did not show up any faults, and replacing the feed line did not improve things at all. I decided to try a different antenna on 40 and looked around for something I could put up without a lot of trouble.

If you'll recall, I recently told you about Dave Ingram's new book *33 Simple Weekend Projects*. One of the projects mentioned was a modified bob-tail antenna. It is a very simple antenna to build, so I decided to try one for 40 meters.

The results were really spectacular! The first weekend I worked 12 VK and nine ZL stations. Switching back and forth between the loop and the bob-tail showed a difference of at least two S units in favor of the bob-tail, and several times signals that were barely readable on the loop were S5 or better on the bob-tail.

I had tried a full size bob-tail on 20 meters many years ago and while I thought it to be a decent antenna, it did not outshine a pair of Lazy H antennas that I normally used for chasing DX on 20. In truth, a Lazy H with the

bottom located one-half wavelength above ground just might be a better antenna on 40, but that's getting BIG!

The modified bob-tail is simply a half-wave long wire with two quarter-wave vertical sections on each end. The antenna is fed at the junction of one quarter-wave section and the half-wave flat-top, see fig. 1.

My particular antenna goes from the top of a 48 foot tower to a tall walnut tree; it is fed at the tower end and that particular vertical is angled away from the tower at about 20 degrees and tied off; the other vertical section drops straight down and is about 15 feet above ground.

I have used this antenna on all bands except 160 and find it works well on the other bands when used with a transmatch. Of particular interest is the fact that it outperforms my 17 meter two element yagi most of the time, and does the same super job on 30 as it does on 40. Eighty meters surprised me, as my first contact on this band was with a WA7 in Washington state who told me I was the only East Coast station he was hearing (not bad for a 40 meter antenna)!

One problem encountered with this antenna is that when cut to formula the antenna was resonant at 7.5 MHz and I had to add 2 ft.

5 in. of wire to each vertical section to bring resonance to 7.1 MHz. This may be due to the proximity of the feed end to just a few inches from my metal tower.

If you are looking for a good, easy-to-build, inexpensive antenna try a modified bob-tail; I think you will like it!

■ Building and Using Baluns and Ununs

Building and Using Baluns and Ununs by Jerry Sevick, W2FMI, describes baluns and ununs thoroughly and is easy to understand. Baluns and ununs are used to match the impedance of feedlines to loads (antennas).

Everything from the basic 1:1 balun to more advanced devices are discussed, along with construction techniques and applications for the devices. Several multiband antennas and their attendant matching systems are fully described as well as several other antennas.

Using this book, I built a 9:1 balun for use with a T2FD antenna that a friend has been using for several years. Normally fed with 450 ohm line and a transmatch, the T2FD is a formidable wideband antenna, but does require retuning for each band. After adding the 9:1 balun the T2FD performs on 40, 30, 20, 17 and 15 meters without tuning! I will describe this antenna and its construction more fully in a future column.

This manual is available from *CQ Magazine* at a price of \$19.95 plus \$4 shipping and handling. Their address is 76 North Broadway, Hicksville, NY 11801.

■ On the Bands

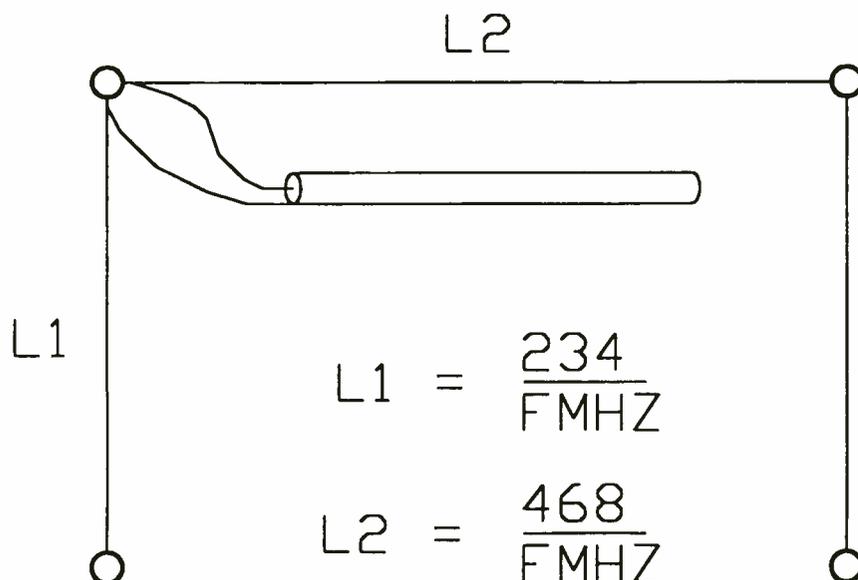
As mentioned earlier, DX has been extremely good so far this season. All continents (except Asia) and about 30 countries have been worked from this QTH on 20 and 15 meter SSB while running 1 watt or less of power. 12 meters has been wide open most days and ten is showing its stuff with lots of openings to the Pacific and South America.

You may be happy to know a new computer is sitting in the N3IK ham shack, and by next month an email address will be available for those who can't wait for the US Postal service to exchange letters with me. Check the *MT* home page for staff email addresses to get the new address even earlier.

That's all for now gang, keep the letters and cards coming.

FIG. 1

MODIFIED BOB-TAIL ANTENNA



Maxon's Full-Featured FRS-214

The development of the Family Radio Service (FRS) is certainly an interesting drama to watch as it unfolds. Dozens of manufacturers have entered the marketplace, and each seems to have its own interpretation of what a Family Radio Service handi-talkie ought to be.

In case you haven't discovered FRS, it's a license-free radio service designed to deliver very short range communications for ordinary citizens. Transmitter power is limited to 1/2 watt maximum, and external antennas are not allowed.

FRS operates on 14 UHF channels, which are, for all intents and purposes, virtually immune to skip:

Channel	MHz
1	462.5625
2	462.5875
3	462.6125
4	462.6375
5	462.6625
6	462.6875
7	462.7125
8	467.5625
9	467.5875
10	467.6125
11	467.6375
12	467.6625
13	467.6875
14	467.7125

Lots of people are discovering the joy and practicality of FRS. People are using FRS for staying in touch while shopping at malls, visiting amusement parks, attending sporting events, convoying with a group of cars, and even while kids are waiting for the school bus. I've also heard of extensive use of FRS at Promise Keepers meetings.

A word or two about range: in practice, FRS delivers crystal clear communications under optimal conditions up to about two miles. When conditions are not optimal, the range can be considerably less — sometimes much less than a mile. If you need reliable communications of at least two miles, GMRS 2-watt handheld units, which share seven of the FRS frequencies, generally offer it, but you need a license to use those radios. In addition, even these more powerful radios can be compromised by hilly terrain.

If you want the ultimate in license-free handi-talkie to hand-talkie performance, there's just one choice. Cherokee's AH-100



The Maxon FRS-214 offers top performance and highly flexible CTCSS programming.

single-sideband CB handhelds, equipped with the SA-4 long-range antenna, deliver range of five or six miles over rolling terrain when communicating in sideband mode. But these radios are not pocket-sized, and the 30-inch antenna is cumbersome for use in public places.

For convenient, pocket-sized, short-range communications, Maxon's FRS-214 handheld is a delightful choice. Powered by four AA batteries, it delivers a full half-watt of transmit power and offers battery life of 33 hours. Recently, I have become a "convert" to AA alkaline cells as opposed to rechargeable batteries. AA alkalines are available almost everywhere and offer both more power and much longer life than NiCad cells of the same size. By contrast, most rechargeables require a fair degree of "management" to make sure that they are properly charged, discharged, and recharged.

The FRS 214 measures 5" high by 1-7/8" wide by 1-7/16" deep. The entire back is removable to allow replacement of the batteries. There is no belt clip on the radio itself, but

a leather case — which includes a belt clip — is included with the radio. The entire unit has a quality look and feel.

On the front panel of the FRS-214, there are 11 buttons, a speaker grill, a backlit liquid crystal display, and an opening for a microphone. On the left side, there is a push-to-talk button and a monitor button that turns off the auto-squelch. On the top, there is an antenna and a jack for an earphone. On the right side near the bottom, you'll find a jack for plugging in an optional charger for use with optional rechargeable batteries.

There are no knobs on the FRS-214. Instead, there is a button for almost every function: one for power on/off, one for a SCAN function, a pair for adjusting volume up and down, another pair for changing channels, another for the LCD backlight, and yet another for locking the handi-talkie's current settings.

