

SCANNING -- SHORTWAVE -- SATELLITES -- HAM RADIO -- COMPUTERS -- INTERNET

Volume 20, No. 8

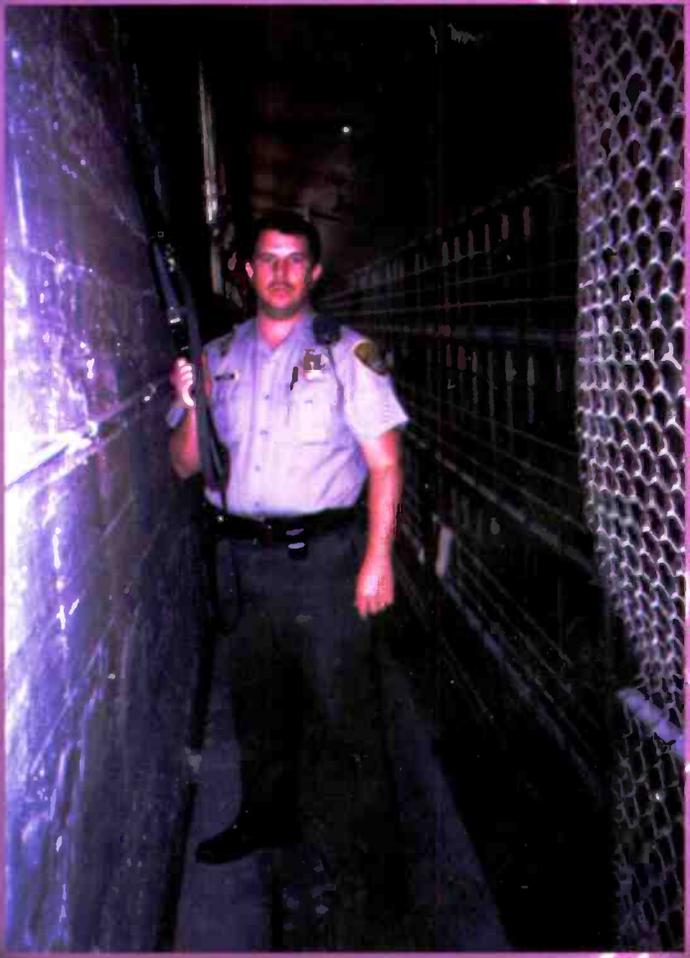
August 2001

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Monitoring Times

Calming the Storm: RADIO BEHIND BARS

*****3-DIGIT 064 S11 P1
EXPIRATION DATE: 04/01/2002
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Universal FSK Decoder

With several powerful analysis tools, the FSK decoder makes it easily possible to determine transmission characteristics of an unknown signal automatically using 1000, 1500 or 3000 Series WiNRADiO receivers.



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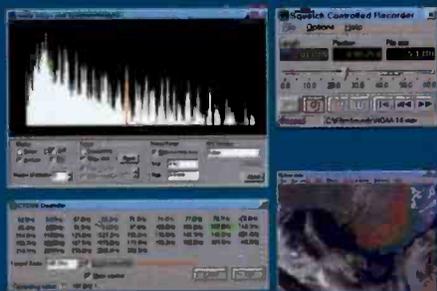
Introducing our Apple Macintosh support for the popular external WiNRADiO WR-1550e receiver. Frequency range 150 kHz to 1.5 GHz. (US version excludes cellular frequencies 825-849 & 869-894 MHz).



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131.000 MHz	FM	USA
131.500 MHz	FM	USA
135.000 MHz	FM	USA
135.500 MHz	FM	USA
145.000 MHz	FM	USA
145.500 MHz	FM	USA

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Join the trunked radio revolution with this option and a WiNRADiO radio receiver. The major trunking modes are included: Motorola SmartNet & MPT 1327.



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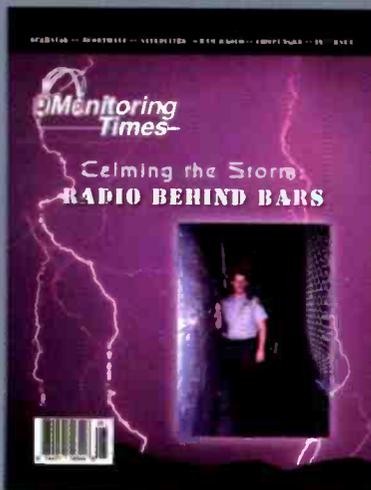
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Monitoring Times

Vol. 20, No. 8

August 2001



On our Cover

Folsom State Prison

Radio behind bars

By John Maky

Running a correctional institution is like the running of a small city, except that in a normal city counting the bars on an oven rack wouldn't be part of the daily routine. In such a complex operation — one in which officers are outnumbered and unarmed — communications are critical to the safety of officers and prisoners alike.

The author, a retired California State Correctional Officer, walks us through an imaginary day in his shift as a gun officer inside Folsom Prison to demonstrate the importance of radio communications in maintaining order. Frequencies are provided for the present-day trunked system for Folsom, which is no longer a maximum security prison. Story starts on page 10.

For the Federal Bureau of Prisons communications and trunked systems, check out this month's *Federal File* on page 64.

Cover photo: John Maky as a gunner inside Folsom in 1993.

Scanning in the Granite State 12

By John Mayson

New Hampshire is one of the last states to get onto the trunking bandwagon, so there's still a lot to hear with a simple scanner. Here's a comprehensive look at public safety channels in the Granite State. If you visit the Old Man of the Mountain or go leaf peeping in the fall, be sure to take your scanner!

ACARS Message Decoding and AirNav 3 17

By Jean Baker

ACARS is a digital data link which allows airline companies to communicate with their fleet, while relieving congestion on the voice channels. Fortunately, the hardware and software to decode the digital signal is easily available and hobbyists can follow right along. Jean Baker introduces you to the most popular options.

The Internet has made opportunities available to the hobbyist that were previously unthinkable — such as real-time aeronautical tracking and SE-CAL decoding available from AirNav Systems.

For other aero-related stories this month, see *Plane Talk*, *Service Search*, and the *MT Review*.

Who's Listening? A Listener Profile 21

By Robert Wyman

This feature started out as a few paragraphs in the *Scanning Report* column, but there was no way the subject's scanning experience could be summed up in a few paragraphs. Wade C. Lingley is a prime example of a hobbyist who learned about communications on his own, and who has been sharing his passion working and volunteering in public service since the age of 15.





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Reviews:

When you add a GPS receiver to DeLorme's mapping software, you have an impressive constellation of products. Catalano tests *DeLorme's Earthmate* GPS receiver coupled with *Road Warrior* software installed in his laptop and he's set to go! (p.80)

Despite its all-mode sophistication, the *Icom IC-706MkIIg* amateur radio transceiver nearly passes the Jock Elliott idiot test,

it's so easy to operate. And its performance sparkles (see p.86).

Another superb flight-tracking product is *Flight Explorer Personal Edition* from Avweb, which is available for a very reasonable subscription (see p.87).

On the satellite side, Ken Reitz introduces the *Motorola 4DTV Sidecar*, which allows your analog receiver to decipher DigiCipher II channels (p.24).

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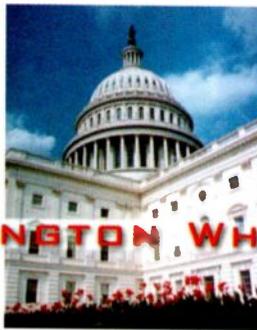
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WASHINGTON WHISPERS

Fred Maia, W5YI

LPFM: Giving a Voice to the Voiceless....

Even though Congress, the National Association of Broadcasters, and National Public Radio tried to derail the FCC's Low Power FM radio initiative, the Commission plowed ahead and has continued to accept applications for LPFM construction permits. The NAB was primarily concerned about interference and competition to existing FM stations. (*See guest editorial on p. 92 - rb*)

Prior to adopting LPFM, the Commission said it conducted four major technical studies of 75 consumer FM radio receivers of various types and performance capabilities, including automobile radios, component tuners or receivers, portable radios such as "boom boxes," personal radios such as "Walkman" type units, and clock radios, and concluded the interference potential to full service FM broadcasters was minimal.

The first ten day filing window closed on June 8, 2000. It has taken a year, but now all U.S. states and territories have had an opportunity to apply to operate a Low Power FM broadcast station. The last two filing windows were consolidated to speed the filing process, and the fifth and final window closed on June 15, 2001 for applicants in the remaining areas

Three LPFM power levels were originally proposed: LP-1000 (up to 1000 watts effective radiated power), LP-100 (50 to 100 watts) and LP-10 (up to 10 watt "micro-stations.") The FCC opted to only approve (at least for now) the LP-100 stations which will serve an area with a radius of approximately 3.5 miles from the transmitter.

◆ Congress puts damper on LPFM

Earlier this year, Congress mandated two rule changes, requiring that LPFM stations meet prescribed minimum distance separations to full service FM stations operating on third adjacent channels. This drastically cut down on the number of LPFM stations that could be approved. Initially the FCC asked that the minimum separation be to stations operating on the second adjacent channel.

The Commission pointed out that over

400 full-power FM stations authorized prior to November 1964 do not meet the 3rd adjacent channel protection requirements and that these "short spaced" FM stations have consistently met the Commission's criteria for distortion-free signals.

Congress also prohibited an applicant from obtaining an LPFM license if that candidate had ever engaged in any manner in the unlicensed operation of any station. The Commission had initially said that "pirate" broadcasters would be eligible for a LPFM license if they certified that they promptly ceased operations when notified of their violation by the FCC and, in any case, ceased operations as of Feb. 26, 1999. Congress and the NAB were vehemently opposed to that idea.

To qualify, each LPFM applicant had to be a non-profit educational organization or institution ...or must propose a noncommercial public safety radio service.

◆ LPFM applications pour in...

The FCC made it easy for applicants by posting an online FM Channel Finder utility to the Internet to help applicants find a vacant frequency in their area. The program even incorporated the protection of third-adjacent channel stations ordered by Congress.

Over a thousand LPFM broadcast applications have already been accepted. That doesn't mean that each will be awarded a construction permit since there are a great many applicants asking for the same channel. Some of the types of LPFM stations are interesting. At least one Amateur Radio club applied; the Hancock County Amateur Radio Assoc., Inc., of Bay Saint Louis, MS, requested 103.5 MHz.

Here is a sample of the wide variety of organizations and locations applying for LPFM licenses:

Athens, GA, Athenstown Media Enthusiasts Assoc.; *Mansfield, LA*, First Baptist Church; *Sitka, AK*, Sitka Tribe of Alaska; *Ocean City, MD*, Edinboro Early School; *Opelousas, LA*, Southern Development Foundation - Field Office; *Newport, RI*, New-

port Musical Arts Assoc.; *Yarmouth, ME*, Maine Science & Technology Museum; *Crescent City, CA*, College of the Redwoods; *Chico, CA*, Radio Education Associates (REA); *Hammond, LA*, Parentcorp Foundation; *Frogtown, GA*, Frogtown Community Radio; *Ada, OK*, Pontotoc Educational Radio; *Warsaw, IN*, Blessed Beginnings; *Rockland, ME*, Penobscot School; *St. George, UT*, Assoc. of Community Resources and News (ACORN); *St. Hope, AK*, North Slope Borough School Dist.; *Valparaiso, IN*, Neighbors Corp.; *St. George, UT*, Latinos Unidos Broadcasting; *Tallapoosa, GA*, Georgia Dept. of Transportation; *Atlanta, GA*, Fellowship of Holy Hip Hop, Inc.; *Malibu, CA*, Pepperdine University; *Red Bluff, CA*, Red Bluff Joint Union High School Dist.; *Logan, UT*, City of Logan; *Hemet, CA*, N. American Indian Mission; *Tok, AK*, Duct Tape Radio & Humanities Forum; *Gore, OK*, Cherokee Communications Council; *Athens, GA*, Web Rights Association; *Porterville, CA*, Lawyers 2nd Amendment Society; *Oroville, CA*, Bird Street Media Project; *San Clemente, CA*, Setec Astronomy Club; *Notre Dame, IN*, Voice of The Fighting Irish; *English, IN*, Advanced Search & Rescue; *Slidell, LA*, Crisis Pregnancy Help Center of Slidell; *Georgetown, CA*, American River Folk Society; *Bartlett, NH*, Jackson Ski Community Radio Assoc.; *Glen, MS*, Write to Read Radio; *Fort Scott, KS*, Mercy Health System of Kansas; *Esko, MN*, Esko Senior Citizens; *Canton, MS*, Canton Convention & Visitors Bureau; *Kansas City, KS*, United Nation of Islam; *Farmington, CT*, The Broadcasters Club; *Yerington, NV*, Rite of Passage Athletic Training Centers & Schools; *Gulfport, MS*, Gulfport Job Corps Center; *St. Marys, KS*, St. Marys Academy Home Study School Assoc.; *Mt. Pleasant, MI*, Children Saving Children Services, and on and on....

As you can see, there is a very wide variety of potential Low Power FM broadcasting stations coming to the airwaves near you!

GRUNDIG SHORTWAVE

Leaders in Their Class

*"Outstanding Performance...
Unbeatable Audio Quality...
Unbeatable Price.."*

Lawrence Magne—Editor in Chief, *Passport to World Band Radio*.



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The LCD Big! Bold! Brightly Illuminated 6" by 3 1/2".

Liquid Crystal Display shows all important data: Frequency, Meter band, Memory position, Time, LSB/USB, Synchronous Detector and more.

The Signal Strength Meter Elegant in its traditional Analog design, like the gauges in the world's finest sports cars. Large. Well Lit. Easy to read.

The Frequency Coverage Longwave, AM and shortwave: continuous 100-30,000 KHz. FM: 87-108 MHz VHF Aircraft Band: 118-137 MHz.

The Tuning Controls

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- For Fixed-step Tuning: Big, responsive Up/Down tuning buttons.

- For direct frequency entry: a responsive, intuitive numeric keypad.

The Operational Controls Knobs where you want them; Buttons where they make sense.

The best combination of traditional and high-tech controls.

The Sound Legendary Grundig Audio Fidelity with separate bass and treble controls, big sound from its powerful speaker and FM-stereo with the included high quality headphones.

The Many Features 70 user-programmable memories, Two 24 hour format clocks, Two ON/OFF sleep timers, Massive, built-in telescopic antenna, Connectors for external antennas - SW, AM, FM and VHF Aircraft Band, Line-out, headphone and external speaker jacks.

Size: 20.5" L x 9" H x 8" W

Weight: 14.50 lbs.



Yacht Boy 300PE AM/FM/SW Radio



Yacht Boy 400PE AM/FM/SW Radio

Power and Performance with Affordability

Designed for the traveller, the titanium look digital AM/FM/SW radio provides incredible power and performance for an incredibly low price! Packed with features, including 3 AA batteries, AC adapter, earphones, supplementary Antenna and carrying case!

State-of-the-art features include:

Digital tuning with 24 user-programmable memory presets, 13 SW Bands (2.30-7.80 MHz; 9.10-26.10 MHz), Illuminated multi-function LCD display screen, AM/FM stereo via earphones, Clock, alarm and 10 to 90 minute sleep timer, Digital tuning display, Direct frequency entry, DX/ local selector, Titanium look finish, External antenna jack, Dynamic micro speaker, Earphone jack, Telescopic antenna.

Size: 5.75" L x 3.5" H x 1.25" W Weight: 9.92 oz.

Most powerful and compact portable

The Big Breakthrough! Power, performance, and design have reached new heights! The Grundig 400 Professional Edition with its sleek titanium look is packed with features like no other compact radio in the world. **Pinpoint Accuracy!** The Grundig 400PE does it all: pulls in AM, FM, FM-Stereo, every shortwave band (even aviation and ship-to-shore)-all with lock-on digital precision. **Ultimate Features!** Auto tuning! The Grundig 400PE has auto tuning on shortwave that stops at every signal and lets you listen. With the exceptional sensitivity of the 400PE, you can use the auto tune to catch even the weakest of signals. Incredible timing features! The Grundig 400PE can send you to sleep listening to your favorite music. You can set the alarm to wake up to music or the morning traffic report, then switch to BBC shortwave for the world news. The choice is yours! **Powerful Memory!** Described as a smart radio with 40 memory positions, the Grundig 400PE remembers your favorites-even if you don't!

Size: 7.75" L x 4.5" H x 1.5" W

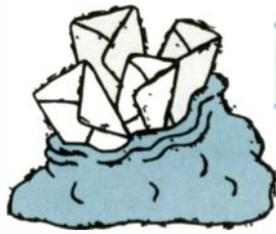
Weight: 11 b. 5 oz.

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LETTERS TO THE EDITOR

◆ In Defense of the BBC

Last month we ran a guest editorial by John Figliozzi. The BBC submitted a rebuttal, but there wasn't room to run it in the same issue. Here is the BBC's explanation of their decision to discontinue shortwave service to North America and Australia.

◆ A message from Mark Byford, Director BBC World Service

In July we [are] making changes that will affect the way some of you will be able to receive BBC World Service in English on short wave.

You'll still be able to hear all of your favourite programmes, but from July 1, 2001 we will be focusing our delivery in English to North America, Australia, New Zealand and the Pacific Islands on our numerous re-broadcasting partnerships on FM and MW together with comprehensive access via our online site. Our short wave services to the rest of the world are unaffected by this decision.

As I'm sure you're aware, in the most developed markets, there has been a real revolution in the way people access the media. In these areas, and in response to the way people now listen to our services, we are making a transition from short wave delivery to FM and web delivery, as well as radio by satellite and cable and via mobile devices.

The World Service in North America, Australia, New Zealand and the Pacific Islands will continue to be accessible via online and through our many re-broadcasting partnerships on FM and MW. Our mix of international news, analysis and features is available on many local stations across North America, Australia and New Zealand and access to the World Service in audio is available via our website

The changing needs in this competitive market have developed such that it is the appropriate time to make these changes in relation to short wave distribution. The savings we make can then be re-invested in building our FM presence across the world and in new Internet developments. Internet availability and usage is already high across North America, Australia and New Zealand. Among our target group of opinion formers and decision makers, in the developed world, it represents a key way of accessing us rather than through shortwave.

We are not pulling out of North America, Australia, New Zealand and the Pacific Islands. On the contrary, we are developing new methods of listening to us in good quality.

You will find that our service is available via the Internet: good sound quality with programmes on demand as well as streamed live, plus more information and background to programmes. You will find us available in other languages; 24-hour Spanish output will become more widely available via the web for example. We intend to take advantage of new delivery methods coming on stream, for example, in the United States of America; this includes the Sirius and XM digital radio services.

You may have read that we are investing large amounts of money in upgrading short wave facilities covering the Middle East, The Gulf and Asia. This is because in those parts of the world the vast majority of our audiences still use shortwave as a primary way to access our programming and that's why we are upgrading our shortwave transmitters for these regions. (In fact it is highly probable, given the nature of short wave transmissions, that North Americans will still pick up our short wave transmissions from our Antigua or Singapore transmitters)

In North America, Australia, New Zealand and the Pacific Islands, this is no longer true. In the United States, for example, nearly three times as many people listen to us on FM as short wave and one and a half million users access us Online each month.

BBC World Service is the world's largest international radio broadcaster and, with over 153 million regular listeners, will remain so after these changes. We are constantly facing the challenges of a rapidly changing media environment, but we're committed to ensuring we are meeting the different needs of our target listeners.

We are at the forefront of harnessing new distribution partnerships to provide you with the programmes you want, when you want to hear them. The changes to our transmission services reflect our commitment to our role in a modern, media world.

Wherever you are in the world you can hear BBC World Service 24 hours a day at <http://www.bbc.co.uk/worldservice>. There are two offerings - news 24 hours a day plus a full 24-hour schedule including features and music.

Full frequency information can be found at <http://www.bbc.co.uk/worldservice/schedules>, or a list can be sent to you if you ring +44 207 5571270 and leave your name and address on our answering service

As well as via the World Service website North Americans can hear BBC World Service as follows:

The BBC is available on many FM stations across the United States. More than 2.3 million people now listen to us through public radio. Through our public radio partners we are now available in over 200 American cities.

We are also available via satellite alongside C-SPAN TV and this year we are launching on Sirius and XM radio, the new digital satellite services. Sirius will carry the all-news service, and XM Radio will carry the mixed schedule. For more details see <http://www.bbc.co.uk/worldservice/americas>

BBC World Service is available on some nationwide FM stations including CBC in Canada. For local CBC frequency information visit <http://radio.cbc.ca/channelguide>



Wanna know where to go for some elbow room? Or for LF DXing? There's not much unwired territory left! Larry Van Horn discovered this nighttime satellite photo at http://antwrp.gsfc.nasa.gov/apod/image/0011/earthlights_dmsp_big.jpg

❖ No Need to Panic

Assistant Editor Larry Van Horn has expressed a point of view regarding the BBC shift which is at odds with many vocal radio listeners. He expressed his opinion as follows:

"I wouldn't draw the shutters and put the hobby to bed yet as others have forecasted to happen because of the BBC. I talk to hundreds of customers each week here at Grove and when I ask then specifically what they want to hear (we try to help people get the right radio), rarely do I hear the BBC mentioned.

While column editor for *MT's Ute World* for 10 years, I heard from all sorts of folks that shortwave was dying. But you know what amazes me: when one service or station leaves, something else is there to always take its place.

The squeeze on the SW spectrum and its users is significant. When you talk to US broadcasters they say it is the lack of spectrum that forces them to operate outside the normal shortwave bands. So where is the shortage of things to listen to on shortwave? Broadcasters only account for about 12% of the spectrum, their bands are full, and they are screaming for more space.

I don't see SW portable sales slipping one little bit because the BBC decides to pull the plug on NA."

—Larry Van Horn, Ass't Editor, *MT* columnist

❖ Prop Plane Contrails - a Correction

Bob Grove says, "A number of readers

pointed out my oversight when I said [in June *Letters*] that prop planes don't produce contrails; indeed they do. Growing up in Cleveland, Ohio, before the jet age, I used to watch prop planes – and their contrails! As several pointed out, they rarely fly at the altitudes required to produce the significant trails which we see from the jets.

John Frank, K3IC, mentioned how much World War II bomber pilots hated the contrails because they were like a finger pointing straight to them. Similarly, Doc Bryant of Midland, Texas, remembered, "During pre-mission briefings, the Weather guessers would often include the height above which contrails could be expected to form (the contrail height) so that pilots could fly below that altitude to eliminate that white target indicator!"

An FAA employee who wrote to correct the record said, "had you not given the sane, rational, and informed response you gave in that issue I might well have stopped reading all radio hobby magazines. ... Seriously, I'm glad you have never succumbed to the rampant paranoia and irrational thinking that seems to abound in the radio hobby. I've enjoyed your magazine since I re-entered the listening hobby in 1991, and you have consistently been a voice of reason."

❖ On the Right Track

"I just want to say great job to Matthew Sadler, Larry VH (for the frequency information) on the timely article on railroad monitor-

ing. With my office about 100 feet from the major railroad tracks that go through Springfield, MA, I now have a very good understanding about the radio systems involved in supporting railroad operations.

"Of course every time I leave the portable scanner in the car is when something happens and I can't listen to it ..."

—Ken Windyka, *Springfield MA Monitoring Area*

❖ More on the Grounded Loop

Randall Trapp, MDXC DXpedition Coordinator, wanted to clarify some details about the loop antenna described in Doug Smith's June *American Bandscan* column.

He says, "the two ground rods (one for the antenna and another one for the ground return line to the cabin) were installed with the aid of an ice auger and a fence post driver." The ground rods were not driven into the frozen ground as implied, but the DXers made use of a frozen lake near the tree which served as the antenna tower. In a shallow section of the lake, they drilled through about 1 foot of ice, passed through 4 or 5 feet of water, and then drove the rod 2 or 3 feet into the lake bed.

We welcome your ideas, opinions, corrections, and additions in this column. Please mail to *Letters to the Editor*, PO Box 98, Brasstown, NC 28902, or email mteeditor@grove-ent.com. Happy monitoring!

—Rachel Baughn, KE4OPD, editor

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❖ **Coming soon: Overseas flight tracking**

Will aeronautical HF radio services go the way of maritime coastal radio? For the frustrated crews and companies involved in oceanic flights, the day they get rid of "the HF relay game" can't be soon enough.

"Let me put it this way," said Martin Cernese, eastern region director for ARINC, a contractor that provides communication services for aircraft headed overseas. "The first transatlantic flight was in 1938. We're pretty much doing it the same way today."

Just east of Newfoundland, communication by VHF radio between aircraft bound for Europe and air traffic controllers on the mainland is no longer possible. For the next five hours, the pilots are on their own, with no radar tracking their flight paths and no direct radio contact with controllers on the ground. Because they must rely on periodic position reports to estimate a plane's location, oceanic controllers must keep planes between 60 and 120 miles apart for safety. At the current rate of growth in the number of transoceanic flights, the Federal Aviation Administration estimates that overseas flights could be held on the ground by 2005 because of congestion over the ocean.

However, in late June the Federal Aviation Administration was expected to award a contract to Lockheed Martin to overhaul the way aircraft are handled across the Atlantic and Pacific. Within *three to four years*, controllers at the nation's three air traffic control centers who handle overseas traffic could be able to look at a screen and view the real-time position of aircraft using the Global Positioning System. And instead of having to rely on HF (high frequency) radio operators to contact pilots, they will be able to use satellites to send high-speed e-mail messages directly to the cockpit.

It's a move that will be welcomed by the airline industry, but how it will affect those of us who love to listen remains to be seen. Stay tuned!

❖ **Radios fail; Firefighters trapped**

In mid-June, firefighters in Claymont, Delaware, were engaged fighting a house fire when one noticed a flashlight beam flitting back and forth through a hole in the floor. A firefighter had fallen through the floor into the basement and had been unable to raise help with his radio. As one would-be rescuer crawled forward on his stomach to reach the stranded man, the floor gave way and he also fell in the basement.

"I'm freaking out because ... I figured they were down there burning," his companion said.

The captain ran outside to get help be-

cause none of their radios could be heard. The deputy chief, who was at a command center outside the house, said he did not know that anyone was in trouble. No one on the scene got the evacuation notice, and firefighters remained at their posts, unaware others were trapped.

Runners were used to relay basic information to crews, such as where to point their hoses and provide ventilation. Those stationed at the back of the house had tried several times to tell the command post about the men. "He was maybe 150 feet away from me, 200 feet, and I couldn't hear him over the radio," the deputy chief said.

Firefighters were able to pull the two men to safety using a ladder.

Emergency workers have long complained about dead zones in the state's \$50 million 800-megahertz system that went online in 1999. This incident was traced to a circuit breaker in a signal booster which had been added after the problems emerged. However, the equipment does not have an alarm to alert anyone if the circuit breaker trips.

The Legislature recently approved spending an additional \$4.3 million for repairs that would include the Claymont area. Claymont fire officials will consider switching to their old radios because of the latest problem, the deputy chief said.

❖ **Mobile phones reveal stealth bombers**

"The front of the stealth plane cannot be detected by conventional radar, but its bottom surface reflects very well," says Mr. Peter Lloyd, the head of projects at the British-based Roke Manor Research. Mr. Lloyd uses mobile telephone calls bouncing between base stations to produce a screen of radiation. When aircraft fly through this screen they disrupt the phase pattern of the signals. The Roke Manor system uses receivers shaped like television aerials, to detect distortions in the signals.

Using a laptop connected to the receiver network, soldiers on the ground can calculate the position of stealth aircraft with an accuracy of 10 meters with the aid of GPS data. A network of aerials large enough to cover a battlefield can be packed in a Land Rover, said the London *Telegraph* article.

Mr Lloyd said. "It's almost impossible to disable a mobile phone network without bombing an entire country, whereas radar installations are often knocked out of action with a single bomb or missile."

"... let's say the US military is very interested."

❖ **Scanners and The Law**

States and even municipalities differ in whether scanners may be monitored while in

a vehicle. Most of those that don't allow it have made exceptions for public service volunteers or workers who need to be able to hear communications in order to perform their jobs. But some law enforcement agents just never seem to "get it."

Scott Heath KC8EMH of Albion, Michigan, was pulled over for a failed tail light. When the officer heard Scott's handheld Bearcat 200 scanner, he confiscated it. Scott was arrested and jailed when they verified it was programmed with police frequencies. They refused to accept Scott's Amateur Radio Operator's license (Technician Class) as license to carry the scanner, even though Michigan law clearly exempts hams, including Technician class, from the prohibition

BULLETIN BOARD

August 11 : St Louis, MO

Baseball Brain Bowl benefit for four St. Louis police families. Trivia contest on the subject of baseball. Contact Bill Maushey, 4255 Louisiana Avenue 63111, St Louis Missouri (314) 353-7296

August 11: Longview, WA

Lower Columbia A.R.A. 10th Annual Swap Meet. Cowlitz Co. Expo Center, 9 a.m.-1 p.m. Talk-in on 147.26+, pl 114.8. Adm \$4. Bob Marehouse, KB7ADO, (360) 425-6076 eves.; KB7ADO@aol.com Flyer at: <http://www.qsl.net/nc7p/> or write LCARA, POB 906, Longview, WA, 98632.

August 12: Lexington, KY

Bluegrass ARS Central KY Hamfest at National Guard Armory adjacent Lexington, KY, airport, 8am-4pm. Talk-in 147.765/165, adm \$6. Fleamarket, license exams, forums, special event station, power-line safety demonstration; airconditioned. Contact John Barnes KS4GL (216 Hillsboro Ave, Lexington, KY 40511-2105; 859-253-1178 evenings) or jrbarnes@iglou.com or <http://www.qsl.net/k4kia/>

August 18-19: Huntsville, AL

Huntsfield Hamfest at Von Braun Center, 700 Monroe St., Huntsville, Alabama; Talk-in: 146.94(-), 9a.m.; adm \$6. License exams both days 10:00 a.m. Forums, giant dealer show and flea market, DX banquet, major door prizes. Hospitality rooms at Hilton. Huntsville Hilton special Hamfest rates (256)533-1400. General Info - (256) 880-8004 or <http://www.hamfest.org>

August 18: Madison, WI

8th Annual Madison Get-Together for DXers and Radio Enthusiasts, beginning at 1 p.m. Hobbyists in all areas of radio are welcome. Contact host Tim Noonan at DXing2@aol.com for more information.

August 24-26: St Louis, MO

IRCA/DecalcaMania convention at Best Western Airport Inn, 10232 Natural Bridge Rd, St Louis MO 63134 . Host Mike Sanburn (PO Box 1256, Bellflower CA 90707; mikesanburn@hotmail.com). Hotel 1-800-872-0070 or (314) 427-5955. Registration \$35/person. Contact Mike or visit <http://www.geocities.com/n0uhy/irca2001.htm> Station tours, video presentation, banquet, auction

against receiving police communications in a vehicle.

Indiana requires a permit be issued in order to carry a radio capable of receiving police frequencies in a vehicle. Kokomo, Indiana, Sheriff Jerry Marr says he routinely gives permission to anyone who asks, and confirmed he gave permission to Jeff Collins, who was arrested in early June for monitoring police activities from his car. Collins is under investigation for suspected criminal racketeering. Former Kokomo Chiefs and Sheriffs are up in arms about Marr giving out "secure" frequencies – even though *Monitoring Times* has confirmed there is nothing secure about them: they are the same frequencies published in any *Police Call* or on any FCC database.

In spite of Kokomo Police Chief Charlie Hackett claiming "the sharp criminals use those frequencies to get the location of officers," we almost never hear of scanners used in the commission of a crime. Case in point: An article from *Dispatch News* referred to another Indiana incident. The article says (italics ours): "*In a rare case of documented scanner use by a criminal, a Morgan County (Ind.) sheriff's deputy was shot 5 times and seriously wounded by a burglary suspect who later admitted he heard the officer run his plate on a scanner.*"

This burglar did not get away either. Guess sharp criminals are few and far between.

◆ **Hands-off in New York**

The state of New York approved a measure that would make the state the first in the nation to ban drivers from using hand-held cell phones. The new law goes into effect December 1st. At least 35 other states are considering such restrictions, but none have yet adopted comprehensive legislation. Twenty-three countries have already passed laws banning hand-held cellphone use while driving (including England and Israel—see following story).

◆ **Cellphone health, humor, and ... well, you decide**

The British Medical Association has said that even a hands-free cell phone can be dangerous while driving. They also said there were large gaps in the research regarding the safety of electromagnetic fields emitted by the phones.

The U.S. Government Accounting Office has also concluded that current research is not adequate to guarantee the safety of cellphone emissions because there is not enough information available to assess long-term effects.

In Israel, where cellphone use verges on obsession, a full orchestra played a compo-

sition entitled "Spring Cellphony" – a 10-minute medley of classical tunes, each prefaced by a 5-second rendition of the tune played by a cellular phone. As the performance was concluding, a cellphone rang loudly. The conductor stopped, turned, and shot a dirty look at the audience. Part of the performance, of course.

A Canadian site (<http://www.cellphonescanner.com/>) actually streams Ottawa-area cellular telephone conversations over the Internet. The site claims it is done to educate people that their analog signals can be overheard. To its credit the site does provide a link to Canadian telecommunication law (<http://www.crtc.gc.ca/ENG/LEGAL/TELECOME.HTM>) which appears to be silent on the subject other than to say it's illegal to profit from what one overhears.

◆ **United Patriot Radio Announces QRT**

On the militia watchdog list Tom Severt of Kansas found a June 15 public statement from Steve Anderson, the driving force behind United Patriot Radio. It appears that United Patriot Radio has left the air, bringing the history of the longest-running domestic United States shortwave clandestine to a close. Following are excerpts from the announcement.

"June 15, 2001, 13:04: It is with regret that I must announce the demise of United Patriot Radio. Last night was my final transmission.

"The reasons for this are ongoing. I am not being intimidated off the air, but starved out. I have put up a good "front" to keep up morale among the people. It ain't workin'! I have needed at least \$2000 per month to get by, and have gotten less than 500. It is the poorest of the patriots that have given the most! I can not continue in this manner. It is not fair to them, or to me.

"I am going to return to what I have done all my life. WORK. I have wasted enough

time trying to help the sleeper. I will put my efforts into building a strike team in my area to "take care of business" when it hits. I still may get raided, as the ATF is training hard at Fort Knox just for this, I have been informed"
... Steve Anderson

Some version of this station broadcast with a virtually daily schedule for over three months. The patriot clandestine has come and gone before, with reactivations taking place before too long.

Prior to the Anderson statement, the station was broadcasting fairly regularly and exclusively in June on 6900 kHz upper sideband. The last broadcast of the station to date has been the June 15 UTC broadcast mentioned in the Steve Anderson statement.

The day after the Anderson statement, veteran ACE member Joe Filipkowski in Rhode Island reported an apparent pirate parody of the patriot clandestine on 6900 kHz about 2145 UTC, using an ID of "Bill's Militia Movement."

"Taking all of this together, it would not surprise me if we have not quite seen the end of this remarkable station," says George Zeller, who forwarded the above information. Stay tuned.

Communications is compiled by editor Rachel Baughn, from news clippings and emails submitted by our readers.

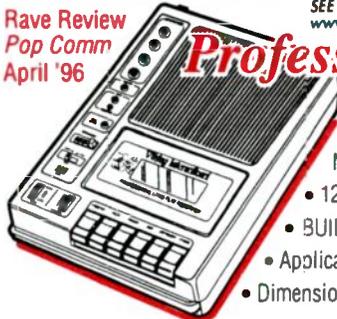
Thanks to this month's reporters: Anonymous, Albany, NY; Bob Fraser, Cohasset, MA; Malcolm Fisher, Lake in the Hills, IL; Harvey Graves, Akron, OH; Ken Hydeman, Xenia, OH; Sterling Marcher, La Mirada, CA; Thomas Risher, Perris, CA; Doug Robertson, Oxnard, CA; Richard Sklar, Seattle, WA; Sue Wilden, Noblesville, IN. Via email: Howard Bailen, Kevin Carey, Chanel Cordell, Roger Cravens, Ed Cummings, Robert Felton, Scott Heath, Maryanne Kehoe, Ron Martin, Eddie Muro, Scott Townell, Larry Van Horn, George Zeller

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Folsom State Prison: How radio is used behind bars

By John Maky AC5ZX

According to the California Code of Regulations, maintaining the safety and security of the institution are the primary functions of being a Correctional Officer. However, in reality, the job is much more diverse.

Running a correctional institution is not unlike the running of a small city. Day-to-day activities as simple as providing inmates haircuts must be monitored by custody staff. Even counting the numbers of bars on an oven rack becomes daily routine. A missing bar could be broken down into a stabbing weapon in no time at all by a determined inmate. In short, anything inside the prison that can be used for escape or as a weapon must be strictly accounted for. Above all; the safety of staff is of utmost concern. This is where radios come into play.

There is no way in an article of this size to totally explain the complexity of running a prison. Ninety percent of what you see on TV is a fantasy. I believe the best way to describe how Folsom's radio system (or *any* California institution, for that matter) is used, is to relate to you a true story of a day as a Correctional Officer.

7:30am

My assignment is serving as one of the two Gun Officers (callsigns "2A" and "2B") inside of "Old" Folsom Housing Unit 2*. Unit 2 houses hundreds of maximum security inmates, and dates from the mid-1800s. My partner and I arrive through a series of "catwalks" – corridors that deny inmates access to the only two officers that carry firearms inside the cell block. We relieve the two night officers by each taking possession of an H&K 9mm rifle, a S&W .38 special, a "Personal Alarm" (which I'll explain later) and a Motorola 800 MHz trunked radio. The morning meal is already in progress.

Immediately, I am in radio communication with the Kitchen Sergeant. He relays to me just how many inmates he wants released for chow, so the line does not back up. Both my partner and I coordinate this release with the other cell block officers (who are only armed with a baton and their wits) and we keep a close watch on them for their safety. Inmates are provided ten minutes to eat, and then are returned to their cells.

Coordinating inmate "movement" within the housing units via radio is crucial to isolating violence. Once one level is locked up, another one is released. Even so, there are an incredible amount of inmates moving around as the cell block contains twice the number of inmates for which it was designed.

8:00am

Work release. All inmates that are assigned a job are released. There are workers for the license plate factory, kitchen, yard, and clerks. Approximately 85% of the inmates inside Unit 2 are employed. The inmates remaining generally either have the day off, or have been given a pass, known as a "ducat" for medical, dental, or consular appointments. Once work release is completed, the cell block officers check the alibis of inmates not locked up.

8:20am

Without warning, Central Control (the nerve center of any prison) announces on the radio "Personal Alarm - Unit 4 - Freeze all inmate traffic!"

Throughout the institution, when an alarm sounds, all inmate movement ceases. Gates are closed, and no foot traffic will resume until everything is under control. Seemingly from nowhere, officers and custody staff appear running towards the alarm. It is in response to a Sergeant being struck by a combative inmate in the adjoining cell block. The inmate is subdued by responding staff and is taken to be medically checked. I am called on the radio to clear the corridor for the restrained – but still hostile – inmate.

Personal Alarm boxes are carried by most staff, and are a transmitter inside a small box. Similar to a garage door opener; each one has a unique code for the employee's work area. When activated, receivers mounted on the ceilings of the workplace will trigger both an audible alarm and show on an annunciator panel inside Central Control. In these situations, custody staff utilize the radio in order to gain additional help, and to summon medical assistance if needed.

Once the incident is contained, a supervisor will announce a "Code 4" and reset the alarm receiver with a key. Fortunately, neither the Sergeant nor responding staff were hurt during the confrontation.

9:00am

Yard time. To help avert the possibility of violence, not all inmates are allowed outside on the main exercise yard at the same time. Schedules are rotated so some inmates go to yard in the morning, and some in the afternoon. The Yard Sergeant calls me on the radio to relay to the building staff to commence our release. There is some routine radio chatter from various yard gun towers to check on suspicious inmate activity.

I advise the yard staff on the radio when our cell block completes its release. Once the release

is complete, the remaining men are given the opportunity to shower. This is also the time when building staff have an opportunity to search cells for weapons and contraband.

11:30am

Yard recall. All inmates are returned to the housing units. This is a critical time for both my partner and I, as several hundred inmates from two cell blocks suddenly converge into the unit. For their safety, both of us have to be especially attentive to the location of the building staff. We also have to watch the flow of inmates, as this is a period where weapons are frequently passed and violence occurs.

Once recall is complete, staff climb the five levels, or "tiers" inside the unit to lock the men up. At various places inside the institution, the close-custody count is announced over the radio to account for the inmates that are judged to be the most likely escape risks. This is a quiet period inside the unit, allowing officers time to complete

Folsom Prison Frequencies

Both "Old" and "New" Folsom Trunked System WNDV910
856.4375 (811.4375 input)*
857.4375 (812.4375 input)*
858.2625 (813.2625 input)
859.2625 (814.2625 input)
860.2625 (815.2625 input)

* It should be noted that most other California prisons utilize both 856.2625 and 857.2625 in lieu of this pair, which is a standardized state-wide frequency plan for CDC.

Folsom Transportation Unit

In addition to the institutional radio, the California Highway Patrol "Blue" channel (42.180M/42.340B) is used. (Folsom callsign KMA960) California Department of Corrections transportation units will identify as 5800 series numbers on CHP channels.

Folsom Prison Fire Department
154.235 (simplex)

California Law Enforcement Radio System

155.070 (159.030 input) Wolf Mountain CLERS repeater.
Seldom used by Folsom Prison; it is only utilized during escapes and major incidents when other agencies are involved.



Aerial view of Folsom and aerial view of "new Folsom" prison courtesy CDC

their paperwork and eat lunch.

1:00pm

Yard time once again. Now the other half of the building population is allowed to go to yard. Like the earlier release, this is coordinated over the radio with the yard staff. Yard time is also when inmates are also allowed to go to the canteen to purchase items. This often leads to much radio chatter, with yard staff maintaining order at what inmates call "The Store." Officers on the yard are also heard using the radio to keep tabs on various gang activity taking place. Intelligence on gangs is collected because knowing "who's-who" is often vitally important in maintaining order.

2:30pm

It is yard recall, and once again we have the sudden influx of men; which now also includes some inmates returning from their work assign-

ments.

This time there is an eerie feeling inside the housing unit; one that often precedes violence. This feeling is difficult to explain to anyone who has not worked inside a correctional institution, but is somewhat a sixth sense. After scanning the returning horde, I notice something happening on the fourth tier. One inmate has another down by the hair and is pummeling his head into the concrete.

I shout the order "Get Down" in which hundreds of inmates instinctively hit the floor – all except the assailant. I chamber a round into my rifle, and fire it into the ceiling as a warning shot. My partner shouts into the radio "Shots Fired – Unit Two" and triggers his personal alarm. His call creates a flood of traffic on the radio.

The assailant immediately hits the floor, knowing what will come next. Responding staff

place him into restraints and summon medical aid for the victim. Soon the Watch Commander and Investigations people arrive to preserve the crime scene. This occurs just as if it happened on the streets.

Supervisors are on the radio summoning staff to lock up the inmates not involved in the incident. I clear my weapon; and as the adrenaline wears off, I realize that I am NOT going home at 3:30 as planned. Long after the institution returns to a normal program, I am still there writing reports. The resulting investigation determines the incident was not gang related, but never turns up a reason for the assault.

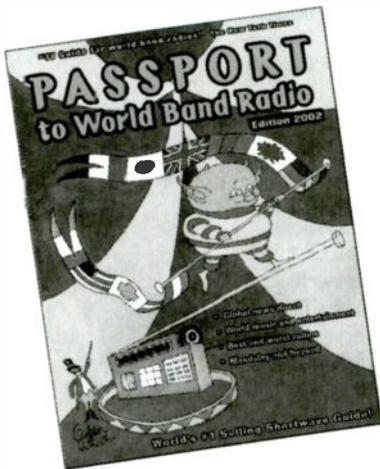
This, admittedly, is more than you will hear on the average day. Sometimes working in – or monitoring – a correctional institution can be a boring routine. But if you live within radio range of one, keep their frequencies in your scanner. You will often hear the same gut-wrenching, adrenaline-filled communications that you hear from agencies on the street. Also, despite the bad publicity "guards" get, you will often hear heroics enacted by the Correctional Officers that make up a professional team working "The Toughest Beat in the State."

About the author:

After leaving the Coast Guard, John became a California State Correctional Officer. Besides working at Folsom, he was also assigned to Soledad and Centinela state prisons. He is now retired, and lives in Arkansas.

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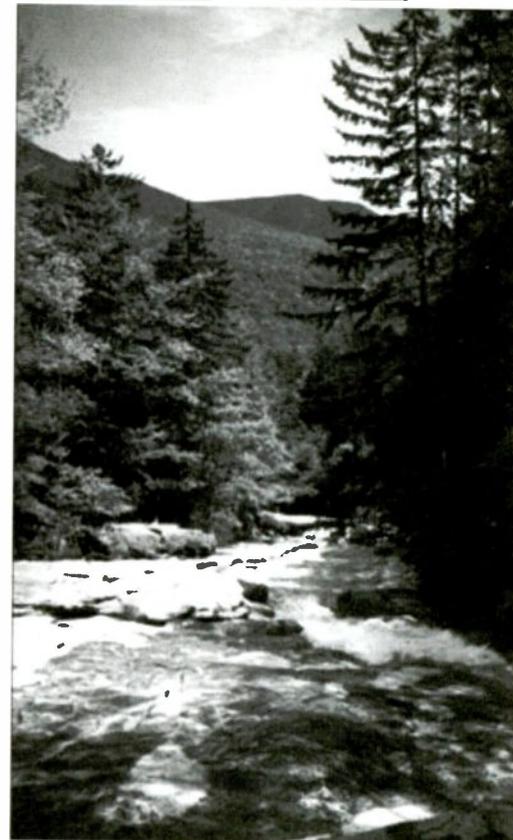
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The Scanning's Great in the Granite State

By John Mayson



Imagine a place where the VHF low band is still alive, UHF hardly used, and trunking an oddity. Such a place is nestled in New England. It's the state of New Hampshire.

New Hampshire is proud of their Yankee stubbornness. 9-1-1 emergency dialing has just recently been introduced statewide, something the rest of the country has had for two decades, if not longer. It's also the lone holdout in the nation for requiring seat belt usage. It's not that the people of New Hampshire are backwards; they just enjoy doing things their own way. "Live Free or Die" means something here.

However, New Hampshire is slowly migrating to new communications technology. The State Police have vacated their low-band frequencies for a digital VHF system. Nashua will implement a digital trunked system. Manchester and Goffstown already operate their own analog EDACS systems. But, by and large, a bulk of the public safety communications in the Granite State can be monitored with the simplest of scanners.

Communications Structure

New Hampshire is comprised of ten counties. Ordinarily I like to organize frequency lists and scanning articles by county, but in New Hampshire's case, this doesn't make the most sense. Dispatch centers often dispatch for cities and towns in more than one county and in some cases, more than one state.

Every sheriff's office in the state shares the same frequencies for channels one and two.

Frequency	Channel	Description
156.090	1	State Police to towns
155.475	2	Nationwide

Capital Area

The Capital Area Fire Mutual Aid (CAFMA) dispatch center is located in the state capital of Concord. It dispatches for communities in the Merrimack County area.

Fire Communications

Frequency	Channel	Description
154.355	1	Dispatch
154.235	2	Fireground
154.220	3	Fireground
154.280	4	Statewide
158.760		Hooksett Dispatch
154.250		Weare Dispatch
154.160		New Boston Dispatch

ID	Agency
50	Allenstown FD
51	Boscovon FD
52	Bow FD
82	Bradford FD
53	Canterbury FD
54	Chichester FD
55	Concord FD
56	Epsom FD
57	Dunbarton FD
58	Henniker FD
59	Hillsborough FD
63	Hooksett FD
60	Hopkinton FD
61	Loudon FD
76	New Boston FD
71	Northwood FD
62	Pembroke FD
64	Penacook FD
72	Pittsfield FD
74	Salisbury FD
80	Warner FD
75	Weare FD
65	Webster FD
66	Central New Hampshire Hazmot Squad
79	Tri-Town Ambulance

Law Enforcement Communications

Frequency	Channel	Description
155.685	3	Merrimack County SO
155.625	4	Concord PD Primary
155.820	5	Concord PD Secondary

Lakes Region

The Lakes Region attracts tourists from around New England. Lake Winnepesaukee of-

fers swimming, water skiing, sailing, and other aquatic activities. Be sure to monitor maritime frequencies such as 156.800 MHz if you find yourself in the Laconia area.

The Lakes Region Mutual Fire Association (LRMFA) dispatch center is located in Laconia, in the central part of the state. DXers are familiar with LRMFA due to the fact their low-band dispatches often skip across the continent.

Fire Communications

Frequency	Channel	Description
33.901		Dispatch
33.962		Fireground
33.843		Fireground
33.764		Fireground
33.485		Mobiles
33.546		Mobiles

ID	Agency
30	Alexandria FD
1	Alton FD
31	Andover FD
2	Ashland FD
6	Bornstead FD
3	Belmont FD
34	Bridgewater FD
4	Bristol FD
35	Campton-Thornton FD



LRMFA console

49	Core-Plus Ambulance
5	Center Harbor FD
66	Central New Hampshire Hazmat Team
36	Danbury FD
32	East Andover FD
7	Franklin FD
8	Gilford FD
9	Gilmanton FD
37	Hebron-Groton FD
11	Hill FD
12	Holderness FD
13	Laconia FD
14	Meredith FD
15	Moultonboro FD
16	New Durham FD
17	New Hampton FD
18	Plymouth FD
38	Rumney FD
19	Sanbornton FD
20	Sandwich FD
45	Stewarts Ambulance Service
25	Strafford FD
21	Tilton-Northfield
44	Twin Rivers Ambulance
40	Warren FD
24	Warren-Wentworth EMS
23	Waterville Valley FD
41	Wentworth FD
22	Winnisquam Fire District
99	Wolfeboro FD

Stratford FD	154.445
Whitefield FD	155.115

Law Enforcement Communications

Agency	Frequency
Countywide Dispatch	155.595

Ossipee Valley

The White Mountains National Forest, the Presidential Mountains, and famous Mount Washington are all found here. The Ossipee Valley Fire Mutual Aid (OVFMA) dispatch center is located in the Carroll County Sheriff's Office.

Fire Communications

ID	Frequency	Agency
20	154.145	Bartlett FD
23	154.145	Bartlett-Jackson EMS
11	155.760	Center Conway FD
1	154.175	Center Ossipee FD
12	155.760	Conway Village FD
13	155.760	East Conway FD
2	154.175	Effingham FD
3	154.175	Freedom FD
21	154.145	Glen Village FD
22	154.145	Jackson FD
4	154.175	Madison FD
18	154.325	Milton FD
15	155.760	North Conway FD
5	154.175	Ossipee Corner FD

14	155.760	Redstone Village FD
6	154.175	Tamworth FD
10	154.175	Tuftonboro FD
8	154.175	Wakefield FD
7	154.175	West Ossipee FD
9	154.250	Wolfeboro FD

Law Enforcement Communications

Frequency	Description
154.860	Carroll County SO Primary
155.535	Carroll County SO Secondary

Seacoast

The Seacoast Fire Net is responsible for dispatching all of the towns in coastal Rockingham County. It also dispatches for some towns in neighboring counties, including York County, Maine and Essex County, Massachusetts.

Frequency	Description
154.190	Seacoast Dispatch
154.280	Statewide Fireground
154.160	Secondary
138.725	Partsmouth Naval Shipyard

Souhegan Valley Fire Mutual Aid Association

The Souhegan Valley comprises much of southwestern Hillsborough County, New

Visit <http://www.lrmfa.org> for more information about this agency.

Law Enforcement Communications

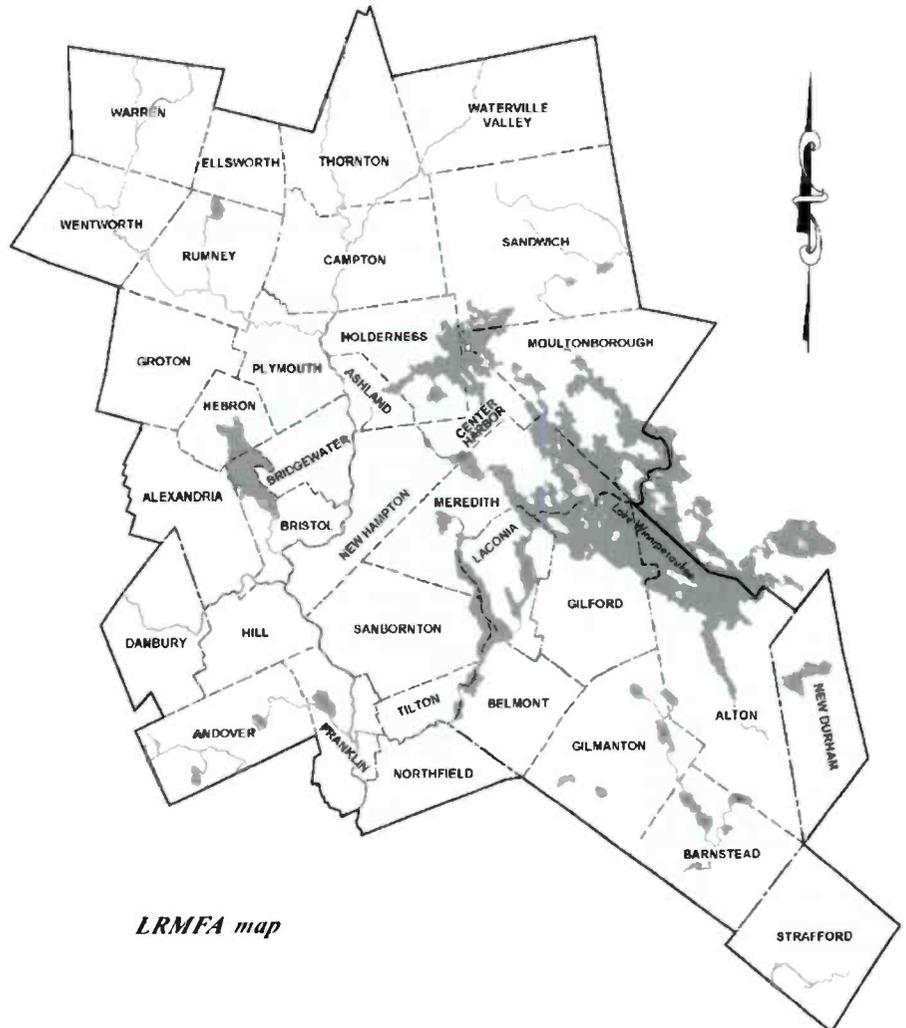
Frequency	Description
155.790	Laconia PD Primary
155.010	Laconia PD Secondary
155.640	Laconia PD to Conway PD
154.830	Belknap County SO Primary
154.085	Belknap County SO Secondary
854.4875	NH Marine Patrol

Northpack

Coos County is the northernmost county in New Hampshire. The towns in this part of the state operate a system known as Northpack. Winter comes early to these parts, but the rugged residents of one small hamlet make sure they're the first in the nation to vote. Polls open at 12:01 a.m. on Election Day in Dixville Notch.

Fire Communications

Agency	Frequency
Berlin FD	154.130
Bethlehem FD	154.235
Colebrook FD	154.340
Dalton FD	155.145
Dixville FD	154.340
Errall FD	155.940
Gorham FD	155.880
Groveton FD	154.445
Jefferson FD	154.355
Lancaster FD	154.445
Milan FD	154.445
Northumberland FD	154.445
North Stratford FD	154.445
Pittsburg FD	154.355
Randolph FD	155.085
Shelburne FD	155.115
Stark FD	154.980
Stewartstown FD	154.355



LRMFA map



Mount Washington Hotel

Hampshire's most populous county. Included in this area is the Milford Area Communications Commission Base (MACC-Base), the city of Goffstown which operates its own VHF EDACS system, and the city of Manchester, which operates its own 800 MHz EDACS system.

ID	Agency	Frequency
1	Amherst FD	33.64
3	Bedford FD	33.78
5	Brookline FD	453.3625
8	Goffstown FD	158.880
10	Greenville FD	33.64
13	Hollis FD	33.64
14	Hudson FD	153.950
15	Litchfield FD	154.190
16	Lyndeboro FD	33.64
17	Manchester FD	460.625 & TRS
18	Mason FD	33.74
19	Merrimack FD	153.980
20	Milford FD	33.64
21	Mount Vernon FD	33.64
22	Nashua FD	151.250
24	New Ipswich FD	154.430
28	Temple FD	154.430
30	Wilton FD	33.64
75	Weare FD	154.160 & CAFMA
76	New Boston FD	33.78 & CAFMA

MACC-Base

Chan	Frequency
1	33.64
2	33.68
3	33.88
4	39.90

Law Enforcement Communications

Description	Frequency
Hillsborough County SO	155.520
Hillsborough County SO Primary	155.430
Amherst PD	154.875
Antrim PD	155.760
Bedford PD	155.310
Bennington PD	155.760
Deering PD	155.370
Francestown PD	155.640
Greenfield PD	155.640
Greenville PD	155.490
Hancock PD	155.640
Hillsborough PD	155.760
Hollis PD	153.785
Hudson PD	460.425
Litchfield PD	154.905
Lyndeborough PD	154.875
Mason PD	155.490
Merrimack PD	155.550
Milford PD	154.875

Mount Vernon PD	154.875
Nashua PD	460.200
New Boston PD	154.055
New Ipswich PD	155.565
Pelham PD	154.770
Peterborough PD	155.640
Sharon PD	155.640
Temple PD	155.490
Weare PD	158.850
Wilton PD	154.875
Windsor PD	155.760

In addition, Manchester and Goffstown operate the state's only two public safety trunked radio systems. Nashua's ASTRO system will be online soon.

Goffstown TRS

EDACS analog	Frequencies	LCN
170.150	1	1
159.840	2	2
160.305	3	3
159.360	4	4
160.485	5	5

The Goffstown PD uses two talkgroups on this system.

AFS	Description
04-081	GPD Primary
04-082	GPD Secondary

Manchester TRS

EDACS analog	Frequencies	LCN
856.2125	1	1
856.4875	2	2
857.4875	3	3
858.4875	4	4
859.4875	5	5
860.4875	6	6
855.4875	7	7
855.7125	8	8
855.7375	9	9
855.9625	10	10
855.9875	11	11

Most city agencies now use the trunked system.

AFS Series	Description
01-xxx	Manchester PD
02-xxx	Highway Department
07-xxx	Civil Defense
08-xxx	Parks
11-xxx	Fire/EMS

If you would like more specific information on the Manchester system, visit <http://www.trunkedradio.net>.

Southwestern New Hampshire District Fire Mutual Aid

The Southwestern New Hampshire District Fire Mutual Aid System is responsible for answering and dispatching emergency calls for Deerfield Valley Rescue as well as 17 other ambulance services, 78 fire departments, and 26 police departments in 78 member towns throughout New Hampshire, Vermont, and Massachusetts.

The dispatch center, located within the Keene Fire Department, is staffed 24 hours a day by 10 full-time and 7 part-time Communication Specialists. Many of the dispatchers are also members of the area ambulance services, rescue squads, fire departments, and police departments they dispatch for.

Deerfield Valley Rescue is dispatched on their own radio frequency of 155.265. The base radio call sign is KDX768 and the ambulances are called DV1, DV2, DV3, and DV4. Deerfield Valley Rescue can also communicate on Mutual Aid's main fire dispatch frequency, 154.430, and the Deerfield Valley Fire Mutual Aid System frequency, 154.010. The ambulances also have two hospital frequencies called HEAR 1 and HEAR 2.

The mutual aid system uses transmitters located in the following cities and towns: Alstead, NH, Dublin, NH, Keene, NH, Gilsum, NH, Greenfield, NH, Lempster, NH, Newfane, VT, Peterborough, NH, Stratton, VT, Temple Mount, NH, Westmoreland, NH, Wilmington, VT, and Winchester, NH.

Fire Frequencies

154.430	Dispatch
33.780	Dispatch
33.540	Dispatch
154.445	Dispatch
154.385	Tactical 1
154.280	Tactical 2
154.830	Tactical 3
154.010	Tactical 4
154.295	Tactical 5

ID	Agency
46	Acworth
1	Alstead
2	Antrim
52	Bellows Falls, VT
4	Bennington
5	Brattleboro
54	Charlestown
55	Chester, VT
6	Chesterfield
56	Claremont
8	Dublin
9	Dummerston, VT



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PCR1000	RCV 45	\$349.95
R75	RCV 32	\$574.95
R8500	RCV 14	\$1469.95*

SONY

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ICF-SW77	RCV 10	\$469.95
ICF-SW7600GR	RCV 1	\$174.95

AOR

AR-5000 Plus 3	RCV 42P	\$2139.95*
AR-7030 Plus	RCV 17	\$1499.95*

SANGEAN

ATS-505	RCV 4	\$129.95
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WiNRADiO

WR-1550 (External)	RCV 47-E	\$549.95
WR-1550 (Internal)	RCV 47-I	\$499.95
WR-3150 (External)	RCV 48-E	\$1849.95
WR-3150 (Internal)	RCV 48-I	\$1849.95
WR-3500 (External)	RCV 49-E	\$2395.95
WR-3500 (Internal)	RCV 49-I	\$2395.95
WR-3700 (External)	RCV 50-E	\$2895.95
WR-3700 (Internal)	RCV 50-I	\$2895.95

GRUNDIG

Satellit 800	RCV 33	\$499.95
Yacht Boy 400 PE	RCV 22	\$184.95

DRAKE

R8-B	RCV 3	\$1349.00
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JAPAN RADIO COMPANY

NRD-545	RCV 21	\$1799.95
---------	--------	-----------

GE

SUPERADIO III	RCV 5	\$59.95
---------------	-------	---------

YAESU

VR5000	RCV51	\$899.95
--------	-------	----------

PALSTAR

R30	RCV 18	\$495.95
R30 w/Collins filter	RCV 18C	\$549.95

ANTENNAS

AOR SA7000 Super-wide receiving	ANT39	\$199.95
Active Duck	ANT 36	\$39.95
Grove Skywire	ANT 2	\$29.95
H800 Skymatch Active	ANT 15	\$129.95*
Select-A-Tenna	ANT 21	\$59.95
Super Select-A-Tenna	ANT 40	\$189.95
Sony AN-LP1	ANT 26	\$89.95
WiNRADiO AX-31B	ANT 4	\$119.95
WiNRADiO Antenna Distribution Unit 3 in/6 out	ANT 37	\$9,799.95
WiNRADiO Antenna Distribution Unit 4 in/8 out	ANT 38	\$11,799.95

ACCESSORIES

ICOM RECEIVERS

UT-106 DSP upgrade kit	ACC 16	\$139.95
Remote control software for R75	SFT 24	\$79.95
OPC-131 DC Power Cord	DCC4	\$11.95

SONY RECEIVERS

AC adaptor for SW7600G	PWR 9	\$19.95
------------------------	-------	---------

AOR RECEIVERS

CTCSS for AR5000 & AR5000+3	ACC 96	\$99.00
-----------------------------	--------	---------

WiNRADiO RECEIVERS

FSK decoder	DEC 1	\$349.95
Portable power supply	PWR 5	\$189.95
Digital Suite software	SFT 15	\$85.00
Database Manager software	SFT 16	\$44.95
Trunking Software	SFT 23	\$89.95
USB Adaptor for External Models	ACC2	\$49.95
Telephone Interface for External Models	ACC6	\$1995.00

DRAKE RECEIVERS

VHF converter	ACC 43	\$249.00
External Speaker	SPK2	\$48.95

JRC RECEIVERS

Wide-band converter (less cellular)	ACC 11	\$349.95
High stability crystal	ACC 12	\$99.95

MISCELLANEOUS

Scancat Gold for Windows	SFT 2W	\$99.95
Scancat Gold for Windows SE Upgrade	SFT 2SE	\$59.95
Speco Speaker	SPK1	\$19.95

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shoulder patch

- 48 East Dover
- 27 East Swanzey
- 10 Fitzwilliam
- 37 Franconstown
- 12 Gilsom
- 77 Goshen
- 58 Grafton, VT
- 13 Greenfield
- 90 Guilford, VT
- 91 Halifax, VT
- 14 Hancock
- 15 Harrisville
- 18 Hinsdale
- 16 Jaffrey
- 47 Jamaica, VT
- 19 Keene
- 17 Langdon
- 76 Lempster
- 120 Londonderry
- 44 Marlboro, VT
- 20 Marlborough
- 21 Marlow
- 11 Meadowood
- 3 Nelson
- 22 New Ipswich
- 23 Newbrook, VT
- 45 North Walpole
- 122 Peru, VT
- 24 Peterborough
- 38 Putney
- 92 Readsboro, VT
- 25 Richmond
- 26 Rindge
- 66 Rockingham, VT
- 57 Roxbury
- 62 Saxtons River, VT
- 121 South Londonderry
- 29 Spofford
- 63 Springfield, VT
- 31 Stoddard
- 125 Stratton, VT
- 32 Sullivan
- 30 Suny
- 28 Swanzey Center
- 50 Temple
- 33 Townsend, VT
- 34 Troy
- 75 Unity
- 41T Vernon, VT
- 35 Walpole

- 49 Wardsboro, VT
- 86 Washington
- 7 West Chesterfield
- 93 West Dover, VT
- 43 West Swanzey
- 42 Westminster, VT
- 36 Westmoreland
- 123 Weston, VT
- 94 Whitingham, VT
- 41 Williamsville
- 95 Wilmington, VT
- 39 Winchendon, MA
- 40 Winchester
- 126 Windham, VT
- 124 Winhall, VT

Law Enforcement Communications

Frequency	Description
155.070	Cheshire County SO Primary
155.640	Cheshire County towns PD Primary
155.250	Keene PD Primary

EMS Frequencies

155.220	Dispatch
155.265	Dispatch
155.340	Medical 1
155.280	Medical 2
155.175	Medical 3

Visit <http://www.firemutualaid.com/> for more information about this system.

Twin State Fire Mutual Aid System

The Twin State Fire Mutual Aid System is located in the Grafton County Sheriff's Office and dispatches for towns in New Hampshire's Grafton County and Vermont's Caledonia County.

Frequency	Description
154.400	Primary
154.295	Fireground

Upper Valley Mutual Aid System

The Upper Valley Mutual Aid System is responsible for dispatching along the Connecticut River for towns in both New Hampshire and Vermont.

Fire Communications

Frequency	Description
154.130	Primary
153.950	Secondary
154.280	Statewide Fireground
154.400	Twin State Mutual Aid

Law Enforcement Communications

Frequency	Description
154.770	Grafton County SO Primary
154.755	Plymouth PD Primary
155.310	Littleton PD Primary

Key to Abbreviations

AFS	Agency-Fleet-Subfleet
CAFMA	Capital Area Fire Mutual Aid
EDACS	Enhanced Digital Access Communications System
EMS	Emergency medical service
FD	Fire Department
Hazmat	Hazardous materials
LCN	Logical Channel Number
LRMFA	Lakes Region Mutual Fire Association
MACC-Base	Milford Area Communications Commission Base
OVFMA	Ossipee Valley Fire Mutual Aid
PD	Police Department
SO	Sheriff's Office
TRS	Trunked Radio System



Lakes Region Mutual Fire Aid (LRMFA) communications center

ACARS Message Decoding and the AIRNAV 3.0 Program

By Jean Baker

Today, monitoring the VHF and HF aerobands involves a lot more than just sitting around and listening, and perhaps keeping a written log of what you hear. In this feature, we are going to look at two activities to enhance your enjoyment of our hobby: decoding and using ACARS messages, and real-time aeronautical tracking using AirNav products.

◆ Decoding ACARS Messages

Before we go into the how-to area, let's look at some basic information. "ACARS" is an acronym for Aircraft Communications Addressing and Reporting System. This is a digital data link system transmitted via VHF radio, which allows airline company flight operations to communicate with the various aircraft in their fleet.

This VHF digital transmission system was developed by ARINC (Aeronautical Radio, Inc.), back in the late 1970s in response to the heavy voice traffic on the 128.825 - 132.000 VHF band. Instead of giving OOOI (Off, Out, On, In) reports, passenger loads, catering requests, service requests, and other rather routine items by voice, these are now transmitted by ACARS as down-

loaded messages, and anything requested by the company can be uploaded by them to the aircraft. This also has the advantage of taking a lot of the voice traffic off the VHF company frequencies and leaving them open for those airlines not ACARS equipped, or for those whose ACARS equipment may be out of service.

Components of the ACARS System:

1. The Airborne Subsystem, which is onboard the aircraft and consists of a Management Unit (which receives ground-to-air messages via the VHF radio transceiver and controls the replies. The Control Unit is the aircrew interface with the ACARS System, consisting of a display screen and printer).

2. The ARINC Ground System consists of all the ARINC ACARS remote transmitting/receiving stations, and the ARINC computer and switching systems.

3. The Air Carrier C2 (Command and Control) and Management Subsystem is basically all the ground-based airline operations, such as operations control, maintenance, crew scheduling and the like, that are linked up with that ACARS System.

Downlinks are those ACARS transmissions that originate in the aircraft, and Uplinks are those messages sent from the ground station to the aircraft. A typical series of ACARS transmissions will look something like this example from United 767-300 ERs departing from Washington Dulles International (IAD):

```
ACARS mode: 2 Aircraft reg.: N651UA
Message Label: QF Block id: 1 Msg no: M82A
Flight id: UA0978
Message content: -
IAD2241FRA
```

05/08/1997

The label **QF** refers to an ACARS OFF report/message. The nose gear struts are now retracting and the ACARS System duly notes this event as the off time (**2241**). Departure Airport and Destination are noted to the left and right of the OFF time respectively.

Here's another example: This time we see a downlink response to an uplink weather report sent by crew request or automatically by the flight operations:

```
ACARS mode: 2 Aircraft reg.: N651UA
Message label: H1 Block id: 2 Msg. no: S82A
Flight id: UA0978
Message Content: -
OLS224151V
```

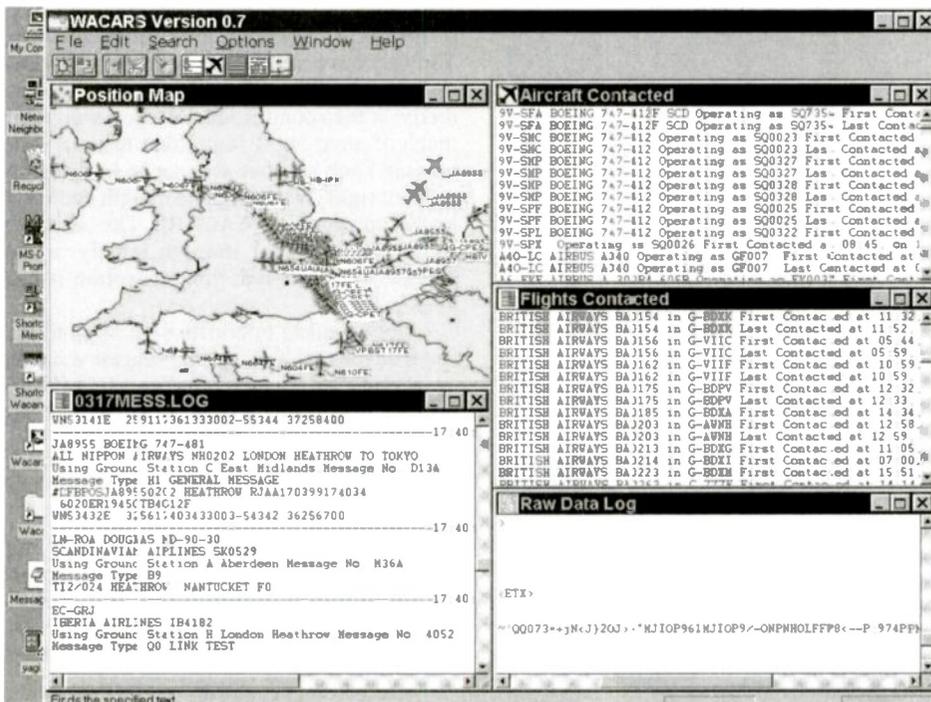
05/08/1997 22:41

In the following two messages, we see a takeoff (TO) engine performance report.

```
ACARS mode: 2 Aircraft reg.: N651UA
Message label: H1 Block id: 3 Msg. no: D89A
Flight id: UA 0978
Message content:
#DFBE13C24651 ???????8 5972240T0
132202 294 25103269 220
1440 947 520 97418600250107179
5341565144173014923812143
262528 11 021
```

05/08/1997 22:42

```
ACARS mode: 2 Aircraft reg.: N651UA
Message label: H1 Block id: 4 Msg. no: D89B
Flight id: UA0978
Message Content: -
#DFB89 0 0 0 661147 47
```



A6F00398000080000D2A000000000000000000000002A3
B4F4039C8000080000D2A000000000000000000000002A3

The following message is a downlink response to an up linked HOWGOZIT report (shown next), which is a United Airlines flight data report format:

ACARS mode: 2 Aircraft reg: N651UA
Message label: SZ Block id: 7 Msg. no: M83A
Flight id: UA978
Message content:-
/R3 IADFRA 0978-5 IAD
-----[05/08/1997 22:44

ACARS mode: 2 Aircraft reg: N658UA
Message label: RA Block id: J Msg. no: QUHD
Flight id: QWDUA~
Message content:-
10978-23 HOWGOZIT
UA978 IADFRA (Dulles/Frankfurt-ib)
IAD 2214/2249 887A
SWANN 2259 37 849
BROSS 2301 37 849
OOD 2307 37 815
RBV 2312 37 801
ACK 2337 37 757
WHALE 2354 37 728
BANCS 0108 37
-----[23/07/1997 22:51]

Waypoints are shown in the left hand column, just below the OUT and OFF times from IAD. Out refers to doors closing on the aircraft at the gate, and OFF refers to time of departure as outlined above. ETAs (estimated times of arrival) at the waypoints along the route are shown in the middle column, requested/expected flight level next and fuel remaining figures are shown in the right hand column.

Okay, now that we have gone over a few of the basics, let us go into a bit more detail on message decoding. By the way, let me assure you that it is perfectly legal to do so.

◆ Software and Hardware for Decoding

First, let's look at what you'll need to be able to decode ACARS messages: A VHF scanner that receives the aero communications band (118.000 – 136.975) comes first. If you plan to use software that enables your computer/sound card to do the decoding, you'll need an audio cable to go between the scanner's recorder or phone outlet and the computer's sound card (LINE IN/AUX). A Sound Blaster sound card seems to bring about the best results, but others also work successfully. A hint: If plugging the audio cable into the sound card does not work, try plugging it into the computer mic outlet. I had no luck whatsoever using the sound card outlet and was about ready to give up when I decided to try the mic. Bingo!

It's a good idea to put your scanner as far away from your computer as possible to avoid computer interference. No matter how up-to-date your computer may be, there's still RF ema-

nating from it. Okay, so you've got everything ready to go, but wait! You still need software for the actual decoding. Let's take a look at what's available:

I've found that the freeware decoders are great for those just starting out in learning to decode ACARS messages; we'll mention some of the commercial ones as well a bit later in this article.

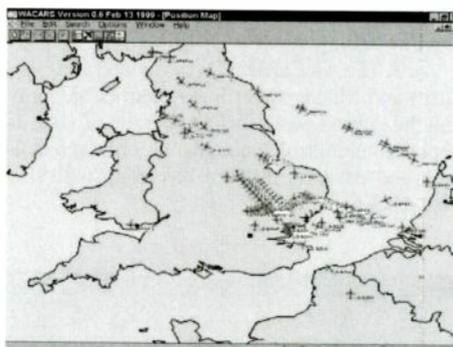
KRACARS:

This freeware program was written by Khalid Rafiq (<http://www.tardis.ed.ac.uk/~kr/>) back in August of 1977. It has not been updated since then, but is still a very popular program. Incidentally, it is a DOS program (still remember how to use DOS?). To use this software, the author lists the following requirements:

- PC with at least 1 M Byte RAM.
- DOS (any later version is acceptable, I've found)
- SoundBlaster sound card or compatibles
- Scanner receiver with audio cable for connection to be established.
- **KRACARS** will also work from within Windows 95 as a DOS application.
- **KRACARS** is an excellent program and it does a fine job of decoding ACARS messages; not only that, it's easy to use and fun, too!

WACARS:

Here is another freeware program; this one was written by Michael Roberts (<http://www.geocities.com/CapeCanaveral/Cockpit/>



9870/acars.html). **WACARS** is a Windows program.

I've tried this program also, and have both **KRACARS** and **WACARS** on my computer. Be advised, however, that while **WACARS** may be a more sophisticated program, **KRACARS** is easier to use!

Decoders:

There is other equipment to consider, such as combination software/decoders from



commercial sources. These usually include an interface which goes between your scanner and computer serial port. The Lowe Airmaster is a good example. Go to <http://www.lowe.co.uk/> for a look at this equipment. Another one to check out is the Pervisell Company at <http://www.pervisell.com/ham/> – they also make a software/decoder. Universal Radio, Inc. <http://www.universal-radio.com> has the Universal ACT-1, which is hooked up between your computer and scanner. However, Universal also sells much more sophisticated decoders, which receive many modes, ACARS among them.

Software-only programs such as **KRACARS** and **WACARS** can take their data from decoders such as those above as well as directly from scanner audio.

◆ Decoding

The next step is to pick a frequency. Listed below are the ACAR frequencies in present usage:

- 131.550 - Primary Channel worldwide
- 130.025 - Secondary Channel for USA & Canada
- 129.125 - Additional Channel for USA & Canada
- 130.450 - Additional Channel for USA & Canada
- 131.125 - Additional Channel for USA
- 136.700 - Additional Channel for USA
- 136.800 - Additional Channel for USA
- 131.725 - Primary Channel in Europe
- 131.525 - European Secondary
- 131.475 - Air Canada Company Channel
- 131.459 - Primary channel for Japan
- 136.900 - European secondary
- 136.925 - ARINC European Channel
- 136.850 - SITA Canadian Frequency

Now that you have picked one (try the first one listed above for your first efforts if you live in the USA), turn on your scanner and turn the squelch completely off! You will see a lot of raw data at first if you use **WACARS**, for instance. Then it should start to form into messages in the message box. You may have to fiddle with the volume control on your PC before data comes in correctly; if the sound is too soft, you won't get much of anything. I found that turning your volume knob on your scanner to halfway up is about right. Watch signal strength and CPU load if you're using **WACARS**. The indicator should show signal strength mostly in the green; if you see red, your reception is too loud.

For complete information on what all the codes on the messages mean, I suggest you pick up a copy of *Understanding ACARS* by ACARS master Ed Flynn. This can also be obtained through Universal Radio, Inc.

Happy decoding!

Acknowledgements:

We send our thanks to Tony, Steve, and Nick, who head the web site <http://patriot.net/~acars> for permission to use some of their very helpful information regarding the ACARS System, and decoding messages. Take a look at their website and tell 'em you saw it in *MT*!



AirNav Systems

Flight Tracking and Monitoring

AirNav Systems Products

Several months ago, I was "talking" with a friend overseas on ICQ who was an avid *AirNav 3.1* user. He did his best to sell me on the product as he was extremely pleased with all facets of the program. I had purchased *AirNav Lite* previously, but hadn't used it much as my old computer wasn't very reliable and half the time I couldn't download data because it would freeze up. Since I had a new computer, I decided to check out the web site. I was very glad I listened to my friend, as once I read all the specs I was amazed at all of the goodies to be found there!

Although there is a demo version of the software, I was so intrigued by my friend's experience and the myriad of features included, that I went for the real thing right away. I used NavAid's secure system to charge the very nominal one-time cost of \$70.00 to my credit card. Within 1-1/2 hours, I had my codes to deactivate the "demo" specifications of the program, which come in three files.

Of course, I had to start working with the software right away! So, I opened one of the North Atlantic maps and downloaded the data. In about 2 minutes, I had a "sky full of planes"! I found that I got even more out of the program by turning on my HF receiver to one of the frequencies for the area I was visually monitoring!

Not only do you get "real time" action, but updated flight data from the Internet is available. The data you receive when you choose this option is downloaded from a meteorological FTP server that receives flight updates from many ATC centers around the world. This is semi-real time tracking with a minimum delay of only 10 minutes.

Here is a partial list of what you get with AirNav 3.1:

- ACARS, HF, and VHF real time tracking and monitoring
- Internet semi-real time tracking (300 flights/hour worldwide)
- Compatible with all ACARS decoders
- Multi-window and vertical tracking
- All heard aircraft management
- Electronic flight progress strips
- Mercator and Azimuthal charts
- Up to 2000 flights simultaneously
- Up to 50 waypoints per flight
- Accurate estimation of times and waypoints
- Professional interface
- Terminal and flight Management modes
- 32 bit application
- 9 updated databases with more than 100,000 records (and these data bases are often updated).
- Seven different map creation methods

- Airspace related data drawing
- New online help, ACARS quick view, Standby Flights
- Six tutorials to help users with most phases of the program
- More than 50 ATC Centers data memorized
- Help file (70 pages +)
- Technical assistance is available via email or can be found on-line.

The ACARS-related part of the program is very simple to use with any of the decoder programs or software/demodulators available. I've used both WACARS and KRACARS with excellent results. There are tutorials to help you get started with ACARS decoding for AirNav 3.1, as well.

If you are an experienced aero comms monitor, you'll love AirNav 3.1 – it's a tool that brings monitoring very close to being in a real control or radio operation facility!

AirNav Internet Lite:

This is an excellent program for those who may be just starting out in the monitoring hobby, or perhaps are returning to it after a long absence. Just as with *AirNav 3.1*, there is access to Internet Flight Tracking. Other features include:

- Multi-window tracking
- Electronic Flight Progress strips
- Mercator and Azimuthal charts
- Up to 2000 flights simultaneously
- Up to 50 waypoints per flight
- 32 bit application
- Updated data base with more than 100,000 records
- Airspace-related data drawing
- Online help and manual
- AirNav Internet Lite has a one-time cost of \$64.95 and can also be purchased on-line

AirNav SELCAL Decoder:

If you have any interest at all in logging SELCALs – those identifiers which are unique to each aircraft – here is a painless and fun way to do it. Remember the days when you sat there by your receiver with a paper and pencil (no pens: a lot of erasing was involved) and furiously logged all the details of the flights you were monitoring – especially, trying to get the SELCAL letters down in correct order? Well, if you purchase AirNav's program, you'll never have that problem again, as all SELCAL, registration, flight number, airline, etc., details are right on the screen and all records can be printed out as well!

A one-time charge of \$39.95 (also payable on line) buys you this excellent program to go along with your other AirNav software. All you need to enjoy it is a shortwave receiver on which you can tune in the HF aero bands (in other words, it has to have a BFO or USB/LSB con-

trol), a soundcard, and Windows 95 or better. These transmissions are all decoded by the program in real time, incidentally. There is no other hardware or decoding system to buy. This is it! If you are a die-hard SELCAL collector, or even have a passing interest in SELCALs, this is the program for you!

If it seems to you that I'm a big fan of AirNav products, you are right – I am. These programs have produced many hours of enjoyment for me, and they can do the same for you. Take a look at the AirNav web site at <http://www.airnavsystems.com> – you'll be glad you did!