The three remaining buttons are used for activating CTCSS (continuous tone coded squelch system) tones. These tones/codes are used to block all transmissions except those that are on the same channel and using the same CTCSS code. The FRS-214 is capable of activating 38 different codes, which means there are 532 possible code and channel combinations. In addition, with the FRS-214, it is possible to set one code for transmitting and another for receiving (of course, you must make sure that the reverse combination is set on the radio you are trying to talk to, otherwise, you won't hear each other!).

To activate CTCSS on the FRS-214, hold the Tone button down, and then press the TX/RX button. You can then use the channel up and down buttons to select your choice of codes. The display will show that a tone has been activated for that channel, but it won't tell you which tone has been activated. In addition, once CTCSS has been programmed for a particular channel, you can turn it on or off simply by pressing the CTCSS button.

The FRS-214 offers range that is competitive with any of the FRS "big boys," and good audio quality. It also offers sophisticated features that are easy to use. For the user who wants high performance and unusually flexible CTCSS programming, the FRS-214 is an excellent choice. Suggested retail is \$129.95. For additional information, contact Maxon at 1-800-821-7848.

Q. *The other evening while I was tuning near 12690 kHz, I heard a broadcast in lower sideband (LSB) identifying itself as "Air Force Radio News," from the Air Force News Agency. What was this? (Ed Lindley, Biddeford, ME)*

A. Years ago, it was common for broadcasters to relay their programs via single sideband from their studio locations to their remote broadcasting facilities via shortwave. The Armed Forces Radio and Television Service (AFRTS) was one of these. These were called "feeders," and were subsequently abandoned in favor of satellite relays.

For some reason, AFRTS, now called the American Forces Network (AFN) has dropped their satellite relay, resuming HF feeders on 4278.5, 6458.5, and 12689.5 kHz. The signals originate from Naval Communications Station Key West.

Q. *Every so often during a short-wave broadcast I hear what sounds like a single, loud, "bird chirp." What is that? (William K. Seamans, Pineville, LA)*

A. I haven't the foggiest notion. Is your window open?
Seriously, there is no format which inserts

a bird chirp into a shortwave broadcast. There are utility stations which send a variety of digital signals that may sound like that, but they are repeated over and over, not just occasionally, and they wouldn't be in the broadcast bands.

Q. *I recently tested a 25-foot length of 16 gauge lamp cord by putting an 8 amp spotlight bulb at one end, and a car battery at the other. When I connected a voltmeter across the battery, it read 12.5 volts, but across the bulb it was only 9.7 volts. Is this an example of Ohm's law? If I used heavier wire, would the voltage drop be less? (Mark Burns, Terre Haute, IN)*

A. Yes to both questions. You can visualize the circuit as being three resistors in series: the bulb and the two wires. Since the resistance is found by dividing the voltage (12.5) by the current in amps (9), the total resistance must be 1.39 ohms. Using heavier-gauge wire will lower the total resistance, allowing more current to flow through the light bulb.

Q. *Can shortwave listeners get their QSL (verification) cards from the Internet? Is it really necessary to*

send an International Reply Coupon (IRC) to get a QSL card? (Dan DeLuca, Cranston, RI)

A. While some shortwave broadcasters will QSL via e-mail, there are no central Internet sites for downloading QSLs. Some broadcasters may send QSLs even without receiving an IRC, but it is a common courtesy to supply one in exchange for their courtesy of sending the QSL.

Q. *What is the future of digital scanners? Does the government really want to ban scanners? (Staley Keener, Hickory, NC)*

A. I really don't subscribe to conspiracy theories, or that the government is out to get us. From what I've seen firsthand in Washington, most bureaucrats spend most of their time ironing out paperwork and attending meetings, trying to satisfy their sponsors as well as their electorate. Wealth and power are prominent driving forces in political circles.

Are many of them corrupt? Probably a few. Are they human? Sure. Do they think they are doing the right thing? Most of the time. Do they want to take scanners away from the public citizenry? No, they couldn't care less about scanners.

What does happen is that special interests, like the cellular industry, apply financial pres-

Bob's Tip of the Month

John Mason of Palm Bay, Florida, decided not to buy a reel antenna for his portable shortwave receiver if he could make one, and he did! John selected a small spool of hookup wire about 50 feet long, and then found a slightly larger "Tupperware" style container to house it in and hold it fairly snug during spooling and unspooling.

A small window crank handle was purchased at a hardware and fed through a hole just large enough in the flat side of the container. He tightened it with a screw through the hub of the spool to the shaft of the crank (*although quick-setting gel glue should work if the surfaces are sanded clean - bg*).

The wire was fed through a tiny hole in side of the container so that it could be easily spooled in and out, and a plug, appropriate for the external antenna connector on my radio, was soldered to the end of the wire. (*A knot should be tied around the hub of the spool to keep the wire from being pulled out - bg*).

Cute idea! Thanks, John.

A Spool Antenna for Portable Shortwave Listening

sure to satisfy their own profit-driven motives. When publicized events like the Newt Gingrich cellular telephone intercept occur, opportunistic corporations and conglomerates take advantage of the general ignorance of technology by politicians, inflaming the issue, resulting in over-reactive legislation.

There is growing concern for communications security because of terrorism and organized, sophisticated crime, and for privacy protection for the average American citizen and American business. Digital encryption is well under way. It is already unlawful to decode encryption of any sort, and that is not likely to change.

Q. Do British CB operators have callsigns? (William Mewes, Oakville, Ont.)

A. So far as I know, and this is reaffirmed by CB columnist Jock Elliott, there is no licensed 27 MHz CB service anywhere on Earth. This is the worldwide "freeband," operating with little fear of retribution since it was deregulated by the Federal Communications Commission (FCC). Any callsigns, monikers, nicknames, or handles you hear in the 27 MHz region are by personal preference, not legal issue.

Q. Will scanner manufacturers be allowed to sell scanners with the new APCO 25 and similar public safety digital formats? (Mark Stachurski, Baltimore, MD)

A. At present, the law (1986 Electronic Communications Privacy Act) stipulates that encryption techniques cannot be descrambled, but only the higher levels of the APCO 25 radios are digitally encrypted for privacy. This would mean that, at present, at least the lower levels of digitization, intended for spectrum efficiency only, would be fair game for scanners to decode.

Q. Will electronic equipment have a longer life span if it is left turned on or turned off between uses? (William Mewes, Oakville, Ont)

A. Under normal circumstances, the major contributing factor to equipment deterioration is heat. If the equipment is properly

designed, using adequately rated components, and the environment is not abusive or destructive (salt air, moisture, heavy dust, corrosive atmosphere, etc.), electronic equipment can last virtually indefinitely. Whether it is left on or off makes no difference — there's nothing to get used up!

The exception to this is for components which have a stated lifetime, such as displays, batteries, and illumination sources, which do have a finite lifetime.

Q. I recently bought a portable radio with digital frequency display. When I tuned it to the frequency of a local AM broadcaster (1250 kHz) I could hear it just fine, of course, but I could even hear it at 1240 and 1230 kHz. How come? (Bob Brock, Phoenix, AZ)

A. One word: selectivity. This is the part of the circuit which defines how much "bandwidth" (chunk of spectrum) a receiver can detect at any one time. For the AM broadcast band, that's about 10 kilohertz; but razor-sharp filters are expensive, so manufacturers commonly skimp on this important compo-

nent, allowing signals to come through from adjacent channels. Thus, when you tune off frequency, your radio should cut off the signals from stations 10 kHz away, but it doesn't. Therefore, you are likely to suffer interference to weak signals from stronger adjacent-frequency signals.

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-ent.com. (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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TrunkTrac, the first, and one of the most sophisticated trunk tracking technologies available, is now even better. New pricing and additional features make TrunkTrac your best choice if you're serious about tracking Motorola Type I, II, III, and Hybrid systems. TrunkTrac now supports the BC895XLT, PCR1000, R7000, R7100, R8500, R9000, and the RS Pro 20xx series with an OS456/535 board installed.

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Grundig Platinum Traveller Portable

Back when a guy and his date could have a carousing night on the town in Paris or Munich for ten bucks—eats, entertainment and all—I came back to the States with something that was unheard of here: a portable reel-to-reel tape recorder about the size of a woman's handbag. This was before cassettes or eight-track carts, or even FM car radios. So it was the height of early Sixties cool to be driving around listening to, say, Ray Charles on tape while everybody else had to make do with the dismal offerings on local AM stations.

The outfit that made this sturdy little wonder was a relatively young German company called Grundig, and I wasn't alone in my electronic bootlegging. For decades after World War II, thousands of returning GIs and American tourists brought back Grundig goodies—radios, mostly, nearly all with shortwave coverage. Called Yacht Boy or Satellit, they were great performers for the money, considering the state of technology in those days.

Even transistorized, these radios weren't small. The Yacht Boys were always at least compact size, and the Satellit models could compete in girth and heft with an Igloo chest full of DAB beer.

■ Grundig begins making travel portables

But that was BC—Before California. Since 1987, Grundig has had a North American facility in California called Grundig/Lextronix. During the ensuing decade, Lextronix has shaken the shortwave trees at Grundig, having successfully fought to have a number of travel-sized models introduced.

■ Platinum Traveller under \$100

The most interesting of these is the G2000A "Porsche Design" model, introduced in 1997. It is technically a compact, but is actually only slightly larger than a pocket model. While its performance is pedestrian, styling is anything but.

With that marketing success, Lextronix has goaded Grundig into producing the new Platinum Traveller, a simplified and diminutive version of the Porsche Design, right down to the Star Trek speaker orifice, sleek aluminum finish and lizard-eye buttons. It even includes the same great purse-type leather



case which folds over to double as an elevation panel.

So there's no mistaking the Platinum Traveller's visual appeal—it's whammo! And at \$99.95, street, this Chinese-made radio is affordable even for casual gift giving.

■ Limited coverage, unusual LCD

The Platinum covers FM, AM (including X-band), and shortwave roughly 5800-6410, 6950-7690, 9380-10080, 11570-12390, 15030-15930 and 17420-18480 kHz. Missing, among other segments, are the important 22 meter (13570-13870 kHz) and 13 meter (21450-21850 kHz) bands.

The Platinum comes with a high-contrast LCD viewable from virtually all angles. It displays either an alarm clock or the tuned frequency, but not both at the same time. However, it's not what you might expect.

First, this is not a digitally synthesized receiver. Rather, it is an analog-tuned receiver with a digital frequency readout. These analog/digital hybrids were popular in the late seventies and early eighties, before consumer-grade synthesized tuning was perfected. Included in this "missing link" category were such fine models as the Panasonic RF-2600 (also sold as the GE World Monitor II), RF-2800, RF-2900, RF-4800 and RF-4900—as well as such collectable gems as the Sony ICF-6800W and Drake R-7/R-7A.

There are virtues to this approach. For one thing, tuning is continuous, with no chugga-chugga tuning increments. And there's no synthesizer-generated phase noise to befoul DX reception. Battery consumption tends to

be less, and it's usually cheaper, too.

However, there is a major downside: You can tune only by knob—no handy keypad tuning, scanning or presets.

The Platinum's frequency readout is only to the nearest 10 kHz, which is another creative cost-cutting technique, as it allows an everyday four-character clock LCD to be used. But if you want to hear, say, 7355 kHz, you have to tune to "7.35" and tune up slightly, or "7.36" and tune down slightly. It's odd, to say the least, but you get used to it.

Second, the clock is in 12-hour format only. Why scare all those style-conscious folks off with anything so alien as (gasp!) 24-hour World Time—even if that is what they'll need for listening to shortwave broadcasts?

There are no other features. The short telescopic antenna exits from an orifice in the side; it is sturdily constructed, and both swivels and rotates.

■ Disappointing performance

Performance is uninspiring, mainly because of poor weak-signal sensitivity. This is somewhat surprising, as among low-cost models those with analog tuning tend to have higher sensitivity than those which have synthesized tuning.

Adjacent-channel rejection, or selectivity, is mediocre, but acceptable for casual listening. Ditto audio quality, which through the speaker is tinny but not grating (through earpieces, which come with the radio, it is much better). Image rejection is poor more in principle than in practice, as the set's limited sensitivity keeps images at bay at least as

much as it makes signals hard to hear on their fundamental frequencies.

But the kicker, on our unit at any rate, is what sounds like old-fashioned cross modulation, even with only the telescopic antenna in use. On the AM band, or at night on some shortwave bands, there was often one station which "ghosted" up and down the band, causing minor background interference.

■ Marketing success?

Most of the pocket portables we've tested over the years have been dismal performers, yet even experienced DXers and professional broadcasters have been known to regale any who will listen about how nicely they receive signals. Small size seems to lower expectations, even though high-performance microelectronics is now old hat. So the Grundig Platinum, warts and all, may well turn out to be a commercial success.

It also helps Grundig that there is no other pocket model in the Platinum's \$99 price range that's appreciably better. You have to go for either a slightly larger model with superior performance at the same price, or else spring for the pocket-sized \$149.95 Sangean ATS 606A—the only solid performer among pocket portables on the sunny side of \$300.

■ Drake: Winding Down of an Era

From *Passport to World Band Radio* reader and VOA host Kim Elliott comes word that the era of Drake's cheerfully servicing older models has come to a partial end (www.rldrake.com/tech/Outofservice.html). Granted, they will still service many older models, some going back more than thirty years. But such models as the DSR-2, R-4A and the outstanding R-4245 are no longer being accepted at Drake for service.

Of course, we can't read Drake's collective mind on this issue. Yet, this news appears to have been foreshadowed by Drake's recently selling off parts for older models at bargain-basement prices (www.rldrake.com/tech/parts/partshtml/partslist.html). In the past, Drake would have hoarded parts for older rigs so they could perform repairs, but now they seem to be doing what virtually all other companies have been doing for years: reducing old-parts inventories to improve profitability and help nudge old-timers into buying new models.

Perhaps more to the point, in the part of Ohio where Drake operates, it is difficult to find and hold worthy electronic technicians because of intense competition from large nearby companies. This latest move reduces the number of models that Drake's new repair

technicians will have to learn to fix.

Drake has been hailed by *Forbes* as an exemplary American company, and this move may be greeted as yet another positive sign for the bottom line. But the price to be paid down the road may be in the diminished mystique of a firm which has been respected as much for its legendary service as for the quality of its products.

That's a precious asset to fritter away for small change.

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.

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AOR AR7000 Wide Coverage Receiver

The AOR AR7000 is different from the AR5000 and ICOM IC-R8500 wide coverage table top receivers we've reviewed in the past. The frequency and all other visual indicators are displayed on a 3-1/2" internal color LCD screen or can be viewed remotely on an NTSC video monitor (not supplied) connected to a phono jack on the rear of the cabinet. We are able to connect the AR7000 (serial number 050019) to the NTSC input of our PC's ATI All-in-Wonder video card and view the scanner indicators on our computer monitor screen while doing other work.

The LCD screen in our AR7000 has low contrast unless viewed at the proper angle and there are no contrast or brightness controls to compensate. The important functions may be performed using the included infrared remote controller. We connected the AR7000 to an old 12" black and white monitor and could easily read the screen across the room while tuning it with the remote control.

The AR7000 is specified to cover 0.1 - 2000 MHz (except cellular phone bands), but ours tunes down as low as 10 kHz, where it is insensitive. The tuning step arrangement is the best we've seen in any receiver. The step size may be set anywhere between 10 Hz and 1 MHz in 10 Hz increments, and the AR7000 does not coerce the display frequency to fit the step size. Frequencies are displayed down to 10 Hz versus 1 Hz in the AR5000.

■ Mechanicals

Physically, the AR7000 is well built — housed in a two piece metal clamshell cabinet and plastic front panel. The hinged tilt bale is made from rugged metal rod, padded with rubber. The unit requires 12 Vdc at 2 amps, and is supplied with a large, external power wart which plugs into the 117 Vac wall outlet. The metal label on our power wart gets uncomfortably hot, reaching temperatures above 105 degrees F when the radio is on.

Separate jacks are provided for headphone, external speaker, video out (PAL or NTSC selectable), and a DB-9 RS-232C computer port. There's no baseband audio jack *per se*, but our CSI CD1 display shows CTCSS and



DTMF codes reliably when connected to the constant low level audio output jack on the rear of the AR7000.

An 8-pin DIN accessory socket provides 10 kilohm audio (for tape recording), squelch activated tape recorder control contacts, ground, +12 Vdc, and +5 Vdc. There is no external time base input for use with an external high stability oscillator, as found on the AR5000.

Construction inside our AR7000 is fairly orderly, except for a few capacitors which are glued to the boards with their leads soldered to resistors suspended in midair. The disorder may reflect last minute revisions in this early production unit. We saw similar "afterthoughts" in the AR5000 we tested but not in the IC-R8500.

■ A la Mode

Reception modes include AM, NFM, WFM, CW, USB, and LSB. You can choose CW offsets of 400, 600, or 800 Hz, each producing a different beat note. There is no tone control, though you can choose between high and low audio response in NFM.

There is one bandwidth for NFM and another for WFM. The AR7000 provides an interesting menu of bandwidths for the other modes. You can select from five CW bandwidths between 50 and 800 Hz. SSB selectivity choices are 2, 2.5, and 3 kHz. There is no AM synchronous detector, though you can choose a selectivity of 2, 6, or 8 kHz. An IF shift, adjustable between -8500 and +8500 Hz, is provided to aid in selectivity for all modes except NFM.