If you prefer not to purchase over the Internet, you may send your registration to AirNav's internet agent, RegSoft, by postal mail or fax, or you can register over the phone. By telephone ask to order AirNav - The Aircraft Tracking Software for Windows, Version 3.1, or you may write and send a check written to RegSoft to: RegSoft.com, 6595-G Roswell Road, Suite 732, Atlanta, GA 30328. Phone 1-877-REGSOFT (Toll-free), 770-497-9126 (for international orders); FAX 770-497-9234, Email: info@regsoft.com

AirNav is not available in stores, except for Flightdeck, Manchester's Aviation Emporium, in England. For more info visit <http://www.flightdeck.co.uk/> or call Tel +44 (0) 161-499-9350.

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“A Diamond in the Sky”

By John Smithson

As a child, I would often watch for the first “star” in the evening sky and recite the poem:

*“Twinkle, twinkle, little star...
How I wonder where you are.
Up above the world so high...
Like a diamond in the sky....”*

This usually meant the planet Venus...almost motionless in the sky. Then I noticed “stars” that traveled quickly across the sky. The Sputnik and Explorer satellites were first, then followed by a host of others like Skylab, the Russian *Mir* station, and the International Space Station. Now, there are *dozens* of objects in space that can be viewed with the naked eye. These “man made stars” give me the same thrill I experienced as a child when they soar across the night sky. I still wonder “where they are” as the poem says...when I hear of a new one.

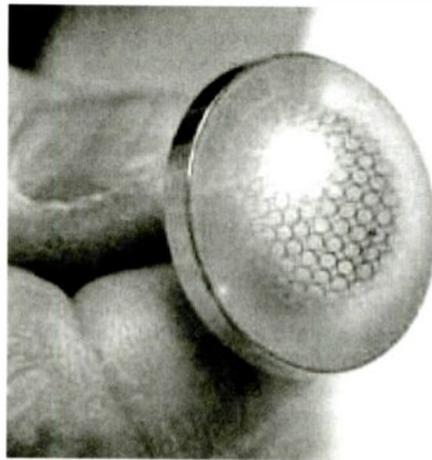
The *newest* “diamond in the sky,” the *Starshine* satellite, is scheduled for launch on August 31, 2001, from NASA’s Kodiak Launch Complex, Alaska. It is a 200 pound aluminum sphere, about three feet diameter, with 1500 small reflective mirrors attached to it and coated with silicon dioxide. School groups from all over the world polished all but 300 of the mirrors.

Starshine was built to the specifications of Gil Moore, project director, by the Naval Research Laboratory, with the assistance of the Calhoun Community College in Decatur, Alabama, and the C.F.P. Paul Rousseau school in



Gil Moore shows the satellite before the mirrors are attached.

Drummondville, Canada. It is a project of many volunteer groups directed by Gil Moore of Monument, Colorado. He has recruited schools from all over the world, procured mirrors and polishing materials, obtained satellite flight opportunities and arranged for tracking orbits and the atmospheric density studies. *Starshine* will ride upon an unmanned Lockheed Martin Athena One Rocket.



Polished mirror

This is the third *Starshine* satellite to be assembled. It will be placed in a 300 mile circular orbit, inclined to the equator by 67 degrees. This means the satellite will be visible at twilight to *all* the children in the world as it orbits the earth for several years. You will be able to see the *Starshine 3* satellite at twilight for several years because it will “blink” as the sun reflects off its mirrors. Students from all over the world will calculate its orbit and decay from *visual* observations. All they need is an accurate watch and basic knowledge of the constellations.

I observed the last *Starshine* satellite “twinkle” across the evening sky several times before it deorbited like a flaming comet into the ocean. Skywatching has been a diversion of mine for several years, the result of the ham radio hobby. There is a beacon aboard *Starshine* transmitting on a two meter ham radio VHF radio frequency. Any general coverage scanner will be able to receive its signal. You will be able to detect it on the frequency of 145.825 MHz. This

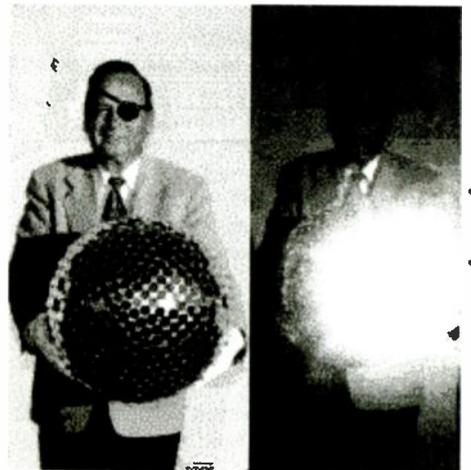
means you can listen to the radio signal (just like the original *Sputnik*), as it crosses the sky.

There will be another *Starshine* satellite (the second assembled) launched from the space shuttle *Endeavor* on November 29, 2001. The internal spin mechanism was reviewed and approved by the NASA Goddard Space Flight Center on January 18, 2001. Progress is being made smoothly for this launch also.

I’ve watched the International Space Station, the Russian *Mir* station, and the Iridium Communications Satellites (the sun reflecting off their solar panels can be seen even in broad daylight sometimes), the Hubbell Space Telescope, and several spy satellites for years. They are just as fascinating as the “diamond in the sky” I wished upon as a kid. I hope you will be able to see *Starshine* as it passes over your home.

How about inviting the family, or the entire neighborhood outside on a clear night to watch the sky? It’s amazing what you can see in the heavens! To learn more about the “Starshine Project” and to participate in its study, you can log onto the *Starshine* web page at <http://www.azinet.com/starshine/index.html> or send e-mail to Jspiker@aol.com.

Skywatching can be a *lifetime* learning experience.



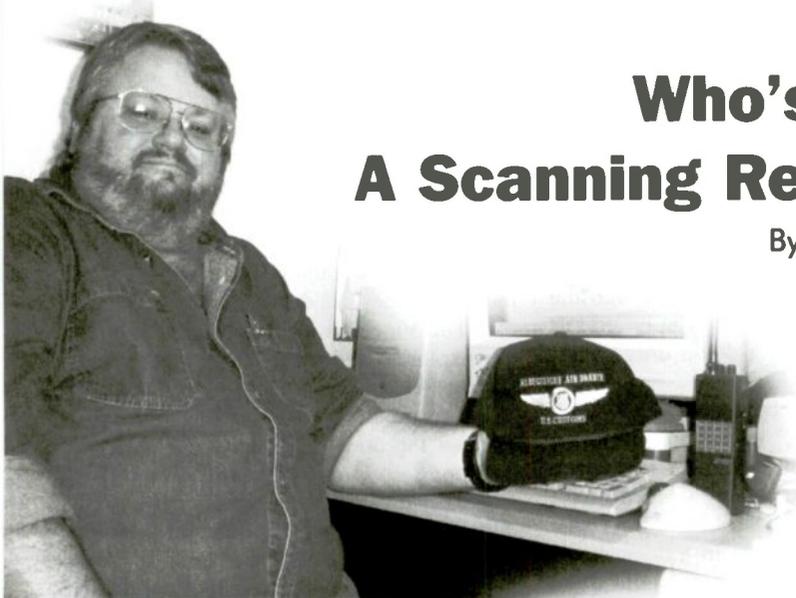
Gil Moore holds a replica of Starshine; photo to right is the sun reflected from just one mirror.

Photo by Kerry Kirkland

Who's Listening?

A Scanning Report Listener Profile

By Robert Wyman



Wade C. Langley has been monitoring for over thirty years. Like many in the hobby, he was drawn toward scanning by an interest in aviation and law enforcement. He recalls riding in the (cockpit) jump seat of a jetliner, thanks to his father's career in the airline industry, and being fascinated with the communication and navigation functions of the airplane. "To hear the pilots be told where to fly the plane was just amazing." He was 8 years old at the time.

His first scanner was a Radio Shack "Patrolman 8" at age 14, stocked with crystals for local VHF police channels. By age 15 he had joined the City of Coral Gables (Florida) Police Explorers, and quickly set himself apart from the other "kids" by bringing his scanner on ride-alongs with Officers...and the Officers loved it!

With Wade's scanner, Coral Gables PD could actually listen to adjacent jurisdictions such as the City of Miami PD, City of South Miami PD, and the County's Public Safety Department. This proved extremely beneficial for calls that were on the jurisdictional borders, since the Gables unit could determine which other agencies and units (if any) were enroute.

The scanner was also used for some occasional "police humor," as when a Gables unit would actually respond to a nearby Miami call...without telling the dispatcher, of course...just to harass the Miami Officer about taking so long to get there!

Membership in the Civil Air Patrol followed at age 16, and this opened the gate to the guarded, closed perimeter of Homestead Air Force Base to Wade's curiosity. His dream at the time? A hand-held scanner capable of receiving the military UHF aircraft band along with VHF and UHF land mobile channels.

After high school he enjoyed using a Bearcat 210 with a home-built, D-cell battery box at work, at home and on the road. This afforded him programmability and portability in a briefcase-sized package. Next came a Bearcat 220 to satisfy his continued interest in aviation. Now armed with a car and a programmable scanner, Wade "camped out" for hours at a time...at the Air Force Base, the Federal Building, the county's Civil Defense Center...to mix a little scanning and searching with his college reading and studying.

His handheld milcom scanner was finally produced by Radio Shack, and the world of aerial refueling, NORAD alerts and military war games became readily accessible. "It was so cool to

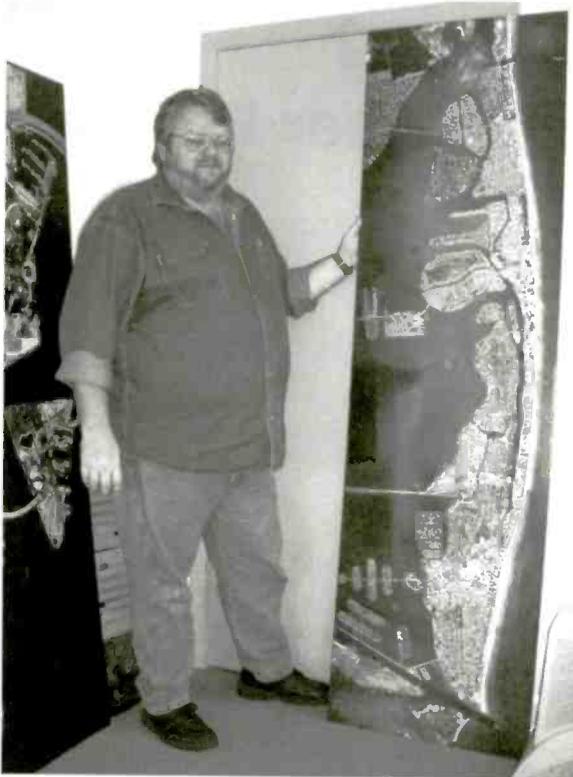
monitor aerial refueling from my house. They [the aircraft] were two miles off the coast and easily heard with a rubber-duckie antenna." Wade also entered local government service in the traffic department, with volunteer communications work at the Civil Defense agency.

The Feds meet their match

In 1981, Wade went back to Police Exploring as an Advisor instead of a Cadet. His scanners were once again used to monitor adjacent jurisdictions and to help coordinate emergency responses. He rode with the Dade County Public Safety Department (now called the Miami-Dade Police Department) twice a week for two years. Officers he rode with on a regular basis complained of "missing the action" when Wade and his scanners were not on board.

Wade shared his communications





ian" advisor and functional leader of the post.

"My ability to monitor his communications got his attention. He was impressed...because I had this information and I was also a 'good guy'...on the side of law enforcement. He asked me to start this Explorer Post, and the next thing I know, I'm on go-fast boats chasing down drug smugglers!"

At the beginning of the "War on Drugs," every coastal police agency put boats in the water and every agency wanted credit for a drug bust. Looking for suspicious vessels in hidden coves and inlets, agencies would often chase *each other* before they figured out what was happening. For the third time in Wade's Police Explorer history, his scanners became a vital tool for the law enforcement community.

What was Wade's role? During his maritime ride-alongs, he again monitored other jurisdic-

dictions and coordinated tactical responses. Customs, Coast Guard, Florida Marine Patrol, Miami PD, Coral Gables PD and other agencies often had one or more vessels in coastal waters at the same time. If you thought the drug war of the 1980s was a well-oiled machine, you've seen too many movies and TV shows. It was really a mess when it started, and several unpublicized incidents occurred where one agency almost had a shootout with another agency because everyone was undercover.

In the course of running the Explorer Post, Wade taught the Cadets about the pitfalls of communications, especially the Federal variety. Agents were often told their communications were secure, scrambled, out-of-band or otherwise secret. Wade quickly pointed out that such equipment was certainly available, though not in use on a day-to-day basis.

"Part of running the Post was teaching the communications aspect of the job...how communications can work for you. You can coordinate a pursuit without ever exceeding the speed limit. You can conduct a search with the least amount of manpower covering the greatest amount of area. You can run an enforcement operation in plain view of the bad guys and still surprise them. I remember an old advertising slogan, 'You may be able to outrun my car, but you can't outrun my Motorola,' and that's so true when the radios are used properly," he recalled.

Customs changes tactics

1988 saw the emergence of newer technologies and a transition in Customs to a more balanced law enforcement effort. At the opening of the super-secret Joint Marine Interdiction Communications Center (JMICC or "Jay-Mick"), Wade and the Explorers (almost sounds like a band, right?) met then-Vice President George Bush, Sr.

The Vice President spoke at length to the Explorers and asked "why are all these teenage kids are being exposed to this?" Wade responded, "By knowing the inside story of the drug war, these kids are better equipped to positively influence their friends and reject negative peer pressure." Also discussed were the individual and sincere efforts of the kids and their Explorer experiences. The V.P. expressed his delight in the program.

With the introduction of JMICC, Customs announced a reorganization of the Marine Enforcement unit and the Explorer Post lost their sponsor. Emphasis was placed on the Contraband Enforcement Teams at the airports and seaports (Ports of Entry), and this was not a particularly safe, educational or exciting assignment for the kids. In fact, it was actually safer having the kids on open water, in specially-equipped Customs go-fast boats cruising at over 50 knots, than having them in the bowels of the airport and seaport looking through shipping containers and luggage.

A meeting was then held to determine the fate of the Customs Explorer Program. Wade and two Cadets noted the agency was also placing an emphasis on aviation assets. In fact, Customs had a growing "air force" of helicopters, turboprops, jets and surveillance

knowledge with local government workers, Civil Defense authorities, the Police Explorers and other scanning hobbyists: VHF and UHF radio systems, antennas, procedures, channel plans. Volunteer and assigned duties during hurricanes, Presidential visits, and local events put him in contact with many government and private communication-industry workers. Others soon took notice, even beyond his circle of friends and associates: U.S. Customs paid him a visit in the early 1980s, during the annual Boy Scout Jamboree that was attended by all local Explorer Posts.

Customs was not, thankfully, investigating him for monitoring federal communications. Instead, they wanted to establish an Explorer Post as an educational and outreach program. As everyone may recall, Miami was loosely associated with drug smuggling in the 1980s...not that it made the news or anything!

The Special Agent who conversed with Wade noticed his scanner and presented a challenge of sorts. "You can't hear us," the Agent advised. "You can monitor the locals, but not the Feds!" Even though the Agent was incorrect, Wade thought it best to just smile and not show any disrespect. One didn't mess around with what the locals called "B.T.F.H." or "Big Time Federal Heat."

A few days later, Wade contacted the Special Agent and presented a concise report of frequencies, call signs and operational notes. While that may sound like an arrestable offense, the Agent was both impressed and shocked. The result: establishment of the first-of-its-kind U.S. Customs Marine Law Enforcement Explorer Post, with Wade as the "civil-



platforms. After much wrangling, lobbying and campaigning, the first U.S. Customs Aviation Law Enforcement Explorer Post was born in 1989 at the Customs Air Branch, Homestead Air Force Base, Florida.

Now, Wade was in his element: aviation, law enforcement *and* communications in one sleek package. With Customs helicopters and airplanes traveling throughout the southeast U.S. and Caribbean, Wade conducted research and amassed frequency lists from almost every police agency. He used his scanner to monitor the locals from the helicopter, and later supplied frequency lists to the pilots when Wulfsberg FLEXCOMM synthesized radios were installed. Wade "saw action" in Blackhawks, Cessna Citations, Cessna 404's and other aircraft.

Memorable experiences

His Customs Air Branch experience ended in the Spring of 1992 when new responsibilities began at his "real job" in the local traffic department. It was an omen of things to come: August 24th, 1992, saw the arrival of Hurricane Andrew and the near-total destruction of Homestead Air Force Base, including the Customs Air Branch facilities. They have just recently been replaced at the since-downsized Homestead Air Reserve Station.

When asked about his most memorable experiences in communications, Wade almost glows with pride and excitement. "I used to perform ground ops for the Blackhawk at airshows and schoolyard appearances. I'd secure the Landing Zone (LZ) and guide the bird down with hand signals. The Explorers and the crew would then setup a small exhibit and answer questions about the Customs Service."

"During one airshow, the pilot saw me working with a scanner and asked what I was listening to. The Thunderbirds, I told him. 'No way' said the ex-military pilot." You guessed it...Wade turned up the volume and piped the scanner through the helicopter's Public Address speakers! It was the first time that any of the ex-military men had ever heard the T-Birds communicate.

"I also remember the importance of altitude, which is something most of us can't use to our advantage. I needed to communicate something to an Explorer in Miami, but I was in a Customs airplane four thousand feet over Naples (on the west coast of Florida). The Explorers used a licensed UHF business-band system at the time, and I communicated in simplex mode from the west coast of Florida to the east coast of Florida...hand-held radio to hand-held radio...and that was just amazing."

On the hobbyist side of things, Wade used to attend most of the Space Shuttle launches.

"We went up there in my van, with about seven scanners and magnet mount antennas. Bearcat 210s, 220s, 250s, Pro



These days, a National Guard UH-60 Blackhawk helicopter is as likely to be fighting Florida fires as doing Customs duty. DoD photo by Master Sgt. Bob Haskell, U.S. Army National Guard.

2004s, 2006s, handhelds...probably over 1,000 channels, and it still wasn't enough to monitor everything at the Space Center. My van looked like a porcupine, and we caught the attention of everyone from the tollbooth operators to the Air Force!" In fact, Wade was part of the group of Miami-area monitors who developed the first Kennedy Space Center frequency list that was published by Bob Grove.

Wade has used his scanners and knowledge for many local government and hobbyist projects over the last 20+ years. He has participated in Emergency Management exercises, testing of the county's 470 MHz bandplan and later the 800 MHz EDACS Trunked system, several emergency response and disaster recovery activities, monitoring trips to Walt Disney World, movie filming locations, parades, races, and many other adventures.

Wade on scanning today

Wade left local government service in 1998 and now works for an aerial photography firm, where he interprets aerial photos and produces large photo exhibits for attorneys, engineers, investigators, realtors, and property owners. He still has a Pro 2004 and a 2006, plus newer OptoElectronics boards, TrunkTrackers, and a JD-100 Aviation Band scanner.

"Anyone who is serious about MilCom and MilAir should have this scanner [the JD-100]," advises Wade. "I also use it regularly on airline flights. I ask permission from the pilot, of course, but when they see 'Sporty's' and 'aircraft receiver' on the back plate, they always say it's O.K. to use." "Just don't point out my mistakes when we

land," one pilot jokingly told him.

His views on more recently-interested hobbyists? "We didn't have the Internet or even OptoElectronics Scouts. If we wanted a frequency for a particular agency, we first looked at the antennas. We studied antenna catalogs and learned to identify radio bands and antenna models on sight. We even *measured* antenna lengths if we could get away with it."

"Then, it was a matter of research. Once we knew what band the antenna was on, we studied the bandplans and licensing directories such as *Police Call*, Grove's books, and even microfiche at the F.C.C. offices to narrow down the possible frequencies. Then, we sat back and listened until something was confirmed."

"Many more informational resources exist today, plus all the newer equipment to help find active frequencies. And, while I like the way the Internet lets everyone share their information, I'm disappointed when some hobbyists just want everything handed to them. They obviously have no knowledge...and no interest...in learning how the frequencies and bands and channels and systems all fit together."

"I also recommend that hobbyists think 'outside the box.' If you don't have a trunking scanner, listen to the inputs. It's more useful than you imagine. If you want to find all the channels in use at an event, then come early and stay late and search every applicable band. If you're not sure if an agency or location uses radios, just assume they do and start your research. Just because it hasn't been published doesn't mean it's not out there."

Motorola's DCII Sidecar & Your Satellite Letters

If you believed the ballyhoo from your local satellite TV dealer, C/Ku-band satellite TV is as dead as my chances to win the lottery. Once proud promoters of a new technology, most of these dealers have succumbed to the pressures of the market and, inadvertently or not, have done everything they could to kill the big dish industry. And who could blame them? The easy bucks for installations of the little dish; fat commissions from overpriced entertainment packages; and a bounty paid for converting existing C-band customers to the little dish were more than enough incentive for many. The bulk of America's satellite TV dealers have dropped the big dish from their inventory.

The result is that the big dish industry has been losing an average of 20,000 subscribers per month over the last several years. Sources inside the industry expect that figure to taper off to a solid base of between 600,000 and a million subscribers. It's this figure which is expected to guarantee continued C-band programming for many years to come. To put C-band's losses in perspective consider this: In the first quarter of this year DirecTV alone lost an average of 166,000 subscribers per month. Figures on DISH Network losses weren't available. Most of C-band's lost subscriptions went directly to the small dish while the bulk of the little dish lost subscribers are said to have gone back to cable.

The one number no one in the industry can nail down is the exact number of big dish viewers. It's quite possible that there are several hundred thousand folks watching big dish satellite TV without the benefit of a decoder, choosing instead to watch the wild feeds, the channels in the clear or just listening to all the audio services. These, in addition to the dozens of ethnic programming sources, specialty channels (such as NASA-TV), and a number of other services simply unavailable anywhere else, give more than a few reasons to have a dish without having to

pay for cable fare. Still, the current core of 1.1 million big dish subscribers who opt for the decoder are loyal and refuse to give up what they consider to be a superior TV technology.

While many areas have lost their local dealers there are some notable exceptions. Some areas are blessed with dealers who believe consumers should be able to choose between the two systems and offer side-by-side comparisons in their showrooms. Another notable exception is Skyvision, a long-time *MT* advertiser and a real resource for those of us who enjoy the hobby of DXing the skies for interesting audio and video. Still another exception is Motorola which bought General Instrument, maker of satellite and cable TV equipment including the amazing 4DTV satellite receiver (see *MT* December 2000 page 72 & 73).

Those who read my review of the 4DTV receiver may have been disheartened by the \$900 price tag. But, as suggested in the piece, Motorola has now released their DSR905 "4DTV Sidecar." This device allows you to access the hundreds of DigiCipherII (DCII) digital channels by connecting to your existing analog receiver. It also allows access to the digital program guide (which lists all analog and VideoCipherII [VCII] channels in addition to DCII); one button pay-per-view movies on the DCII channels; and includes a 4-in-1 IR/UHF remote control. It's the simplest solution to bringing the ever-expanding digital universe on C and Ku-band to those who are interested but who don't want to give up their current, and still very useful analog receiver. The best part is that the Sidecar sells for less than half the price of the full-fledged 4DTV. Skyvision sells the product for \$400 plus \$27 shipping. I've also seen the product discounted in Skyvision flyers.

Music lovers will appreciate being able to tune the more than 100 digital audio services from Digital Music Express (DMX) and Music

Choice (MC). There are also dozens of public television feeds from Georgia, Nebraska, South Carolina and PBS central which are unavailable in analog format on both C and Ku-bands. In fact, the DCII mode has really changed the face of big dish satellite TV. To get an idea of the channels available in the DCII format (and all other analog and VCII channels for that matter), check out Motorola's 4DTV web site <http://www.4dtv.com>.

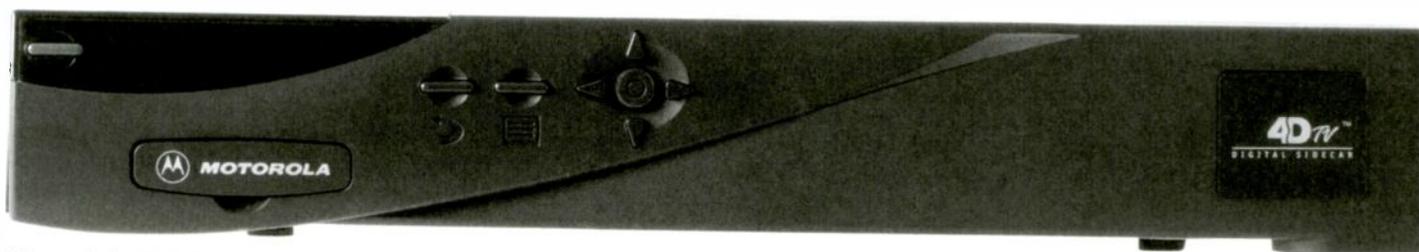
◆ Motorola Speaks

Earlier this spring I talked with Ajamu Bernard, 4DTV Marketing Manager at Motorola, about the current state and future prospects of the C-band universe. Bernard says there are currently 100,000 4DTV units in the marketplace with both the receiver and the sidecar "...moving very well through the marketing channels."

I asked him how long pay networks such as HBO, Showtime, etc, which are currently available to both VCII and DCII subscribers, will continue to simulcast the VCII broadcasts and further, how long analog C-band signals, such as TBS, The Weather Channel and others not in DCII format will remain available to VCII viewers.

"For a very long time," says Bernard. "Remember, C-band is the backbone of how programmers transmit their programming to cable systems. So, until cable makes the commitment to go totally digital, the main channels will continue to be available in analog formats." I would also add that there are many thousands of cable companies throughout the U.S. all of which are loathe to spend one dime more than they absolutely have to in order to upgrade their service. A digital upgrade to these companies represents a major investment.

Bernard also noted that, "...premium channels have a higher penetration rate and make a higher margin on C-band than they do anywhere



Motorola's 4DTV Sidecar (DSR905) allows access to hundreds of DCII digital audio and video services (many for free), a digital satellite guide (updated daily), one-button Pay-Per-View option, and a 4-in-1 IR/UHF remote control. (Courtesy Motorola)

else. Part of the reason for this is the fact that 4DTV is the only format that allows customers to receive the full suite of programming, thus customers have a higher satisfaction rate."

Customer satisfaction aside, few will argue with the profit motive. Since the average C-band customer spends about \$30 month in subscription fees, programmers rake in a staggering \$33 million dollars per month. Who would want to kill such a golden goose?

❖ TVRO Mailbag

Chris Singleton, KE3MC, from Worton, MD, writes, "...saw your article in the April issue of *MT*. What caught my attention was at the end, you mentioned that you could use an old Primestar dish and LNB along with an MPEGII receiver to receive Telstar 5 for instance. I have an old Primestar system and....my question is this: Is there any way that I could modify the Primestar receiver to work with anything else?...I'm really not interested in investing hundreds of dollars into this..."

Chris, the Primestar receiver is essentially junk. You might be able to scavenge parts from the boards etc., but, the real operating is in the receiver's software. Still, you needn't invest hundreds in the hobby because an MPEGII receiver, even new, can be had for well under \$200. In fact, as the next letter explains, it pays to look around.

Ralph Siebert, long time *MT* reader and TVRO enthusiast, wrote recently, "...I really made out good here with some equipment. I never

got addicted to cigarettes or alcohol but Ebay has got me. I picked up a brand spanking new DMT-2000 [MPEGII receiver] for \$200 plus \$10 shipping ...and it works great; I get some new channels that the DMT-1000 wouldn't pick up...Last week I bought a GI 450i C-band receiver from a lady and paid \$81 for it...it arrived Friday and it doesn't have a scratch on it. It is very sophisticated...it even programs the other sats when you put two in..."

Well, Ralph, you did good! The GI 450i new still sells for \$500. There are many places to get great deals on new and used TVRO equipment. The cheapest is to look in the local "weekly trader" papers in your town or county. Folks are always wanting to give away complete satellite systems. Even if you have to pay \$100 for the whole dish, receiver, feed horn etc., if it's in really good condition, it's a cheap way to get into the satellite TV hobby. Installation is easy and the only thing you'll need to buy new is the cable to run from the dish site to the house. From then on all you'll have to do is program the receiver and start DXing the Clarke belt. And that brings us to the next letter.

Steve Stenslie writes, "...you wrote an article about setting up a really cheap fixed-dish (probably 4-5 ft.) straight receiver (for non-scrambled analog feeds) for someone who lived way out in the country. I mentioned it to my uncle (who lives way out in the country) who was only moderately interested. Now, maybe 3-6 years later, any help in finding which issue it was and then getting a copy if you have one would be very much appreciated."

Steve, I've done a lot of articles in the past couple of years about setting up such a system so it's hard to say which one it was. At any rate, the answers in the previous question will help and these sources may be quite useful as well: <http://www.lyngsat.com> lists all audio and video services on all satellite around the world. It's kept up to date daily. For new MPEGII systems and components (including 4.5 ft. dishes) check out <http://www.smallear.com> and <http://www.global-cm.net>.

There are a few new developments in the area of smaller C-band dishes which are worth looking into. Both Panamsat 9 and Anik F1 are two very powerful C-band satellites with a lot of in the clear (Free-to-Air) MPEGII channels. They should show up nicely on a 4 ft. dish. By the next installment of "TVRO Update" here at the Beginner's Corner I'll have some definite facts to relate. In addition, I'll be reporting on a small, inexpensive dish mover for the Smallear's 4.5 ft. dish. Stay tuned!

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Q. Why are some "wall warts" (AC power cubes) so large and heavy, while others are small and lightweight? (Richard Dailey, Pittsburgh, PA)

A. Power supplies contain transformers, windings of copper wire on an iron core. If a radio or other appliance requires heavy current (amperage), larger-diameter wire and more iron must be used to maintain efficiency and prevent resistive losses. Thus, the higher the current rating, the heavier the power supply.

Q. I enjoyed "Waiting for the Go Code" in the July 2000 issue of MT, as well as a recent EMP question in "Ask Bob." While I can't afford a copper screen room, I'd like to be able to have reception after a nuclear event. Is there any way to protect equipment on a smaller budget? (David C. Lowe, Sweetwater, TN)

A. Extensive tests were done in the '80s and '90s using artificial lightning-discharge techniques to emulate the electromagnetic pulse (EMP) from a nuclear detonation. These tests revealed that although older, vacuum-tube equipment was more resilient than low-voltage, solid-state equipment, the newer transistorized stuff really was tougher than anticipated.

Screen rooms aren't necessary, although some diehards keep a spare radio in a metal box, or wrapped in aluminum foil to fully shield it from EMP. If you are far enough away from a nuclear event that you survive it, chances are your equipment did, too. But a few precautions go a long way to preserve equipment from such an unspeakable event.

Antenna and power cable lengths in excess of 3-4 feet should be shielded. Surge protectors should be installed on antenna and AC lines. Disconnect and tightly coil up unused antenna, power, control, and audio cables to repel induced current flows. Connect all equipment to a common earth ground.

That should do it.

Q. I recently noticed a factory stamp on a radio that said, "Burn-in test OK." What does this mean? (Mark Burns, Terre Haute, IN)

A. The term "burn-in" refers simply to an extended period during which the equipment is left on to be sure it isn't likely to fail after the customer receives it. Burn-ins are typically 24-48 hours, and since there are no rigid industry standards, it's up to the manufacturer just what tests he makes and how long he leaves the equipment powered up.

Q. What is a good way to polish scratches from the front plastic bezel on the display of my radio? (Robert Chapman, Machiasport, ME)

A. I've had excellent success with non-abrasive metal polishes like Brasso; I've even rubbed out minor abrasions with my thumb, rubbing briskly as it feels hot (but don't overdo this or you'll get a blister!). Some hobbyists have tried polishing with tooth paste, but I've not confirmed this. Finally, you might try buffing it with dressmakers chalk (perhaps as a paste?), commonly used in silver polish.

Readers? Any pet procedures?

Q. I now own a classic R390A communications receiver. Where can I get 600 ohm headphones and speakers? (Harry Sliger, Indianapolis, IN)

A. It is very common for owners of this receiver to simply get an audio output transformer from Radio Shack. Order the 32-1031 (\$5.99), a 10 watt device that will match the high impedance output from your receiver to any 4, 8, or 16 ohm speaker or headset. Another, lower cost, lower power transformer is the 273-1380 (\$1.99) which will operate any 8 ohm (or so) speaker or headset, but at lower power levels.

Q. Are lie detectors influenced by intimidation? Can a sociopathic liar (like some politicians) fool one? (Mark Burns, Terre Haute, IN)

A. Yes, and yes. A simple "lie detector" like a toy galvanic skin response (GSR) device is highly erratic, influenced by perspiration, pressure, and emotional response. A professional polygraph, however, has several attachments, including a pneumograph (breathing rate), GSR, blood pressure, and pulse rate. All of these factors display their findings on a pen trace which records on paper any wide changes in body response when key questions are asked.

Still, such a procedure is subject to the same variables as the simple device, and a nervous, innocent subject can make the pens go wild, while a cool sociopath can look the examiner right in the eye and lie without detection.

Q. I have a cordless phone with a swivel-based whip. If I remove the screw holding this and replace it with a longer antenna, may I expect greater range? (Raymond Vane, Ft. Myers, FL)

A. Assuming it's a 40 MHz-range phone, probably so. The "iffy" part is whether or not the output circuit of the phone has been resonated to match the length of the present antenna. In that case, it could actually reduce range if you attached a different length. But the answer is, try it; you won't damage the circuitry.

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 website: www.grove-ent.com

Getting Started

Bright Ideas

Gary Webbenhurst

ab7ni@arrl.net

55

I frequently do radio repairs on "the bench." This is delicate work. Small screws and springs can easily get lost. Plus, I do not want battery acid or solder materials ruining my tabletop. I needed a special surface for such work. I found a cloth/carpet strip made for gun repair. When not needed, I can roll it up and store it out of the way. Any large gun store would carry this type of product.

56

I further protect my work surface with a sheet of clear plexiglas. Underneath the plexiglas, are the important pages of information I often need while scanning. The sheets of paper are always visible, but also protected from soft drinks spills, and pizza crumbs. OK, I admit to occasionally drooling while reading the *MT* ads.

57

Reader Robert Homuth wrote about his PRO-2056. It's the older Uniden/Radio Shack 20XX model line with no keypad. The only banks are POLICE, FIRE, AIR, WX, MARINE, and PRI-



VATE. The only other buttons are for PROGRAM, BAND, SEARCH, LOCKOUT, HOLD, and up/down arrows for searches. Robert reports it works great for skip opening detection. He suggested programming the PRIVATE bank with the following frequencies:

29.000	Ham	simplex	calling
29.025	Ham	simplex	alternate
29.500	Ham	simplex	and some remote links
29.600	Ham	simplex	and other remote links
29.620, 29.640, 29.650, 29.660, and 29.680		ham	repeater outputs
50.300		Simplex	California
50.400		Simplex	
52.525		Simplex	nationwide

You can also lock out all the FIRE channels above 50 MHz, then fill the 10 programmable remaining channels with ham ten-meter and six-meter frequencies. The Uniden Bearcat 350A and other models are still in stock. These scanners are inexpensive and thus very good as a dedicated use scanner. Since they have no numerical keypad, they are a little bit difficult to program.

Hence, they are often found at garage and flea market sales. Frustrated owners simply give up on the scanner rather than unlocking its potential. Great idea, Robert.

58

If you have a large collection of scanners, and radios – ham or otherwise – you should consider taking pictures as proof of your collection. Then talk to your insurance agent about a special rider to cover the radios. I also recorded the radio serial numbers. Whenever possible, I program my radios to display my name and callsign when the radio is powered up. I also opened the radio and place my name and phone number in the battery compartment. If you have an expensive computer and peripherals, you might also ask about ensuring them at the same time.

59

Here is an idea from "Bob." He had a problem with the rubber keypad keys on his radio. After thousands of punches, they failed to make the proper contact with the circuit board below. There are two possible fixes he suggested. The first is a flexible conductive mixture made by Chemtronics, their part # CW2610. It completes the circuit as the two materials bond together. Check'em out at <http://www.chemtronics.com/>.

Another possible answer is Loctite's "Quick Grid" repair resin. About \$10 in automotive and electrical supply houses. As with any modification or repair of your radio, if you are not familiar with working on these small and complex electronics, do not attempt do the work yourself. Thanks, Bob.

60



This next tip comes from reader Patrick Brown, WB5JHG. He ordered a new Drake MS8 External Speaker. He was not happy with the midrange speaker, so he replaced it with a Radio Shack 4" full range speaker (Catalog#40-1197). All he needed to do was remove the Drake speaker and use a round file to enlarge the screws opening on the RS speaker. He soldered the new speaker wire, paying careful attention to polarity. He then assembled the new speaker in the Drake case. He reports he was very pleased with the new sound. Thanks, Patrick.

61

To escape the heat, I recently spent the day at the local mall. I am always on the lookout for items that might apply to our radio hobby. I decided to wander through a cam-

era store. I found small padded cases that work well for some of my radios. Best part of all, was the price. They had a large bin they were closing out at \$5.95. I grabbed a handful at that price. My Scout™ frequency finder and Yaesu VX-5R now have new homes when I am out and about. They have better protection and no one pays much attention to a small pager-like case on your belt.

62

In these changing times, we must be prepared for rolling electrical blackouts. If your radios and clocks need a backup 9 volt battery, be sure you are prepared. I like to keep a large 12-volt gel cell battery to run my scanners. In fact, I actually have a computer uninterruptible power supply (UPS) just for my listening station. You can find these in the \$40-100 range at most office supply stores. Since we can all expect some electrical problems, a good surge protector is more important than ever. A lot cheaper than buying new radios.



We are in the midst of another busy fire season. Keep those scanners tuned for the VHF fire frequencies. Keep the lights off, and we will meet again next month.

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A Scanning Smorgasbord

Welcome to August and a busy edition of the *Scanning Report*. First, I extend my sincere "thank you" to Mike Fink, Nick Gossman, Ken Freriks, Greg Gilbert, Don Baker, Michael Wallach, Ben Meyer and John Braden for their supportive comments about my March 2001 article on MilCom monitoring. Thanks for taking the time to write and share your thoughts. Another "thank you" is offered to Ken Windyka, a longtime contributor who holds down the monitoring fort in Springfield, Massachusetts. Ken's outstanding reports can be seen on the MilCom mailing list.

In the June issue I mentioned my use of a *Personal Data Assistant* (PDA) to store frequency information. Popular brands include devices from Palm, Handspring and Sharp. Gerry Gomes, Communications Specialist for Wayne County, Michigan, writes, "Is there somewhere on the Internet to download one of these databases?"

Today's PDAs have the ability to synchronize data with Personal Information Manager (PIM) programs such as Microsoft Outlook or Internet calendar/address book/notepad sites such as Yahoo Calendar and Excite Planner. If you type a frequency list into your computer using an address book or notepad format, you should be able to import that file into the PDA. Similarly, an online file

using Yahoo, Excite, or any of the other PIM portals can also be imported.

Check your PDA's help file for additional information or restrictions on importing files. Also, backup your existing data before importing anything new...some PDA's have enough memory to hold multiple files, while others will overwrite the existing data with new data. That means your existing data is erased, so be careful.

Frequent *MT* contributor John Mayson also wrote in to advise everyone of his new *Texas Radio Guide*. Check out the link to his free website at the end of this column.

Chris Parris was recently at *Dodger Stadium* in Los Angeles. He found the following channels during a baseball game:

451.450, Digital PL 047 – Channel 4
451.500, Digital PL 071 – Unid. Use
451.875, Digital PL 032 – Channel 3
451.950, Digital PL 134 – Channel 1 "Command Post"
452.725, Digital PL 026 – Unid. Use
456.350, Digital PL 114 – Unid. Use
464.550, Digital PL 612 – Unid. Use

Chris adds, "the DPL codes are important, as these frequencies seem to be in use by lots of other users in the LA area, and the only way to really keep on top of the activities at the ball game was to use a scanner with DPL capabilities."

◆ On-Scene Commander

I attended the annual *Dayton HamVention* in May, along with Chris Parris and Jorge Rodriguez...and several thousand others, of course. I enjoyed speaking with the former author of this column, Rich Barnett, at his ScannerMaster booth (and I picked up *Police Call* on CD...don't think about it, just buy it...available from Grove Enterprises or ScannerMaster.

The folks at OptoElectronics and Vector Products were hospitable as always. It's amusing that I travel from Fort Lauderdale to Dayton, just to see the products of two compa-



Photo by Bob Grove

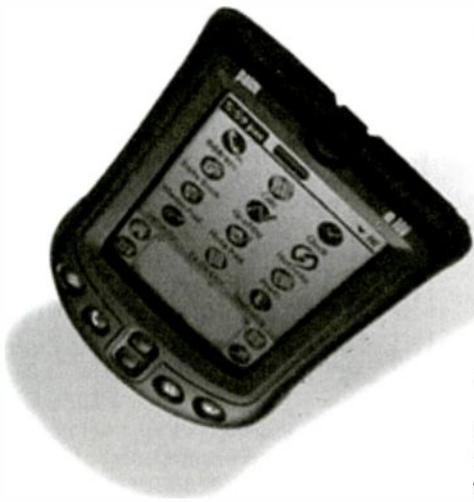
nies that are actually located in my back yard!

Chris and I also purchased the WinRadio AX-31B planar antenna, based on Bob Grove's review in the April edition of *MT*. Chris used his throughout the Dayton and Cincinnati areas with excellent results on all bands. We also checked out Wright-Patterson AFB and the U.S. Air Force Museum, and met Brian at "The Spot," his famous plane-spotting location at the perimeter of Wright-Pat. Brian's reports are also featured on the MilCom mailing list.