The shape factor for the most narrow CW bandwidths isn't nearly as steep as for the SSB and AM modes. DSP (digital signal processing) technology is used in the final 10.7 MHz IF stage, but the instruction manual

contains no block diagram or mention of which bandwidths are implemented by conventional filters or by the DSP.

■ Memory, Searching and Scanning

The AR7000 has two VFOs and its 1,500 memory channels are organized into 15 banks of 100 channels

each. You can scan multiple memory banks provided they are adjacent. Our AR7000 scans a mixture of memory channels at only 12 channels/sec versus our AR5000's 43 channel/sec rate. The per-bank rescan delay is adjustable between 0.1 and 9.9 seconds.

You can search directly from a VFO frequency. For limit searches, you can set up 8 pairs of search limits (search banks) and designate mode, search direction, and step size. An auto store type feature lets you designate a memory bank into which active frequencies will be stored during a limit search, with a different target bank for each search bank. Duplicate frequencies are not stored during auto store.

Memory bank 14 holds frequencies which are locked out from searches. You can designate an addition bank for pass frequencies, making a total of 200 frequencies which can be locked out from a search.

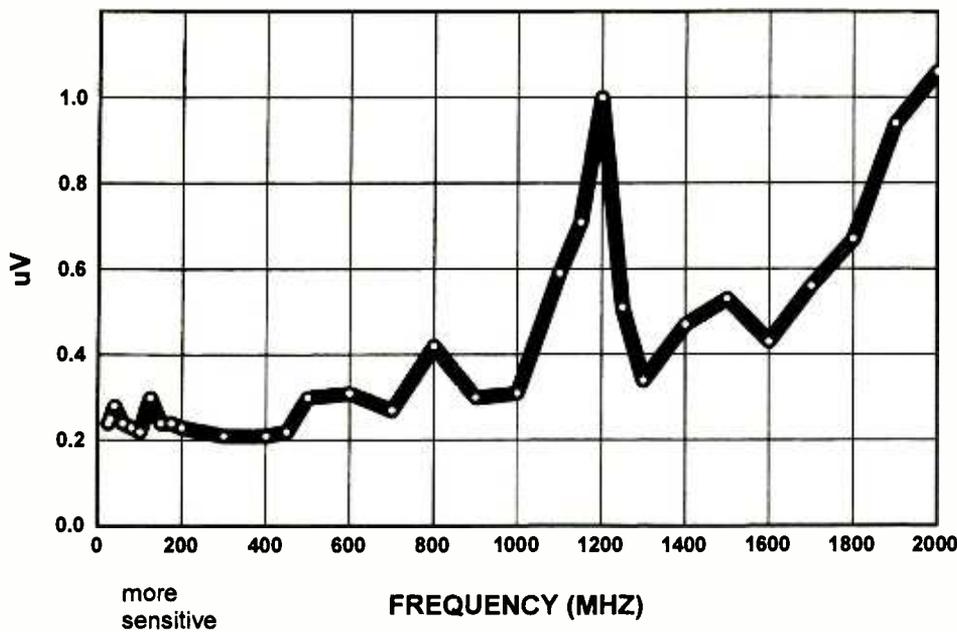
A multicolor graphic portrays spectrum activity by displaying the S-meter values as vertical bars at each step during searches and while tuning the VFOs.

It's easy to assign alphanumeric labels to both search banks and memory channels using an onscreen menu.



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FREQUENCY (MHZ)

■ **Using It**

Our AR7000's shortwave reception is head and shoulders above the handheld wideband scanners we've tried, especially in ham bands crowded with SSB transmissions. AM foreign broadcast reception is not quite as good as our IC-R8500. Reception in the 7.4 MHz region is peppered with QRN (man made noise) on our AR7000, but not on the IC-R8500, even with the ICOM's noise blanker off. This leads us to suspect some of the noise is generated inside our AR7000. The ICOM's

smooth tuning knob is easier to use for band surfing than the smaller, detented knob on our AOR.

As in the ICOM IC-R8500 and AOR AR-5000, internal relays chatter as the AR7000 scans a mixture of memory channels on different bands. We hear a relay click when tuning across 20, 225, 860, and 1215 MHz boundaries (vs. 40, 400, 1000, and 1600 MHz in the AR5000 and 500, 1025, and 1200 MHz in the IC-R8500).

Instead of a simple squelch knob, you must press the Squelch key, then adjust the squelch level in discrete steps using the encoder knob, then press Ent. We have trouble finding a squelch setting which permits pausing a search or scan to hear weak signals without falsing. When the squelch is fully open in NFM, there is a "chuffing" noise while tuning the VFO.

Searches in the military air and VHF high bands are often interrupted by short noise bursts. This doesn't happen when using our AR7000 with the antenna disconnected, which makes us suspect an intermodulation problem.

Moderate and stronger NFM signals cause our AR7000 to stop searching 5 or 10 kHz off frequency where the audio is distorted. GRE scanners employ a window detector to ensure the search stops on the center frequency.

Our AR7000's audio is clear when monitoring most signals. As measured by our HP audio analyzer, distortion remains below 10% at full volume into a noninductive, resistive load. Our AR7000 has a modulation acceptance of only 5.8 kHz in NFM, unusually narrow compared with our other receivers. A

few NFM signals with wider deviation sound rough on voice peaks.

The fast AGC setting distorts strong AM signals, but works well on weaker and moderate strength signals. We could find no noise blanker as included in the IC-R8500.

■ **In Closing**

We find our AR7000's menu driven squelch difficult to control, the display blurry at most angles, and FM searching problematic. Computer commands are not documented and should be.

Despite these glitches, the AR7000 packs a lot of features into a sturdy desktop package and offers much better shortwave performance than contemporary handhelds. The IR remote control, NTSC video output, accessory jack, and RS-232 serial port are attractive and we like the adjustable rescan delay, step size flexibility, and selection of AM and SSB bandwidths.

ABBREVIATIONS

Abbreviations used in this column	
µV	Microvolts
AM	Amplitude modulation
CTCSS	Continuous tone code squelched system
CW	Continuous wave (Morse code)
DSP	Digital signal processing
DTMF	Dual tone multi frequency
F	Fahrenheit
HP	Hewlett Packard
IF	Intermediate frequency
IR	Infrared
kHz	Kilohertz
LCD	Liquid crystal display
LSB	Lower sideband
MHz	Megahertz
NFM	Narrowband frequency modulation
NTSC	Television standard used in U.S.
PAL	European television standard
PC	Personal computer
QRN	Man-made noise
S/N	Serial number
SINAD	Signal to noise and distortion ratio
SSB	Single sideband
USB	Upper sideband
Vac	Volts alternating current
Vdc	Volts direct current
VFO	Variable frequency oscillator
WFM	Wideband frequency modulation

MEASUREMENTS

AOR AR7000 SCANNER
S/N 050019

- Frequency coverage (MHz):
0.01 - 2000, except 824.01 - 849 and 869.01 - 894
- Step sizes:
10 Hz - 1 MHz in increments of 10 Hz
- NFM Sensitivity: see graph
- AM Sensitivity (8 kHz IF bandwidth, 12 dB SINAD, 30% mod. 1 kHz tone):
4.0 µV @ 0.5 MHz
4.5 µV @ 1 MHz
3.3 µV @ 10 MHz
1.7 µV @ 20 MHz
1.2 µV @ 30 MHz
- Attenuator: 18.5 - 23 dB
- FM modulation acceptance: 5.8 kHz
- Audio output (at ext. spkr jack):
0.26 W @ 8.6% distortion
- Intermediate frequencies (MHz):
275.4 or 782.28, 45.0, 10.7
- Practical memory scan speed:
12 channels/sec.
- Search speed: 14 steps/sec.

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A Reflection on Computers & Radar

From my earliest recollections, I knew the name Nike. Yes, in Greek mythology he was the swift, fleet-footed god. But I remember the Nike that was designed to protect the country from an enemy bomber attack. Welcome to the 1950s and the Cold War. The Nike missile system, developed in the 1940s, went through a number of evolutions as the Ajax, Hercules, Zeus and finally was decommissioned as the Nike-X in 1974.

The Nike system started life as the Nike Ajax. See Figure 1. Missile sites were setup in "rings" around large cities such as Washington, New York, Boston, Chicago, San Francisco and twenty-plus other US cities. The Nike was designed to use the inputs from a number of radars located near, or on, the missile site. These radars and data communications links operated in the 3 to 17 GHz frequency range for the various versions. This target data was fed to a target tracking computer. Once an intercept solution was determined by the computer, the Nike missile could be fired by a member of the US Army who was responsible for their operation.