Also in May, I spent a little time monitoring the annual *Fort Lauderdale Air & Sea Show*. Unlike most airshows, this one takes place over the beach and Atlantic coastal waters. It's one of those events in which a team of monitors with a truckload of scanners are the only way to catch all the action. Military VHF and UHF airbands, military and commercial land-mobile bands, marine band, Family Radio Service, public safety bands, TV and radio stations...it's overwhelming. Following is an example of the frequencies you'll find at this annual event.

Fort Lauderdale Air & Sea Show 2001

kHz AM	
610	WIOD ("live" continuous coverage of airshow)
MHz AM	
119.300	FLL tower (Fort Lauderdale-Hollywood Intl Airport)
121.400	FLL ground
122.825	Ian Groom FedEx aerobatic demo
123.100	USCG SAR demo
123.175	unid. aerobatic team
123.475	Army Golden Knights
132.900	Air Boss
141.850	USAF T-birds air/air



- 157.150 USCG perimeter vessels
- 251.100 MIA departure (Miami Int'l Airport)
- 251.900 USAF Air Rescue Combat SAR demo
- 255.400 FSS
- 257.800 FLL tower
- 272.100 Snowbirds
- 285.600 MIA approach
- 295.700 HST tower (Homestead Air Reserve Base)
- 322.950 USAF T-Birds air/air
- 343.000 unid. interplane
- 380.200 MIA approach
- 380.300 MIA approach
- 381.800 USCG SAR demo
- 413.025 T-Birds ground support comms (not aircraft) at FLL

This is just a small sample of what was out there. Also in use were city and county trunked systems, various private repeaters and rental radios, and several military interplane or squadron channels that I didn't get a chance to hear!

The "On-Scene Commander" department will continue to spotlight special events attended by *MT* subscribers. Please send your on-scene stories and frequencies to me at the e-mail address listed above.

◆ Florida Fires

June's lead story on fire fighting mentioned that both 2000 and 2001 have been active fire seasons for Florida. Following is a list of active fire frequencies contributed by Mike Comer of Titusville, Florida, west of the Kennedy Space Center. Those frequencies marked with an asterisk were monitored by Mike; the others he can vouch for! Thanks, Mike; we like to see this kind of verified list!

* monitored, confirmed active
reported by others

- 118.050* Forestry air-air Gainesville/Hunters Creek Fire Orlando
- 122.750* LEAD air-air with Tankers
- 128.550* NASA Tower
- 122.925* Forestry cir-air
- 123.025* Forestry, News air-air
- 151.235# Forestry - Tactical
- 151.295* Forestry - Tactical
- 154.175* Brevard County Fire Rescue South paging
- 154.265* Mutual Aid RED
- 154.280* Mutual Aid WHITE (patch with Orange County 800)
- 154.295* Mutual Aid BLUE (unid FD primary)
- 154.385* Brevard County Fire Rescue North paging
- 154.445* Brevard County Fire Rescue Central paging
- 159.240* Forestry - Jacksonville District (bond opening)
- 159.270* Forestry - Orlando District
- 159.285* Forestry - Ch-11
- 159.300* Forestry - Orlando Flight Following
- 159.300* Forestry - Withlacoochee Flight Following
- 159.315* Forestry - car to car
- 159.330* Forestry - Lakeland District
- 159.405# Forestry - Okeechobee District
- 159.450* Forestry - Bunnell District
- 164.125* Forest Service (Control-Ocala Base)
- 164.625* US Fish & Wildlife Service (repeater Ch-5)
- 168.350* National Interagency Fire Center
- 168.625* Forest Service Tanker
- 169.175* Forest Service Helos
- 170.475* Forest Service Ch-21 Air-Ground

- 172.275# Air Tanker 420 for air drop Martin County
- Orange County FD Fire 11 2416 patch to 154.280

Aircraft:

- 10Foxrot
- *Air Attack 747
- *Retention Pond Air Attack (Hunters Creek area)
- *LEAD 52
- *LEAD 53
- *LEAD 77
- *Helo 70C Firehawk
- *Helo 261BH Fish & Wildlife, Bell 206B, Jet Ranger
- *Helo 164EH Bell 412
- *Helo 744
- *Helo 747 Sky Crane
- *Helo 612RM Sikorsky S-61N (CH-3)
- *Privateer # # Fla National Guard UH-60
- *Sheriff 3 Orange County CHASE
- *Tanker 05 P2V Neptune
- *Tanker 23 P-3A
- *Tanker 26 P-3A
- *Tanker 62 DC-7
- *Tanker 66 DC-7
- *Tanker 124 P4Y2
- *Tanker 160 C-54E
- #Tanker 420 no listing

◆ The Views of the Host...

I'm going to add a brief editorial to this month's special "Who's Listening" segment, which is appearing in the feature section.

This hobby is an outgrowth of the radio industry and the innovative "radiomen" who designed circuits, fabricated components, adopted operational policies and established the various radio standards that are still followed today. Without this focused approach, we probably would not have the equipment and knowledge we currently enjoy.

Yet, all the hobbyists I know...both men and women...are quite diversified in their interests and specialties. Radios, computers, cameras, cars, aviation, firearms, law enforcement, fire-rescue and "extreme sports" seem to be common elements. Perhaps the radio pioneers also had diverse interests of their time...they just weren't recorded for posterity.

The fact that all hobbyists use their knowledge for positive means and community service is one of the "platforms" which you'll see regularly in this column. I am personally offended when the hobby is characterized as something questionable at best and criminal at worst.

Certainly, anyone who has used a scanner or scanning information in the commission of a crime cannot be labeled a "hobbyist." Such an individual is simply a criminal who has adopted scanning as a tool for illegal activities...just as they have similarly adopted their automobile, their cellphone, their firearm or their computer. Positive and law-abiding uses of scanners are everywhere. It's up to all of us to get the word out and change any lingering, negative percep-

tions that we encounter.

The best example of a law-abiding hobbyist? A law-enforcing hobbyist. This month's "Who's Listening" candidate, Wade Langley, has many diversified interests, plus one which few in the hobby share: the ability to teach. We'll return to a shorter "Who's Listening" format next month.

◆ Bank Number One

As a follow-up to last month's column on UHF wireless microphone channels, here are some VHF selections to try. These are used by law enforcement agencies running videotaped traffic stops, DUI squads taping roadside sobriety tests, training units, news reporters, and public address systems in auditoriums and conference rooms.

A recent check of these channels in South Florida found activity by law enforcement (Collier County Sheriff's Office traffic units), a local church service, some musicians at a nearby club, a meeting in an office building, and a news media wireless microphone transmitting back to the camera-mounted receiver. I've also heard them used for training at the Federal Law Enforcement Training Center in Gynco, Georgia.

Range is very limited...several hundred feet at best...but you never know what you may hear from your base or mobile location.

VHF Wireless Mic Channels

(produced by several manufacturers)

- 169.445
- 169.505
- 170.305
- 171.045
- 171.105
- 171.905

◆ On the Keyboard

In September we'll look at another member of our monitoring family, visit summertime special events, and look into Canadian frequency websites. Send *your* information to me via e-mail to be featured in a future Scanning Report column.

Links of Interest from this column:

- MilCam mailing list, <http://www.qth.net>
- Yahoo Calendar for storing frequency info, <http://calendar.yahoo.com>
- Excite Planner for storing frequency info, <http://www.excite.com>
- John Mayson's Texas Radio Guide, http://groups.yahoo.com/group/CenTexComm/files/Texas_Radio_Guide.PDF
- Dayton HamVention, <http://www.hamvention.org>
- Police Call on CD*, <http://www.sconnormaster.com>
- OptoElectronics, <http://www.optoelectronics.com>
- Vector Products, (954) 584-4446
- WinRadio planar antenna*, <http://www.winradio.com>
- Wright-Patterson AFB, <http://www.wpaafb.af.mil>
- U.S. Air Force Museum, <http://www.wpaafb.af.mil/museum/>
- Fort Lauderdale Air & Sea Show, <http://www.airseashow.com>
- U.S. Customs Service, <http://www.customs.ustrade.gov>
- *also available from Grove Enterprises, <http://www.grove-ent.com>

Fixed Base Company Frequencies

In this month's column we will explore some civilian aircraft "company" assignments used by Fixed Base Operators (FBO) in the 128.825-132.0 MHz range. FBOs are the commercial operators who supply fuel, maintenance, aircraft sales, rental, flight training, handling and other general aviation services at an airport.

Airport ID	FBO Company	Airport	Frequencies (MHz)	
			ARINC	Unicom
ABE	Piedmont Haworthorne	Allentown, PA	122.950	
ABY	Piedmont Haworthorne	Albany, GA	122.950	
ACY	Raytheon Aircraft Service	Atlantic City International, NJ	122.950	
ADS	Mercury Aviation	Addison Airport, TX	131.600	
ALB	Signature Flight Support	Albany County, NY	129.700	122.950
ALN	Premier Air Center	St. Louis Regional Airport, Alton, IL	130.650	122.950
ANC	Signature Flight Support	Anchorage International, AK	130.550	122.950
APA	Signature Flight Support	Denver Centennial, CO	129.725	122.950
ATL	Mercury Aviation	Atlanta Hartsfield, GA	131.650	
AUS	Signature Flight Support	Austin-Bergstrom International, TX	130.375	122.950
AVL	Asheville Jet Center	Asheville Regional Airport, NC	129.825	
BCB	Virginia Polytech Institute	Virginia Tech Airport, VA	123.050	
BDL	Signature Flight Support	Bradley International, CT	131.875	122.950
BEO	Mercury Aviation	Bedford, MA	130.800	
BFL	Mercury Aviation	Bakersfield, CA	131.600	
BHM	Raytheon Aircraft Service	Birmingham International Airport, AL	130.575	
BID	Piedmont Haworthorne	Block Island, RI	123.000	
BJJ	Mid-Ohio Aviation	Wooster/Wayne County Airport, OH	122.800	
BLA	Beaver Lake Aviation	Rogers, AR	122.875	
BMI	Image Air	Central IL Regional, Bloomington, IL	122.950	
BNA	Mercury Air	Nashville International, TN	130.575	
	Mercury Aviation	Nashville International, TN	131.600	
	Signature Flight Support	Nashville International, TN	131.100	
BOS	Signature Flight Support	Lagan International, MA	130.250	122.950
BUR	Mercury Aviation	Burbank, CA	131.600	
BWI	Signature Flight Support	Baltimore/Washington Int'l, MD	129.000	122.950
CGK	Signature Flight Support	Meigs Airport, IL	128.925	122.950
CHA	Krystal Aviation	Lovell Field/Chattanooga, TN	129.150	
CHO	Piedmont Haworthorne	Charlottesville, VA	122.950	
CID	Piedmont Haworthorne	Cedar Rapids, IA	122.950	
CLT	Signature Flight Support	Charlotte/Douglas International, NC	128.825	122.950
CRP	Mercury Aviation	Corpus Christi International, TX	131.600	
	Signature Flight Support	Corpus Christi International, TX	130.875	122.950
DAL	Piedmont Haworthorne	Dallas Love Field, TX	129.275	
	Raytheon Aircraft Service	Dallas Love Field, TX	122.950	
	Signature Flight Support	Dallas Love Field, TX	130.400	130.750
DCA	Signature Flight Support	Ronald Reagan Washington Nat'l, DC	129.000	122.950
DEN	Signature Flight Support	Denver International, CO	129.725	122.950
DET	Signature Flight Support	Detroit City Airport, MI	129.650	122.950
OIX	Piedmont Haworthorne	Knoville, TN	122.950	
DSM	Signature Flight Support	Des Moines International, IA	131.000	122.950
DTW	Signature Flight Support	Detroit Metro Wayne County, MI	129.950	122.950
EQY	Piedmont Haworthorne	Monroe, NC	122.700	
EWR	Signature Flight Support	Newark International, NJ	130.850	
F45	Piedmont Haworthorne	North County Airport, FL	123.000	
FAT	Mercury Aviation	Fresno-Yosemite International Airport, CA	131.600	
FAY	Piedmont Haworthorne	Fayetteville Regional, NC	122.950	
FLL	Raytheon Aircraft Service	Ft. Lauderdale International, FL	130.100	
	Signature Flight Support	Ft. Lauderdale International, FL	129.725	
FTY	Hill Aircraft	Fulton County Airport, GA	129.575	
	Raytheon Aircraft Service	Fulton County Airport, GA	130.575	122.950
	Piedmont Haworthorne	Greensboro, NC	130.575	
GSO	Air Service Hawaii	Kona International Airport, HI	128.950	
HKO	Air Service Hawaii	Lihue Commuter Terminal, HI	128.950	
HNL	Air Service Hawaii	Honolulu International Airport, HI	128.950	
HNY	Air Service Hawaii	Kahului International Airport, HI	128.950	
HOU	Raytheon Aircraft Service	William P. Hobby Airport, TX	130.575	
HPN	Signature Flight Support	Westchester County, White Plains, NY	132.000	
HSV	Signature Flight Support	Huntsville International, AL	130.375	122.950
HTO	Air Service Hawaii	Hilo International Airport, HI	128.950	
IAD	Piedmont Haworthorne	Washington Dulles International, VA	129.775	
	Signature Flight Support	Washington Dulles International, VA	131.875	122.950
ICT	Raytheon Aircraft Service	Mid-Continent Airport, Wichita, KS	130.575	122.950
IND	Raytheon Aircraft Service	Indianapolis International, IN	130.575	122.950
	Signature Flight Support	Indianapolis International, IN	129.725	122.950
INT	Piedmont Haworthorne	Winston-Salem, NC	122.950	
JYO	Piedmont Haworthorne	Leesburg Airport, VA	132.000	122.975
KEF	IGS Ground Services	Keflavik International, Iceland	131.900	
KEF	Vallarvinir Airport Assoc	Keflavik International, Iceland	131.775	
LAL	Piedmont Haworthorne	Lakeland Linder Regional, FL		122.950
LAS	Raytheon Aircraft Service	McCarran International, NV	128.850	122.950
	Signature Flight Support	McCarran International, NV	128.750	122.950
LAX	Mercury Aviation	Los Angeles International Airport, CA	131.600	
LFPB	Signature Flight Support	Aeropor de Paris le Bourget, France	131.425	
LGA	Signature Flight Support	La Guardia Airport, NY	129.700	122.950
LIT	Raytheon Aircraft Service	Little Rock Airport, AR	130.575	
LZU	Atlanta Jet/Jet Executive	Gwinnett County Airport, GA	128.850	
	GMD Aviation	Gwinnett County Airport, GA	128.850	
	Piedmont Haworthorne	Gwinnett County Airport, GA	123.050	123.050
MCO	Signature Flight Support	Orlando International, FL		122.950
MDT	Piedmont Haworthorne	Hornsburg International, PA		122.950
MDW	AmeriTech	Midway Airport, IL	130.500	
	Signature Flight Support	Midway Airport, IL	128.925	
MEM	Signature Flight Support	Memphis International, TN	129.875	122.950
MIA	Signature Flight Support	Miami International, FL	131.600	
MIE	Muncie Aviation	Delaware County-Johnson Field, IN	122.950	
MKE	Signature Flight Support	General Mitchell International, WI	131.000	
MMU	Signature Flight Support	Morristown Muni Airport, NJ	129.600	
MSP	Signature Flight Support	Minneapolis/St. Paul International, MN	128.950	
OCF	Piedmont Haworthorne	Ocala Regional, FL	123.000	
ONT	Mercury Aviation	Ontario International Airport, CA	131.600	
OGU	Piedmont Haworthorne	Quonset State, North Kingston, RI	122.950	
ORD	Signature Flight Support	O'Hare International, IL	128.925	122.950
ORF	Piedmont Haworthorne	Norfolk International, VA	130.575	122.950
PBI	Signature Flight Support	Palm Beach International, FL	128.975	122.950
PDK	Airway Aviation/Air BP	DeKalb Peachtree, Atlanta, GA	130.900	
	Epps Aviation	DeKalb Peachtree, Atlanta, GA	129.050	
	Mercury Aviation	DeKalb Peachtree, Atlanta, GA	131.650	
	Signature Flight Support	DeKalb Peachtree, Atlanta, GA	130.900	
PIE	Signature Flight Support	St. Petersburg/Clearwater International, FL	130.375	122.950
PSP	Signature Flight Support	Palm Springs International, CA	129.725	
RDU	Piedmont Haworthorne	Raleigh-Durham International, NC	131.150	
RFD	Raytheon Aircraft Service	Rockford Airport, IL	130.575	
RIC	Million Air	Richmond, VA	130.300	
RIL	Corporate Aircraft Service	Garfield County Regional, Rifle, CO	122.800	
RNO	Mercury Aviation	Reno/Tahoe International Airport, NV	131.600	
ROA	Piedmont Haworthorne	Roanoke, VA	130.575	
ROC	Piedmont Haworthorne	Rochester, NY	122.950	
SAT	Piedmont Haworthorne	San Antonio International, TX	129.175	122.950
	Raytheon Aircraft Service	San Antonio International, TX	130.575	122.950
SAV	Savannah Aviation	Savannah International, SC	122.950	
	Signature Flight Support	Savannah International, SC	130.375	122.950
SBA	Signature Flight Support	Santa Barbara Muni Airport, CA	123.300	
SEA	Signature Flight Support	Seattle/Tacoma International, WA	128.925	122.950
SFO	Signature Flight Support	San Francisco International, CA	128.925	122.950
SFZ	Piedmont Haworthorne	North Central State Airport, RI	122.700	
SNA	Signature Flight Support	Executive Terminal, Santa Ana, CA	131.500	
SPS	Piedmont Haworthorne	Wichita Falls, TX	122.950	
SYR	Piedmont Haworthorne	Syracuse, NY	122.950	
TEB	Signature Flight Support	Teterboro Airport, NJ	130.150	
TPA	Raytheon Aircraft Service	Tampa International, FL	130.575	
TUL	United States Aviation	Tulsa International Airport, OK	130.725	122.950
UUU	Piedmont Haworthorne	Newport Airport, RI	122.800	
WNY	Raytheon Aircraft Service	Van Nuys Airport, CA	130.575	122.950
WST	Piedmont Haworthorne	Westerly, RI	123.000	
1N9	Piedmont Haworthorne	Queen City Airport, Allentown, PA	122.700	
9G2	Price Aviation	Linden Airport, MI	123.000	
CYR	Piedmont Haworthorne	Vancouver, British Columbia, Canada	123.000	
CYX	Piedmont Haworthorne	Calgary International, Alberta Canada	122.850	
MMTO	Raytheon Aircraft Service	Adolfo Lopez Mateos International, Mexico	131.700	
VHHH	Signature Flight Support	Hong Kong Business Aviation Center., HK	131.100	
	AvTech	Cobb County - McCollum Airport, GA	130.175	
	Piedmont Haworthorne	Toronto, Ontario Canada	122.950	

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WLO Marine Radio Network

Mighty WLO, a commercial maritime station just southwest of Mobile, Alabama, has joined with two others in a Marine Radio Network (MRN). The other stations are KLB, Seattle Radio in Washington state, and WSC, Tuckerton Radio, which is north of Atlantic City, New Jersey.

While lacking the planetary scope of such giants as Globe Wireless, the MRN fills a niche that is attractive to smaller vessels in North American waters. It accepts commercial ship traffic in a large number of modes and formats for voice and teleprinted communications.

The digital modes use a computer and radio modem (modulator-demodulator) connected to a slightly beefed-up and tricked-out marine upper-sideband (USB) transceiver. Superficially anyway, these popular and relatively inexpensive setups resemble modern ham radios, and they are made by many of the same companies.

◆ MRN Telex and E-Mail Services

MRN accepts the traditional ship Telex (radiogram messages) in SITOR (Simplex Teleprinting Over Radio). It also allows the use of AMTOR (an amateur radio SITOR clone), and PACTOR (Packet Teleprinting Over Radio). PACTOR is a relatively new mode, invented by German hams who subsequently went into business as Special Communication Systems (SCS).

PACTOR I, the slowest version, uses an internationally recognized 1700 hertz (Hz) audio center, with a shift plus and minus 100 Hz, and a speed of 100 or 200 baud. In bad conditions, the resending of lost data packets can slow PACTOR I down to an agonizing crawl. PACTOR broadcasts are possible, but most features use Internet-style connections, mailboxes, and file transfers.

WLO's initial PACTOR connections can be decoded with hobby-class equipment or software. However, things get a lot tougher once the contact switches to PACTOR IIe. This newer, faster system is a total rethinking of PACTOR, and it makes an amazing number of different noises as it adapts to band and interference conditions. PACTOR IIe decoders are available to

hobbyists, but at US\$650 and up this is not a casual investment. Also, there is still no readable copy from encrypted or compressed files.

Although SITOR allows simplex operation, where stations very rapidly alternate on a single frequency, in practice it nearly always uses the paired, duplex channels allocated by the International Telecommunications Union. The ship transmits on the lower of the pair, and the shore on the higher. You've probably heard the ear-splitting bursts, followed by Morse code identifiers, from WLO and other high-powered coastal stations. The high-pitched, screeching sound is for SITOR sync. The lower-pitched gurgle is something similar for PACTOR, or for its many proprietary variants used in such higher-priced systems as GlobeData.

MRN also allows e-mail and file transfers on several maritime simplex telegraphy frequencies. Internet e-mail at sea is fairly new, but it's coming into extremely wide use. This particular mode greatly resembles the mailboxes being offered by SailMail, PinOak, and several others.

Things get a bit tricky here, since USB radios use audio frequency shift keying (AFSK) instead of true FSK telegraphy. This places the center of the actual PACTOR signal 1.7 kilohertz (kHz) higher. Therefore, many transmitters will read this much lower than the listed channel center when they are actually on-frequency. Similarly, most USB receivers will have to be tuned 1.7 kHz HIGHER than the listed frequency. This can really confuse people. Often it's easier to just do it than to try and think about it too much.

Interestingly enough, all this offsetting tends to put the filtered USB carrier outside of the channel, making it a spurious emission under regulations and requiring its greater suppression than what would otherwise be necessary. The use of out-of-band ham radios, though common in some countries, is strongly discouraged in favor of type-accepted marine transceivers.

◆ Voice Radio Services

Recently, WLO has begun calling itself the "Water to Land Operator." This undoubtedly refers to its position as the sole remaining high-seas public ship-to-shore radiotelephone vendor in the United States.

Your editor has actually heard vessels placing phone calls, just like on the old stations that AT&T closed a couple of years ago. Yes, terrestrial ship telcom survives in the US, though traf-

fic is obviously a tiny fraction of what we heard in the pre-satellite glory days. Voice message traffic is also taken.

With the coming of hurricane season, WLO's voice weather bulletins become important. This year, tropical forecasts for the Gulf are broadcast at 1200, 1600, and 2200 Coordinated Universal Time (UTC). Atlantic forecasts are at 1205, 1700, and 2300. Caribbean weather is at 1210, 1800, and 0000.

If hurricane conditions warrant, additional broadcasts are made on the hour. Interestingly, registered PACTOR users can connect to any MRN station, at any time, and download the various National Hurricane Center products. These include the Atlantic and Pacific tropical cyclone advisories, and Atlantic hurricane strike probabilities.

MRN USB Voice Channels

Assigned Carrier Frequencies

* = Shore side broadcasts weather

ITU #	Ship	Shore
405*	4077.0	4369.0
419	4119.0	4411.0
607	6218.0	6519.0
824*	8264.0	8788.0
830	8282.0	8806.0
1212*	12263.0	13110.0
1226	12305.0	13152.0
1607	16378.0	17260.0
1641*	16480.0	17362.0
1807	18798.0	19773.0
2237*	22108.0	22804.0
2503	25076.0	26151.0

MRN Telex Pairs

Assigned Channel Centers

ITU#	Ship	Shore
406	4175.0	4213.0
606	6265.5	6317.0
806	8379.0	8419.0
810	8381.0	8421.0
1205	12479.0	12581.5
1215	12482.0	12584.5
1605	16685.5	16809.0
1615	16690.5	16814.0
1810	18875.0	19685.5
2215	22291.5	22383.5
2515	25180.0	26108.0

MRN Simplex E-Mail

Assigned Channel Centers

(shift in all cases is +/- 100 Hz)

4256.	6416.0	8473.0
8514.0	12886.5	13051.5
16997.5	22688.0	



Abbreviations used in this column

ACARS	Aircraft Communications Addressing and Reporting System
AFB	Air Force Base
ALE	Automatic Link Establishment
ARIA	Advanced Range Instrumentation Aircraft
ARQ	Automatic Repeat Request teleprinting system
ASECNA	Agence pour la Securite de la Navigation Aerienne en Afrique et a Madagascar
CW	Continuous Wave (Morse telegraphy)
DX	Distant Transmitter
EAM	Emergency Action Message
FAX	Radio facsimile
FEC	Forward Error Correction teleprinting system
FGS	Federal German Ship
FS	French Ship
GHFS	Global High Frequency System
HFDL	High Frequency Data Link
LSB	Lower Sideband
M8a	Cuban CW, ANDUWRIGMT for 1-0, 3 messages
M10a	Czech CW numbers in 3-figure groups
MARS	Military Affiliate Radio System
Meteo	Meteorological (weather office)
MFA	Ministry of Foreign Affairs
NAVTEX	Navigation Text
PACKTOR	Packet Teleprinting Over Radio
RSA	Republic of South Africa
RTTY	Radio Teletype
SAM	Special Air Mission
SITOR-A	Simplex Telex Over Radio, ARQ mode
SITOR-B	Simplex Telex Over Radio, FEC mode
UK	United Kingdom
Unid	Unidentified
US	United States
V2a	Cuban numbers, 3 messages, begins "Atencion"
VOLMET	Flying Weather (loosely from French)

All transmissions are USB (upper sideband) unless otherwise indicated. All frequencies are in kHz (kilohertz) and all times are UTC (Coordinated Universal Time). "Numbers" stations (encrypted, usually unidentified, broadcasts thought to be intelligence-related) are identified in () with their ENIGMA station designators, as issued by the European Numbers Intelligence Gathering and Monitoring Association.

- 490.0 Cullercoats Radio, UK, with weather in SITOR-B, at 0720. (Day Watson-UK)
- 518.0 "B"-NAVTEX station, Bodo, Norway, with SITOR-B bulletins at 0010. "T"-NAVTEX, Cagliari, Italy, SITOR-B, at 0010. Also D, Istanbul, Turkey, at 0030; H, Jeddah, Saudi Arabia, 0110; K, Kerkyra, Greece, 0140; L, Limnos, Greece, at 0150; M, Cyprus, at 0200; N, Alexandria, Egypt, 0210; R, Monsanto, Portugal, 0250; O-Malta, 2220; C, Odessa, Ukraine, 2230; and U, Tallinn, Estonia, at 2320. (Ary Boender-Netherlands)
- 2829.5 SPB28-2045 Szczecin Radio, Poland, telling a ship in SITOR-A to "type or quit please," at 2047. (Watson-UK)
- 3167.0 "E-1-Q"-Unknown military, telling an unid station to use frequency "Thunder" for data, at 0132. (Ron Perron-MD)
- 4166.0 KPA2-Israeli Intelligence, AM callup only (E10a), at 2217. (Boender-Netherlands)
- 4479.0 Cuban "Atencion" numbers station (V2a), machine-generated Spanish-speaking female voice, with three messages in AM at 0300. (Camillo Castillo-Panama) Cuban station, usually the voice "numbers," this time with the right message format, but in Morse code (like M8a), at 0300. (John Maky-AR) [Do we need any more proof that V2 and M8 use the same transmitters? -Hugh]
- 4525.0 5ST-ASECNA, Antananarivo, Madagascar, with RTTY weather (400/100), at 1615. (Bob Hall-RSA)
- 5277.0 Panther-US Drug Enforcement Administration, Bahamas, working Coast Guard 63A in a drug operation, at 0245. (Perron-MD)
- 5862.5 Unid-US Navy MARS, calling NNN0DWF and NNN0DWG (region four group calls), in slow PACKTOR at 1018. (Mid-Atlantic DXer-MD)
- 6091.0 Cuban "Cut" numbers station (M8a), with three CW messages at 1200. (Castillo-Panama)
- 6496.5 CFH-Canadian Forces, Halifax, Meteo center with RTTY weather observations, alternates with hourly FAX, at 0431. (MADX-MD)
- 6622.0 US Air 334, giving position to Gander at 0440. (MADX-MD)
- 6697.0 Abstainer-US military, probably U.S. Strategic Command, with EAM at 0615. (Jeff Haverlah-TX)
- 6730.0 Andrews-US Air Force, MD, working Foot Hill, who had come from 8040, and was then sent to 9023, at 0500. (Haverlah-TX)
- 6754.0 CHR-Canadian Forces, Trenton Military, with weather VOLMET at 1024. (MADX-MD)
- 6761.0 Reach 7043-US Air Force transport, coordinating mid-air refueling with Air National Guard tanker Maine 87, discussed fuel amount and weather, at 0123. (Jim Ashe-MA)
- 6795.0 Cuban "Cut" numbers station (M8a), with three CW messages at 1200. (Castillo-Panama)
- 6834.0 Unid-CW "numbers" with 555 callup (M10a), at 1630. (Boender-Netherlands)
- 6844.0 FDC-French Air Force, Metz, with a CW marker at 0434. (MADX-MD)
- 6853.0 Cuban "Cut" numbers station (M8a), with three CW messages at 1200. (Castillo-Panama)
- 6855.0 Cuban "Atencion" numbers station (V2a), with three AM messages at 0300. (Castillo-Panama)
- 6911.5 DUST-US Army or National Guard, sounding in ALE at 0436. (MADX-MD)
- 6981.0 Cuban "Cut" numbers station (M8a), with three CW messages at 1300. (Castillo-Panama)
- 7740.0 DEPM-Possibly Moroccan Ministry of Information, sounding in LSB ALE, at 1920. DG, LSB ALE, sounding at 1923. DEPT, LSB ALE, sounding at 1927. (Watson-UK)
- 7893.5 B4CHU-Hungarian station in Combined Endeavour 2001, testing PACKTOR, USB, ARQ, and FEC with N6NGE (CIS Georgia), at 1610. (Boender-Netherlands)
- 7919.0 Spar 66-US military, working Metaforce for a patch, at 1414. (Boender-Netherlands)
- 8156.0 "Capetown Control"-Net control station in RSA, for the fleet in the British Telecom Around-The-World Yacht Race, passing weather observations at 0610. (Hall-RSA)
- 8779.0 ZSC-Capetown Radio, RSA, working US Coast Guard Cutter Sherman, which had just rescued and towed in a 33,000-ton auto carrier, at 0633. (Hall-RSA)
- 8906.0 Air Canada 3040-Scheduled flight with position for New York Radio, at 0343. (Brent Davenport-CO)
- 8912.0 004-Aeronautical Radio, Incorporated, New York, passing data in the new High Frequency Data Link mode, at 0717 and 0803. (Watson-UK) [Looks like ARINC's HFDL, which is a bit like the "ACARS" on higher bands, is finally up and going. -Hugh]
- 8942.0 007-Aeronautical Radio, Inc., Shannon, Ireland, with HFDL data at 1940. (Watson-UK)
- 8977.0 003-Aeronautical Radio, Inc., Reykjavik, Iceland, with HFDL at 1931. (Watson-UK)
- 8992.0 Puerto Rico-US Air Force GHFS, Salinas, PR, sending Foot Hill (unheard) to a discrete frequency of 8040 kHz, where Foot Hill worked Andrews, who sent him to 6730, all at 0455. (Haverlah-TX)
- 9007.0 Sigonella-US Air Force, new Global station, with EAM at 0100. (Perron-MD)
- 9016.0 Ownership-US military, with an EAM in a new format where they give the character count, simulcast on 8992 and 11244, at 0020. (Haverlah-TX)
- 9023.0 Andrews-US Air Force, MD, working Foot Hill, who had come from 6730, and was sent to 9120 after asking for a duplex data frequency, at 0503. (Haverlah-TX)
- 9120.0 Andrews-US Air Force, MD, working Foot Hill, who had come from 9023, then both stations stepped on by a US Navy link-11 tracking data link, and gone, at 0515. (Haverlah-TX)
- 9164.9 HLL-Seoul Meteo, Korea, with a FAX satellite weather picture, poor quality, at 1903. (Watson-UK)
- 9260.0 Cuban "Atencion" numbers station (V2a), with three AM messages at 0200. (Castillo-Panama)

- 9265.0 Cuban "Atencion" numbers station (V2a), with three AM messages, twice at 0200. (Castillo-Panama)
- 10155.0 BYG- Probably Chilean Navy, calling unknown station in LSB ALE, at 0005. (MADX-MD)
- 10192.5 DHJ 59-German Navy, with voice and RTTY for DRET, Mine Hunter FGS *Rothweil*, went to 6779, at 0012. (Perron-MD)
- 10215.0 HZN48-Jeddah Meteo, with RTTY weather (850/100), slightly off frequency and with rough notes, at 1515. (Watson-UK)
- 10608.0 Shark 24-US Coast Guard Cutter *Steelhead*, trying to set up secure voice with Coast Guard Group Miami, at 0001. (Perron-MD)
- 11104.0 N140SC-Heavy L-1011, practicing a Pegasus orbital drone launch on the Eastern Test Range, working ARIA aircraft, also on 10780 with Cape Radio, at 1640. (Allan Stern-FL)
- 11105.0 116-Possible Chinese diplomatic, working 191 in ALE, at 1908, and working 198 in ALE and data modes at 1946. YT362A-Possibly Chinese, calling ZT201A in ALE, at 1948. (Watson-UK)
- 11122.0 Unid-US Air Force Global Weather Center, sending a weather FAX with no image, either encrypted or another of those black raster things, at 1020. (MADX-MD)
- 11149.0 GYU-UK Royal Navy, Gibraltar, with RTTY test markers at 0656. (Watson-UK)
- 11175.0 Ops 19-Possible call sign of US military aircraft patching McCord AFB via Hickam Global, requesting diversion for an icing problem, at 0346. Earl 27-US military, with a patch to Fairchild Meteo via Andrews Global, at 0359. (Davenport-CO)
- 11232.0 Trenton Military-Canadian Forces, in radio check with CANFORCE 3205, at 2142. (Perron-MD)
- 11244.0 Fletcher-US Strategic Command, sounding like the control in the old Nightwatch net, asking Map Tack if he'd talked to Asorted, at 0044. (Haverlah-TX)
- 11246.0 "15"-Partial call sign of a US military aircraft calling MacDill, a station that closed years ago, on a frequency they haven't used since 1992 anyway, at 1736. (Haverlah-TX)
- 11253.0 Royal Air Force, UK, with VOLMET weather at 0452. (MADX-MD)
- 11429.0 GBR-Probably Chilean Navy, working KJD in LSB ALE and Skyfax, at 2340. (MADX-MD)
- 12478.0 UCNJ-Russian vessel *Igor Grabar*, located off Portugal, passing weather observations to Arkhangelsk in SITOR-A, at 1835. (Watson-UK)
- 12525.7 Unid-Vessel on a frequency used by Indian ships, with ARQ messages in English to Mumbai, at 1650. (Hall-RSA)
- 12746.0 JJC-Tokyo Radio, Japan, with a FAX newspaper in Japanese, 60/576, at 0830. (Hall-RSA)
- 12815.0 LYL-Klaipeda Radio, Lithuania, with a CW traffic list and info, at 1000. (Watson-UK)
- 12851.0 SAB-Globe Wireless Goeteborg, Sweden, working a ship in Globedata, then back to sync markers at 1508. (Watson-UK)
- 13276.0 004-Aeronautical Radio, Inc., New York, with HF DL data traffic for several stations, at 1857. (Watson-UK)
- 13440.0 SAM 204-US Air Force Distinguished Visitor flight, working Andrews AFB, MD, inbound from Bogota, Colombia, made patches to SAM Command and Andrews Meteo, at 2134. (Haverlah-TX)
- 13882.5 DDK6-Hamburg Meteo, Germany, with FAX weather charts at 1042. (MADX-MD)
- 13920.0 AXM35-Canberra Meteo, Australia, with weak FAX chart at 0908. (MADX-MD)
- 13961.5 HBD46-Swiss Embassy, Havana, Cuba, with an hours-long SITOR-A message in 5-letter code groups, at 1105. (MADX-MD)
- 14358.0 Unknown-Net control station, passing Azores weather observations with many small vessels in the British Telecom yacht race, in English and Portuguese, at 2231. (MADX-MD)
- 14366.9 BAFB-Beijing Meteo, China, with weak FAX weather charts at 0847. (Hall-RSA)
- 14718.3 RFHI-French Forces, Noumea, with two coded ARQ messages on circuit "HIJ," at 1138. (MADX-MD)
- 14719.0 OST53-Oostende Radio, Belgium, giving mailbox instructions to an unknown ship in SITOR-B, at 1041. (MADX-MD)
- 15016.0 Sigonella-New US Air Force GHFS station, with two EAMs at 1632. (MADX-MD)
- 15025.0 LH8273-Aircraft with position and data for Reykjavik, in HF DL at 1604. LH8183, HF DL position at 1605. LH8189, HF DL position at 1606. LH8273, in HF DL at 1613. LH8420, with an ACARS link test, identified self as D-ALCG, at 1631. (Watson-UK)
- 15851.0 FAAZLA-US Federal Aviation Administration, Los Angeles, sounding in ALE at 1309 and 1409. FAAZMA, Miami, sounding at 1334. FAAZMP, Farmington, MO, sounding at 1342. FAAZFW, Fort Worth, TX, sounding at 1410. (MADX-MD)
- 15873.0 P6Z-French MFA, Paris, with encrypted and clear FEC messages for an unknown station in Europe, at 1052. (MADX-MD)
- 16087.7 RFVI-French Forces, Le Port, with several ARQ messages on circuit "REI," at 1117. (MADX-MD)
- 16105.0 S84-Swedish Embassy, Washington, DC, working S12, Bogota, in ALE and data modes, at 1153. (MADX-MD)
- 16120.0 GYU-UK Royal Navy, Gibraltar, with RTTY marker (810/75), at 1917. (MADX-MD)
- 16127.0 DHJ 58-German Navy, Glucksburg, working DRKH, FGS Meersburg, English and German, at 0019. (Perron-MD)
- 16181.0 S86-Swedish Embassy, Mexico City, working S91, Lima, Peru, in ALE and data at 0009. (MADX-MD)
- 16183.0 CA2- Probably Chilean Navy, working unknown station in LSB ALE, at 0001. TAC calling ASI in LSB ALE at 0002. (MADX-MD)
- 16316.0 Polish Embassy, Kinshasa, Zaire, signing with an unknown station in ARQ, at 0852. (Hall-RSA)
- 16326.0 NWKHF1-US Army Corps of Engineers, Kansas City, sounding in ALE at 0123. (MADX-MD)
- 16544.0 Radgena-Colombian Navy, working Turbo (Coast Guard Headquarters), in ALE and CLOVER2000 modes, at 0049. (MADX-MD) [CLOVER2000 is an 8-tone, high-speed version of the 4-tone Clover digital mode used by hams. -Hugh]
- 16812.5 NRV-US Coast Guard, Guam, with CW markers at 1558. (Watson-UK)
- 17555.0 SUN5-Sunair Electronics, Ft Lauderdale, FL, sounding in ALE, at 1539. (MADX-MD)
- 17928.0 006-Aeronautical Radio, Inc., Hat Yai, Thailand, with HF DL at 1612. (Watson-UK)
- 17934.0 002- Aeronautical Radio, Inc., Hawaii, with HF DL at 1840. (Watson-UK)
- 18220.0 JMH5-Tokyo Meteo, Japan, with FAX weather charts, fading, at 1057. (MADX-MD)
- 18320.7 RFFIC-French Navy, Paris, with ARQ messages for AIG2135 and RFFXOC (French Army, Paris), at 1245. (Hall-RSA)
- 19131.0 ATLAS-US Drug Enforcement Agency, IA, working Flint 411, at 1504. (MADX-MD)
- 19692.5 ZSC-Capetown Radio, with SITOR-B weather bulletins at 0930. (MADX-MD)
- 20338.0 CENTR5-Romanian MFA, working Z2H98, Romanian Embassy, Harare, with ALE calls back and forth but no connection for traffic, at 1706. (MADX-MD)
- 20698.0 S32-Swedish Embassy, Kuwait, sounding in ALE at 0004. S00-Swedish MFA, Stockholm, working S53, Amman, Jordan, in ALE-initiated data at 1613. (MADX-MD)
- 21949.0 008-Aeronautical Radio, Inc., Johannesburg, RSA, with HF DL at 1218. (Watson-UK)
- 22374.0 Unid-African bank station, with RTTY financial traffic for Odessa, at 1610. (Hall-RSA)
- 23522.7 JMH6-Tokyo Meteo, with a clear FAX chart at 0837. (Hall-RSA)
- 26441.7 RFFMVB-French Navy, Toulouse, with ARQ Indian Ocean cyclone warnings addressed to RFFINDI (FS *Alindien*), RFFKO (partial routing), RFVIGRN (FS *Garonne*), RFVIFLR (FS *Floreal*), RFFLAAC (unknown), RFFLADL (FS *Dupleix*), RFFLAYE (FS *Lafayette*), RFFKMPP (CEW; vessel name unknown), and RFFKAVL (FS *LDV Lavallee*), all on "REI" circuit, at 1525. (Hall-RSA)

Mysteries Solved, More ALE Networks, PACTOR

This month we provide some news about the US Coast Guard's networks which appear to have solved a few of our long-standing logbook mysteries. We also update a few of the networks covered in our ALE Feature in the February issue of *MT*, and take a more detailed look at the popular PACTOR system.

◆ US Coast Guard

Prompted by a message to the WUN (Worldwide Utility News) from Mark Chinsky about the location and origin of the 75bd/170 Hz encrypted RTTY signal occupying 11436 kHz, Larry Van Horn confirmed this as belonging to the US Coast Guard's "Eastern Pacific HF Radioteletype" network.