FIGURE 1

On a recent trip to San Francisco I had the opportunity to tour Fort Barry, the only fully restored Nike missile base opened to the public, including underground missiles stores, above ground launchers, communications vans, and computer/command vans.

Modern Techno-Archeology

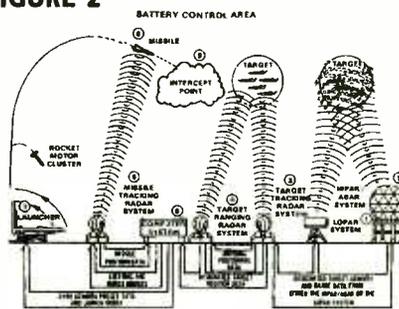
Bud Halsey, a retired US Army Colonel, and a group of very dedicated volunteers have spent their time and money to restore Fort Barry in the low foothills of the Marin Headlands, just over the Golden Gate Bridge in the Golden Gate National Recreation Area. They have used their efforts in an attempt to provide us all with a reminder of a chapter in our civilization's evolution. Just like a "dig" at an Egyptian pyramid in the late 1800s, the work that Bud and his people are doing provides us with a glimpse into "how it was."

Real Computer Games

Once the Nike Ajax was fired, another group of radars tracked the Nike and fed data to the computer. See Figure 2. If the target changed its path the computer would compute a new trajectory for the Nike and radio (uplink) the new data to the supersonic Nike. This computer game was dead serious. The Nikes were the last line of defense engaging the enemy bomber in a 150 to 30 mile range of the bomber's destination city! Thank goodness that insane chapter of human history is over ... and we are still here as a civilization.

The later Nike Hercules carried a nuclear warhead to insure the bomber forces destruction even with a near miss. Although not one single US Nike was fired in anger, the system was tested quite a number of times and downed unmanned bombers, fighters, missiles and, in the 1960s, even reentry vehicles. So now that we have discussed what Nike Ajax could do, let's look at its computer brain.

FIGURE 2



Improved Nike-Hercules missile control and guidance system
From FM 44-1-2 ADA Reference Handbook, 15 June 1984, see page 21 "Range of Supersonic Steel"

When Analog Computers Ruled the Earth

Today, digital computers are everywhere, common in our everyday lives. CPU types such as the 8080, 286, 486 and Pentium are as familiar to us as the models of cars (and have made Intel more profit than General Motors). However, there was a time in human history when analog computers ruled

the earth. If you can remember a time prior to the introduction of Hewlett Packard's HP-35/45 calculators in the early 1970s, then you may also remember one of the three most common analog computers in history. Hint: The first two were used by storekeepers, pilots, accountants and technical people. The third by just about everyone else.

If you said *mechanical adding machines* and *slide rules* you would be correct in identifying the state-of-the-art ubiquitous analog computers of the 40s, 50s and 60s. They began life as the Chinese abacus thousands of years ago. What is number three—the most commonly used?

A Swiss Analog Computer

A mechanical analog computer uses mechanical movement to mimic mathematical solutions to processes or procedures. A simple illustration, and one I guarantee you will know, is an analog computer to calculate some Newtonian and Keplerian celestial mechanics. Yes, you do know it: a mechanical wrist watch.

The system of gears in this analog computer are designed and constructed so that they fairly accurately give you the position of the earth in its rotation period about its axis. It tells you the time of day in hours, minutes and seconds. Not bad for a bunch of mechanical gears. That's just what the Nike computer designers thought in 1945.

Computer or Car Transmission?!

As I followed Col. Halsey into the communication and tracking van at Fort Barry, four floor-to-ceiling metal equipment racks lined the left wall of the very cramped van. Bud began opening the doors of the first two racks while explaining that this was the "heart of the operation—the tracking computers." See Figure 3.

One rack was packed with rows of 12AX7 tubes (valves). "There are over 200 tubes in the computer, 170 amplifiers, and the rest servo motor drivers," Bud informed me.

The next cabinet, a trajectory solution

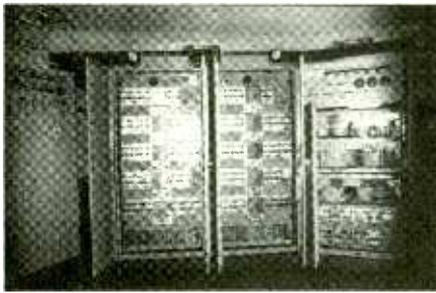


FIGURE 3

computer, had what appeared to be three metal drawers in its midsection. Each drawer was 3 feet wide, 2.5 feet high and 2.5 feet deep. They looked like small metal coffins. Bud pulled open one of the drawers and there was the most complex system of gears that I had ever seen. Many of the gears were driven by separate motors. There were actuator linkages everywhere in this monster. Welcome to the 1945 state-of-the-art computer!

In actual operation, the metal "coffins"

were filled with oil to ensure smooth, fast and reliable operation. Position and speed inputs from the various Nike radars for the in-flight Nike and the incoming enemy aircraft were sent to this "computer." Each input rotated a different system of gears. When all the gears were properly linked together, amazingly, an intercept point was determined. Then the supersonic Nike was steered to that position in the sky via its microwave radio uplink. The fins near the front of the missile are antennae. Pretty amazing stuff even by today's standards. But when you consider it was all done with gears ... enough said!

See Ed Thelen's excellent website for a very detailed discussion of the Nike systems. Today, this "computer" could easily be replaced by an old 8088 PC. His site is located at www.jps.net/ethelen.

If you are lucky enough to find yourself in San Francisco on the first Sunday of the month, around noontime, you could do no

better than to visit the dedicated crew at Fort Barry. The setting is beautiful (spousal consideration) and the equipment and conversation will make you and your family feel the atmosphere of the cold war and how lucky the world is today. You'll feel like a worker at a modern King Tut's technology tomb.

My special thanks to Col. Bud Halsey and his crew at Fort Barry for their dedication and giving us the ability to show our children the world we grew up in, and don't want repeated. Check out their website at www.nikemissile.org for pictures, directions, movies, links and more history on the Nike missiles. Also thanks to Ed Thelen for his great Nike website.

Well, that's it from the greatest in 1945 computer technology. Now, let's shut down the time machine. Till next month when we'll be back looking at the best computer and radio technology of the closing days of the twentieth century.



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Alpha Delta VRC Speaker

Reviews by Bob Grove

In the past few years, several manufacturers have released digital signal processing (DSP) audio accessories for customizing sound under noisy shortwave (and scanner) reception conditions. Some have automatic heterodyne notching and background noise reduction, some are cumbersome to operate, some add noise artifacts, and most (if not all) lack "warmth" in their sound as a result of the digital shaping of the audio.

Alpha Delta's VRC (Variable Response Console) is an attractive, easy-to-operate package with an internal speaker. Its sturdy, diecast enclosure is visually pleasing, and the LED bargraph brilliantly announces the low pass filter cutoff settings from 400 to 10,000 Hz. A second LED bargraph shows bass boost/attenuation by up to 12 dB. An



operational folder is included, containing equalization graphs of the various control settings.

The notch/peak filter is continuously adjustable from broad (for voice and music) to razor sharp (to peak or reject narrow-bandwidth data or single-tone interference). Resultant audio is quite listenable, although harsher than produced by an analog processor.

A 1/4-inch front-panel jack invites the use of headphones when speaker operation is undesirable. A rear panel tape output (RCA phono jack) is provided. The VRC is powered by 12 VDC (AC adaptor provided). A shielded patch cord with 1/8-inch plugs and a 1/8 to 1/4-inch adaptor plug are included.

Although functions are limited to simple audio contouring (which it does very well), the Alpha Delta VRC is one of the easiest to use and acoustically acceptable DSP audio processors we have tested. And it has a decent internal speaker, not universally found in competitive DSP products.

The VRC speaker accessory is available for \$249.95 from Alpha Delta, Inc., Highway 25 North, East Bernstadt, KY 40729; call (606) 843-6567.

Icom's Q7A Hand-Held Transceiver

For those of us who enjoy both ham radio and scanning, Icom's new entry is stunning. Slightly more than two inches wide and three inches tall, and powered either by replaceable alkaline or rechargeable AA cells (thanks, Icom!), the tiny Titan easily fits in a shirt pocket, yet transmits on the popular 144-148 and 440-450 MHz ham bands, and offers continuous reception (less cellular) from 30-1310 MHz — AM, NFM, and WFM modes!

■ No Keypad?

All this punch, in such a teensy package requires some compromises. How does one enter frequencies without a direct-entry keypad? It takes a little practice, but it's actually quite simple. The small cluster of keys are multi-function, as is the rotary knob on the top. After the appropriate band is selected (roughly 42, 133, 154, 370, 406, 865, 1300 MHz), the rotary knob is programmed to fine tune in megahertz, then kilohertz, steps. It sounds more complicated than it is ... once you get used to it!

Mode, step size, memory channels and banks, squelch threshold, volume level, VFO/memory toggling, repeater offsets, CTCSS tone (receive and transmit!), re-scan delay, and a myriad other useful functions are simi-

larly menu-selected by the dual-function keys.

But don't try to figure it out without following the manual; we value our readers' sanity!

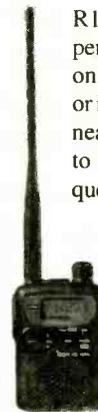
■ As a Transmitter

Audio quality is excellent, both transmit and receive, but is the low output power (1/3 watt) adequate for reliable communications? Under ideal conditions, as with similarly-powered FRS transceivers, a Q7A probably could talk to another of its kin up to a mile or so away, and even hit local repeaters. It may not be a DX machine, but for close-in talk-around, it will hold its own with bigger—and much heavier—competitors.

Icom's obsession with the SMA connector makes it difficult to substitute standard BNC-fitted external antennas to the radio. SMA/BNC adaptors are available, but they create a leverage hazard on the plastic case (which is admittedly quite rugged).

■ As a Receiver

The Q7A receiver will hold its own with virtually any scanner on the market — except for scan/search speed which, like its R1 and



R10 predecessors, is a ponderous 7 channels per second. In actual practice, however, where only a few channels are likely to be scanned, or in busy metropolitan areas, where action is nearly continuous, the scanner doesn't have to look very far to find the next active frequency.

Sensitivity is on par with any comparable scanner (typically 0.2 microvolt or better), as is adjacent-channel selectivity (15 kHz AM/NFM, 150 kHz WFM). And the 100 mW audio output is surprisingly strong and clear from the internal speaker; a convenient top-mounted speaker/earphone jack is provided.

■ The Bottom Line

Would I recommend the Icom Q7A as a primary communications instrument? Not for extended distances. Does it make a good backup rig for close-in communications as well as a fine scanner? You bet! In fact, if you'll pardon me, I have to go now — a dispatcher in a nearby town has just reported a fire. I'm letting the little Icom take me to the scene!

The new Icom Q7A wideband transceiver is available from several MT advertisers, including Grove Enterprises (\$229.95)

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Garmin's GPS III Plus



Garmin has upgraded its popular global positioning system (GPS) receiver in the GPS III Plus Personal Navigator. Improvements over the unit mentioned in the June '98 edition of "What's New" are mainly evident in the detailed basemap. The Plus model adds 10,000 additional towns as well as airport locations, more secondary roads within urban areas, and

interstate highway exit information. It's a snap to look up information about available services such as food, lodging, and service stations. See also this month's "Scanning Report" for fun with the Garmin while airborne!

The Garmin GPS III Plus is available from Grove Enterprises (800-438-8155 or www.grove-ent.com) for \$379.

Two optional CD-ROMs from Garmin's MapSource line provide additional enhancements to the base map: *U.S. Roads and Recreation* provides street level detailed maps and nautical navigation aids for the 50 states, and the *World Map* CD-ROM provides additional nautical aids, streams, rivers, small roads, and islands worldwide.

Where in the World is...?

DXers have long relied upon maps and atlases for clues to help with station identification of an unknown signal. Finding those maps has never been easier since the advent of the internet.

Magellan Geographix has redesigned their virtual map store at www.maps.com to include not only atlases, CD-ROMs, paper maps, outdoor recreational maps, software, and digital maps, but travel accessories as well. If you're not on the internet, call 1-800-929-4MAP for a catalog.

Spy / Counter Spy

These days, the most valuable asset of corporations,



government agencies, or even individuals may well be information. Theft of certain kinds of information may rob you of your business, your livelihood, or even your identity.

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High Speed Internet Access via Satellite



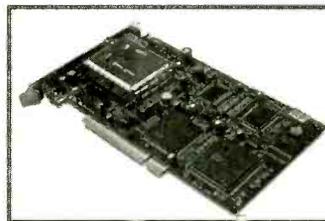
ComBox Ltd is a telecommunications company near Tel Aviv, Israel, which specializes in high-speed data networking for satellite and cable markets. Their new SatStream PC Satellite Modem is a half size format PCI card which is installed inside the subscriber's PC (Windows 95/NT platforms) and connects directly to the LNB. The satellite modem offers residential and commercial subscribers a high-speed connection to the

Internet and local community information via satellite Digital Broadcasting Services.

Based on the standard digital video broadcast (DVB) MPEG2 protocol, SatStream features up to 53 Mbps variable downstream data rates; the upstream link is via your telephone line.

Potential users for the SatStream System are small office/home office (SOHO) users, corporate private networks, desktop distance learning applications, or telemedicine.

For more information, visit www.combox-i.com or write



ComBox Ltd., 16 Bazel Street, P.O.Box 10186, Petach-Tikva 49001, Israel; Tel: 972-3-924 1495

Scancat-Gold Supports Ten Tec RX320

Software programs to enhance the RX320 (reviewed in December's "Computers & Radios") are a natural accessory, since Ten-Tec's new shortwave radio itself is computer-controlled. Computer Aided Technologies is proud to be the first third-party software developer to support the under-\$300 "PC-radio."

Add Scancat's database support, scanning, logging, spectrum analysis, and sound recording (with SE option) to the

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SCANCAT supports almost ALL computer controlled radios by: AOR, DRAKE, KENWOOD, ICOM, YAESU and JRC (NRD) Plus PRO-2005/6/35/42 (with OS456/535), Lowe HF-150, and Watkins-Johnson.

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AOR AR-8200B



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FEATURES

- Exclusive "MACRO" control by frequency of Dwell, Hang, Resume, Sig. Treshold and even 6 separate programmable, audible alarms.
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- By Signal Strength per frequency in a "histograph".
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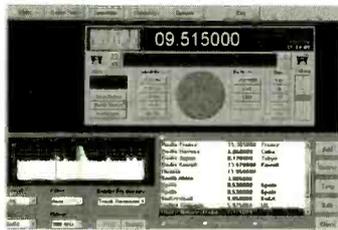
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RX320 and you have created one of the most sophisticated systems available at a total cost of less than \$500!



Scancat Gold for Windows-SE sells for \$159.95 (\$99.95 without the SE option). It supports over 50 radios from over 12 manufacturers, and is available from Computer Aided Technologies (toll-free 888-SCANCAT or scancat@scancat.com), Grove Enterprises (800-438-8155 or order@grove-ent.com), and other MT advertisers.

Light in a Flash!

The power has just gone out and you've been sitting in the dark for five minutes. This outage may last a while. No problem: you're all prepared. The flashlight is in a box by the bed, and fresh batteries are in the refrigerator. A-a-h, but you're in the den!

Again, no problem. A thirty-second hand crank of the BayGen lantern's internal generator and you have several min-



utes to get other light and heat sources up and going. Each 30-minute crank produces three to five minutes of light. Or, the generator may be used to power or recharge other small accessories when their batteries give out. The BayGen lantern may also be operated from house current with an AC adapter.

The BayGen self-powered lantern is \$69.95 from Grove Enterprises (800-438-8155) and other dealers. Visit www.freeplay.com or www.grove-ent.com for more information.

"No Worries" EMF Safety Monitor

When it's your job to work around strong electromagnetic fields you can't constantly be pulling out a meter to check the

field strengths. With RadMan, you won't need to; stick it in your pocket or on your belt and forget it. RadMan is a new addition to the line of safety test solutions from the German company Wandel & Goltermann.

The monitor arrives already calibrated according to the standards of the relevant country. Models currently exist for Germany (VDE), the U.S. (FCC), Australia/New Zealand (AS-NZ) and Japan (RCR-STD-3). Further standards are in development. LEDs show the electric or magnetic field in terms of a percentage of the norm and activates a visual and audio alarm



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- With the addition of AOR's SDU-5000 Spectrum Analyzer and this NEW Windows Software any radio that has a 10.7MHz IF output will give you full computer controllable spectrum analysis.
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COPYCAT PRO FEATURES

- 32K incoming text buffer.
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HOKA CODE-3 USA Version

"The Standard Against Which All Future Decoders Will Be Compared"

Many radio amateurs and SWLs are puzzled! Just what are all those strange signals you can hear but not identify on the Short Wave Bands? A few of them such as CW, RTTY, Packet and AmTOR you'll know - but what about the many other signals?