Our interest went a little further since we had long suspected that the signal on 11436 kHz had siblings elsewhere. Most users of the Hoka gear know that there is a precision baudrate measurement feature accessible by pressing the "R" key when checking a signal with the spectrum analysis tools. This feature can measure the speed of a signal to four decimal places, which is very useful for "fingerprinting" purposes.

Having seen 75bd/170Hz signals on other frequencies, we had previously used this capability and determined that many of the suspected related signals measured the exact same speed – 74.9832bd – indicating that they are all probably derived from the same source.

Checking Larry's list helped us confirm that the mysterious signals were indeed from the same source – the US Coast Guard. Here are those 75bd/170 Hz channels we found:

5214, 5219, 5221, 9371, 11436, 13948, 18245 and 20135 kHz

And, here's Larry's complete list of USCG "A1401 Network" frequencies for comparison: 2016.0 2040.0 2054.0 4913.5 5108.5 5217.0 5223.0 5266.0 5272.0 5419.5 5942.5 6961.0 7439.0 7577.0 7617.0 7626.0 7754.5 7845.0 7884.0 7909.0 9169.0 9291.0 9332.0 9373.0 10297.5 10338.5 10354.5 10378.0 10675.0 10759.0 10788.0 10929.5 10935.5 11024.0 11045.0 11157.5 13413 13484.0 13537.7 13950.0 14506.0 14518.75 14731.0 14752.0 14919.2 18189.0 18255.0 18283.0 18335.0 18497.0 18650.0 18716.0 20095.0 20137.0 20518.0 20639.0 23373.0 23515.0

Atlantic Only: 2161.0

Pacific Only: 2144.0 5932.5 7713.0 9299.5 11165.8 18757.0

Looking at the list also helped solve another mystery. Since being able to decode the MIL-188-110A 2400bd HF modems, we had noticed at least 20 channels carrying the same KG84 encrypted traffic, always being sent at 600bd and with a short interleave. We are now sure that a large number of these transmissions are also USCG. Here are those 110A channels. These also make excellent places to listen to a 110A modem if you've not yet heard one:

4156.0 5105.5 5193.5 6961.0 6996.5 7751.5 7845.0 8307.0 8328.0 9166.0 10294.5 10343.0 10378.0 10756.0

10788.0 10932.5 11021.0 12372.0 12384.0 12390.0 13481.0 14752.0 14919.2 16550.2 20092.0

◆ ALE Update

After some in-depth research, we appear to have uncovered the organizations behind a number of the networks featured in the February 2001 issue of *MT*.

"CGE, CLC, CRC, SCLM" Network is Venezuelan Army

We had originally listed these identifiers as a sub-network belonging to the Canadian Forces. Despite sharing at least two channels with the Canadians, it's now pretty likely that this network is in fact the Venezuelan Army. See the Resources section for a profile of this network and the clues that point to the user.

"VFO, TAC" Network is Chilean Navy

Some extensive monitoring of this unidentified network by Leif Dehio eventually yielded some operator chatter that instructed one of the stations to relay a message to CCS. From previous operator chatter, we knew that the network was probably South American, and with CCS being the callsign of the Chilean Navy in Santiago, we're now reasonably sure that this is indeed the operator of this network. See the Resources section for a profile of this network.

◆ Taiwanese Navy Network

This network came to prominence during a recent "goodwill tour" to a number of South and Central American countries. It operates on the following frequencies (all LSB, although USB has been noted):

8672.0 10827.0 12026.0 13850.0 14360.0 16000.0 17418.0 18035.0 19180.0 21860.0

Identifiers, which change every day or so, are always four letters, for example:

AMNP CJXH DEVC DFNM DOJC SFDJ

As a reminder, you can check for the latest details on ALE Networks by visiting Utility Monitoring Central's ALE Networks page.

◆ System Profile: PACTOR

A very effective digital system, and successful in making the transition from amateur radio to commercial operations, PACTOR has developed considerably since its introduction in the mid 1980s.

As its name suggests, PACTOR combines both packetized data and SITOR (automatic repeat request) techniques to achieve high efficiency and throughput.

The original system is, or has been used by amateurs, US Forces MARS stations and many quasi-governmental organizations. It is FSK-based and provides 100bd or 200bd speeds with a shift of 200 Hz.

Commercial adoption of the system warranted the development of many mutually incompatible variations with changes made to the packet structure to support the privacy requirements of the various quasi-governmental users – so-called "bit-bashing." The Hoka series of decoders supported at least seven of these variations:

Pactor 1	Amateur	PACTOR
Pactor 2	International Red Cross	PACTOR-II
Pactor 3	UN Commission for Refugees	PACTOR-U
Pactor 4	International Federation of Red Crosses	PACTOR-12
Pactor 5	Unidentified	PACTOR-5
Pactor 6	Unidentified	PACTOR-6
Pactor 7	Unidentified	PACTOR-7

The success of the original version of PACTOR resulted in the development of PACTOR-II which is DSP-based and is as much as eight times faster than PACTOR-I.

A PACTOR-II signal features two tones with 200 Hz shift using baud rates of 100 or 200 fitting into a 500 Hz channel. PACTOR-II is a half-duplex synchronous ARQ system and designed to be backward compatible with the original PACTOR-I protocol. The system can handle raw 8 bit data and ASCII compression.

More importantly with PACTOR-II, depending on band conditions, the data throughput can be increased by changing the modulation form used from FSK to PSK. These speed changes happen transparently to the user, which is called "adaptive" behavior. Maximum throughput is 800 bps using the following modes:

DBPSK	(Differential Binary PSK)	200 bps
DQPSK	(Differential Quad PSK)	400 bps
8-DPSK	(8-phase Differential PSK)	600 bps
16-DPSK	(16-phase Differential PSK)	800 bps

Many users of the original system have also transitioned to the new modem including Medecins sans Frontieres, UN affiliates, US Coast Guard and many of the commercial HF email services (SailMail, Globe Wireless, Pin Oak Digital) also use PACTOR-II, or variants.

That's all for this month.

Resources

Venezuelan Army:

<http://www.mindspring.com/~mike.chace/mil/army/Venezuel.txt>

Chilean Navy:

www.mindspring.com/~mike.chace/mil/navy/Chile.txt

Taiwanese Navy:

www.mindspring.com/~mike.chace/mil/navy/Taiwan.txt

PACTOR-I Audio Clip:

rover.vistecprivat.de/~signals/WAV/PACTOR-200.WAV

PACTOR-II Audio Clip:

rover.vistecprivat.de/~signals/WAV/PACTOR-II.WAV

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Changes In U.S. Government International Broadcasting

The US Government notified Spain that the Playa de Pals transmitting station would close May 25. It had a long and distinguished history, playing a critical role in bringing objective news and information to the people of the former Soviet Union (FSU) with Radio Liberty, later RFE and VOA. In an IBB press release via Kim Elliott, this explanation was given:

Today, the ability of newer and different media and the availability of other transmitting locations to reach the FSU, along with development of democratic institutions and market-based economies in the region, have significantly diminished the utility of the Playa de Pals station as a U.S. Government broadcasting facility to the point where its continued broadcast operations can no longer be operationally or financially justified.

All programs transmitted from Playa de Pals were moved to other sites; with very few exceptions on the same frequencies, says Dan Ferguson of IBB, so most listeners would not even notice.

Pravda reported: Townspeople are enthusiastic about the news after the residents of houses around the station were uneasy for many years with radiowaves' bad effect. They are also glad to have a large Mediterranean coastal strip back after the station is dismantled with prospects to use another plot for tourism, one of the principal sources of local revenues (via Mike Terry)

Radio Free Asia has been heard via a "mysterious" transmitter on 11605, says Olle Alm, Sweden, in *Cumbre DX*. With good East Asian signals, he could easily identify the transmission before 1400 as RTI Japanese with several IDs and the CBS URL from Taiwan. The carrier went off at 1400.00 and returned after 40 seconds with RFA Vietnamese program. The offset was about +260 Hz, exactly the same before and after the break. So there is no doubt that RTI is now used by RFA. This was probably arranged thru Merlin. One wonders if the Taiwanese would dare to broadcast RFA in Chinese languages.

Herminio San Román, Director of Radio and Television Marti, has announced that he will step down on 27 July, reports *Media Network* via John Norfolk. That's the day after Cuba's national holiday...

From the Crisis at Radio Marti website via Mike Terry, BDXC-UK, http://www.cubapolidata.com/carm/carm_01_newsflash.html :

ANGOLA Rádio Nacional, Luanda, 4950, reactivated as unheard there for some time, Portuguese 2140 to 2200, large signal (Bob Padula, EDXP) 4950 at 0300, Portuguese paps, bollads, news at hourtop, \ 11955.8; both fair, also at 2315 (Brian Alexander, PA, *DX Listening Digest*) 11955.8 from 2330 Portuguese talk and music to 0200 fade-out, brief PT news at 0000 and 0100; strong signal, back after long absence, 2 kHz higher than before (Ernie Behr, Ont., *DXLD*)

AUSTRALIA Drove past the Radio Australia transmitting station on Verney Road, Lemnos (known as Shepparton - actually 8 km north of Shepparton) and noted that in the past few years there has been extensive work done on feeder lines, replaced and enclosed in shielded ducting. Looks very good. The old feeder lines have long since been suspected of causing intermod products that have been heard in Sydney at S9+ levels (Ian Baxter, ARDXC)

BRAZIL R. Senado began broadcasting on SW May 21, covering N, NW and WC Brasil (Agência Brasil via Célio Romois) 5990 from fade-in 2050 past 2220, rare to hear Brazil in this time period (Bob Padula, Victoria) Same program as on FM, live Senate coverage, plenary and commissions, Brazilian music. A newscast especially for the above regions is at 1045; on the air from 1000 to 0200 (from <http://www.senado.gov.br> via Romois) Transmitted from Brasilia with 250 kW Brown Boveri, 18 dBi gain, 344 degree azimuth, soys Aldo Renato Bernardes de Assis, maintenance engineer (Samuel Cássio Martins Santos, @ividade DX)

R. Globo, Rio, 11805 simulcasts *Tarde Legal* with Globo São Paulo 6120 and 9585, heard at 1508 (Samuel Cássio, DX Clube do Brasil) 5035.28, Radio Aparecida, at 0135 Portuguese religious service, measured on

OCB Director Herminio San Román was forced to resign because Congressman Lincoln Díaz-Balart (R-FL) faced insurmountable political pressure from exile leaders. San Román has told members of his inner circle that he was betrayed by Congressman Díaz-Balart because did not deliver on his promises of political influence that would protect him. Also, pending Congressional legislation seeks to abolish the Martis: (H.R. 1646).

Outgoing VOA Director Sandy Ungar has been working on a project to modify the format of *VOA News Now*, which was too repetitive with news. From mid July there would be more music, cultural items and softer news. Details were sketchy until arrangements could be worked out with unions, as reported on *VOA Communications World* via Chris Hambly.

Andre de Nesnera, with the VOA for 20 years, has been selected as VOA News Director. Andre is fluent in English, Russian, and French, and he has a solid command of German. Before coming to VOA, Andre worked for CBS News and WMCA Radio in New York, per Sandy Ungar, VOA Director, via Kim Elliott.

Effective July first, the Broadcasting Board of Governors has asked Myrna Whitworth, currently VOA Program Director, to serve as Acting Director of the Voice of America. A long time VOA employee, Myrna also served in a number of managerial positions within VOA's News and Worldwide English Divisions and was the Executive Producer of World Report and other English news programs. Myrna previously served as Acting VOA Director from March to June 1999.

Kelu Chao, currently Director of VOA's East Asia and Pacific Division has been named Acting Program Director and will manage the daily operations of the Voice of America. Kelu has been with VOA for over twenty years.

What has become of the ex-VOA Bethany site? David Walcutt and Dan Ferguson draw our attention to this on the SWBC list: http://cnniw.yellowbrix.com/pages/cnniw/Story.nsp?story_id=21454536&ID=cnniw Meanwhile, Bethany's most outspoken employee, John Vodenik, says he is going back to work for IBB, at Delano.

5035.28, 6135.11, 9630.19 and 11855.26 (Mark Mohrmann, VT) Wow, they go out of their way to present a variety of frequency offsets (gh)

R. Dif. Taubaté is rendering special treatment to DXers reporting 4925, creating a new QSL card; also plans to ID in Spanish and English at night; they are even returning IRCs and dollar bills sent with reception reports. Also is hurrying to raise power from 1 to 5 kW and improve antenna. Address is Rua Dr. Souza Alves, 960 12020-030 Taubaté-SP BRASIL (Samuel Cássio, DXCB, *radioescutas*)

BULGARIA I tuned into Eurosonor Radio 6900 at 1605 only to find they were playing a Radio Ezra tape. This stopped after a couple of minutes and then Eurosonor Radio started; proves they are coming from the same site as we had assumed (Mike Borraclough, UK) Eurosonor also on 20700, 3 x 6900 at 1600. Then moved to 9980 (Roberto Scaglione, Italy, BCL.News.IT via hard-core-dx) Only on Sundays, 1600-1700 in German. Reports highly welcomed at radio@urosonor.de and will be verified by new QSL card. In a few weeks they would also start new service to Americas in English, Spanish, German (Harald Kuhl, Germany, NU)

13850, R Ezra, quite good Sunday *1100-1115*, but the recorded sound was not always easy to understand. A plug for <http://www.transmitter.org> at the beginning; apparently the Belgian animator of that site arranged this. Sounds

like an expensive hobby. Religious talk; most of the small pieces were quite literate and coherent, but the overall point wasn't clear (John Campbell, UK, NU via BC-DX) Another Sunday 13850 kept breaking down 1050-1115 (Wolfgang Büschel, Germany, *DX Listening Digest*)

CANADA Drastic cuts at RCI: Complete info available at <http://www.geocities.com/rciaction>

- All RCI programs in all languages reduced to 30

*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; A-01=summer season; [non] = Broadcast to or for the listed country, but not necessarily originating there; u.o.s. = unless otherwise stated*

minutes.

- English and French weekend programs will re-run after the 30-minute program on weekdays.
- No news on weekends from RCI, but CBC.
- Foreign language services will have NO NEWS AT ALL on weekends
- More changes due in October (Ricky Leong, swprograms)

Then it was announced June 12 that RCI Executive Director Robert O'Reilly has retired! He is being replaced by a CBC insider, from the Radio-Canada French language domestic network. Also interesting to note that the replacement's title will be "General Manager" and not "Executive Director."

Perhaps O'Reilly did his job too well, making RCI possibly more efficient; something that CBC administrators just couldn't swallow. I have a feeling that perhaps CBC tried to implement changes to try to destroy some of the things that O'Reilly was able to accomplish in his term as Director. I am sick and tired of the meddling of CBC in the operations of RCI, and I want people to know it. I think it is time we called a spade a spade. This is nothing more than the beginnings of a full-fledged, all out attack on RCI, with the ultimate goal of complete absorption of RCI into the ranks of CBC. I've had enough and I'm going all out to scream it from the rooftops. Hopefully somebody with the power to stop these people will be listening (Sheldon Harvey, QU, DX Listening Digest)

CFVP, Calgary, 6029.95, at 0000 with oldies format, improving until Marti carrier at 0059, then still audible with CKMX ID; also at 2141 (Walt Salmani, Victoria, BC, DXLD) 6030 CFVP nice at 0307 UT Monday when Marti is off (Hans Johnson, WY, Cumbre DX)

CHNX on 6130 was remarkably loud at 0231 with CHNS Weather Center", "Oldies 96 CHNS" (Tom Read, UK, BDXC-UK) 2200 announcing its e-mail address as chnx@chnsradio.com (Charles F. Washburn, ME, ODXA)

Back after lightning strike put it off for a while; just 41 watts; 500 watt CKZN 6160 received only slightly better (Noel R. Green, UK, BC-DX) Fair in USB but frequent drop-outs mid-song at 0801 (Craig Seager & John Schache, Limekilns NSW DXpedition, ARDXC)

CHECHNYA R. Kavkoz ("R. Caucasus"), I checked carefully at least at 1300-1600 and heard nothing - no trace of any signal on 7350. URL is <http://www.nohchy.org> Address for requests of Nohchy info bulletins is nohchy@wanex.net (Vladimir Titarev, Ukraine, NU)

CHINA [non] World Falun Dafa Radio changed name to Fang Guang Ming Radio. Address: Fang Guang Ming Inc, P. O. Box 117, Buford, GA 30518, USA. v/s was Yuan Li (Patrick Robich, Austria via Martin Schöch, CRW) Means Great Brightness Radio (Richard Lam, Singapore, Cumbre DX) 12075 & 15440 at 2200. 15440 showed some delay compared to 12075, both running the CIS pips before 2200. 15440 may be from a site in the Far East. I was able to confirm that 12075 is broadcast from old Novosibirsk site (Olle Alm, Sweden, BC-DX) Pips indicate program routed through the Khabarovsk switching centre. The early carrier sign on excludes Komsomolsk, so only Vladivostok and Khabarovsk are left. The weak pips point to Tavrichanka. I guess they are using 100 kW at each location (Novosibirsk + Tavrichanka) (Olle Alm, Sweden, Cumbre DX)

COLOMBIA Many hams are hearing Radio "Majagual" in AM mode on various freqs very close to 14301 kHz. (The signal drifts around between 14300.8 and 14301.4 kHz, mostly on 14301.1 kHz.) The audio is often distorted, QRMs ham nets on 14300 USB. I notice you had a report (23 Jan 1998) of a Majagual Radio, HJQX, Sincelejo, Colombia, on its third harmonic of 4290.3 (making the fundamental then at 1430.1). If it is the same station, their freq hasn't changed. But tenth harmonic? Wow. Read you every month in MT. Good Show! (Martin H. Potter, VE3OAT, IARU Region 2 Monitoring System Co-ordinator)

CONGO R. Congo has reactivated 4765, heard from 2130 in French until closing around 2251 (Célio Romais, Brasil) Absolutely amazing signal heard here in UK from 1800 UT onwards (Graham Powell) Huge level 2030-2300* ex-5985? (Bob Padula, Australia, EDXP) English 1850-1900 (Leigh Morris, South Australia, hard-core-dx) Best here from *0426 (gh, OK) English language section Sat from around 1835. Announced address not in the WRTH: PO Box 223, Radio Congo, Brazzaville, Republic of Congo (Tom Read, BDXC-UK) Announces daily 15 min English news: Mon-Thu at 1900, Fri at 1930 UT, Sat & Sun at 1835. Their announced address remains P. O. Box 2241, Brazzaville, and they want letters from listeners. Besides national news, they obviously also use items coming from UN Radio, which are then read in the studios of R. Congo (Harold Kuhl, Germany, NU)

COSTA RICA RFPI welcomes *Like It Is*, a weekly half-hour public affairs program on issues confronting African-Americans and contemporary American society, politics, education, crime, healthcare, entertainment, host Bob Franklin Thursdays at 1630. RFPI's weekly program previews can be found at <http://www.rfpi.org/update.html> (RFPI)

CROATIA Croatian Radio First Programme, domestic service, SW portion: 6165 0400-2300, 7365 0400-0900, 9830 0430-1800, 13830 0900-2300 (© BBC Monitoring)

CZECH REPUBLIC Radio Prague has taken the opposite approach of the BBC-W.S. On the mailbag, they state they have no thought of leaving shortwave; and to emphasize that, they ask listeners in Australia to tell them a time they would like to see a transmission to that region on shortwave, as many listeners don't have a computer (Bill KA2EMZ Bergadano, swprograms)

DOMINICAN REPUBLIC Radio Barahona, 4930, Pedernales near the Haitian border, was heard at 2305 relaying VO's Spanish call-in program, about immigration (José Francisco Ocaña, Barinas, Venezuela, Banda Tropical, Club Diexistas de la Amistad)

ECUADOR La Voz del Upano, 5965.00, testing from Tena at 1100, math lessons. At this time LV del Upano, Macas on 5040.07 kHz was off air. The following day Macas and Tena had different programmes. Close down 1337 with "el himno a la provincia del Napo" and started the following day with the Ecuadorian National Anthem (Björn Malm in Quito, Ecuador, SW Bulletin)

It was announced on Inside HCJB that former HCJB staffer, and announcer, Bob Beukema, passed away at the age of 72. That gentleman had an incredible radio voice (Bill Bergadano, Freehold, NJ)

EQUATORIAL GUINEA 5003.6, Radia Nacional de Guinea Ecuatorial; Bata, reactivated on 5003.6, 2145-2206*, Non-stop Afro music, closing with national anthem matching the one at <http://www.emulateme.com/anthems/> - great signal (Mark Veldhuis, Netherlands, Conexion Digital)

ETHIOPIA [non] New clandestine from Bulgaria? is Netsanet Radio, testing 12110 at 1700-1800. See <http://www.netsanet.com> (Ludo Moes, Belgium, Cumbre DX) Not Bulgaria, but via Russia, very good here in Amharic (Ivo and Angel, Observer, Bulgaria) Clearly via CIS (Olle Alm, Sweden, Cumbre DX)

FINLAND YLE's Latin page is at <http://www.yle.fi/fbc/latini/> and the current schedule is at: <http://www.yle.fi/fbc/latini/latinsummer.html> (Fernando Sousa Riporius, Portus Cale, Portucale, radioescutas)

Scandinavian Weekend Radio continues the first Saturday of each month for 24 hours from 2100 UT Friday on 11720 or 11690; and also from June testing on 5990 or 6170 (Alpo Heinonen, Rovaniemi, Finland, "A weak voice from the Finnish Arctic Circle")

GUATEMALA The "Radio Committee" of the Iglesia Bautista Getsémani has applied for a shortwave license for Radio Amistad at San Pedro La Laguna in Guatemala and I am constructing the transmitter now. The plan is to put it on the air by the end of the year. If Radio Amistad gets a license it will probably be for the 49 or 60 meter band and most likely 500 watts into a "cloud warmer" (NVIS) antenna of either the dipole/reflector or square loop design. (Larry Baysinger, Cumbre DX)

GUYANA GBS, 3291.40, has been a regular here with poor to fair signals around 0446 sports; 0514 parallel and just behind BBCWS on 6175 (Walt Salmani, Victoria, BC, DX Listening Digest)

INDIA Please note that there are a lot of errors on the official AIR site <http://www.allindiaradio.com> which lists the external services. In most cases the timings of latest changes are given in IST rather than UT while the rest of the sked is in UT. Uptodate info on AIR can be got from my site <http://www.bcdx.qrzindia.net> (Jose Jacob, India, EDXP)

All India Radio, Jaypore, in the Eastern State of Orissa is noted back on SW after about 2 years. It is of 50 kW and was off air due to shortage of spare valves. Address for reports is: All India Radio, Jaypore 764005, Orissa, India. 5040 0025-0430 (Sundays up to 0445), 1130-1741; 6040 0700-0935 (Sundays also at 1030-1130) (Jose Jacob, VU2JOS, Hyderabad)

INDONESIA New RRI Jakarta networks on SW as follows:

Programa 2 (PRO-2), ex. Prog. Ibukota 2 - sometimes relayed by SW 9680
Programa 3 (PRO-3), ex. Prog. Nasional 1 - news, talks, and entertainment, 9565; 9630; 11760; 11860; 15125 kHz
Programa 4 (PRO-4), ex. Prog. Nasional 1 {sic} - culture (including religions) and sports, 4775.

Programa 5 (PRO-5), ex. Prog. Nasional 2 - education and information, 9680; 11750; 11885 (Akbar Indra Gunawan, INDONESIA, Jembatan DX)

RRI Palangkaraya, 3325, 1346-1419. Mostly continuous bizarre drumming music. I've heard this before from Palangkaraya so it must be a local thing. This and Pontianak are both heard reliably here with strong signals. Unfortunately I can't get either one to respond to a report! (Ed Tilbury, near Anchorage, Alaska, World of Radio)

IRAN [non] R. International in Persian via Grigoriopol', Moldova, 500 kW, 115 degrees at 1630-1715 very good on new 11625 plus bubble jammer, ex 11635 (Ivo and Angel, Observer, Bulgaria)

IRELAND Reflections Europe uses the old Radio Fax transmitters, unlicensed. Usual schedule is 1500-2230 Sunday on 3910 6295 12255. I am not sure what their present QSL policy is; nothing in QSL Information pages since late 1998. Their address is Reflections Europe, Lucks Green, The Forge, Cranleigh, Surrey GU6 7BC, UK. They used to run a loop tape asking for reports to be sent to the individual programmes and also once offered some sort of certificate for replies from 10% of them; as they get paid for airing these programmes, they want the people who pay up to realise that there is an audience out there (Mike Barraclough, England, hard-core-dx)

ISRAEL Galei Zahal has new frequency change time, heard at 0215-0258* on 6973 with local pops, folk music, Hebrew talk, fair; then from *0259-0315+ on 15788.52 with same; had been on 15785.0 a few days earlier (Brian Alexander, PA, DX Listening Digest)

ITALY RAI seems to have shifted its broadcast in English (and the subsequent broadcast in French) to North America to five minutes later. English newscast now airs [1800, 9675] at 0055 UT with French beginning at 0115. Format of the 20-minute broadcast remains unchanged, with 10 minutes of news followed by 10 minutes of fill music (Mike Cooper, GA, June 10, DXLD)

KURDISTAN [non] Voice of Mesopotamia, 15770, *1400-1600* opening in four languages, no jamming (Mike Barraclough, UK, DX Listening Digest) Clearly from Samara, Russia with a rather buzzy carrier and strong signal (Olle Alm, Sweden, Cumbre DX) 1400-1455* in Turkish/Kurdish, *1500-1601* v in Kurdish (Ed Kusalik, Alberta, Cumbre DX) BBCM classifies this under clandestine for Turkey: This Kurdistan radio station was first observed on 21 May 2001 with tests. IDs as "Denge Mesopotamia" (English: Voice of Mesopotamia). Its broadcasts have been publicised by Medya TV, a Kurdish satellite television station broadcasting from France. During its test transmissions it announced that "Despite all the injustices and oppression, we have not been silenced. Our language has remained the same and songs were composed in this language and on this land and the story of this people was written in it. Let this be your own voice. Look out for us, we are awaiting your requests with great anticipation." No contact details were announced. VOM is believed to broadcast via a high-powered relay, probably in Eastern Europe/CIS. Languages: Kurmanji Kurdish, Sorani Kurdish, Turkish, Zazayee Kurdish. Daily 0800-1000 15230, 1400-1600 15770 (© BBC Monitoring)

Radio Bopeshowa renewed transmissions via a powerful transmitter, 1500-1600 on 9960 on Mon/Wed/Fri (not on Thu now). First half of programme is in Arabic, second in Kurdish, opening with 'Lambada' music (Robertas Petraitis, Lithuania, Clandestine Radio Watch)

Shortwave Broadcasting

LIBYA Voice of Africa broadcasts 1000-0355 on 17725, also widely heard on MW 711 and 1251. Main language is Arabic, but also news in English and French. English lasts from 2 to 12 minutes, but mostly 7-8. The news in English and French noted after 1100 and then every hour starting from 1700, as monitored: 1140-1150, 1735-1745, 1820-1825, 1920-1925, 2030-2040, 2120-2130, 2220-2225, 2330-2340, 0020-0025, 0130-0140, 0220-0225, 0320-0330. Note: all times variable day to day approx. plus minus 10 minutes! The French news follows right after English. Heard in May 2001 (Robertas Petraitis, Lithuania, *World DX Club*) Best bet to hear English news is only at 2032-2040, fair and in the clear; Moscow dominating 17725 1730-1800+, poor at 2234-2342 and very weak under strong WYFR (Brian Alexander, PA, *DX Listening Digest*)

MOROCCO RTM Rabat back on 7471 and 14942 (2x). Carrier was on before 1800 and programme started at 1802 (Jürgen Lohuis, Germany, harmonics@yahoo.com) 7471.14 and 14942.28, both varying slightly, \15345 vs Argentina (Vlad Titarev, Ukraine, *ibid.*)

NETHERLANDS Director General of Radio Netherlands, Lodewijk Bouwens, has reaffirmed this station's commitment to its shortwave audience in the light of recent developments at the BBC. Mr. Bouwens pointed out that there are 800 million radio sets in the world capable of receiving shortwave broadcasts. He also referred to RN's active involvement in the development of digital shortwave broadcasting (© Radio Netherlands Media Network)

NIGERIA Voice of Nigeria, 7255 now has English 0500-1000(?) and 1900-2300, also announcing 15120 to America, and 11770 but only 7255 heard as early as 2030. From the programme schedule: Thursday 2230: "World Peace", Saturday 2200: "Who are the Nigerians?", 2230: "African Monarchies", Monday 2230: "African Integration" (Bob Thomas, CT, *DXLD*) I think announcing ancient and possibly future frequencies is customary (gh)

PALAU Radio Station T8BZ on Babeldaob Island, Palau, would appreciate reports on our 9985 kHz transmissions from 1100 to 1200 daily. This is the old KHBN which has been allocated a new call sign, running 50 kW to a double extended zepp antenna with reflector curtain, firing into Japan, Korea, China and the Philippines. All reports will be QSLed (Rev Dr Bill Burton, Chief Engineer Radio Station T8BZ, High Adventure Radio Network, PO Box 66, Koror, Palau PW 96940 or Cacciatore@lineone.net (via *DXing.com* Newsroom))

PERU 2257v, Radio La Mejor, Tumbes, at 1000, splendid strength and audio quality. Hard to believe that it is a harmonic. Announces MW 1130 kHz but not listed in *WRTH*. New station? Every morning at 1000 "Aires andinos del Perú" and 1030 "Mañanitos pasilleras". Thord Knutsson, responsible for Perú in *WRTH*, writes that it is not in his lists, could be new or pirate.

2439.65, Radio Bagua, Bagua at 1010. Same DJ also heard previously on Cajaruro, 6524.07. Harmonic 2 x 1219.82.

2828v, Radio Huarmaca, at 1105. Also heard with ID on unlisted 1414v kHz. Is this Radio Huarmaca a new station? Thord Knutsson says it is the same as on 5385.5.

2840.24, Radio Ilucán, Cutervo, at 1040. Also heard on 1420.12.

2842v (harmonic?) unID "Radio L.Y.R.", la provincia de Sullana (?), el departamento de Piura (?) at 1200. Also with jingle as "Radio Lider"

3179.02, Radio Unión, Tocache, at 0100*. Announced shortwave 3180 kHz and FM 96.1 MHz. Often music from Tarapoto. Keeps its frequency exactly and has a very regular scheme: 1030-0100. Starts every morning with the programme "El madrugador". Mostly pretty weak signal.

4346.00v, Radio Naylamp, Lambayeque at 2300. Heard both mornings and evenings.

4654.99, Radio Nuevo Amanecer, Celendin at 0050. Reactivated after being off air for a month. Very nice sound quality and great Peruvian folk music.

5264.87, Radio La Voz de Chiriacó, Chiriacó, la provincia de Bagua, el departamento de Amazonas at 0300*. Announces 5264 kHz. Mostly nonstop Peruvian music interrupted by greetings to friends and acquaintances. Decent signal on air 0000-0300.

5775.29, La Voz de San Juan, provincia de Utcubamba, departamento de Amazonas at 0055. Good and very frequency stable signal; 0200* one evening, another on much later.

5949.59, Radio Bethel, Arequipa, at 2325. Religious format, heard most evenings but very disturbed by other stations which makes it difficult to ID.

6011.32, Radio L.T.C., Juliaca, provincia de San Román, departamento de Puno at 2305, new on SW? Ads, comunicados and sports from Juliaca. Even ads for companies in Arequipa. Henrik Klemetz says this was previously on 5980.

I have found a very useful site for Peruvian geographical info, <http://www.ventanaperu.com/FrmPrincipal.asp?wModo=BG> which lists the distritos within each province within each department (Björn Malm, Quito, Ecuador, *SW Bulletin*, translated by editor Thomas Nilsson for *DXLD*)

ROMANIA RRI Galbeni, English on 17735 had two strong spurs 306.37 kHz away, on 17428.63 and 18041.37 around 1430 (Wolfgang Bueschel, BC-DX)

RUSSIA 7325, New R. Adygeya, Maykop, Resp. Adygeya, "1700-1800", on the air Mon & Fri in Adegeyan. Also reported to broadcast in Arabic and Turkish, but today all was in Adegeyan! 1700 regional anthem, ID, local classical music, hymn and Balalaika; 1800 a few seconds relay of news from Moscow then abrupt cut off the relay from Krasnodar transmitter! 33443.

17266 USB, Murmansk R. "0800-0810, New relay, Russian time announcement, ID: "Murmanska Radiyo", temperatures, news, ID; followed 0810-0900* by relay of Radiostantsiya Atlantika with ID and Russian pop songs (Anker Petersen, Denmark, *DXLD*)

SIERRA LEONE Radio UNAMSIL is operated by the United Nations Assistance Mission in Sierra Leone. Languages: English, Krio. Address: UNAMSIL HQ., PO Box 5, Freetown, Sierra Leone. Tel: +232 273183/4/5 ext. 6297. Schedule 24h on 6140 and FM 103.0 including UN News in English from NY daily at 0700-0715, 0800-

0815 (© BBC Monitoring) Where are the DX reports of this one?? (gh) I checked 6140 after R Finland 2000* when the fq was free, but not even a het (Mauno Ritola, Finland, *DXLD*)

Sierra Leone Broadcasting Service (SLBS). The 100.0 MHz frequency is announced as 99.9. Languages: English, Temme, Mende, Krio, Limba. Address: Sierra Leone Broadcasting Service, New England, Freetown, Sierra Leone. Tel: +232-22-240123/241919/24017. Fax: +232-22-240922. Web Site: <http://www.sierra-leone.org/slbs.html> Schedule on 3316: 0600-0815, 1700-2000 including 1745-1800 daily, Disarmament, Demobilisation and Reintegration, the RUF Amnesty program (© BBC Monitoring)

SINGAPORE 6150, superb reception with ID, "This is Radio Singapore International," jingle. \9600 very good, except for some mild splash at 11:15 (Walt Salmaniw, Grayland WA *DXpedition, DXLD*)

SOMALIA 6750-usb, Voice of the People; Radio Mogadishu, 1805 audio a bit muffled, difficult to get solid program details down, not being a linguist, but at least one language I know is music, so I transcribed the distinctive theme tune that was used repeatedly. Hope this counts as proof of reception! (Tom Read, BDXC-UK)

SWEDEN MediaScan, through its predecessor program, Sweden Calling DXers is the oldest program of its kind in international broadcasting. Under the legendary Arne Skoog, SCDX started as a clearinghouse for news about shortwave radio in 1948. But all good things come to an end, and so it is with this radio program. The last edition will be on July 17th. The good news is that the online and e-mail MediaScan newsletter will continue, covering the entire world of electronic media, with an emphasis on satellites and cyberspace. And it's my plan (subject to approval from management) that as of August 1 the newsletter will revert to a weekly schedule (George Wood, MediaScan 2359 June 20 via Mike Terry, BDXC-UK)

TAIWAN CBS-R. Taipei International has finally improved their website so it's worth a visit now. The new URL for the English page is <http://www.cbs.org.tw/english/index.htm> Includes the day's news with archives. Selected programs on real audio include *Soundbite* and *Naluwan* (Daniel Sampson, Arcadia WI, June 5, *DX Listening Digest*)

Prime Time Shortwave <http://www.angelfire.com/wi2/shortwave/>

TANNU TUVA According to the report of Vladimir Kovalenko, the republic was renamed Tyva. Tyvinskoe Radio (GTRK "Tyva") SW 6100, \MW 567: local programs 0610-0700, 1810-1900, 1910-2000 in local and Russian langs. Annt: "Govorit Kyzyl" (Vladimir Kovalenko, Tomsk, Russia, *RUS-DX* via BC-DX)

UKRAINE RUJ will continue using 12040 to North America, Alexander Yegorov tells me; they were pleased with clear reception and working on the buzzing in the transmitter (Kraig Krist, KG4LAC, VA, *DX Listening Digest*)

U K If BBCWS went through with its shortwave cutbacks on July 1, some prime shortwave frequencies at prime listening times could be taken over by some truly awful programming. Perhaps the best replacement programming on those Merlin-owned or brokered transmitters would also come from the U.K. (Kim Elliott, DC, *swprograms*, standard disclaimer)

USA WWL, New Orleans, was being heard in the 2322-0042 period on 6484.4, good clean audio, with IDs for 870. This turned out to be a mixing product with WRNO. Mark Morhmann noted that 870 + 6484.4 = 7354.4, a frequency used by WRNO. I then noted The Overcomer exactly on 7353.4 @ 2315, with WWL audible in the background. Only WWL audible on 6484.4 (David Hodgson, TN, *DXLD*)

Obituary: Christian radio engineer David Briggs, 50, of liver and bone cancer. Briggs was at KCBI *90.9 Dallas, and built the Criswell shortwave station [now KAIJ] and the FM network "from the ground up." (Bruce F. Elving, *FMedia*)

Ranting about lack of support for Mark Koerne, who has been sentenced to a jail term in Michigan, Steve Anderson pulled the plug on his United Patriot Radio June 15. It had been operating day and night on 6900 (Hans Johnson, Cumbre DX; John Norfolk)

UZBEKISTAN R. Tashkent in German at 2000 heard on two third harmonics, 15180 and 15075 (Jürgen Lohuis, Germany, harmonics@yahoo.com)

VATICAN/ITALY Vatican Radio and the Italian Government announced an agreement ending the quarrel about the so-called "electro-smog" at Santa Maria di Galeria near Rome. Both parties agreed that SW transmission are complying with Italian regulations. MW adjustments to be completed by August 2001 when Vatican Radio will begin broadcasting also from other European sites, which have been identified and will be announced later. Listeners around Europe will soon find new frequencies (Luigi Cobisi, EDXC via Wolfgang Bueschel)

VR broadcasts in Latin for A-01: all but the 1000 broadcast are designated religious [as one would expect].

0530-0600	Daily	EuMEAFAsAuAm	0.527 1.530 4.005 5.885-v 7.250 9.645 11.740 15.595 93.3 96.3 105.0
1000-1015	Su.	EuAfDom	0.527 1.530 5.885-v 9.645 11.740 15.595 21.850 93.3 105.0
1500-1530	Daily	EuDom	1.530 5.885-v 7.250 9.645 93.3
1840-1900	Daily	EuMEAFAsAuAm	0.527 1.260 1.530 4.005 5.885-v 6.185 9.660 11.625 13.765 93.3 96.3 103.8 105.0

(© BBC Monitoring)

VENEZUELA I am hearing Spanish music on 5000 under WWV and YVTO at 0257 (Bob Montgomery, PA, *DXLD*) At 0115 on 5000 I am hearing R. Popular de Venezuela, YVKG AM 950, mixing with YVTO timesignals (José Elias Diaz Gómez, Venezuela)

VIETNAM [non] V. of Khmer Krom Radio started June 1, Fridays only at 1400-1500 on 15725; see <http://www.shortwave.be/cla.html> (Luda Maes, TDP, via Dan Ferguson, SWBC) Mixes with WRM, had some English phrases such as 'Genocide', 'Cambodia the People & Policing of Vietnam' as well 'fifteen years after the fall' (Ed Kusalik, Alberta, Cumbre DX) Since it was in Cambodia, at first assumed to be clandestine for there but actually for oppressed Cambodians in southern Vietnam (Nick Grace, *Clandestine Radio Watch*)

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

0000 UTC on 4876.7

BOLIVIA: Radio la Cruz del Sur. Program in Aymara and Spanish. Music program to ID as, "Radio La Cruz del Sur, que senal el camino de la vida...". Fair signal quality. (Nicolas Eramo, Argentina) Bolivians audible; **Radio Santa Ana** 4949, 2203-2209; **Radio La Palabra** 4732.4; **Radio Mallku** 4796.4, 2214-2219. (Marcelo Cornachioni & Arnaldo Slaen/DX Camp Punta Indio) Bolivian Survey audible from 2230-2315 - 3392.2 **Emisora Camargo**; 4471.7 **Radio Movima**; 4552.3 **Radio Difusoras Tropical**; 4702.2 **Radio Eco**; 4716.7 **Radio Yura**; 4865 **Radio Centenario La Nueva**; 6024.9 **Radio Illimani**; 6134.8 **Radio Santa Cruz**. (Michael Schnitzer, Hassfurt, Germany/Hard-Core DX)

0005 UTC on 21680

AUSTRALIA: Radio Australia. Via Darwin in Indonesian, poor to fair signal quality. (Victor Salmaniw, Victoria, BC, Canada/HCDX) Station noted 1125 on 9580 Asia-Pacific program on the newspaper industry in India. (Fraser, MA; David Weronka, Benson, NC) 13605 at 0945, *Australia Talks Back*, discussion on centralizing the central government. (Bob Fraser, Cohasset, MA)

0011 UTC on 6797.5

PERU: Radio Ondas del Rio Mayo. Spanish text to Andean tunes. Station promotional repeated twice, fair to poor signal. Peru's **Radio La Voz** heard 6250.3, 2250-2305, including regional music and ads. (Claudio Morales, Buenos Aires, Argentina) Peruvian's logged on DX Camp Punta Indio-**Radio Ancash** 4992.5, 0001-0005; **Radio Andina** 6673.02, 0110-018 & 0325-0340; **Ondas del Huallaga** 3329.5, 0015-0025; **Radio Huancabamba** 6535.37, 0012-0035; **Radio Ilucan** 5678, 0040-0049; **Radio Frecuencia San Ignacio** 5699.8, 0045-0050; **Radio Superior** 5300, 0202-0305; **Radio Cora** 4915, 0307-0315; **Radio Santa Rosa** 6045, 1023-1030; **Radio Twantinsuyo** 6173.4, 1045-1052. (Cornachioni & Slaen)

0015 UTC on 6160

CANADA: CKZN St. John's, Newfoundland. News, talk and interviews to weather forecast for Newfoundland and Labrador. Station ID, good signal quality. (Daniele Canonica, Muggio, Switzerland) **Radio Canada Int'l** monitored 21570 at 2010, *Maple Leaf Mailbag* (fair-poor). 2010 on 17870 // 15325. (Fraser, MA; Duane Hadley, Bristol, TN) RCI, 0100 on 13670 *Canada Today* // 13770, 15170, 15305. (William McGuire, Cheverly, MD)

0030 UTC on 9885

SWITZERLAND: Swiss Radio Int'l. Station interval signal, identification, Internet address to Swiss folk melody. (McGuire, MD) National newscast including interview with lady Mt. Everest climber on 13770 at 1937. (Howard Moser, Lincolnshire, IL)

0030 UTC on 11970

IRAN: VOIRI. Musical bridge to ID, frequency quote and national anthem, to Qu'ran recitations. (McGuire, MD) 13730 at 2027 including national news to ID, freq quote and 2027*. (Moser, IL)

0055 UTC on 11440

PIRATES: Radio Cochiguaz. South American pirate almost buried under very poor signal quality. *El Condor Pasa* tune to 0100 to "Radio Lord" identification at 0105. **Take It Easy Radio** 6950USB, 0140-0238*. Feature on AFRS in Vietnam and pop music of that era. Belfast maildrop quote. **Z100**, 6955 USB, 0117-0124+, pop music to ID. Station noted 0052-0054* including pop music and identifications. **Shadow Radio**, 6950 USB, *0238-0245+ with ID and *Cartoon Planet* segment. (Frodge, MI)

0132 UTC on 4915

BRAZIL: Radio Anhanguera. Portuguese. Evening program including newscast with promo, "principaes noticia do dia..CBN." Best to monitor in USB. Brazil's **Radio Cultura Filadelfia** noted 2305-2310. Portuguese religious format to Bible verse quotes. ID as, "Cultura Ondas Curtas." (Eramo, ARG) **Radio Clube** 2311 on 3245, ID as "Transamerica" to musical melodies. (DX Camp Punta Indio) **Radio Transmundial** 9530, 0010-0045+. WRTH/

Passport note this as Radio Nova Visao but ID confirmed as "esta Transmundial" at 0043. Commercials and promo identifications to religious spots 0031-0033. (Frodge, MI)

0608 UTC on 21620

FRANCE: Radio France Int'l. Their published English schedule is amiss. I'm hearing 21620 at 0618 in French. Poor level // 17800 stronger. I've not heard them at this time in English. Now at 1455 in English, 11610 at good level, just behind 17720. (Salmaniw, CAN) 17605 at 1635, *Club 9516* discusses the Cannes Film Festival, fair signal quality. (Fraser, MA) 0600-0630 should also be on // 11710. -ed.