There are some well known CW/RTTY Decoders but then there is CODE-3. It's up to you to make the choice, but it will be easy once you see CODE-3. CODE-3 has an exclusive auto-classification module that tells YOU what you're listening to AND automatically sets you up to start decoding. No other decoder can do this on ALL the modes listed below - and most more expensive decoders have no means of identifying ANY received signals! Why spend more money for other decoders with FEWER features? CODE-3 works on any IBM-compatible computer with MS-DOS with at least 640kb of RAM, and a CGA monitor. CODE-3 includes software, a complete audio to digital FSK converter with built-in 115V ac power supply, and a RS-232 cable, ready to use. CODE-3 is the most sophisticated decoder available for ANY amount of money.

26 Modes included in PROFESSIONAL package include:

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- SWED-ARQ-ARQ-SWE
- ARQ-E/ARQ1000 Duplex
- ARQ-N-ARQ1000 Duplex Variant
- ARO-E3-CCIR519 Variant
- POL-ARQ 100 Baud
- TDM242/ARQ-M2/4-242
- TDM342/ARQ-M2/4
- FEC-A FEC100A/FEC101
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* All modes in typical baud rates with possibility of changing to any desired value of speed and shift.

* User can save incoming data to disk in either ASCII or raw bit form.

PROFESSIONAL CODE-3 DECODER

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Includes: ALL Modes, Plus Oscilloscope*, ASCII Storage, Auto Classify*, and PACTOR* Options

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when the limit is reached.

RadMan can also be used to monitor and locate leaks. Using FCC standards, the unit measures E-field from 3 MHz to 7 GHz (18 GHz planned), and H-field from 3 MHz to 1 GHz. An optional optical interface is available to record output to a computer.

RadMan operates on two AAA batteries (provided) for up to 300 hours. Other standard accessories are an earphone for noisy environments, carrying case, and manual. For more information contact Wandel & Goltermann GmbH & Co, Elektronische Messtechnik, Internationales Marketing, Postfach 12 62, D-72795 Eningen u.A., Germany (Fax 0049-(0) 7121 8613 33) or visit www.wg.com, info@wago.de

Competition Grade SW Loop

Raymond Moore, author of *Communications Receivers* now in its fourth edition, has completed another in a long list of his accomplishments. He has designed and brought to market a series of three loop antennas which cover a frequency range from 150 kHz to 30 MHz.

The loops are designed for difficult receiving situations, precision direction-finding, and the most exacting of hobbyists. The shortwave loop, Model 108B (2.5 to 30 MHz) is "a competition grade short wave

loop for those who need an indoor antenna that equals or exceeds the performance of the usual outdoor installation. The antenna is for those who want top notch performance but don't want to be bothered with stringing wires, putting up poles and towers (which often aren't permitted anyway), drilling holes in the house for lead-ins, worrying about storms and lightning, or, perhaps, whose spouses think outdoor antennas are aesthetically unattractive."

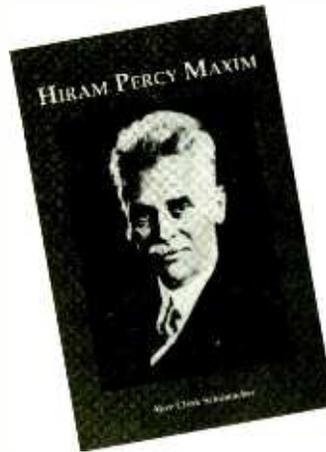
The loop can be used passively or with any low noise, high dynamic range line amplifier for very weak signal applications. It is adjustable in four ranges for optimum performance across its entire frequency range. It terminates in a 5/8-inch diameter rod for easy rotation using RSM Communications' tripod or desk mount or one of your own choosing. Output is to a standard SO-239 connector.

The 108B shortwave loop is \$240 plus \$15 shipping. To order or to enquire about other loops in the series, write RSM Communications, P.O. Box 27, Labelle, FL 33975-0027 (phone 941-675-2923).

Hiram Percy Maxim

Hams revere the name of Hiram Percy Maxim because of his foundational establishment of amateur radio, but Maxim was more than a ham, he was truly a renaissance man. His interests were unbounded, influencing developments in motor sports, aeronautics, air conditioning, space sciences, even motion pictures. Left-side steering and the gun silencer are but two of his contributions.

Alice Clink Schumacher's 216 page book is a tribute to this man and his works, and makes fascinating reading, especially for the radio enthusiast. \$19.95 from Electric Radio Press,



14643 Country Rd. G, Cortez, CO 81321; phone/fax 970-564-9185, ore-mailer@frontier.net.

Family-friendly Communications



GoComm is the snappy name of a Woodlands, Texas, company that sells those equally snappy, colorful little pagers so popular with young people and families these days. Now the kids can talk back;

GoComm has expanded their line into two-way communications using the unlicensed Family Radio Service (FRS).

The GoTalk II, whose modern design bears strong resemblance to the Icom IC4008A and Kenwood's FreeTalk, boasts all the features commonly available in top-end models — 14 channels with 38 "privacy codes" per channel (a CTCSS, continuous tone coded squelch system, that will exclude all signals except those from radios using the same channel and tone); 500 mW power; speaker and mic jacks, voice activation when used with the optional mic; and back-lit LCD display. Housed in a sturdy black case

less than 4 inches tall, the transceiver operates on three AA batteries. Belt clip and handstrap are included.

GoTalk II is available from Grove Enterprises (800-438-8155 or www.grove-ent.com) for \$89.95, or \$79.95 each when purchasing two or more radios.

Trunked Radio Systems (California)

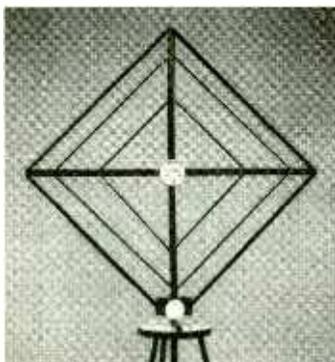
Robert Kelty's handy guide to scanners in California lists 800 MHz public safety trunking systems for county, state, federal, and industrial users throughout the state, identifying frequencies and talk groups, as well as system manufacturers.

Trunked Radio Systems is available for \$18 postpaid from Mobile Radio Resources, 1224 Madrona Avenue, San Jose, CA 95125-3547.

Books and equipment for announcement or review should be sent to

**"What's New?"
c/o Monitoring Times,
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Brasstown, NC
28902**

Press releases may be faxed to 828-837-2216 or e-mailed to mteitor@grove-ent.com.



LETTERS TO THE EDITOR

NEWS AND VIEWS FROM OUR READERS

Rachel Baughn, Editor

Looking Forward

As we begin a new year and prepare for the century to roll over to the year 2000, we pause to take stock of where we've been and where we're headed — and we even take a look at how we record time and dates and why that should matter to radio hobbyists.

We also welcome two new authors to our ranks: Stan Scalsky and Mike Chace are very familiar to members of the World Utility Network (WUN) emailing list as editors of their Frequently Asked Questions (FAQ) page. Stan and Mike will be taking over the task of explaining digital modes to our readers in the monthly "Digital Digest" column.

The Future is up to us

"I've been reading various letters in *Monitoring Times* and other publications discussing the very future of the radio hobby. There used to be a time when you told someone that you were a shortwave listener or a ham radio operator they would regard you with a sense of respect, a little awe, and a large dose of wonderment. Today everybody possesses that ability. We just are not that special anymore. That is why our frequencies are being sold at auction and our listening ability is being repeatedly restricted by more "relevant communication services."

"Or, maybe it's not how the public sees the radio hobbyist that we should be concerned about right now, but more about the radio hobbyist himself. I came across a delightful article in the November '98 issue of *Airways* magazine penned by Rick Drury in which he relates how he lost his 'joy' of flying and then through a period of introspection regained this almost childlike joy in its intensity and love for flying.

"Have we radio hobbyists lost our joy and wonder when it comes to radio? Maybe we should do some soul searching and regain that childlike wonder that first pulled us heart-first into that realm of radios, radiowaves, and late night DXing. Perhaps that is what draws the public into the hobby and not the allure of being in a select fraternity.

"Radio is still a mysterious realm, even to those who have walked its pathways for many years."

— Thomas White, Centralia, IL

Thanks, Grove

"Many thanks for sponsoring the *Communications World/World of Radio* hour on WCCR. My listeners are already telling me they are

pleased that the half-hour version of *Communications World* will return to shortwave. Thanks again. I'm proud to produce VOA's first sponsored radio program!"