0645 UTC on 4845

MAURITANIA: RTM . Arabic Quran recitations, SINPO=45554 in upper sideband. (Klaus Elsebusch, Marienthal, Germany) Tentative logging in Arabic, 2105-2135. Very weak for poor audio. (Tom Banks, Dallas, TX)

0710 UTC on 9880

CZECH REP: Radio Prague. Simon & Garfunkle classic '60s tunes to station ID. (David Weronka, Benson, NC) Magazine program on religious holidays. 2150 on 11600. (Fraser, MA) *Talking Points* program on WWII looted art. SIO=3+23. German station interferences to 2255. ID to 2258*. (Frodge, MI)

1030 UTC on 15455

CLANDESTINES: The Voice of the Justice. Listed as broadcasting in Cambodian. Announcer's text and political style commentary format. Abruptly left the air at 1047 sans signoff. **Radio Free Iraq** 1803-1819 in Arabic on 15160 with announcer duo; **International Radio** 15550, 1904-1927. Farsi service with Arabic music. Presumed newscast with comments to station identification, 1927*. (Claudio Morales, Buenos Aires, Argentina)

1150 UTC on 9590

SOUTH KOREA: Radio Korea Int'l. Focus on agriculture of pine trees in South Korea. (Weronka, NC) Station's additional English service monitored as; 0200-0300, 11725 // 11810// 15575; 1300-1400, 9570 (very poor signal quality) // 13670. (Ben A. Clements, Portland, OR)

1817 on 11675

RUSSIA: Voice of Russia. *Commonwealth Update*, focus on new military weapons. (Fraser, MA) 2015 on 15455, national news update on Siberian flood disasters. (Moser, IL) **University Network** via Samara at 1526 on 17645. Dr. Scott programming, lots of splash from 17640 RFA. (Salmaniw, CAN/HCDX)

1910 UTC on 11900

BULGARIA: Radio Bulgaria. *Events & Developments* program featuring meeting of Balkan foreign ministers // 9400. (Fraser, MA) Program segments and news items to ID. Traditional Bulgarian music for *Time Out For Music* with utility interferences. (Frodge, MI)

1907 UTC on 17545

ISRAEL: Kol Israel. News item on continuing demonstrations. (Fraser, MA) Monitored this freq to 1925*. (Moser, IL)

2245 UTC on 7255

NIGERIA: Voice of Nigeria. National, African, and world news to 2255. *Reflections* program segment including philosophical commentary. UTC time check to ID and schedule at 2300. Monitored in LSB to avoid amateur radio interference to 2301*. (Frodge, MI) Hausa service audible 0738-0755 for fair signal quality. (Hardley, TN)

2314 UTC on 9570

ROMANIA: Radio Romania Int'l. Station ID to *A Challenge For The Future* program with focus on future European confederation of countries. Romania in the *Third Millenium* quiz segment. (Frodge, MI)

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

Lighthouse - Lightship Weekend a Beam for DXers

Sandy Hook. Fire Island. Boston. St. Augustine and Cape Hatteras. What is it that is so appealing about a lighthouse? Perhaps it is the legends from mariners or tales from the lonely lighthouse keeper. Who hasn't wondered what it might be like to DX atop a lighthouse?

If your wanderlust aims towards lighthouses you're in luck this month. The International Lighthouse-Lightship Weekend (ILLW) will take place from 0001 UTC Saturday August 18 until 2359 UTC on Sunday August 19, 2001.

Hundreds of amateur radio operators worldwide will be broadcasting via ham stations from a lighthouse, lightship or maritime beacon. Participants will operate portable, mobile, marine mobile or maritime mobile from any existing or extinct lighthouse or lightship anywhere in the world. Listeners (a.k.a. "landlubbers") operate from home and work or monitor as many stations as possible.

This is not a contest, but it is designed to promote goodwill and friendship among amateur "ham" operators, as well as shortwave hobbyists. Last year, over 200 amateur radio stations were established at lighthouses or lightships in over 40 countries during this event.

The *Amateur Radio Lighthouse Society* <http://arlhs.com/> (sponsors of the event) recommend the following subbands within the five main ham bands for activity during this weekend event:

CW (Morse code)

80 meters	3.510-3.540 MHz
40 meters	7.005-7.035 MHz
20 meters	14.010-14.040 MHz
15 meters	21.010-21.040 MHz
10 meters	28.010-28.040 MHz

Phone (voice)

80 meters	3.650-3.750 MHz
40 meters	7.040-7.100 MHz
20 meters	14.125-14.275 MHz
15 meters	21.150-21.250 MHz
10 meters	28.300-28.400 MHz

QSLing the station involved during this event is open to shortwave listeners as well as "hams." A complete list of entrants and how to QSL them after you have heard or worked them (i.e., a QSL Route) can be found at <http://www.vk2ce.com/illw/2001.htm>. When you report these stations you should note their call, sign, frequency, time, date, and whom they worked, as well as a signal report.

Additional information on amateur radio lighthouse operations may be found at the *Amateur Radio Lighthouse Society* website, www.waterw.com/~weidner/arlhs/index.html. Here you will find links for other events and DXpeditions, lighthouse links (some with photos), awards, and a World List of Lights plus more.

If you love the lure of lighthouses, this is an exceptional opportunity to answer that call, recognize the tradition of lighthouses, and pay honor to those who have served as keepers of the light.



Ponce de Leon Inlet, FL Lighthouse (photo by Gayle VH)

CANADA

Voice of Vietnam relay, 9525 kHz. Station verification card unsigned, plus VOV pennant. Received in 78 days for an English report. Station address: 58 Quan Su Street, Hanoi, Vietnam. (Cindy Baumann, Columbia, IL; David Weronka, Benson, NC; Joe Squashic, Wake Forest, NC)

JAPAN

JJY-Standard Time/Frequency Station 8000 kHz. Three special full data fold-over cards, verifying their last days of operation (28, 29, 30 March 2001). Front QSL cover has station information including opening and closing dates ("thanks for joining us for 61 years") plus past QSL images through the years. Cards received for three reception reports with a cassette tape, three US dollars and souvenir postcards. Station address: Communications Research Laboratory, 2-1 Nukui-Kitamachi 4-chome, Koganei-shi, Tokyo 184, Japan. (Lee Silvi, Mentor, OH)

Radio Japan, 6145 kHz. Full data card signed by T. Yaguchi, plus station pennant and schedule. Received in 65 days for an English report and two US dollars. Station address: NHK World, Nippon Hoso Kyokai, Tokyo 150-8001, Japan. (Squashic, NC)

MEDIUM WAVE

CJVR, 750 kHz AM. Full data letter signed by Bayne Opseth-Chief Engineer. Received in 400 after a follow up AM report. Station

address: Box 750, Melfort, SK Canada S0E 1A0. (Patrick Martin, Seaside, OR)

KLZ & KLVZ 560/1220 kHz AM. Verification letter on Crawford Broadcasting Company letterhead, confirming both stations for their format swap. Letter states the KCMN/1530, began June 4, parallel broadcasting for some of the programming from KLVZ between 1000 and 1800 Mountain Time. Received in two days for an email report, returned from W.C. "Cris" Alexander-Director of Engineering. Station address: 2150 W. 29th Ave., Suite 450, Denver, CO 80211. (Patrick Griffith, Westminster, CO)

KXO, 1230 kHz AM. Verification letter signed by Carroll Buckley-Vice Pres. Received in 25 days for an AM report. Station address: 420 Main St. (Or) P.O. Box 140, El Centro, CA 92244. (Martin, OR)

WMAQ, 670 kHz AM. Very nice verification letter signed by Donald R. Coleman-WA9DZS, Chief Engineer, plus historical information on the station and souvenir stickers. This was for reception under local KLTT-670 whose tower lights are visible from my receiver site. Received in 20 days for an AM report and one US dollar. Station address: 455 N. Cityfront Plaza, 6th Floor, Chicago, IL 60611. (Griffith, CO)

WTIR, 1680 kHz AM. Winter Garden, FL. Very nice certificate signed by initials R.H.. Received in 215 days for an AM report. QSL

address: 301 Plymouth Dr. NE, Dalton, GA 30721-9987. (Martin, OR)

PAPUA NEW GUINEA

NBC, 4890 KHz. Full data color station logo card unsigned. Received in 68 days for an English report, PNG mint stamps, SAE (used for reply) and souvenir postcards. Station address: P.O. Box 1359, Boroko NCD, Papua New Guinea. (Sam Wright, Biloxi, MS)

Radio Southern Highlands, 3275 kHz. Date only verification letter signed by Andrew Meles-Provincial Program Manager. Received in five weeks for a taped report and one U.S. dollar. Station address: P.O. Box 104, Mendi, Southern Highlands Province, Papua New Guinea. (Joe Talbot, CAN/HCDX)

PIRATES

Radio Neptune, 6950 kHz USB. Full data QSL plus personal letter from veri signer Joe Mack. Received in 109 days for three mint stamps. Pirate QSL maildrop: P.O. Box 109, Blue Ridge Summit, PA 172214. (Ross Comeau, Andover, MA)

Radio Three, 6240 kHz USB. Full data verification sheet signed by Sal. Received in two months for an ACE log. (Comeau, MA) Station only verifies loggings in *The ACE* (Association of Clandestine Enthusiasts). Sample copies of *The ACE* are \$2.00 via P.O. Box 1, Belfast, NY 14711. For loggings, info and more go to website www.frn.net/ace/about.htm.

Discovering Lots of Life on SW (without the BBC)

As I prepare this month's column, it's mid June and the BBC's decision to drop shortwave to North America is still pending. For those who use their radio almost exclusively to DX, the attitude may be, "What's all the fuss? Fewer frequencies occupied by megawatt transmitters? Sounds good to me!"

However, for others who use their radio more as a source for information and entertainment or who may have even purchased their radio just to hear the *BBC World Service*, their attitude may be less jauntily. A few may even be contemplating putting that radio up on the shelf and finding something else to do with their newfound free time.

That would be a mistake. Consider this:

(1) One of the great things about shortwave is that it has a penchant for ignoring geographical boundaries (unlike certain BBC bureaucrats). By now, you should have checked the *MT Program Guide* and discovered that there are quite a few BBC frequencies intended for other areas and carrying other streams that can be heard here quite reliably. If you can overcome your disappointment in the BBC and any feelings of abandonment, the World Service can still be available to you, if you wish.

(2) The BBC World Service is far from the only game in town. If you weren't aware of that fact, maybe it's time you started widening your listening horizons.

Maybe I can help. There isn't enough space here to provide the broadcast times of the more than 50 references mentioned here, but all can be found in *MT's Shortwave Guide* this month. As usual, times and days are in UT.

News Coverage

Missing your daily dose of *BBC's Newshour* or *The World Today*?

VOA has positioned its *News Now* service as the international equivalent of a "news whenever you want it" station. Although not intended for an American audience, *VOA's* shortwave broadcasts can be heard stateside at least several times a day. The early morning (1000-1100) daily and early evening (0000-0200) weekday broadcasts to the Americas are easiest to pick up. If you haven't already done so, experiment a little at other times by trying the frequencies given in our *Shortwave Guide*. Broadcasts to the Middle East and Africa can regularly be heard in eastern North America; those to East Asia and the Pacific are heard in the west.

Deutsche Welle (DW) – for in-depth treat-

ment of European news and issues – and *Radio Australia* – for comprehensive coverage of the Asia-Pacific region – are two easy-to-hear stations that fill the bill nicely.

DW presents *Newslink* every weekday. This excellent program offers full and professional coverage of the whole of the European continent, as well as major international events and issues.

Radio Australia, despite having become a regional broadcaster rather tightly focused on its and neighboring regions, is still well heard in eastern North America at least every morning and in western North America every afternoon and evening usually on frequencies targeted to the Pacific. *Asia Pacific*, which presents timely and well prepared reports on this volatile and quickly changing region, is broadcast in several editions daily.

Radio New Zealand International (RNZI), also despite not having a specific North American service, can be heard well – especially in summer – even on the east coast. *RNZI* considers itself primarily a service for the Pacific Island nations, so its reports and news from the region provide another voice to complement *Radio Australia's*.

Radio Netherlands, through the rather unique prism of its daily *Newsline* program, and *Radio Exterior de Espana (REE)* with its weeknight half hour of news focused on the Iberian peninsula, round out *DW's* coverage very nicely.

REE also puts its focus on "Ibero-America" (Latin America). *HCJB's* daily newscasts and weekday *Studio 9* feature emphasize Central and South America and *Radio Habana Cuba* provides an added perspective on the region.

Radio Canada International (RCI), despite again undergoing its own internal problems, still does every bit as good a job covering the North American scene as the *BBC* ever did. *As It Happens* is the daily domestic *CBC* program that, over a quarter century ago, originated the now common practice of phoning in to global hotspots and talking with the famous, the infamous and the everyday person about

what is happening right in front of them. *RCI* still carries it every weeknight.

The African services of the *BBC*, *VOA* and *DW*, which are designed to serve as "local radio" for the continent, remain the most readily available sources for the region's news. *Channel Africa* from South Africa and *Voice of Nigeria* – originating from the continent's two major powers – can often be heard quite well in North America, especially the east coast. Each brings added perspective.

Programs like *Dispatches (RCI)*, *Correspondents' Report (Radio Australia)* and *Worldwatch (RNZI)* provide excellent background to current events, as well.

At least philosophically, every station is of some value when it comes to news. Rather than just relying on one source, comparing reports from different sources has always been the best way to try and piece together the truth, whether you have access to the BBC or not.

Below are some examples of quality non-BBC programming in other popular genres. And all this is truly just the tip of the proverbial iceberg! Happy hunting and – still – good listening!

Science and Health

Research File, Radio Netherlands
Our World, VOA
Quirks and Quarks, RCI
Science and Engineering, Voice of Russia
The Science Show, *The Health Report* and
Ockham's Razor, Radio Australia
Eureka!, RNZI
Horizon and *Heartbeat*, Radio Sweden
Spectrum, DW
Studio 9 (Tuesday's edition), HCJB

Environment

Man and Environment, DW
Earthbeat, Radio Australia
Greenscan, Radio Sweden
Studio 9 (Thursday's edition), HCJB

Documentaries

Weekly Documentary, Radio Netherlands
The Sunday Edition, RCI
Background Briefing, Radio Australia

Literature and Drama

Audio Book Club, Voice of Russia
Short Story, Radio Australia
Playhouse, RNZI
Readings from Czech Literature, Radio Prague
Between the Covers, CBC North Quebec
American Stories, VOA Special English

Business

VOA News Now (for daily continuous reports)
A Good Life, Radio Netherlands
Marks and Markets, DW
Money Matters, Radio Sweden

Listener Contact

Talk to America, a daily, global VOA phone-in at 1700
Australia Talks Back, Radio Australia
Cross Country Check-up, CBC North Quebec
In Touch with Stockholm, Radio Sweden
Sincerely Yours, Radio Netherland
Feedback, Radio Australia
Mailbox, RNZI

Music

The Planet, Radio Australia
Music 52-15, Radio Netherlands
Music Time In Africa, VOA Africa Service
Musica del Ecuador, HCJB
From Havana and The Jazz Place, Radio Habana Cuba
Global Village, RCI
Saturday Music, Radio Prague
Music from Flanders, Radio Vlaanderen International

HOW TO USE THE SHORTWAVE GUIDE

0000-0100 twhfa USA, Voice of America 5995am 6130ca 7405am 9455af
 ① ② ⑤ ③ ④ ⑥ ⑦

Convert your time to UTC.

Broadcast time on ① and time off ② are expressed in Coordinated Universal Time (UTC) – the time at the 0 meridian near Greenwich, England. To translate your local time into UTC, first convert your local time to 24-hour format, then add (during Daylight Savings) 4, 5, 6, or 7 hours for Eastern, Central, Mountain or Pacific Times, respectively. Eastern, Central, and Pacific Times are already converted to UTC for you at the top of each page.

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 (in other words, 8:30 pm Eastern, 7:30 pm Central, etc.).

Find the station you want to hear.

Look at the page which corresponds to the time you will be listening. On the top half of the page English broadcasts are listed by UTC time on ①, then alphabetically by country ③, followed by the station name ④. (If the station name is the same as the country, we don't repeat it, e.g., "Vanuatu, Radio" [Vanuatu].)

If a broadcast is not daily, the days of broadcast A will appear in the column following the time of broadcast, using the following codes:

Day Codes	
s/S	Sunday
m/M	Monday
t/T	Tuesday
w/W	Wednesday
h/H	Thursday
f/F	Friday
a/A	Saturday
D	Daily
mon/MON	monthly

In the same column ⑤, irregular broadcasts are indicated "tent" and programming which includes languages besides English are coded "vl" (various languages).

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

The frequencies ⑥ follow to the right of the station listing; all frequencies are listed in kilohertz (kHz). Not all listed stations will be heard from your location and virtually none of them will be heard all the time on all frequencies.

Shortwave broadcast stations change some of their frequencies at least twice a year, in April and October, to adapt to seasonal conditions. But they can also change in response to short-term conditions, interference, equipment problems, etc. Our frequency manager coordinates published station schedules with confirmations

and reports from her monitoring team and MT readers to make the Shortwave Guide up-to-date as of one week before publication.

To help you find the most promising signal for your location, immediately following each frequency we've included information on the target area ⑦ of the broadcast. Signals beamed toward your area will generally be easier to hear than those beamed elsewhere, even though the latter will often still be audible.

Target Areas

af:	Africa
al:	alternate frequency (occasional use only)
am:	The Americas
as:	Asia
au:	Australia
ca:	Central America
do:	domestic broadcast
eu:	Europe
irr:	irregular (Costa Rica RFPI)
me:	Middle East
na:	North America
om:	omnidirectional
pa:	Pacific
sa:	South America
va:	various

Choose a program or station you want to hear.

Selected programs follow immediately after the frequency section and cover prime listening hours – space does not permit 24 hour listings nor can every station be listed. However, listings for the most popular stations and selected lesser-known stations illustrate the variety available on shortwave. The format of the listings alternates among three different styles – by station, by genre and by day – month by month. Times listed are approximate and programs are subject to change.

The program listings emphasize broadcasts targeted to North America. In most cases, the stations and programs listed should be readily receivable in North America using a portable radio. Most broadcasters produce one broadcast in English per day that is repeated over a 24 hour period to all areas. If you are able to listen to transmissions to other areas of the world during "non-prime time" hours, referring to the prime time listings for those stations will likely be helpful in determining what programs will be broadcast.

Occasionally, a program or station listing may be followed by a reference to another listing for the same program or station at a different time. This is done to conserve space and make it possible to provide more listings.

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Program Highlights

John Figliozzi

All the recent talk about the BBC should not obscure the fact that there are plenty of fine listening opportunities available even without them. A case in point is *Radio Netherlands*.

New and Not-So-New from RN

At the end of June, RN began a new 17-part series that will run every Friday (UT) through the end of October. The program is titled *Talking It Over*. Presented by Chris Chambers, it features an informal interview with a well-known person who is either Dutch or has lived in The Netherlands for many years.

In addition, you may recall an excellent series that first aired over RN in the mid '90s—*From Sapphire to Laser*. (My dictionary says "sapphire," but this is the way it's spelled on the RN web site!) Rob Green returns with a second chance to hear his classical music series, also every Friday.

These program are a quarter-hour each and are aired consecutively. They replace *The Basement Sessions*, the vintage jazz series that has ended its run.

RN's Documentaries

August provides listeners with second chances to hear a quartet of radio documentaries that captured awards and honors at the recent New York Radio Festival:

2nd/4th - *Mean or Green: Nuclear Power in Europe*, produced by Jonathan Groubert.

9th/11th - *Somebody Must be Held Responsible*, from Eric Beauchemin.

16th/18th - *The Basement Sessions*, all that jazz by Hans Mantel.

23rd/25th - *Youth Against Aids*, from the Roughly Speaking team.

VOA's Talk to America

Before there was *Talking Point*, there was *Talk to America*. The VOA's global listener phone-in airs "live" Monday through Friday at 1705 on all VOA News Now frequencies. Be advised that stateside listeners' calls are not accepted. Nonetheless, the topics are always current and the opinions expressed come from a range of perspectives from around the world. Carol Pearson hosts this daily and lively exchange. The abbreviated version *Best of Talk to America* airs 0233, 1033, 1833 Saturdays; 0633, 1433, 2233 Sundays; and is repeated Fridays at 0033, 0433, 0833, 1233, 2033.

Shortwave Guide

0000			
0000	0015	Cambodia, National Radio Of	11940as
0000	0015	Japan, Radio	6145na 13650pa 17810pa
0000	0027	Czech Rep, Radio Prague Intl	7345na 11615na
0000	0030	Australia, Radio	9660pa 12080pa 15415as 15240as 15415as
		17580pa 17775as 17795va	21740va
0000	0030	Egypt, Radio Cairo	9900am
0000	0030	Thailand, Radio	9655af 9690af 11905af
0000	0030	UK, BBC World Service	3915as 5965as 5975am 6195as 7105as
		9410me 9590am 9915sa	11945as 11955as 12095sa 15280os
		15310as 15360as 17615as	17790as
0000	0045	India, All India Radio	9705as 9950as 11620as 13605as
0000	0056	North Korea, Voice of Korea	4405va 11460na 11710na 13760na
		15180na	
0000	0057	Canada, R Canada International	11895as
0000	0100	Anguilla, Caribbean Beacon	6090am
0000	0100	Australia, ABC/Alice Springs	4835do
0000	0100	Australia, ABC/Katherine	5025do
0000	0100	Australia, ABC/Tennant Creek	4910do
0000	0100	Australia, Christian Voice	17775pa 17850va 21550va 21680pa
0000	0100	Canada, CBC Northern Service	9625do
0000	0100	Canada, CFRX Toronto ON	6070do
0000	0100	Canada, CFVP Calgary AB	6030do
0000	0100	Canada, CHNX Halifax, NS	6130do
0000	0100	Canada, CKZN St John's NF	6160do
0000	0100	Canada, CKZU Vancouver BC	6160do
0000	0100	Costa Rica, R for Peace Intl	7455irr 15049va 21815va
0000	0100	Costa Rica, University Network	5030am 6150am 7375am 9724sa
		11870am 13749na	
0000	0100	Ecuador, HCJB	9745na 15115na 21455usb
0000	0100	Finland, Scandy Weekend Radio	11720va
0000	0100	Guyana, Voice of	3289do 5949do
0000	0100	Japan, Radio	6145na
0000	0100	Malaysia, Radio	7295do
0000	0100	Malaysia, RTM Kota Kinabalu	5980do
0000	0100	Malaysia, RTM Sarawak	7160do
0000	0100	Namibia, Namibian BC Corp	3270af 3289af
0000	0100	Netherlands, Radio	6165na 9845na
0000	0100	New Zealand, R New Zealand Int	17675pa
0000	0100	New Zealand, ZLXA	3935do 7290do
0000	0100	Papua New Guinea, NBC	9675do 11880irr
0000	0100	Singapore, SBC Radio One	6150do
0000	0100	Solomon Islands, SIBC	5020do
0000	0100	Solomon Islands, SIBC	9545do
0000	0100	Spain, R Exterior Espana	15385na
0000	0100	Ukraine, R Ukraine International	5905ue 7320as 9640as 12040na
0000	0100	USA, Armed Forces Radio	4278va 4319va 4993va 5765va
		6350va 6458va 6847va	10320va 10940va 12579va 12689va
		13254va 13362va 16847va	
0000	0100	USA, KAU Dallas TX	13815va
0000	0100	USA, KTBN Salt Lake City UT	15590na
0000	0100	USA, KWHR Naalehu HI	17510as
0000	0100	USA, Voice of America	5995am 6130am 7405am 9455am 9775am
		11695am 13740am	
0000	0100	USA, WBCQ Monticello ME	7415na 9330na
0000	0100	USA, WEWN Birmingham AL	5825na 13615na
0000	0100	USA, WHRA Greenbush ME	7580ue
0000	0100	USA, WHRI Noblesville IN	5745va 7315am
0000	0100	USA, WINB Red Lion PA	12160am
0000	0100	USA, WJCR Upton KY	7490am 13595as
0000	0100	USA, WRMI Miami FL	9955sa
0000	0100	USA, WRNO New Orleans LA	7355va
0000	0100	USA, WSHB Cypress Crk SC	7535am 9430am 15285sa
0000	0100	USA, WTJC Newport NC	9370na
0000	0100	USA, WWBS Macon GA	11910na
0000	0100	USA, WWCN Nashville TN	5070na 7435na 9475na 13845na
0000	0100	USA, WWFV McCaysville GA	5085va 6890am
0000	0100	USA, WYFR Okeechobee FL	6085na 9505na
0000	0100	Vanuatu, Radio	3945do 4960do 7260do
0000	0100	Zambia, Christian Voice	4965do
0030	0100	Australia, Radio	9660pa 12080pa 15415as 17580pa
		17750as 17755as 17795va	21740va 11970am
0030	0100	Iran, VOIRI 9022am	9835am
0030	0100	Lithuania, Radio Vilnius	11690eu
0030	0100	Sri Lanka, Sri Lanka BC Corp	4940do
0030	0100	Sri Lanka, Sri Lanka BC Corp	4940do 6005as 6075as 9770as
		15425as	
0030	0100	Thailand, Radio	9655as 11905as 15395na
0030	0100	UK, BBC World Service	5965as 5975am 6195as 7105as 9410me
		9590am 9915sa	12095sa 15280as 15360as 17790as
0030	0100	USA, Voice of America	7215as 9770as 11760as 15185as 15290as
		17740as 17820as	
0030	0100	Yugoslavia, Radio	11870am
0045	0100	Pakistan, Radio	11650as 15455as
0050	0100	UK, International BC Tamil	11570as
0055	0100	Italy, RAI International	9675na 11800na

0100

0100	0115	Italy, RAI International	9675na 11800na
0100	0115	Pakistan, Radio	11650as 15455as
0100	0125	Netherlands, Radio	6165na 9845na

0100	0127	Czech Rep, Radio Prague Intl	5915na 7345na
0100	0127	Vietnam, Voice of	9525na
0100	0130	Germany, Universal Life	9435os
0100	0130	Hungary, Radio Budapest	9560na
0100	0130	Iran, VOIRI 9022am	9835am 11970am
0100	0130	Slovakia, R Slovakia International	5930na 7230ca 9440sa
0100	0130	USA, Voice of America	5995am 6130am 7405am 9455am 9775am
		13740am	
0100	0130	Uzbekistan, Radio Tashkent	7190as 9375as 9530as 9715as
0100	0145	Germany, Deutsche Welle	6040na 9640am 11810na 13720am
0100	0156	North Korea, Voice of Korea	3560va 11734va 15230va 17735va
0100	0159	Canada, R Canada International	5960am 9755am 13670am 13770am
		15170am	
0100	0200	Anguilla, Caribbean Beacon	6090am
0100	0200	Australia, ABC/Katherine	5025do
0100	0200	Australia, ABC/Tennant Creek	4910do
0100	0200	Australia, Christian Voice	17775pa 21550vs 21680pa
0100	0200	Australia, Radio	12080pa 15240as 15415as 17580pa
		17750as 17755as 17795va	21725pa
0100	0200	Canada, CBC Northern Service	9625do
0100	0200	Canada, CFRX Toronto ON	6070do
0100	0200	Canada, CFVP Calgary AB	6030do
0100	0200	Canada, CHNX Halifax, NS	6130do
0100	0200	Canada, CKZN St John's NF	6160do
0100	0200	Canada, CKZU Vancouver BC	6160do
0100	0200	China, China Radio International	9570na
0100	0200	Costa Rica, R for Peace Intl	7455irr 15049va 21815va
0100	0200	Costa Rica, University Network	5030am 6150am 7375am 9724sa
		11870am 13749na	
0100	0200	Cuba, Radio Havana	6000na 9820na 11705na
0100	0200	Ecuador, HCJB	9745na 15115na 21455usb
0100	0200	Finland, Scandv Weekend Radio	11720va
0100	0200	Guyana, Voice of	3289do 5949do
0100	0200	Indonesia, Voice of	9525as 11784as 15149as
0100	0200	Japan, Radio	11860pa 11870me 11880me 15325as 17685pa
		17810as 17835sa	17845as
0100	0200	Malaysia, Radio	7295do
0100	0200	Malaysia, RTM Kota Kinabalu	5980do
0100	0200	Namibia, Namibian BC Corp	3270af 3289af
0100	0200	New Zealand, R New Zealand Int	17675pa
0100	0200	New Zealand, ZLXA	3935do 7290do
0100	0200	Papua New Guinea, NBC	9675do 11880irr
0100	0200	Russia, Voice of Russia WS	9665na 11825na 12000na 17595na
0100	0200	Singapore, SBC Radio One	6150do
0100	0200	Solomon Islands, SIBC	5020do
0100	0200	Solomon Islands, SIBC	9545do
0100	0200	Spain, R Exterior Espana	15385na
0100	0200	Switzerland, Swiss R International	9885am
0100	0200	UK, BBC World Service	5965as 5975am 6195as 9410as 9590am
		9915sa 11955as 12095sa	15280as 15310as 15360as 17790as
0100	0200	USA, Armed Forces Radio	4278va 4319va 4993va 5765va
		6350va 6458va 6847va	10320va 10940vc 12579va 12689va
		13254va 13362va 16847va	
0100	0200	USA, KAU Dallas TX	13815va
0100	0200	USA, KJES Vado NM	7555na
0100	0200	USA, KTBN Salt Lake City UT	15590na
0100	0200	USA, KWHR Naalehu HI	17510as
0100	0200	USA, Voice of America	7115as 9635as 11705as 11725as 11820as
		13650as 15250as 17740as	
0100	0200	USA, WBCQ Monticello ME	7415na 9330na
0100	0200	USA, WBCQ Monticello ME	7415na 9330na
0100	0200	USA, WEWN Birmingham AL	5825na 13615na
0100	0200	USA, WHRA Greenbush ME	7580ue
0100	0200	USA, WHRI Noblesville IN	5745va 7315am
0100	0200	USA, WINB Red Lion PA	12160am
0100	0200	USA, WJCR Upton KY	7490am 13595as
0100	0200	USA, WRMI Miami FL	7385na
0100	0200	USA, WRMI Miami FL	9955am
0100	0200	USA, WRNO New Orleans LA	7355va
0100	0200	USA, WSHB Cypress Crk SC	7535na 9430am 15285sa
0100	0200	USA, WTJC Newport NC	9370na
0100	0200	USA, WWCN Nashville TN	3215na 5070na 7435na 13845na
0100	0200	USA, WWFV McCaysville GA	5085va 6065na 9505na 15060as
0100	0200	USA, WYFR Okeechobee FL	6065na 9505na 15060as
0100	0200	Vanuatu, Radio	3945do 4960do 7260do
0100	0200	Zambia, Christian Voice	4965do
0130	0145	Libya, Voice of Africa	11815af 15435af 17725af
0130	0200	Austria, R Austria International	9870na
0130	0200	Sweden, Radio	13625as
0130	0200	UK, RTE Radio	6155ca
0130	0200	USA, VOA Special English	9775am 7405am 13740am
0130	0200	USA, Voice of America	5995am 6130am 9455am
0140	0200	Vatican City, Vatican Radio	9650au 12055au
0145	0200	Albania, R Tirana International	6115na 7160na

0200

0200	0210	Greece, Voice of	7475va 9420va 11645va 12105va
0200	0230	Belarus, R Belarus International	6070eu 7210eu
0200	0230	Myanmar, Radio	7185do
0200	0230	UK, Wales Radio Intl/Merlin	9795na
0200	0230	USA, KJES Vado NM	7555na
0200	0230	USA, WINB Red Lion PA	12160am
0200	0245	Germany, Deutsche Welle	11965as 13710as 15370as
0200	0245	Iraq, Radio Iraq International	7157irr 9684irr 11785irr

SELECTED PROGRAMMING BEGINS ON PAGE 55

Shortwave Guide



0200	0256		North Korea, Voice of Korea	11845va	13650va			
0200	0256		Romania, R. Romania International	11940na	15105as	15180as	15340na	
			17735as 17790pa					
0200	0257		Canada, R. Canada International	15260as	17860as			
0200	0300		Anguilla, Caribbean Beacon	6090am				
0200	0300	twfha	Argentina, RAE	11710am				
0200	0300	vl	Australia, ABC/Alice Springs	4835da				
0200	0300	vl	Australia, ABC/Katherine	5025da				
0200	0300	vl	Australia, ABC/Tennant Creek	4910da				
0200	0300		Australia, Christian Voice	17775pa	21550va	21680pa		
0200	0300		Australia, Radio	9660pa	12080va	15240as	15415as	15515va
			17580va 17750as 21725va					
0200	0300		Bulgaria, Radio	9400na	11700na			
0200	0300		Canada, CBC Northern Service	9625da				
0200	0300		Canada, CFRX Toronto ON	6070da				
0200	0300		Canada, CFVP Calgary AB	6030da				
0200	0300		Canada, CHNX Halifax, NS	6130da				
0200	0300		Canada, CKZN St John's NF	6160da				
0200	0300		Canada, CKZU Vancouver BC	6160da				
0200	0300		Costa Rica, R for Peace Intl	7455irr	15049va			
0200	0300		Costa Rica, University Network	5030am	61500am	7375am	9724sa	
			11870am 13749na 13749na					
0200	0300		Cuba, Radio Havana	6000na	9820na	11705na		
0200	0300		Ecuador, HCJB	9745na	15115na	21455usb		
0200	0300		Egypt, Radio Cairo	9475am				
0200	0300	a/monthly	Finland, Scandv Weekend Radio	11720va				
0200	0300		Guyana, Voice of	3289da	5949da			
0200	0300		Kenya, Kenya BC Corp	4885irr	4915irr			
0200	0300		Malaysia, Radio	7295do				
0200	0300		Malaysia, RTM Kota Kinabalu	5980do				
0200	0300		Namibia, Namibian BC Corp	3270af	3289af			
0200	0300		New Zealand, R New Zealand Int	17675pa				
0200	0300		New Zealand, ZLXA	3935do	7290do			
0200	0300	vl	Papua New Guinea, NBC	9675do	11880irr			
0200	0300		Russia, Voice of Russia WS	9665na	12000na	17595na		
0200	0300	vl/as	Singapore, SBC Radio One	6150do				
0200	0300	vl/a	Solomon Islands, SIBC	5020do				
0200	0300		Solomon Islands, SIBC	9545do				
0200	0300		South Korea, R Korea Intl	7275na	11725sa	11810sa	15575na	
0200	0300		Sri Lanka, Sri Lanka BC Corp	6005as	6075as	6130do	9770as	
			15425as					
0200	0300		Taiwan, Radio Taipei International	5950na	9680na	11740am	15270as	
			15345as					
0200	0300		UK, BBC World Service	5975am	6135am	6195as	9410as	9770af
			9915sa 11955as 12095va	15280as	15310as	15360as	17790as	
0200	0300		UK, Merlin Network One	9430na				
0200	0300		USA, Armed Forces Radio	4278va	4319va	4993va	5765va	
			6350va 6458va 6847va	10320va	10940va	12579va	12689va	
			13254va 13362va 16847va					
0200	0300		USA, KAIJ Dallas TX	5755va				
0200	0300		USA, KTBN Salt Lake City UT	7510na				
0200	0300		USA, KWHR Naahehu HI	17510as				
0200	0300		USA, Voice of America	7115as	9635as	11705as	11725as	11820as
			13650as 15250as 17740as	17820as				
0200	0300		USA, WBCQ Monticello ME	7415na				
0200	0300		USA, WBCQ Monticello ME	7415na				
0200	0300		USA, WBCQ Monticello ME	9330na				
0200	0300		USA, WEWN Birmingham AL	5825na				
0200	0300		USA, WHRA Greenbush ME	7580eu				
0200	0300		USA, WHRI Noblesville IN	5745va	7315am			
0200	0300		USA, WJCR Upton KY	7490am				
0200	0300		USA, WRMI Miami FL	7385na				
0200	0300		USA, WRNO New Orleans LA	7355va				
0200	0300		USA, WSHB Cypress Crk SC	5850na	7535am	9430na		
0200	0300		USA, WTJC Newport NC	9370na				
0200	0300		USA, WWCR Nashville TN	3215na	5070na	5935na	7435na	
0200	0300		USA, WWFV McCaysville GA	5085va				
0200	0300		USA, WYFR Okeechobee FL	6065na	9505na			
0200	0300	vl	Vanuatu, Radio	3945do	4960do	7260do		
0200	0300		Zambia, Christian Voice	4965do				
0200	1215		Cambodia, National Radio Of	11940as				
0215	0220		Nepal, Radio 5005as	7165as				
0230	0257		Vietnam, Voice of	9525na				
0230	0300		Albania, R Tirana International	6115na	7160na			
0230	0300		Hungary, Radio Budapest	9570na				
0230	0300		Philippines, Radyo Pilipinas	11885pa	15120pa	15270pa		
0230	0300		Slovakia, Adventist World Radio	7235as				
0230	0300		Sweden, Radio	9495am	9755na			
0230	0300		Switzerland, Swiss R International	9885am				
0240	0247		Croatia, The Voice of Croatia	6165eu	7365eu	9830eu	9925sa	
			11870am					
0250	0300		Vatican City, Vatican Radio	7305am	9605am			
0250	0300	vl	Zambia, National BC Corp	6165do	6265do			

0300

0300	0310		Vatican City, Vatican Radio	7305am	9605am			
0300	0327		Czech Rep, Radio Prague Intl	7345na	7385na	9870na		
0300	0330		Egypt, Radio Cairo	9475am				
0300	0330		S Africa, Channel Africa	6035af				
0300	0330		Thailand, Radio	9655am	11905am	15395na		
0300	0330		UK, BBC World Service	3255af	5975am	6005af	6135am	6190af
			6195eu 7120af 7160af	9410eu	11730af	12035as	12095me	
			15280as 15310as 15360as	15575me	17760as	17790as	21660as	
			21830as					
0300	0330		USA, WBCQ Monticello ME	7415na				
0300	0330	s twfha	USA, WBCQ Monticello ME	9330na				
0300	0345		Germany, Deutsche Welle	9535na	9640na	13780am	15105na	
0300	0400		Anguilla, Caribbean Beacon	6090am				