Kim Andrew Elliott, Producer and Presenter
Communications World, Voice of America

Cut Numbers

We received several excellent replies to Edward Defreitas' letter about the Morse code transmission that had him mystified. One of the first was from well-known utility writer Don Schimmel (an email from Bill Kelly agreed with Don's code scheme).

• "The signals reported in the October *MT* 'Letters,' were cut numbers. This particular system is as follows:

1 2 3 4 5 6 7 8 9 0
A N D U W R I G M T

"Based on the above, the group UUURA breaks out to 44461."

• Mike Chace of Philadelphia, PA, elaborated that this particular "cut numbers" scheme was "long-favored by Cuban intelligence for its numbers transmissions to agents in the field."

• Bill Ricker, N1VUX, of Boston, Mass, not only identified it as cut numbers, but sent along a description of how cut numbers work and provided a couple of references for further reading. Look for his entire letter on the *MT* website at www.grove-ent.com/hmpgmt.html.

Bill says, "I enjoyed the special spooky theme of the October issue. This arrived at the same time that my old jr. high interest in cryptanalysis was being reawakened by a new result in factoring. With regard to Ed's letter on a 'Numbers' station that was sending only a portion of the alphabet in Morse, rather than suspecting a block-code, he should check the ADFGVX cipher and NKVD ciphers in Kahn's book or better yet in Bauer's *Decrypted Secrets* [available from Springer].

"Rather than sending Morse numerals, one uses either cut-figures or letters: they're shorter. With part-time non-specialist radio operators such as spies or infantry, a subset of Morse characters chosen for sounding different provides for better copy.

"If you aren't used to cut-numerals, you might mis-transcribe them as close letters. The sender omits all but the first trailing DASH on 1,2,3 and all but the first trailing DOT on 6-9. ... Of course, any station and its operatives could have any numeral-to-letter mapping they wish. Ten is more than enough, even for Cyrillic."

"I strongly recommend the Bauer book, as it gives the actual techniques and math behind

them in more detail than Kahn. Other good books on spy-craft abound; I'm sure the books I used to like are both out of date and of print. A recent fictional book, *TASS is Authorized to Announce*, is an apparently well researched novel of the KGB ferreting out a Carter-era US mole who they know is target of repeated radio messages they can't decrypt — until they raid his flat. *Puzzle Palace* and *Deep Black* both focus more on the current technology and less on routine field-work spy-craft and its cryptographic protection.

"There are internet discussion groups at news:sci.crypt (and news:alt.crypt?) where discussion of such projects might prove fruitful."

Spookily yours, Bill Ricker

Lesson Plans using Radio

"Thought I'd alert you to the lesson plan I added to the AskERIC online lesson plan collection recently," writes Anton Ninno, AskLN coordinator for the Information Institute of

Continued on page 102

Products that make the difference!

★ ★ ★ ★

High Performance MW Loop Antenna

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Letters, continued from page 101

Syracuse. ERIC is the Educational Resources Information Center, which can be accessed at www.askeric.org or askeric@askeric.org.

"An article I wrote on using radios in the classroom also appeared in the April issue of *Technology Connection*, a magazine for school librarians and school technology coordinators. Since many schools are receiving *Monitoring Times* as complimentary subscriptions, thanks to your generous policy, you might want to mention the lesson plan in an upcoming issue."

Ask for Lesson Plan #: AELP-INT0093, "Integrated Learning with an AM Radio." It includes ways of using AM, FM, and short-wave radios in academic activities. Some other

articles on the ERIC site:

Articles on Using Radios in School —

Introduction to Shortwave Radio in the Classroom, by Myles Mustoe
<http://ericae.net/db/rc80/ej375529.htm>

Communications Corner: Tune in News and Science with Your Shortwave Receiver, by David A. Wolf
<http://ericae.net/db/rieci/ej433505.htm>

Shortwave Radio and the Foreign Language Classroom, by Philip D. Smith
<http://ericae.net/db/rc66/ej155278.htm>

Shortwave Radio and the Second Language Class, by Joseph A. Wipf
<http://ericae.net/db/rc80/ej295358.htm>

Shortwave Radio: A Tool for Integrating the Curriculum, by Irwin L. King
<http://ericae.net/db/rieci/ej364216.htm>



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By Bob Grove,
Publisher

The Millennium Dilemma: Myth or Monster?

Just one year from now, we'll know whether the alarmists or the skeptics are right about the millennium "crisis." Some evangelists are predicting Armageddon, while other opportunists are cashing in on windfall profits from public ignorance. Predictions range from world-wide famine because of non-delivery of foods, global economic collapse because of paralyzed bank transactions, rioting among panic-stricken populations, to complete cessation of utilities such as power and water.

The heart of the problem is the real-time clock — the quartz-crystal-controlled microprocessor — that puts everything into digital sequence. The problem comes from calculations arising from comparing two dates, one before and the other after the turn of the millenium.

Most computers, in order to save processing space and speed, use only two (binary) digits to signal the year, just as we often do when we write the date ('99 for example). So when the world's clocks turn to "Y2K" (year 2000) at 12:01, January 1st, inadequately designed microprocessors around the earth will think it's 1900, not 2000.

The most seriously affected operations are those that are calendar dependent — billing, accounting, scheduling operations that rely on day of the week as well as the date — not technical services or industries. And it won't be just major computers affecting accounting, payroll, shipping, and inventory control, it will be minor headaches for any equipment or appliance that depends on a microprocessor-generated calendar. However, if all the calendar does is show the date, but doesn't control any function, there's nothing to worry about.

The list may include some cash registers, clocks, security systems, climate control systems, home entertainment systems (TV, VCRs, stereos), telephone systems, radio equipment, pocket organizers — anything with date-sensitive embedded computer chips. You may not want to be on an elevator when everyone is shouting, "Happy New Year!"

The result could be anything from mass chaos to sporadic inconvenience, depending upon our level of preparation by next January 1st. And just for an additional kick in the CPU, it's leap year as well!

So what does all this mean for the world's businesses, citizens, and governments? A recent Federal Communications Commission (FCC) report revealed that although there was considerable hand wringing over the issue among their regulated organizations, virtually nothing was being done to correct it. As usual, Americans are largely apathetic, assuming "someone will do something." Others seem to think that nothing really needs to be done, or that it's a government conspiracy to subdue the people and take absolute control. While most institutions have been upgrading in preparation

of the Y2K event since 1996, let's take a look at specific concerns:

Public Utilities: Will electricity supply shut down nationwide? Tennessee Valley Authority (TVA) engineers simply switch to manual control and phase the generators back on line when there are problems. Power providers have been bringing their systems up to Y2K compliance for three years; they are now in a check-out phase, and everything is going well.

Airlines: Will planes fall out of the sky? The Federal Aviation Administration (FAA) says that backup systems abound. When computer systems fail, pilots simply switch to their manual systems (VOR, ILS, VFR). All mission-critical FAA systems have been upgraded to Y2K compliance and are now in a final check-out phase. Some 500 worldwide airlines are sharing their upgrade information...on schedule. Any scheduling problems will be caused by phone-call swamping from concerned customers.

Banking and financing: Will our financial institutions fail, unable to keep up with transactions? Will ATMs stop functioning? Is it likely that transfers will be paralyzed by a panic bank run? Will the IRS default on tax refunds? Will Social Security and welfare checks be interrupted? Can credit cards be validated for transactions? Will Americans hoard cash, creating an artificial depression? What is the consequence of our dependence on the European and Asian economic communities?

Predictably, banking and other financial organizations have been working on this for some time. They know that mortgages, loans, interest rates, credit transfers, and similar transactions are time sensitive. Federal regulatory agencies are at the heels of the banks to be sure they are upgrading, and keeping backup records as well. Even so, it's a good idea to keep track of your own transactions — like keeping paper copies of bank deposits and receipts!

The U.S. stock market has been well ahead of the Y2K problem for some time now, regularly conducting mock emergencies. So far, so good — on the American scene. The international market — both European/Asian and third world — is a wild card.

The Bottom Line: Will Y2K end life as we know it? No. Will it impose serious safety hazards? No. Will there be minor disruptions and inconveniences? Yes.

While major institutions and networks have been working hard to be Y2K compliant, smaller businesses — and individuals — will be caught unprepared. Mom and pop operations may well have to go back to paper and pencil transactions until they upgrade their computers.

But we Americans are a hardy, resourceful bunch and, just as when hurricanes ravage our coasts, winter storms knock out power and communications, and homicidal dictators threaten our way of life, we come back swinging. We are survivors, and we'll get through the millennium.

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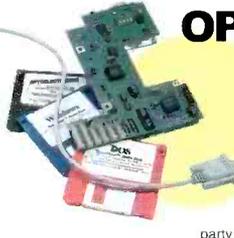
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