0300	0400	vl	Australia, ABC/Alice Springs	4835da				
0300	0400	vl	Australia, ABC/Katherine	5025da				
0300	0400	vl	Australia, ABC/Tennant Creek	4910da				
0300	0400		Australia, Christian Voice	21550va	21680pa	15240as	15415as	15515va
			Australia, Radio	9660pa	12080pa			
			17580va 17750as 21725va					
0300	0400	mtwhf	Bhutan, Bhutan BC Service	6035da				
0300	0400	vl	Botswana, Radio	3356da	6035da	7255da		
0300	0400		Canada, CBC Northern Service	9625da				
0300	0400		Canada, CFRX Toronto ON	6070da				
0300	0400		Canada, CFVP Calgary AB	6030do				
0300	0400		Canada, CHNX Halifax, NS	6130do				
0300	0400		Canada, CKZN St John's NF	6160do				
0300	0400		Canada, CKZU Vancouver BC	6160do				
0300	0400		China China Radio International	9690na				
0300	0400		Costa Rica, Faro del Caribe	5054ca	6175ca	9644ca		
0300	0400		Costa Rica, R for Peace Intl	7455irr				
0300	0400		Costa Rica, University Network	5030am	6150am	7375am	9724sa	
			11870am 13749na 17645as					
0300	0400		Cuba, Radio Havana	6000na	9820na	11705na		
0300	0400		Ecuador, HCJB	9745na	15115na	21455usb		
0300	0400	a/monthly	Finland, Scandv Weekend Radio	11720va				
0300	0400	vl	Guatemala, Radio Cultural	3300da	5955da			
0300	0400		Guyana, Voice of	3289da				
0300	0400	sm	Honduras, Radio Luz y Vida	3250ca				
0300	0400		Japan, Radio	17825co				
0300	0400		Kenya, Kenya BC Corp	4885irr	4915irr			
0300	0400	vl	Lesotho, Radio	4800do				
0300	0400		Malaysia, Radio	7295do				
0300	0400		Malaysia, Voice of Islam	6175as	9750as	15295as		
0300	0400		Namibia, Namibian BC Corp	3270af	3289af			
0300	0400		New Zealand, R New Zealand Int	17675pa				
0300	0400		Oman, Radio Sultanate of	15355va				
0300	0400	vl	Papua New Guinea, NBC	9675da	11880irr			
0300	0400		Philippines, Radyo Pilipinas	11885	15120pa	15270pa		
0300	0400		Russia, Voice of Russia WS	9665na	11750na	12000na	17565na	
			17650na 17660na 17690na					
0300	0400		Singapore, SBC Radio One	6150do				
0300	0400	vl/as	Solomon Islands, SIBC	5020do				
0300	0400	vl/a	Solomon Islands, SIBC	9545do				
0300	0400		Sri Lanka, Sri Lanka BC Corp	6005as	6075as	6130do	9770as	
			15425as					
0300	0400		Taiwan, Radio Taipei International	5950na	9680na	11875pa	15320as	
0300	0400		Turkey, Voice of	7270af	11655va	21715as		
0300	0400		Uganda, Radio	4976do	5026do			
0300	0400		Ukraine, R Ukraine International	7320as	7410eu	9640as	12040as	
0300	0400		USA, Armed Forces Radio	4278va	4319va	4993va	5765va	
			6350va 6458va 6847va	10320va	10940va	12579va	12689va	
			13254va 13362va 16847va					
0300	0400		USA, KAIJ Dallas TX	5755va				
0300	0400		USA, KTBN Salt Lake City UT	7510na				
0300	0400		USA, KWHR Naahehu HI	17510as				
0300	0400		USA, Voice of America	5855af	6080af	7105af	7275af	7290af
			7340af 9575af 9885af	17895af				</

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0400	0430	s	twhta	Mexico, R Mexico International	9705am	11770am			
0400	0430	vl		Nigeria, Radio/Kaduna	6090do	7275do			
0400	0430			S Africa, Channel Africa	5955af				
0400	0430			Sri Lanka, Sri Lanka BC Corp	6005as	6075as	6130do	9770as	
				15425as					
0400	0430			Switzerland, Swiss R International	9610eu	9885om			
0400	0430			USA, WBCQ Monticello ME	7415na				
0400	0430	h		USA, WBCQ Monticello ME	9330na				
0400	0430			USA, WRMI Miami FL	7385na				
0400	0445			Germany, Deutsche Welle	7225af	9565af	9765af	3690af	
0400	0455			USA, WYFR Okeechobee FL	6065na	9355eu	9505na		
0400	0456			China China Radio International	9560na	9730na			
0400	0456			Romania, R Romania International	11940na	15365na	17735as	21480as	
0400	0500			Anguilla, Caribbean Beacon	6090am				
0400	0500	vl		Australia, ABC/Alice Springs	4835do				
0400	0500	vl		Australia, ABC/Katherine	5025do				
0400	0500	vl		Australia, ABC/Tennant Creek	4910do				
0400	0500			Australia, Christian Voice	21550va	21680pa			
0400	0500	vl		Botswana, Radio	4820do	7255do			
0400	0500			Canada, CBC Northern Service	9625do				
0400	0500			Canada, CFRX Toronto ON	6070do				
0400	0500			Canada, CFVP Calgary AB	6030do				
0400	0500			Canada, CHNX Halifax, NS	6130do				
0400	0500			Canada, CKZN St John's NF	6160do				
0400	0500			Canada, CKZU Vancouver BC	6160do				
0400	0500			Costa Rica, R for Peace Intl	7455irr	15049va			
0400	0500			Costa Rica, University Network	5030am	6150am	7375am	9724sa	
				11870am 13749na	17645as				
0400	0500			Cuba, Radio Havana	6000na	9820na	11705na		
0400	0500			Ecuador, HCJB	9745na	15115na	21455usb		
0400	0500	a/monthly		Finland, Scandv Weekend Radio	11720va				
0400	0500	vl		Guatemala, Radio Cultural	3300do	5955do			
0400	0500			Guyana, Voice of	3289do				
0400	0500			Kenya, Kenya BC Corp	4885irr				
0400	0500	vl		Lesotho, Radio	4800do				
0400	0500			Malaysia, Radio	7295do				
0400	0500			Malaysia, Voice of Islam	6175as	9750as	15295as		
0400	0500			Myanmar, Radio	9730do				
0400	0500			Namibia, Namibian BC Corp	3270af	3289af			
0400	0500			New Zealand, R New Zealand Int	17675pa				
0400	0500			New Zealand, ZLXA	3935do	7290do			
0400	0500	vl		Nigeria, Radio/Enugu	6025do				
0400	0500	vl		Papua New Guinea, NBC	9675do	11880irr			
0400	0500			Russia, Voice of Russia WS	9665na	11750na	12000na	17565na	
				17650na 17660na	17690na				
0400	0500			Singapore, SBC Radio One	6150do				
0400	0500	vl/os		Solomon Islands, SIBC	5020do				
0400	0500	vl/a		Solomon Islands, SIBC	9545do				
0400	0500			Uganda, Radio	4976do				
0400	0500			UK, BBC World Service	3255af	5975am	6005af	6135am	6175am
				6190af 6195eu	7120af	7160af	9410eu	12035eu	12095me
				15280as 15310as	15420af	15575me	17640af	17760as	17790as
				21660as 21830as					
0400	0500			USA, Armed Forces Radio	4278va	4319va	4993va	5765va	
				6350va 6458va	6847va	10320va	10940va	12579va	12689va
				13254va 13362va	16847va				
0400	0500			USA, KAJI Dallas TX	5755va				
0400	0500			USA, KTBN Salt Lake City UT	7510na				
0400	0500			USA, KWHR Naalehu HI	17780as				
0400	0500			USA, Voice of America	4960af	5855af	6080af	7275af	7290af
				9530va 9575af	11965me	15205va	17895af		
0400	0500			USA, WEWN Birmingham AL	5825na				
0400	0500			USA, WHRA Greenbush ME	7580eu				
0400	0500			USA, WHRI Noblesville IN	5745va	7315am			
0400	0500			USA, WJCR Upton KY	7490am	13595as			
0400	0500			USA, WMLK Bethel PA	9465eu				
0400	0500			USA, WSHB Cypress Crk SC	11930eu	15195af			
0400	0500			USA, WTJC Newport NC	9370na				
0400	0500			USA, WWVF McCaysville GA	5085va				
0400	0500			Zambia, Christian Voice	6065do				
0400	0500	vl		Zambia, National BC Corp	6165do	6265do			
0400	0500	vl		Zimbabwe, Zimbabwe BC Corp	4828do	6045do			
0405	0500			USA, WWCR Nashville TN	3210na	5070na	5935na	7435na	
0427	0525	a		Liberia, Voice of Hope	12060af	15320af			
0430	0500			Australia, Radio	9660pa	12080pa	15240as	15415as	15515va
				17580pa 21725pa					
0430	0500			Italy, Italian Radio Relay Service	3985va				
0430	0500			Netherlands, Radio	6165na	9590na			
0430	0500	vl		Nigeria, Radio/Ibadan	6050do				
0430	0500	vl		Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do	
0430	0500	vl		Nigeria, Radio/Lagos	3326do	4990do			
0430	0500			S Africa, Adv World Radio Africa	11975af				
0430	0500			Sri Lanka, Sri Lanka BC Corp	6130do				
0430	0500	mtwhfa		Swaziland, Trans World Radio	3200af	4775af			
0430	0500			Switzerland, Swiss R International	9885am				
0430	0500			USA, WBCQ Monticello ME	7415na				
0430	0500	s twnta		USA, WRMI Miami FL	7385na				
0430	0500			Yugoslavia, Radio	11870na				
0435	0500			Italy, RAI International	5975af	7235af			
0445	0500			USA, WYFR Okeechobee FL	9355eu				

0500

0500	0515			Canada, CBC Northern Service	9625do				
0500	0515	s	hfa	USA, KVOH Los Angeles CA	9975na				
0500	0520			Vatican City, Vatican Radio	4005eu	5885eu	7250eu	9660af	
				11625af 15570af					
0500	0530	as		Australia, Radio	17750as				
0500	0530			France R France International	11710af	17800af			

0500	0530	.	twhta	Mexico, R Mexico International	9705am	11770am			
0500	0530			Netherlands, Radio	6165na	9845na			
0500	0530			S Africa, Adv World Radio Africa	5960af	6015af			
0500	0530			S Africa, Channel Africa	11720af				
0500	0530			Switzerland, Swiss R International	9610eu				
0500	0530			Uganda, Radio	4976do	5026do			
0500	0530	s	twhta	USA, WRMI Miami FL	7385na				
0500	0530	vl		Zimbabwe, Zimbabwe BC Corp	4828do	6045do			
0500	0545			Germany, Deutsche Welle	9690na	9785na	11985na		
0500	0600			Anguilla, Caribbean Beacon	6090am				
0500	0600	vl		Australia, ABC/Alice Springs	4835do				
0500	0600	vl		Australia, ABC/Katherine	5025do				
0500	0600	vl		Australia, ABC/Tennant Creek	4910do				
0500	0600			Australia, Christian Voice	21550va	21680pa			
0500	0600	vl		Botswana, Radio	4820do	7255do			
0500	0600			Canada, CFRX Toronto ON	6070do				
0500	0600			Canada, CFVP Calgary AB	6030do				
0500	0600			Canada, CHNX Halifax, NS	6130do				
0500	0600			Canada, CKZN St John's NF	6160do				
0500	0600			Canada, CKZU Vancouver BC	6160do				
0500	0600			Costa Rica, R for Peace Intl	7455irr	15049va			
0500	0600			Costa Rica, University Network	5030am	6150am	7375am	9724sa	
				11870am 13749na	17645as				
0500	0600			Cuba, Radio Havana	9550na	9820na	9830na		
0500	0600			Ecuador, HCJB	9745na	15115na	21455usb		
0500	0600	a/monthly		Finland, Scandv Weekend Radio	11720va				
0500	0600			Guyana, Voice of	3289do				
0500	0600			Italy, Italian Radio Relay Service	3985va				
0500	0600			Japan, Radio	5975eu	6110na	7230eu	11715as	11760as
				13630na 15195as	17810pa	21755pa			
0500	0600			Kenya, Kenya BC Corp	4885irr	4915irr			
0500	0600			Kuwait, Radio	15110as				
0500	0600	vl		Lesotho, Radio	4800do				
0500	0600	vl		Liberia, R Liberia International	5100do				
0500	0600			Malaysia, Radio	7295do				
0500	0600			Malaysia, RTM Sarawak	7160do				
0500	0600			Malaysia, Voice of	6175va	9750va	15295va		
0500	0600			Malaysia, Voice of Islam	6175as	9750as	15295as		
0500	0600			Myanmar, Radio	9730do				
0500	0600			Namibia, Namibian BC Corp	3270af	3289af			
0500	0600			New Zealand, R New Zealand Int	11725pa				
0500	0600			New Zealand, ZLXA	3935do	7290do			
0500	0600	vl		Nigeria, Radio/Enugu	6025do				
0500	0600	vl		Nigeria, Radio/Ibadan	6050do				
0500	0600	vl		Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do	
0500	0600	vl		Nigeria, Radio/Lagos	3326do	4990do			
0500									

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0800

0800	0805	Pakistan, Radio	17520eu	21465eu				
0800	0815	Guam, KTWR/ Trans World R		15200as				
0800	0820	Monaco, Trans World Radio		9870eu				
0800	0830	vi	Australia, ABC/Alice Springs	4835do				
0800	0830	vi	Australia, ABC/Katherine	5025do				
0800	0830	vi	Australia, ABC/Tennant Creek	4910do				
0800	0830		Australia, Radio	5995pa	9710pa	12080va	13605pa	15240va
			15415as	21725pa				
0800	0830		Malaysia, Voice of	6275as	9750as	15295as		
0800	0830		Myanmar, Radio	9730do				
0800	0830		Sierra Leone, Sierra Leone BS		3316do			
0800	0830		Sri Lanka, Sri Lanka BC Corp		3316do			
0800	0900		Anguilla, Caribbean Beacon		6090am			
0800	0900		Australia, Christian Voice		17820as	21680pa		
0800	0900	mtwhf	Bhutan, Bhutan BC Service		6035do			
0800	0900	vi	Botswana, Radio	7255do	7255do	9600do		
0800	0900		Canada, CFRX Toronto ON		6070do			
0800	0900		Canada, CFVP Calgary AB		6030do			
0800	0900		Canada, CHNX Halifax, NS		6130do			
0800	0900		Canada, CKZN St John's NF		6160do			
0800	0900		Canada, CKZU Vancouver BC		6160do			
0800	0900		Costa Rica, R for Peace Intl		7455irr	15049va		
0800	0900		Costa Rica, University Network		5030am	6150am	7375am	9724so
			11870am	13749na	17645as			
0800	0900		Ecuador, HCJB		11775pa	21455usb		
0800	0900	mtwhf	Eq Guinea, Radio Africa		15185af			
0800	0900	as/vl	Eq Guinea, Radio East Africa		15185af			
0800	0900	a/monthly	Finland, Scandv Weekend Radio		11690va			
0800	0900		Germany, Deutsche Welle		13640eu			
0800	0900		Germany, Overcomer Ministries		13800pa	13810ou		
0800	0900		Germany, Trans World Radio		12070eu			
0800	0900		Germany, Voice of Hope		5975eu	21590me		
0800	0900	vi	Ghana, Ghana BC Corp		3366do	4915do		
0800	0900		Guyana, Voice of		3289do	5949do		
0800	0900		Indonesia, Voice of		9525pa	11784pa	15149pa	
0800	0900	as/vl	Italy, Italian Radio Relay Service		7120va			
0800	0900		Kenya, Kenya BC Corp		4885irr	4915irr		
0800	0900	vi	Lesotho, Radio		4800do			
0800	0900	vi	Liberia, ELWA		4760do			
0800	0900	vi	Liberia, R Liberia International		5100do			
0800	0900		Malaysia, Radio		7295do			
0800	0900	s	Malta, Voice of Mediterranean		11770eu			
0800	0900		Namibia, Namibian BC Corp		7165af	7215af		
0800	0900		New Zealand, R New Zealand Int		9885pa			
0800	0900		New Zealand, ZLXA		3935do	7290do		
0800	0900	vi	Nigeria, Radio/Enugu		6025do			
0800	0900	vi	Nigeria, Radio/Ibadan		6050do			
0800	0900	vi	Nigeria, Radio/Kaduna		4770do	6090do	7275do	9570do
0800	0900	vi	Nigeria, Radio/Lagos		3326do	4990do		
0800	0900	vi	Nigeria, Voice of		7255af	11770af	15120na	
0800	0900	vi	Papua New Guinea, NBC		4890do	9675irr		
0800	0900		Russia, Voice of Russia WS		15490au	17495au	17525au	17635au
			17685au					
0800	0900	s	S Africa, Amateur Radio League		9750af	21560af		
0800	0900		Singapore, SBC Radio One		6150do			
0800	0900	vi	Solomon Islands, SIBC		5020do			
0800	0900		South Korea, R Korea Intl		9570om	13670eu		
0800	0900		Uganda, Radio		5026do	7110do	7196do	
0800	0900		UK, BBC World Service		6190af	9740as	11940af	12095eu
0800	0900				15310as	15360as	15400af	12095eu
0800	0900				17830af	17885af	21470af	15655eu
0800	0900	as	UK, BBC World Service		15575as	21660as	21830as	17640eu
0800	0900		USA, Armed Forces Radio		6350va	6458va	6847va	12095eu
					13254va	13362va	16847va	17600as
0800	0900		USA, KALJ Dallas TX		5755va			
0800	0900		USA, KNLS Anchor Point AK		11765as			
0800	0900		USA, KTBN Salt Lake City UT		7510na			
0800	0900		USA, KWHR Naalehu HI		11565pa			
0800	0900		USA, Voice of America		11930as	13610as	15150as	
0800	0900		USA, WEWN Birmingham AL		5825na			
0800	0900		USA, WHRA Greenbush ME		11730af			
0800	0900		USA, WHRI Noblesville IN		5745va	7315am		
0800	0900		USA, WJCR Upton KY		7490am			
0800	0900		USA, WRNO New Orleans LA		7395am			
0800	0900		USA, WSHB Cypress Crk SC		9845ou	9860eu	11615eu	
0800	0900		USA, WTJC Newport NC		9370na			
0800	0900		USA, WWCR Nashville TN		3210na	5070na	5935na	7460na
0800	0900	vi	Vanuatu, Radio		3945do	4960do	7260do	
0800	0900		Zambia, Christian Voice		9865do			
0800	0900	vi	Zambia, National BC Corp		6165do	6265do	6265do	
0800	0900	vi	Zimbabwe, Zimbabwe BC Corp		5975do	6045do		
0810	0830	s	Armenia, Voice of		4810eu			
0815	0900		Guam, KTWR/ Trans World R		15200as	15330as		
0815	0900	f	Seychelles, FEBA Radio		15460as			
0830	0900	vi	Australia, ABC/Alice Springs		2310do			
0830	0900	vi	Australia, ABC/Katherine		2485do			
0830	0900	vi	Australia, ABC/Tennant Creek		2325do			
0830	0900		Australia, Radio		5995pa	9710pa	12080va	13605pa
			15415as	17750as	21725pa	15240va		
0830	0900		Austria, AWR Europe		17780af			
0830	0900		Georgia, Georgian Radio		11910me			
0830	0900		Italy/Adv World Radio Europe		9610eu			
0830	0900		Lithuania, Radio Vilnius		9710eu			
0830	0900		Switzerland, Swiss R International		21770af			
0855	0900	s	Taiwan, CBS		11725as			

0900

0900	0915	vi	Ghana, Ghana BC Corp		3366do	4915do		
0900	0929		Czech Rep, Radio Prague Intl		21745as			
0900	0930		Australia, Radio		11880as	13605pa	15240as	21820as
0900	0930		Guam, KTWR/ Trans World R		15330as			
0900	0930		UK, BBC World Service		6190af	6195as	9605as	9740as
					11940af	11945as	12095eu	15190as
					15485eu	15565eu	15575as	17640eu
					17830af	17885af	21470af	21660as
0900	0945		Germany, Deutsche Welle		6160pa	12035af	15410af	15470af
					17715pa	17770pa	17800af	17820as
								21560af
								21680pa
								21790as
0900	1000		Anguilla, Caribbean Beacon		6090am			
0900	1000	vi	Australia, ABC/Alice Springs		2310do			
0900	1000	vi	Australia, ABC/Katherine		2485do			
0900	1000	vi	Australia, ABC/Tennant Creek		2325do			
0900	1000		Australia, Christian Voice		13755as			
0900	1000	vi	Botswana, Radio		7255do	9600do		
0900	1000		Canada, CFRX Toronto ON		6070do			
0900	1000		Canada, CFVP Calgary AB		6030do			
0900	1000		Canada, CHNX Halifax, NS		6130do			
0900	1000		Canada, CKZN St John's NF		6160do			
0900	1000		Canada, CKZU Vancouver BC		6160do			
0900	1000		China China Radio International		11730pa	15210pa		
0900	1000		Costa Rica, R for Peace Intl		7455irr	15049va		
0900	1000		Costa Rica, University Network		5030am	6150am	7375am	9724so
			11870am	13749na	17645as			
0900	1000		Ecuador, HCJB		11775pa	21455usb		
0900	1000	mtwhf	Eq Guinea, Radio Africa		15185af			
0900	1000	as/vl	Eq Guinea, Radio East Africa		15185af			
0900	1000	a/monthly	Finland, Scandv Weekend Radio		11690va			
0900	1000	a	Germany, Good News World R		5985eu	5995eu		
0900	1000		Germany, Overcomer Ministries		13800pa	13810ou		
0900	1000		Germany, Trans World Radio		12070eu			
0900	1000		Germany, Voice of Hope		5975eu	21590me		
0900	1000		Guyana, Voice of		3289do	5949do		
0900	1000	as/vl	Italy, Italian Radio Relay Service		7120va			
0900	1000	vi	Kenya, Kenya BC Corp		4885irr	4915irr		
0900	1000	vi	Lesotho, Radio		4800do			
0900	1000	vi	Liberia, ELWA		4760do			
0900	1000	vi	Liberia, R Liberia International		6100do			
0900	1000		Malaysia, Radio		7295do			
0900	1000		Namibia, Namibian BC Corp		7165af	7215af		
0900	1000		New Zealand, R New Zealand Int		9885pa			
0900	1000		New Zealand, ZLXA		3935do	7290do		
0900	1000	vi	Nigeria, Radio/Enugu		6025do			
0900	1000	vi	Nigeria, Radio/Ibadan		6050do			
0900	1000	vi	Nigeria, Radio/Kaduna		4770do	6090do	7275do	9570do
0900	1000	vi	Nigeria, Radio/Lagos		3326do	4990do		
0900	1000	vi	Nigeria, Voice of		7255af	11770af	15120na	
0900	1000	vi	Papua New Guinea, NBC		4890do	9675irr		
0900	1000	vi	Singapore, SBC Radio One		5020do	6150do		
0900	1000	vi	Solomon Islands, SIBC		5020do			
0900	1000		Sri Lanka, Sri Lanka BC Corp		6130do			
0900	1000		Uganda, Radio		5026do	7110do	7196do	
0900	1000		USA, Armed Forces Radio		6350va	6458va	6847va	12095eu
					13254va	13362va	16847va	17600as
0900	1000		USA, KALJ Dallas TX		5755va			
0900	1000		USA, KTBN Salt Lake City UT		7510na			
0900	1000		USA, KWHR Naalehu HI		11565pa			
0900	1000		USA, Voice of America		11930as	13610as	15150as	
0900	1000		USA, WEWN Birmingham AL		5825na			
0900	1000		USA, WHRA Greenbush ME		11730af			
0900	1000		USA, WHRI Noblesville IN		5745va	7315am		
0900	1000		USA, WJCR Upton KY		7490am			
0900	1000	mtwhf	USA, WRMI Miami FL		9955om			
0900	1000		USA, WSHB Cypress Crk SC		9455eu	9860eu	11615eu	
0900	1000		USA, WTJC Newport NC		9370na			
0900	1000		USA, WWCR Nashville TN		3210na	5070na	5935na	7435na
0900	1000	vi	Vanuatu, Radio		3945do	4960do	7260do	
0900	1000	rt hfa	Vatican City, Vatican Radio		5885eu			
0900	1000		Zambia, Christian Voice		9865do			
0900	1000	v	Zambia, National BC Corp		6165do	6265do	6265do	
0900	1000	vi	Zimbabwe, Zimbabwe BC Corp		5975do	6045do		
0910	0920		Greece, Voice of		12105eu	15630eu		
0915	1000	vi	Ghana, Ghana BC Corp		6130do	4915do		
0915	1000	vi/as	Ghana, Ghana BC Corp		4915do			
0930	1000		Australia, Radio		11880as	13605pa	15240as	21820as
0930	1000		Netherlands, Radio		9790as	12065as	13710as	
0930	1000							

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1000	1030	as	UK, BBC World Service	15190sa	15400af	17830af			
1000	1100		Anguilla, Caribbean Beacon	11775am	2310da				
1000	1100	vl	Australia, ABC/Alice Springs	2485do					
1000	1100	vl	Australia, ABC/Katherine	2325do					
1000	1100	vl	Australia, ABC/Tennant Creek	13775sa	17825sa				
1000	1100		Australia, Christian Voice	13605pa	15240as	17750as	21820as		
1000	1100	as	Australia, Radio	11880as	6035do				
1000	1100	vl	Bhutan, Bhutan BC Service	7255do	9600do				
1000	1100		Batswana, Radio	6070do					
1000	1100		Canada, CFRX Toronto ON	6030do					
1000	1100		Canada, CFVP Calgary AB	6130do					
1000	1100		Canada, CHNX Halifax, NS	6160do					
1000	1100		Canada, CKZN St John's NF	6160do					
1000	1100		Canada, CKZU Vancouver BC	11730pa	15210pa				
1000	1100		China China Radio International	7455irr	15049va				
1000	1100		Costa Rica, R for Peace Intl	5030am	6150am	7375am	9724sa		
1000	1100		Costa Rica, University Network	11870am	13749na	17645sa			
1000	1100		Ecuador, HCJB	11755pa	21455sub				
1000	1100	mtwhf	Eqt Guinea, Radio Africa	15185af					
1000	1100	as/vl	Eqt Guinea, Radio East Africa	15185af					
1000	1100	a/monthly	Finland, Scandv Weekend Radio	11690va					
1000	1100	s	Germany, Deutsche Welle	13640eu					
1000	1100		Germany, Sunshine Radio	6015eu					
1000	1100		Germany, Voice of Hope	21590me					
1000	1100	vl	Ghana, Ghana BC Corp	6130do					
1000	1100	vl/as	Ghana, Ghana BC Corp	4915do					
1000	1100		Guyana, Voice of	5949do					
1000	1100		India, All India Radio	11585as	13700au	15020as	15770au	17845au	
1000	1100		India, All India Radio	17840au	17895au				
1000	1100	as/vl	Italy, Italian Radio Relay Service	7120va					
1000	1100		Japan, Radio	9695pa	15590as	21755pa			
1000	1100		Jordan, Radio	11690eu					
1000	1100	vl	Kenya, Kenya BC Corp	4885irr	4915irr				
1000	1100	vl	Lesotho, Radio	4800do					
1000	1100	vl	Liberia, ELWA	4760do					
1000	1100	vl	Liberia, R Liberia International	6100do					
1000	1100		Malaysia, Radio	7295do					
1000	1100		Namibia, Namibian BC Corp	7165af	7215af				
1000	1100		New Zealand, R New Zealand Int	9885pa					
1000	1100		New Zealand, ZLXA	3935do					
1000	1100	vl	Nigeria, Radio/Enugu	6025do					
1000	1100	vl	Nigeria, Radio/Ibadan	6050do					
1000	1100	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do		
1000	1100	vl	Nigeria, Radio/Lagos	4990do	7285do				
1000	1100	vl	Papua New Guinea, NBC	4890do	9675irr				
1000	1100		Singapore, SBC Radio One	6150do					
1000	1100	vl	Solomon Islands, SIBC	5020do					
1000	1100		Uganda, Radio	5026do	7110do	7196do			
1000	1100		USA, Armed Forces Radio	6350va	6458va	6847va			
1000	1100		USA, Armed Forces Radio	13254va	13362va	16847va			
1000	1100		USA, KAIJ Dallas TX	5755va					
1000	1100		USA, KATN Salt Lake City UT	7510na					
1000	1100		USA, KWHR Naalehu HI	9930as	11565pa				
1000	1100		USA, Voice of America	6165am	7370am	9590am	9770pa	15240as	
1000	1100		USA, WEWN Birmingham AL	7425na	15745eu				
1000	1100		USA, WHRI Noblesville IN	6040na	9495am				
1000	1100		USA, WJCR Upton KY	7490am	13595as				
1000	1100	mtwhfa	USA, WRMI Miami FL	9955am					
1000	1100		USA, WRNO New Orleans LA	7395am					
1000	1100		USA, WSHB Cypress Crk SC	6095am	9455sa	11870as			
1000	1100		USA, WTJC Newport NC	9370na					
1000	1100		USA, WWCR Nashville TN	5070na	5935na	7435na	9475na		
1000	1100	vl	USA, WYFR Okeechobee FL	5950na					
1000	1100	vl	Vanuatu, Radio	3945do	4960do	7260do			
1000	1100	vl	Zambia, Christian Voice	9865do					
1000	1100	vl	Zambia, National BC Corp	6165do	6265do				
1000	1100	vl	Zimbabwe, Zimbabwe BC Corp	5975do	6045do				
1000	1030		Switzerland, Swiss R International	15315eu					
1030	1035		Israel, Kol Israel	15640va	17545va				
1030	1045	mtwhf	Ethiopia, Radio	5990do	7110do	9705do			
1030	1100		Guam, KSDA/ Adventist World R	11560as					
1030	1100		Malaysia, TRM Sarawak	7160do					
1030	1100		Mongolia, Voice of	12085eu					
1030	1100		Netherlands, Radio	6045eu	9760as	9860eu	12065as	13710as	
1030	1100		Palau, KHBN/Voice of Hope	9965as	15725as				
1030	1100		Sri Lanka, Sri Lanka BC Corp	4940do	11835as	15120as	17850as		
1030	1100		UAE, Radio Dubai	13675eu	15370eu	15395eu			
1030	1100		UK, BBC World Service	6190af	6195va	9740as	11760me	11760me	
1030	1100		UK, BBC World Service	11940af	12095eu	15310as	15485eu	17640eu	
1030	1100		UK, BBC World Service	17790as	17885af	21470af			

1100

1100	1105		New Zealand, R New Zealand Int	9885pa					
1100	1105		Pakistan, Radio	17520eu	21465eu				
1100	1120	fa	Kazakhstan, Radio Almaty	9620eu	11840eu				
1100	1127		Vietnam, Voice of	7285as					
1100	1130		Australia, Radio	5995pa	6020pa	9475as	9580va	11650pa	
1100	1130		Australia, Radio	11880as	12080va	13605va	15240as	21820as	
1100	1130		Netherlands, Radio	6045eu	9790as	9860eu	12065as	13710as	
1100	1130		Sri Lanka, Sri Lanka BC Corp	4940do	11835as	15210as	17850as		
1100	1130	mtwhf	UK, BBC Caribbean Report	6195ca	15220ca				
1100	1130		UK, BBC World Service	6190af	6195as	9740as	9815as	11760me	
1100	1130		UK, BBC World Service	11940af	11955as	12095eu	15280as	15485eu	
1100	1130		UK, BBC World Service	15565eu	15575as	17640eu	17700as	17790sa	17830af
1100	1130		UK, BBC World Service	17885af	21470af				

1100	1130	as	UK, BBC World Service	6195am	15190sa	15220am			
1100	1130		Ukraine, R Ukraine International	12040eu	15135na				
1100	1145		Germany, Deutsche Welle	11785af	15410af	17860af	21780af		
1100	1200		Anguilla, Caribbean Beacon	11775am					
1100	1200	vl	Australia, ABC/Alice Springs	2310do					
1100	1200	vl	Australia, ABC/Katherine	2485do					
1100	1200	vl	Australia, ABC/Tennant Creek	2325do					
1100	1200		Australia, Christian Voice	13775sa	17825sa				
1100	1200	vl	Batswana, Radio	7255do	9600do				
1100	1200		Bulgana, Radio	15700eu	17500eu				
1100	1200		Canada, CBC Northern Service	9625do					
1100	1200		Canada, CFRX Toronto ON	6070do					
1100	1200		Canada, CFVP Calgary AB	6030do					
1100	1200		Canada, CHNX Halifax, NS	6130do					
1100	1200		Canada, CKZN St John's NF	6160do					
1100	1200		Canada, CKZU Vancouver BC	6160do					
1100	1200		Costa Rica, R for Peace Intl	7455irr	15049va				
1100	1200		Costa Rica, University Network	11870am	13749na	17645sa			
1100	1200		Ecuador, HCJB	12005am	15115am	21455sub			
1100	1200	mtwhf	Eqt Guinea, Radio Africa	15185af					
1100	1200	as/vl	Eqt Guinea, Radio East Africa	15185af					
1100	1200	a/monthly	Finland, Scandv Weekend Radio	11690va					
1100	1200	s	Germany, Sunshine Radio	6015eu					
1100	1200		Germany, Voice of Hope	21590me					
1100	1200	vl	Ghana, Ghana BC Corp	6130do					
1100	1200	vl/as	Ghana, Ghana BC Corp	4915do					
1100	1200		Guyana, Voice of	5949do					
1100	1200		Iran, VOIRI	15385as	15430as	15585as	21470as	21730as	
1100	1200	as/vl	Italy, Italian Radio Relay Service	7120va					
1100	1200		Japan, Radio	6120na	9695pa	15590as			
1100	1200		Jordan, Radio	11690eu					
1100	1200		Kenya, Kenya BC Corp	4885irr	4915irr				
1100	1200	vl	Lesotho, Radio	4800do					
1100	1200	vl	Liberia, ELWA	4760do					
1100	1200	vl	Liberia, R Liberia International	6100do					
1100	1200		Malaysia, Radio	7295do					
1100	1200		Malaysia, TRM Sarawak	7160do					
1100	1200		Namibia, Namibian BC Corp	7165af	7215af				
1100	1200		New Zealand, ZLXA	3935do					
1100	1200	vl	Nigeria, Radio/Enugu	6025do					
1100	1200	vl	Nigeria, Radio/Ibadan	6050do					
1100	1200	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do		
1100	1200	vl	Nigeria, Radio/Lagos	4990do	7285do				
1100	1200	vl	Papua New Guinea, NBC	4890do	9675irr				
1100	1200		Singapore, SBC Radio One	6150do					
1100	1200		Solomon Islands, SIBC	5020do					
1100	1200		Switzerland, Swiss R International	13735as	21770as				
1100	1200		Taiwan, Radio Taipei International	7445as	11905as				
1100	1200		Taiwan, Voice of Asia	7445as					
1100	1200		Uganda, Radio	5026do	7110do	7196do			
1100	1200		USA, Armed Forces Radio	6350va	6458va	6847va			
1100	1200		USA, Armed Forces Radio	13254va	13362va	16847va			
1100	1200		USA, KAIJ Dallas TX	5755va					
1100	1200		USA, KATN Salt Lake City UT	7510na					
1100	1200		USA, KWHR Naalehu HI	9930as	11565pa				
1100	1200		USA, Voice of America	6160as	9645as	9760as	9770pa	15160as	
1100	1200		USA, WEWN Birmingham AL	7425na	15745eu				
1100	1200		USA, WHRI Noblesville IN	6040na	9495am				
1100	1200	a s	USA, WINB Red Lion PA	13750am					
1100	1200	mtwhfa	USA, WJCR Upton KY	7490am	13595as				
1100	1200		USA, WRMI Miami FL	9955am					
1100	1200		USA, WRNO New Orleans LA	7395am					
1100	1200		USA, WSHB Cypress Crk SC	6095am	9455am	11590am	11660am		
1100	1200		USA, WTJC Newport NC	9370na					
1100	1200		USA, WWCR Nashville TN	5070na	5935na	7435na	9475na		
1100	1200		USA, WYFR Okeechobee FL	5950na					
1100	1200	vl/s	Vanuatu, Radio	3945do	4960do	7260do			
1100	1200	vl	Zambia, Christian Voice	9865do					

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1200	1220	as	UK, BBC World Service	6195am	15220am			
1200	1225		Netherlands, Radio	6045eu	9860eu			
1200	1230		France R France International	15540eu	25820af			
1200	1230		Iran, VOIRI	15385as	15430as	15585as	21470as	21730as
1200	1230		Philippines, FEBC	15110as				
1200	1230		Sri Lanka, Sri Lanka BC Corp		4940do			
1200	1230		Switzerland, Swiss R International		15315eu			
1200	1230		Uzbekistan, Radio Tashkent		7285as	9715as	15295as	17775as
1200	1245		USA, WYFR Okeechobee FL	5850na	5950na	17750na		
1200	1255		Poland, Radio Polonia	6095eu	7270eu	9525eu	11820eu	
1200	1256		North Korea, Voice of Korea		3560va	9640va	9850va	9975va
				11334va	13650va			
1200	1300		Anguilla, Caribbean Beacon		11775am			
1200	1300	vl	Australia, ABC/Alice Springs		2310do			
1200	1300	vl	Australia, ABC/Katherine		2485do			
1200	1300	vl	Australia, ABC/Tennant Creek		2325do			
1200	1300		Australia, Christian Voice		13775as	13795as		
1200	1300		Australia, Radio	5995pa	6020pa	9475as	9580as	11650va
				11880as	21820as			
1200	1300		Bangladesh, Bangla Betar		7185as	9550as		
1200	1300	vl	Botswana, Radio	7255do	9600do			
1200	1300		Canada, CBC Northern Service		9625do			
1200	1300		Canada, CFRX Toronto ON		6070do			
1200	1300		Canada, CFYP Calgary AB		6030do			
1200	1300		Canada, CHNX Halifax, NS		6130do			
1200	1300		Canada, CKZN St John's NF		6160do			
1200	1300		Canada, CKZU Vancouver BC		6160do			
1200	1300		Canada, R Canada International		9660as	15190as		
1200	1300	mtwhf	Canada, R Canada International		9640am	9640am	15305am	17820am
1200	1300		China China Radio International		9730as	9760pa	11675pa	11980as
					15415pa			
1200	1300		Costa Rica, R for Peace Intl		7455ir	21815usb		
1200	1300		Costa Rica, University Network		5030am	6150am	7375am	9724sa
					11870am	13749na	17645as	
1200	1300	os/vl	Ecuador, HCJB		12005am	15115am	21455usb	
1200	1300	a/monthly	Egt. Guinea, Radio East Africa		15185af			
1200	1300		Finland, Scandv Weekend Radio		11720va			
1200	1300	s	Germany, Deutsche Welle		13640eu			
1200	1300		Germany, Sunshine Radio		6015eu			
1200	1300	vl	Germany, Voice of Hope 15715me					
1200	1300		Ghana, Ghana BC Corp		4915do	6130do		
1200	1300	os/vl	Guyana, Voice of		5949do			
1200	1300		Italy, Italian Radio Relay Service		7120va			
1200	1300		Jordan, Radio		11690eu			
1200	1300	vl	Kenya, Kenya BC Corp		4885irr	4915irr		
1200	1300	vl	Lesotho, Radio		4800do			
1200	1300	vl	Liberia, ELWA		4760do			
1200	1300	vl	Liberia, R Liberia International		6100do			
1200	1300		Malaysia, Radio		7295do			
1200	1300		Namibia, Namibian BC Corp		7165af	7215af		
1200	1300		New Zealand, R New Zealand Int		11675as			
1200	1300	vl	New Zealand, ZLXA		3935do			
1200	1300	vl	Nigeria, Radio/Enugu		6025do			
1200	1300	vl	Nigeria, Radio/Ibadan		6050do			
1200	1300	vl	Nigeria, Radio/Kaduna		4770do	6090do	7275do	9570do
1200	1300	vl	Nigeria, Radio/Lagos		4990do	7285do		
1200	1300	vl	Palau, KHBN/Voice of Hope		9965as			
1200	1300	vl	Papua New Guinea, NBC		4890do	9675irr		
1200	1300		Singapore, R Singapore Intl		6150as	9600as		
1200	1300		Taiwan, Radio Taipei International		7130as	9610au		
1200	1300		Uganda, Radio		5026do	7110do	7196do	
1200	1300		USA, Armed Forces Radio		4278va	4319va	4993va	5765va
					6350va	6458va	6847va	10320va
					13254va	13362va	16847va	10940va
1200	1300		USA, KAIJ Dallas TX		13815va			
1200	1300		USA, KTNB Salt Lake City UT		7510na			
1200	1300		USA, KWHR Naalehu HI		9930as	11565pa		
1200	1300		USA, Voice of America		6160as	9645as	9760as	15160as
					15425as			15240as
1200	1300		USA, WEWN Birmingham AL		7425na	15745eu		
1200	1300		USA, WHRI Noblesville IN		6040na	9495am		
1200	1300		USA, WINB Red Lion PA		13570am			
1200	1300		USA, WJCR Upton KY		7490am	13595as		
1200	1300	mtwhf	USA, WRMI Miami FL		15724na			
1200	1300	s	USA, WRMI Miami FL		9955am			
1200	1300		USA, WRNO New Orleans LA		7395am			
1200	1300		USA, WSHB Cypress Crk SC		6095am	9455am	9875as	11590am
					11660am	17635as		
1200	1300		USA, WTJC Newport NC		9370na			
1200	1300		USA, WWCR Nashville TN		7435na	12160na	13845na	15685na
1200	1300	vl/s	USA, WWFV McCaysville GA		12172va			
1200	1300		Vanuatu, Radio		3945do	7260do		
1200	1300		Zambia, Christian Voice		9865do			
1200	1300	vl	Zambia, National BC Corp		6165do	6265do		
1200	1300	vl	Zimbabwe, Zimbabwe BC Corp		5975do	6045do		
1205	1210		Croatia, The Voice of Croatia		6165eu	9830eu	13830eu	
1215	1300		Egypt, Radio Cairo		17595as			
1220	1300		UK, BBC World Service	6190af	6195as	9740as	9815as	11760me
				11940af	11955as	12095eu	15220am	15280as
				15656eu	15575as	17640eu	17700as	15310as
							17830af	15485eu
								21470af
1230	1257		Vietnam, Voice of		12019as			
1230	1300		Finland, YLE/Radio Finland		15400no	17670na		
1230	1300		Germany, Overcomer Ministries		6110eu			
1230	1300		Italy/Adv World Radio Europe		9610eu			
1230	1300		Sri Lanka, Sri Lanka BC Corp		4940do	6005as	6075as	9770as
					15425as			
1230	1300		Sweden, Radio		17505as	18960na	21530as	
1230	1300		Thailand, Radio		9655as	9885as	11905as	
1230	1300		Turkey, Voice of		17810as	17830eu		
1230	1300	a	UK, Wales Radio Intl/Merlin		17810au			

1245	1300	a	Seychelles, FEBA Radio	15535me				
1245	1300		USA, WYFR Okeechobee FL		17750na			
1255	1300	mtwhf	Taiwan, CBS	6180as	7250as	9630as	11725as	11775as

1300									
1300	1305		New Zealand, R New Zealand Int		11675as				
1300	1329		Czech Rep, Radio Prague Intl		13580eu	21745as			
1300	1330		Australia, Radio		5995pa	6020pa	9475as	9580va	11650va
					11880as	21820as			
1300	1330		Egypt, Radio Cairo		17595as				
1300	1330	s	Germany, Universal Life		9955na				
1300	1330		Guam, KSDA/ Adventst World R		15385as				
1300	1330		Turkey, Voice of		17810as				
1300	1400		Anguilla, Caribbean Beacon		11775am				
1300	1400	vl	Australia, ABC/Alice Springs		2310do				
1300	1400	vl	Australia, ABC/Katherine		2485do				
1300	1400	vl	Australia, ABC/Tennant Creek		2325do				
1300	1400		Australia, Christian Voice		13775as	13795as			
1300	1400	vl	Botswana, Radio		7255do	9600do			
1300	1400		Canada, CBC Northern Service		9625do				
1300	1400		Canada, CFRX Toronto ON		6070do				
1300	1400		Canada, CFYP Calgary AB		6030do				
1300	1400		Canada, CHNX Halifax, NS		6130do				
1300	1400		Canada, CKZN St John's NF		6160do				
1300	1400		Canada, CKZU Vancouver BC		6160do				
1300	1400	mtwhf	Canada, R Canada International		9640am	9640am	15305am		
1300	1400	as	Canada, R Canada International		17820am				
1300	1400		Canada, R Canada International		17800am				
1300	1400		China China Radio International		7405na	9570na	11675pa	11900pa	
					11980as	15180as			
1300	1400		China, Voice of Hope		13820as				
1300	1400		Costa Rica, R for Peace Intl		15049irr	21815usb			
1300	1400		Costa Rica, University Network		5030am	6150am	7375am	9724sa	
					11870am	13749na	17645as		
1300	1400	as/vl	Ecuador, HCJB		12005am	15115am	21455usb		
1300	1400	a/monthly	Egt. Guinea, Radio East Africa		15185af				
1300	1400		Finland, Scandv Weekend Radio		11720va				
1300	1400		Germany, Deutsche Welle		13640eu				
1300	1400		Germany, Overcomer Ministries		6110eu	13810af			
1300	1400	s	Germany, Sunshine Radio		6015eu				
1300	1400		Germany, Voice of Hope 15715me						
1300	1400	vl	Ghana, Ghana BC Corp		4915do	6130do			
1300	1400	as/vl	Guyana, Voice of		5949do				
1300	1400		Italy, Italian Radio Relay Service		7120va				
1300	1400		Jordan, Radio		11690eu				
1300	1400	vl	Kenya, Kenya BC Corp		4885irr	4915irr			
1300	1400	vl	Lesotho, Radio		4800do				
1300	1400	vl	Liberia, ELWA		4760do				
1300	1400	vl	Liberia, R Liberia International		6100do				
1300	1400		Malaysia, Radio		7295do				
1300	1400		Namibia, Namibian BC Corp		7165af	7215af			
1300	1400	vl	New Zealand, ZLXA		3935do				
1300	1400	vl	Nigeria, Radio/Enugu		6025do				
1300	1400	vl	Nigeria, Radio/Kaduna		4770do	6090do	7275do	9570do	
1300	1400	vl	Nigeria, Radio/Lagos		4990do	7285do			
1300	1400	vl	Palau, KHBN/Voice of Hope		9965as				
1300	1400	vl	Papua New Guinea, NBC		4890do	9675irr			
1300	1400	as	S Africa, Channel Africa		11720af	17780af	21725af		
1300	1400		Singapore, R Singapore Intl		6150as	9600as			
1300	1400		South Korea, R Korea Intl		9570as	13670am			
1300	1400		Sri Lanka, Sri Lanka BC Corp		4940da	6005as	6075as	9770as	
					15425as				
1300	1400		Uganda, Radio		4976do	5026do			
1300	1400		UK, BBC World Service		6190af	9740as	9815as	11760me	11940af
					12095eu	12095eu	15220am	15310as	15485eu
					15575me	17640eu	17700as	17830af	15656eu
									21470af
1300	1400		USA, Armed Forces Radio		4278va	4319va	4993va	5765va	
					6350va	6458va	6847va	10320va	
					13254va	13362va	16847va	10940va	
1300	1400		USA, KAIJ Dallas TX		13815va				
1300	1400		USA, KJES Vado NM		11715na				
1300	1400		USA, KNLS Anchor Point AK						

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1330	1400	India, All India Radio	9690as	11620as	13710as		
1330	1400	Sweden, Radio	17505va	18960na			
1330	1400	UAE, Radio Dubai	13630eu	13675eu	15395eu	21605eu	
1330	1400	UK, BBC World Service	6190af	6195va	9740as	9815as	11760me
		11940af 12095eu	15220am	15310as	15420af	15485eu	15565eu
		15575me 17640eu	17700as	17830af	17885af	21470af	
1330	1400	Uzbekistan, Radio Tashkent		7285as	9715as	15295as	17775as

1400

1400	1430	Ecuador, HCJB	12005am	15115am	21455usb		
1400	1430	Guam, KSDA/ Adventist World R		17720as			
1400	1430	Thailand, Radio	9655as	9830as	11905as		
1400	1430	UK, BBC World Service	15245as				
1400	1430	USA, Voice of America	18275va				
1400	1456	Romania, R Romania International	15250eu	17735eu			
1400	1500	Anguilla, Caribbean Beacon		11775om			
1400	1500	Australia, ABC/Alice Springs		2310do			
1400	1500	Australia, ABC/Katherine		2485do			
1400	1500	Australia, ABC/Tennant Creek		2325do			
1400	1500	Australia, Christian Voice		13730as	13795as		
1400	1500	Australia, Radio	5995va	9580va	11660as		
1400	1500	Botswana, Radio	7255do	9600do			
1400	1500	Cameroon, CRTV Radio Buea		6005do			
1400	1500	Canada, CBC Northern Service		9625do			
1400	1500	Canada, CFRX Toronto ON		6070do			
1400	1500	Canada, CFVP Calgary AB		6030do			
1400	1500	Canada, CHNX Halifax, NS		6130do			
1400	1500	Canada, CKZN St John's NF		6160do			
1400	1500	Canada, CKZU Vancouver BC		6160do			
1400	1500	Canada, R Canada International		9640am	15305am		
1400	1500	Canada, R Canada International		17820am			
1400	1500	Canada, R Canada International		1780am			
1400	1500	China China Radio International	11765as	13685af	15125af		
1400	1500	China, Voice of Hope	13820as				
1400	1500	Costa Rica, R for Peace Intl		15049irr	21815usb		
1400	1500	Costa Rica, University Network	11870am	13749na	17645as		
1400	1500	Eqt. Guinea, Radio East Africa		15185af			
1400	1500	Finland, Scandy Weekend Radio		11720va			
1400	1500	France R France International		11610me	17620as		
1400	1500	Germany, Deutsche Welle		13640eu			
1400	1500	Germany, Overcomer Ministries		17490eu			
1400	1500	Germany, Overcomer Ministries		6110eu	13810af		
1400	1500	Germany, Voice of Hope 15715me		17550as			
1400	1500	Ghana, Ghana BC Corp		4915do	6130do		
1400	1500	Guyana, Voice of		5949do			
1400	1500	India, All India Radio	9690as	11620as	13710as		
1400	1500	Italy, Italian Radio Relay Service		7120va			
1400	1500	Japan, Radio	7200pa	9505na	11730as	17755me	
1400	1500	Jordan, Radio		11690na	17680af		
1400	1500	Kenya, Kenya BC Corp		4885irr	4915irr		
1400	1500	Lesotho, Radio		4800do			
1400	1500	Liberia, ELWA		4760do			
1400	1500	Liberia, R Liberia International		6100do			
1400	1500	Malaysia, Radio		7295do			
1400	1500	Malaysia, RTM Sarawak		7160do			
1400	1500	Namibia, Namibian BC Corp		7165af	7215af		
1400	1500	New Zealand, R New Zealand Int		6095pa			
1400	1500	New Zealand, ZLXA		3935do			
1400	1500	Nigeria, Radio/Enugu		6025do			
1400	1500	Nigeria, Radio/Ibadan		6050do			
1400	1500	Nigeria, Radio/Kaduna		4770do	6090do	7275do	9570do
1400	1500	Nigeria, Radio/Lagos		4990do	7285do		
1400	1500	Oman, Radio Sultanate of		15140va			
1400	1500	Palau, KHBN/Voice of Hope		9965as			
1400	1500	Russia, Voice of Russia WS		9495as	12055as	15510as	
1400	1500	S Africa, Channel Africa	11720af	17780af	21725af		
1400	1500	Singapore, SBC Radio One		6150do			
1400	1500	Sri Lanka, Sri Lanka BC Corp		4940do	6005as	6075as	9770as
1400	1500	Switzerland, Swiss R International		9575as	17680as		
1400	1500	Taiwan, Radio Taipei International		15265as			
1400	1500	Uganda, Radio		4976do	5026do		
1400	1500	UK, BBC World Service	6190af	6195as	9740as	9815as	11940af
1400	1500	12095eu 15310as 15485eu	17830af	17840am	21470af	21660af	17700as
1400	1500	USA, Armed Forces Radio	6350va	6458va	6847va	10320va	4319va 4993va 5765va 12689va
			13254va	13362va	16847va		
1400	1500	USA, KAIJ Dallas TX		13815va			
1400	1500	USA, KJES Vado NM		11715na			
1400	1500	USA, KTBN Salt Lake City UT		7510na			
1400	1500	USA, KWHR Naalehu HI		9930as	11565pa		
1400	1500	USA, Voice of America		6160as	7125as	9645as	9760as 15160as
		15255va 15425as					
1400	1500	USA, WBCQ Monticello ME		17494na			
1400	1500	USA, WEWN Birmingham AL		11875na			
1400	1500	USA, WHRI Noblesville IN		6040na	15105am		
1400	1500	USA, WINB Red Lion PA		13750am			
1400	1500	USA, WJCR Upton KY		7490am	13595as		
1400	1500	USA, WRMI Miami FL		15724na			
1400	1500	USA, WRMI Miami FL		9955am			
1400	1500	USA, WRNO New Orleans LA		7395am			
1400	1500	USA, WTJC Newport NC		9370na			
1400	1500	USA, WWCN Nashville TN		9475na	12160na	13845na	15685na
1400	1500	USA, WWFV McCaysville GA		12172va			
1400	1500	USA, WYFR Okeechobee FL		11550as	11830na	11970na	17750na

1400	1500	Zambia, Christian Voice	9865do				
1400	1500	Zambia, National BC Corp		6165do	6265do		
1400	1500	Zimbabwe, Zimbabwe BC Corp		5975do	6045do		
1415	1420	Nepal, Radio 500Sas		7165as			
1430	1500	Guam, KTWV/ Trans World R		15330as			
1430	1500	Malaysia, RTM Kota Kinabalu		5980do			
1430	1500	Myanmar, Radio		5985do			
1430	1500	Netherlands, Radio		9890as	11835as	12075as	

1500

1500	1530	Australia, Radio	5995va	9580va	11650va	11660as	
1500	1530	Germany, Voice of Hope	17550as				
1500	1530	Mexico, R Mexico International		9705am	11770am		
1500	1530	Mongolia, Voice of		12015as	12085as		
1500	1530	S Africa, Channel Africa		17770af			
1500	1530	Seychelles, FEBA Radio		11600as			
1500	1530	UK, BBC World Service	5975as	6190af	6195as	9740as	11860af
		11940af 12095eu 15310as	17700as	17830af	17840am	21470af	21490af 21660af
1500	1530	USA, VOA Special English		6160as	9590as	9760as	9845as
		12040as 15550as					
1500	1556	North Korea, Voice of Korea		4405va	6574na	9335na	11710na
		13760na					
1500	1559	Canada, R Canada International		15455as	17720as		
1500	1559	Canada, CBC Northern Service		9640am	15305am	17800am	
1500	1600	Anguilla, Caribbean Beacon		11775am			
1500	1600	Australia, ABC/Alice Springs		2310do			
1500	1600	Australia, ABC/Katherine		2485do			
1500	1600	Australia, ABC/Tennant Creek		2325do			
1500	1600	Australia, Christian Voice		13730as	13795as		
1500	1600	Botswana, Radio		7255do	9600do		
1500	1600	Canada, CBC Northern Service		9625do			
1500	1600	Canada, CFRX Toronto ON		6070do			
1500	1600	Canada, CFVP Calgary AB		6030do			
1500	1600	Canada, CHNX Halifax, NS		6130do			
1500	1600	Canada, CKZN St John's NF		6160do			
1500	1600	Canada, CKZU Vancouver BC		6160do			
1500	1600	China China Radio International		7160as	7405na	9785as	13685af
		15125af					
1500	1600	China, Voice of Hope	13820as				
1500	1600	Costa Rica, R for Peace Intl		15049irr	21815usb		
1500	1600	Costa Rica, University Network	11870am	13749na	17645as		
1500	1600	Eqt. Guinea, Radio East Africa		15185af			
1500	1600	Finland, Scandy Weekend Radio		11720va			
1500	1600	Germany, Deutsche Welle		13640eu			
1500	1600	Germany, Overcomer Ministries		17490eu			
1500	1600	Germany, Overcomer Ministries		5110eu	13810af		
1500	1600	Germany, Voice of Hope 15715me		17550as			
1500	1600	Ghana, Ghana BC Corp		4915do	6130do		
1500	1600	Guam, KTWV/ Trans World R		15330as			
1500	1600	Guyana, Voice of		5949do			
1500	1600	Japan, Radio		7200pa	9750as	11730as	
1500	1600	Jordan, Radio		11690na	17680af		
1500	1600	Kenya, Kenya BC Corp		4885irr	4915irr		
1500	1600	Lesotho, Radio		4800do			
1500	1600	Liberia, ELWA		4760do			
1500	1600	Liberia, R Liberia International		6100do			
1500	1600	Malaysia, Radio		7295do			
1500	1600	Malaysia, RTM Kota Kinabalu		5980do			
1500	1600	Malaysia, RTM Sarawak		7160do			
1500	1600	Myanmar, Radio		5985do			
1500	1600	Namibia, Namibian BC Corp		7165af	7215af		
1500	1600	Netherlands, Radio		9890as	11835as	12075as	
1500	1600	New Zealand, R New Zealand Int		6095pa			
1500	1600	New Zealand, ZLXA		3935do			
1500	1600	Nigeria, Radio/Enugu		6025do			
1500	1600	Nigeria, Radio/Ibadan		6050do			
1500	1600	Nigeria, Radio/Kaduna		4770do	6090do	7275do	9570do
1500	1600	Nigeria, Radio/Lagos		4990do	7285do		
1500	1600	Russia, Voice of Russia WS		9490me	4965me	4975me	7325me
1500	1600	9730eu 11500as 11985me					

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1500	1600	vi	Zambia, National BC Corp	6165do	6265do				
1500	1600	vi	Zimbabwe, Zimbabwe BC Corp	5975do	6045do				
1530	1545		Seychelles, FEBA Radio	11600as					
1530	1600		Australia, Radio	5995va	9475as	9580va	11650va	11660as	
1530	1600		Austria, AWR Europe	7165eu	17660as				
1530	1600		Austria, R Austria International	6155eu	13730eu	17865no			
1530	1600	vi	Botswana, Radio	3356do	4820do	7255do			
1530	1600		Georgia, Georgian Radio	6180me					
1530	1600		Iran, VOIRI	7245as	9635as	11775na			
1530	1600	mtwhf	S Africa, World Beacon	6145af					
1530	1600		UK, BBC World Service	5975as	6190af	6195as	9740as	9615as	
1530	1600		11940af 12095eu	15310as	15400af	15485eu	15565eu	17700as	
1530	1600		17830af 17840am	21470af	21660af				
1545	1600	smtw o	Seychelles, FEBA Radio	11600as					
1550	1600		Vatican City, Vatican Radio	12065au	13765au	15235au			

1600

1600	1610		Vatican City, Vatican Radio	12065au	13765au	15235au			
1600	1615		Pakistan, Radio	11570me	15100af	15725af	17720af		
1600	1625		Netherlands, Radio	9890as	11835as	12075as			
1600	1627		Czech Rep, Radio Prague Intl	5930eu	21745af				
1600	1630		Iran, VOIRI	7245as	9635as	11775na			
1600	1630		Israel, Kol Israel	15615va		21670va			
1600	1630		Jordan, Radio	11690na	17680af				
1600	1630		Mexico, R Mexico International	9705am	11770am				
1600	1630		S Africa, Channel Africa	9525af					
1600	1630		UK, BBC World Service	3915as	5975as	6190af	6195as	7:60as	
1600	1630		9410eu 9740as	11940af	12095eu	15310as	15400af	15485eu	
1600	1630		15565eu 17700as	17830af	17840am	21470af	21660af		
1600	1630	vi	Zimbabwe, Zimbabwe BC Corp	5975do	6045do				
1600	1640		UAE, Radio Dubai	13630eu	13675eu	15395eu	21605eu		
1600	1645		Germany, Deutsche Welle	6140eu	6170as	7225as	9735af		
1600	1650	occsnal	New Zealand, R New Zealand Int	6095pa					
1600	1656		North Korea, Voice of Korea	3560va	6520va	9660va	9975va		
1600	1700		Algeria, R Algiers International	11715va	15160va				
1600	1700		Anguilla, Caribbean Beacon	11775am					
1600	1700	vi	Australia, ABC/Alice Springs	2310do					
1600	1700	vi	Australia, ABC/Katherine	2485do					
1600	1700	vi	Australia, ABC/Tennant Creek	2325do					
1600	1700		Australia, Christian Voice	13730as	13795as				
1600	1700		Australia, Radio	5995va	9475as	9580va	11650va	1:660as	
1600	1700	vi	Botswana, Radio	3356do	4820do	7255do			
1600	1700		Canada, CBC Northern Service	9625do					
1600	1700		Canada, CFRX Toronto ON	6070do					
1600	1700		Canada, CFVP Calgary AB	6030do					
1600	1700		Canada, CHNX Halifax, NS	6130do					
1600	1700		Canada, CKZN St John's NF	6160do					
1600	1700		Canada, CKZU Vancouver BC	6160do					
1600	1700		China China Radio International	7190af	13650af				
1600	1700		Costa Rica, R for Peace Intl	15049irr	21815usb				
1600	1700		Costa Rica, University Network	5030am	6150am	7375am	9724sa		
1600	1700		11870am 13749na						
1600	1700		Ethiopia, Radio	7165af	9560af				
1600	1700	a/monthly	Finland, Scandv Weekend Radio	11690va					
1600	1700		France R France International	11615af	11995af	12015af	15605af		
1600	1700		17605af 17850af						
1600	1700	a	Germany, Good News World R	15105af					
1600	1700	os	Germany, Overcomer Ministries	17490eu					
1600	1700	vi	Ghana, Ghana BC Corp	4915do	6130do				
1600	1700	a	Greece, Voice of	9420eu	15630eu	17705na			
1600	1700		Guam, KSDA/Adventist World R	11850as					
1600	1700		Guyana, Voice of	5949do					
1600	1700		Kenya, Kenya BC Corp	4885irr	4915irr				
1600	1700	vi	Lesotho, Radio	4800do					
1600	1700	vi	Liberia, ELWA	4760do					
1600	1700	vi	Liberia, R Liberia International	6100do					
1600	1700		Malaysia, Radio	7295do					
1600	1700		Namibia, Namibian BC Corp	7165af	7215af				
1600	1700		New Zealand, ZLXA	3935do					
1600	1700	vi	Nigeria, Radio/Enugu	6025do					
1600	1700	vi	Nigeria, Radio/Ibadan	6050do					
1600	1700	vi	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do		
1600	1700	vi	Nigeria, Radio/Lagos	3326do	4990do				
1600	1700		Russia, Voice of Russia WS	9875as	11985me	12055as	15540me		
1600	1700		S Africa, World Beacon	6145af					
1600	1700		South Korea, R Korea Intl	5975om	6150eu	9515af	9870af		
1600	1700		Sri Lanka, Sri Lanka BC Corp	4940do					
1600	1700		Taiwan, Radio Taipei International	11550as					
1600	1700		Uganda, Radio	4976do	5026do				
1600	1700	a	UK, Merlin Network One	6175eu					
1600	1700		UK, World Beacon	15455eu					
1600	1700		USA, Armed Forces Radio	4278va	4319va	4993va	5765va		
1600	1700		6350va 6458va	6847va	10320va	10940va	12579va	12689va	
1600	1700		13254va 13362va	16847va					
1600	1700		USA, KAU Dallas TX	13815va					
1600	1700		USA, KTBN Salt Lake City UT	15590na					
1600	1700		USA, KWHR Naalehu HI	9930as					
1600	1700		USA, VOA Special English	13600af	15445af	17895af			
1600	1700		USA, Voice of America	6035af	6160as	7125as	9645as	9700me	
1600	1700		9760as 13605af	13710af	15205eu	15225af	15255va	15410af	
1600	1700		USA, WBCQ Monticello ME	1749na					
1600	1700		USA, WEWN Birmingham AL	11875na	13615na	15745eu			
1600	1700		USA, WHRA Greenbush ME	17650af					
1600	1700		USA, WHRI Noblesville IN	13760va	15105am				
1600	1700		USA, WINB Red Lion PA	13570am					
1600	1700		USA, WJCR Upton KY	7490am	13595as				
1600	1700		USA, WMLK Bethel PA	15265eu					

1600	1700	mtwhfo	USA, WRMI Miami FL	15724na					
1600	1700	s	USA, WRMI Miami FL	9955om					
1600	1700		USA, WRNO New Orleans LA	7395am	15420af				
1600	1700		USA, WSHB Cypress Crk SC	18910af					
1600	1700		USA, WTJC Newport NC	9370na					
1600	1700		USA, WWCR Nashville TN	9475na	12160na	3845na	15685na		
1600	1700		USA, WWFV McCaysville GA	12172va					
1600	1700		USA, WYFR Okeechobee FL	11830na	17750na	18980eu	21455eu		
1600	1700		21525af						
1600	1700		Zambia, Christian Voice	4965do					
1600	1700	vi	Zambia, National BC Corp	6165do	6265do				
1615	1630		Vatican City, Vatican Radio	4005eu	5885eu	7250eu	9645eu		
1615	1700	as	UK, BBC World Service	11860af	21490af				
1625	1640		Armenia, Trans World Radio	5855me					
1630	1657		Vietnam, Voice of	9730eu	11630do	13740eu			
1630	1700	vi	Cameroon, CRTV Radio Buea	6005do					
1630	1700		Egypt, Radio Carro	15255af					
1630	1700	s	Seychelles, FEBA Radio	11605as					
1630	1700		Slovakia, R Slovakia International	5920eu	6055eu	7345eu			
1630	1700	as	UK, BBC World Service	11860af	21490af				
1630	1700		UK, BBC World Service	3915as	5975as	6109af	6195as	7160as	
1630	1700		9410eu 9740as	11940af	12095eu	15310as	15400af	15420af	
1630	1700		15485eu 15565eu	17700as	17830af	17840am	21470af	21660af	
1630	1700	f	UK, Merlin Network One	11535as					
1630	1700	mtwh	UK, Merlin Network One	11590as					
1630	1700	as	UK, Merlin Network One	11540as					
1630	1700	vi	Zimbabwe, Zimbabwe BC Corp	4828do	6045do				
1645	1700		Germany, Deutsche Welle	6140eu					
1650	1700	mtwhf	New Zealand, R New Zealand Int	6095as					

1700

1700	1727		Czech Rep, Radio Prague Intl	5930eu	21745af				
1700	1727		Vietnam, Voice of	12070eu					
1700	1730		Azerbaijan, Voice of	6110eu	9155eu				
1700	1730		France R France International	15605af	17605af				
1700	1730		Germany, Overcomer Ministries	6110eu					
1700	1730		S Africa, Channel Africa	17870af					
1700	1746		UK, BBC World Service	3255af	3915as	5975as	6035af	6190af	
1700	1755		6195eu 7160as	9410eu	9510as	9630af	9740as	12095eu	
1700	1756		15400af 15420af	15485eu	15575me	17830af	21470af		
1700	1800		Poland, Radio Polonia	6000eu	7285eu				
1700	1800		Romania, R Romania International	11740eu	15365eu	15380eu	17805eu		
1700	1800	vi	Anguilla, Caribbean Beacon	11775am					
1700	1800	vi	Australia, ABC/Alice Springs	2310do					
1700	1800	vi	Australia, ABC/Katherine	2485do					
1700	1800	v	Australia, ABC/Tennant Creek	2325do					
1700	1800		Australia, Christian Voice	9720as	11890as				
1700	1800		Australia, Radio	5995va	9475as	9580va	9655va	9815as	
1700	1800		11880va						
1700	1800	vi	Botswana, Radio	3356do	4820do	7255do			
1700	1800		Canada, CBC Northern Service	9625do					
1700	1800		Canada, CFRX Toronto ON	6070do					
1700	1800		Canada, CFVP Calgary AB	6030do					
1700	1800		Canada, CHNX Halifax, NS	6130do					
1700	1800		Canada, CKZN St John's NF	6160do					
1700	1800		Canada, CKZU Vancouver BC	6160do					
1700	1800		China China Radio International	7150af	9570af	9670af	9695af		
1700	1800		11910af 15365af						
1700	1800		Costa Rica, R for Peace Intl	15049irr	21815usb				
1700	1800		Costa Rica, University Network	5030am	6150am	7375am	9724sa		
1700	1800		11870am 13749na	17645as					
1700	1800		Egypt, Radio Carro	15255af					
1700	1800	mtwhf	Eqt Guinea, Radio Africa	15185af					
1700	1800	a/monthly	Finland, Scandv Weekend Radio	11690va					
1700	1800		Germany, Deutsche Welle	6140eu					</

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1700	1800		USA, KAIJ Dallas TX	13815va					
1700	1800		USA, KTBN Salt Lake City UT		15590na				
1700	1800		USA, KWHR Naalehu HI	9930as					
1700	1800		USA, Voice of America	6160as	7125as	7170as	9645as	9700me	
			9760af	15255va	15410af	15445af	17895af		
1700	1800	mtwhf	USA, Voice of America	5990as	6045as	7215as	9550as	9770as	
			9785as						
1700	1800		USA, WBCQ Monticello ME	17494na					
1700	1800		USA, WEWN Birmingham AL	11875na	13615na	15745eu			
1700	1800		USA, WHRA Greenville ME	17650af					
1700	1800		USA, WHRI Noblesville IN	9495am	13760va				
1700	1800		USA, WINB Red Lion PA	13570am					
1700	1800		USA, WJCR Upton KY	7490am	13595as				
1700	1800		USA, WMLK Bethel PA	15265eu					
1700	1800	mtwhf	USA, WRMI Miami FL	15724na					
1700	1800		USA, WRNO New Orleans LA	7395am	15420af				
1700	1800		USA, WSHB Cypress Crk SC	18910af					
1700	1800		USA, WTJC Newport NC	9370na					
1700	1800		USA, WWCR Nashville TN	9475na	12160na	13845na	15685na		
1700	1800		USA, WWFV McCaysville GA	12172va					
1700	1800		USA, WYFR Okeechobee FL	13855af	18980eu	21455eu			
1700	1800		Zambia, Christian Voice	4965do					
1700	1800	vi	Zambia, National BC Corp	6165do	6265do				
1700	1800	vi	Zimbabwe, Zimbabwe BC Corp	4828do	6045do				
1725	1740		Germany, Trans World Radio	5855eu					
1725	1745	mtwhf	UK, United Nations Radio	6125af	15265me	17580af			
1730	1745	vi	Libya, Voice of Africa	11815af	15435af	17725af			
1730	1745	as	Swaziland, Trans World Radio	9500af					
1730	1745	mtwhf	Swaziland, Trans World Radio	3200af					
1730	1800		Belgium, RVI Flanders R Intl	5910eu	9925eu	13770eu			
1730	1800	mtwhf	Georgia, Georgian Radio	6230eu					
1730	1800	as	Georgia, Georgian Radio	6080as					
1730	1800		Guam, KSDA/Adventist World R	11965as					
1730	1800		Netherlands, Radio	6020af	7120af	11655af			
1730	1800		Philippines, Radyo Pilipinas	11720pa	15190pa	17720pa			
1730	1800		S Africa, Adv World Radio Africa	12130af					
1730	1800	mtwhfa	Sweden, Radio	6065va					
1730	1800	s	Sweden, Radio	13580eu					
1730	1800		Switzerland, Swiss R International	15220af	17640af	21720af			
1730	1800		Vatican City, Vatican Radio	13765af	15570af	17515af			
1735	1745	vi/th	Paraguay, Radio Nacional	9739sa					
1745	1800		Bangladesh, Bangla Betar	7185eu	9550eu	15520eu			
1745	1800		India, All India Radio	7410eu	9950as	11935as	13750af	13790af	
			15155af	17670af					
1745	1800	smtwhf	Swaziland, Trans World Radio	3200af					
1746	1800		UK, BBC World Service	3255af	3915as	5975as	6190af	6195eu	
			7160as	9410eu	9510as	9740as	12095eu	15400af	15420af
			15485eu	15575me	17830af	21470af			

1800

1800	1827		Vietnam, Voice of	7145eu	9730eu				
1800	1830		Egypt, Radio Cairo	15255af					
1800	1830	s	Germany, Universal Life	13855af					
1800	1830		Netherlands, Radio	6020af	7120af	11655af			
1800	1830		S Africa, Adv World Radio Africa	5960af	6100af				
1800	1830		S Africa, Channel Africa	17870af					
1800	1830		UK, BBC World Service	3255af	5975as	6190af	6190eu	6195eu	
			9410eu	9510as	12095eu	15400af	15420af	15575me	17830af
1800	1830	mtwh	UK, Merlin Network One	11590as					
1800	1830	f	UK, Merlin Network One	11540as					
1800	1830		UK, Merlin Network One	11535as					
1800	1830	mtwhf	UK, RTE Radio	15315me					
1800	1850		New Zealand, R New Zealand Int	6095as					
1800	1858		Yemen, Rep of Yemen Radio	9780me					
1800	1859		Canada, R Canada International	13690af	15470af	17820af	21570af		
1800	1900		Anguilla, Caribbean Beacon	11775am					
1800	1900	mtwhf	Argentina, RAE	15345eu					
1800	1900	vi	Australia, ABC/Alice Springs	2310do					
1800	1900	vi	Australia, ABC/Katherine	2485do					
1800	1900	vi	Australia, ABC/Tennant Creek	2325do					
1800	1900		Australia, Christian Voice	9720as	11890as				
1800	1900		Australia, Radio	6080pa	7240va	9475as	9580va	9815pa	
			11880va						
1800	1900	vi	Bangladesh, Bangla Betar	7185eu	9550eu	15520eu			
1800	1900		Botswana, Radio	3356do	4820do				
1800	1900		Canada, CBC Northern Service	9625do					
1800	1900		Canada, CFRX Toronto ON	6070do					
1800	1900		Canada, CFVP Calgary AB	6030do					
1800	1900		Canada, CHNX Halifax, NS	6130do					
1800	1900		Canada, CKZN St John's NF	6160do					
1800	1900		Canada, CKZU Vancouver BC	6160do					
1800	1900		Costa Rica, R for Peace Intl	15049irr	21815usb				
1800	1900		Costa Rica, University Network	5030am	6150am	7375am	9724sa		
			11870am	13749na	17645as				
1800	1900	mtwhf	Eqt Guinea, Radio Africa	15185af					
1800	1900	a/monthly	Finland, Scandv Weekend Radio	11690va					
1800	1900		Germany, Deutsche Welle	6140eu					
1800	1900		Germany, Unt Methodist Church	13820af	15485af				
1800	1900		Germany, Voice of Hope	15750eu					
1800	1900	vi	Ghana, Ghana BC Corp	3366do	4915do				
1800	1900	s	Greece, Voice of	9420eu	15630eu	17705na			
1800	1900		Guyana, Voice of	5949do					
1800	1900		India, All India Radio	7410as	9950as	11935as	13750af	13790af	
			15155af	17670af					
1800	1900	vi	Italy, Italian Radio Relay Service	3985va					
1800	1900		Kenya, Kenya BC Corp	4885irr	4915irr				
1800	1900		Kuwait, Radio	11990va					

1800	1900	vi	Lesotho, Radio	4800do					
1800	1900	vi	Liberia, ELWA	4760do					
1800	1900	vi	Liberia, R Liberia International	5100do					
1800	1900		Namibia, Namibian BC Corp	3270af	3289af				
1800	1900		New Zealand, ZUXA	3935do					
1800	1900	vi	Nigeria, Radio/Enugu	6025do					
1800	1900	vi	Nigeria, Radio/Ibadan	6050do					
1800	1900	vi	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do		
1800	1900	vi	Nigeria, Radio/Lagos	3326do	4990do				
1800	1900		Philippines, Radyo Pilipinas	11720pa	15190pa	17720pa			
1800	1900		Russia, Voice of Russia WS	7300eu	9480eu	9495af	9685eu		
			9775eu	9890eu	11630eu	11675eu	11695me	11980af	
1800	1900	m	S Africa, Amateur Radio League	3215af					
1800	1900	as	S Africa, Radio Lufonia	3345af					
1800	1900		S Africa, World Beacon	3230af	9675af	17665af			
1800	1900		Sierra Leone, Sierra Leone BS	3316do					
1800	1900		Sri Lanka, Sri Lanka BC Corp	3316irr					
1800	1900		Swaziland, Trans World Radio	3200af	9500af				
1800	1900		Taiwan, Radio Taipei International	3955eu					
1800	1900		Uganda, Radio	4976do	5026do				
1800	1900		UK, World Beacon	15585af	17665af				
1800	1900		USA, Armed Forces Radio	4278va	4319va	4993va	5765va		
			6350va	6458va	6847va	10320va	10940va	12579va	12689va
			13254va	13362va	16847va				
1800	1900		USA, KAIJ Dallas TX	13815va					
1800	1900		USA, KJES Vado NM	15385eu					
1800	1900		USA, KTBN Salt Lake City UT	15590na					
1800	1900		USA, KWHR Naalehu HI	17510as					
1800	1900		USA, Voice of America	6035af	7415af	9760af	9770me	11975af	
			15410af	15580af	17895af				
1800	1900	mtwhfa	USA, WBCQ Monticello ME	17494na					
1800	1900		USA, WEWN Birmingham AL	11875na	13615na	15745eu			
1800	1900		USA, WHRA Greenville ME	17650af					
1800	1900		USA, WHRI Noblesville IN	9495am	13760va				
1800	1900		USA, WINB Red Lion PA	13570am					
1800	1900		USA, WJCR Upton KY	7490am	13595as				
1800	1900		USA, WMLK Bethel PA	15265eu					
1800	1900	mtwhf	USA, WRMI Miami FL	15724na					
1800	1900		USA, WRNO New Orleans LA	7395am	15420af				
1800	1900		USA, WSHB Cypress Crk SC	15665va	18910af				
1800	1900		USA, WTJC Newport NC	9370na					
1800	1900		USA, WWCR Nashville TN	9475na	12160na	13845na	15685na		
1800	1900		USA, WWFV McCaysville GA	12172va					
1800	1900		USA, WYFR Okeechobee FL	18980eu					
1800	1900		Zambia, Christian Voice	4965do					
1800	1900	vi	Zambia, National BC Corp	6165do	6265do				
1800	1900	vi	Zimbabwe, Zimbabwe BC Corp	4828do	6045do				
1805	1810		Croatia, The Voice of Croatia	6165eu	13830eu				
1815	1845	s	S Africa, Radio Lufonia	7155af					
1830	1855		Greece, Voice of	11645eu					
1830	1900		Ascension Island, RTE Radio	21630af					
1830	1900		Austria, R Austria International	5945eu	6155eu				
1830	1900	vi	Cameroon, CRTV Radio Buea	6005do					
1830	1900		Canada, RTE Radio	13640na					
1830	1900		Georgia, Georgian Radio	11760eu					
1830	1900		Netherlands, Radio	6020af	7120af	9895af	11655af	13700af	
			17605af	21590af					
1830	1900		Slovakia, R Slovakia International	5920eu	6055eu	7345eu			
1830	1900		Turkey, Voice of	9730as	9785eu				
1830	1900		UK, BBC World Service	3255af	6005af	6190af	6195eu	9410eu	
1830	1900		9630af	12095as	15400af	15400af	15575me	17830af	21470af
1830	1900	as	USA, Voice of America	11690af	13730af	15525af			
1830	1900		Yugoslavia, Radio	6100eu					
1835	1850		Congo, RTV Congolaise	4765do					
1845	1900		Albania, R Tirana International	7210eu	9510eu				
1850	1900		New Zealand, R New Zealand Int	11725pa					

1900

1900	1915	mtwh	Congo, RTV Congolaise	4765do					
1900	1927		V						

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1900	2000		Costa Rica, University Network 11870am 13749na 17645as	5030am	6150am	7375am	9724sa		
			Ecuador, HCJB 17660eu						
1900	2000	mtwhf	Eqt Guinea, Radio Africa	15185af					
1900	2000	a/monthly	Finland, Scandy Weekend Radio	11690va					
1900	2000		Germany, Voice of Hope 7290eu	15750as					
1900	2000	vl	Ghana, Ghana BC Corp	3366do	4915do				
1900	2000	vl	Italy, Italian Radio Relay Service	3985va					
1900	2000		Kenya, Kenya BC Corp	4885irr					
1900	2000		Kuwait, Radio 11990va	4915irr					
1900	2000	vl	Lesotho, Radio	4800do					
1900	2000	vl	Liberia, ELWA	4760do					
1900	2000	vl	Liberia, R Liberia International	5100do					
1900	2000	asmtwh	Malta, Voice of Mediterranean	12060eu					
1900	2000		Namibia, Namibian BC Corp	3270af	3289af				
1900	2000		Netherlands, Radio	6020af	7120af	11655af	13700af		
			17605af 21590af						
1900	2000		New Zealand, ZLXA	3935do					
1900	2000	vl	Nigeria, Radio/Enugu	6025do					
1900	2000	vl	Nigeria, Radio/Ibadan	6050do					
1900	2000	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do		
1900	2000	vl	Nigeria, Radio/Lagos	3326do	4990do				
1900	2000		Nigeria, Voice of	7255af	11770af	15120na			
1900	2000		Russia, Voice of Russia WS	9480eu	9685eu	9775eu	9890eu		
			11675eu 12070eu						
1900	2000		Russia, World Beacon	7360eu					
1900	2000		S Africa, World Beacon	3230af	9675af	11640af			
1900	2000		Sierra Leone, Sierra Leone BS	3316do					
1900	2000	vl	Solomon Islands, SIBC	5020do					
1900	2000		South Korea, R Korea Intl	5975	om	7275eu			
1900	2000		Sri Lanka, Sri Lanka BC Corp	3316irr					
1900	2000	a	Sri Lanka, Sri Lanka BC Corp	6010eu					
1900	2000		Swaziland, Trans World Radio	3200af					
1900	2000		Thailand, Radio	7155eu	11905eu				
1900	2000		Uganda, Radio	4976do	5026do				
1900	2000		UK, BBC World Service	3255af	6005af	6190af	6195eu	9410eu	
			9630af 12095eu	12095eu	15400af	15575me	17830af		
1900	2000		UK, World Beacon	9675eu	15585eu				
1900	2000		USA, Armed Forces Radio	4278va	4319va	4993va	5765va		
			6350va 6458va	6847va	10320va	10940va	12579va	12689va	
			13254va 13362va	16847va					
			13815va						
1900	2000		USA, KAJI Dallas TX	13815va					
1900	2000		USA, KTBN Salt Lake City UT		15590na				
1900	2000		USA, KWHR Naalehu HI	17510as					
1900	2000		USA, VOA Special English	7260eu	9680me	13690me			
1900	2000		USA, Voice of America	4950af	6035af	6160me	7375af	745af	
			9525pa 9760af	9770af	11805pa	11975af	15180pa	15410af	
			15445af 15580af						
1900	2000	mtwhf	USA, Voice of America	9550eu	9840as	11780me	11780me	11970as	
			12015as 13725me	15235as					
1900	2000	mtwhfo	USA, WBCC Monticello ME	7494na					
1900	2000		USA, WEWN Birmingham AL	11875na	13615na	15745eu			
1900	2000		USA, WHRA Greenbush ME	17650af					
1900	2000		USA, WHRI Noblesville IN	9495am	13760va				
1900	2000		USA, WINB Red Lion PA	13570am					
1900	2000		USA, WJCR Upton KY	7490am					
1900	2000		USA, WMLK Bethel PA	15265eu					
1900	2000	mtwhf	USA, WRMI Miami FL	15724na					
1900	2000		USA, WRNO New Orleans LA	7395am	15420af				
1900	2000		USA, WSHB Cypress Crk SC	15665va	18910af				
1900	2000		USA, WTJC Newport NC	9370na					
1900	2000		USA, WWCN Nashville TN	9475na	12160na	13845na	15685na		
1900	2000		USA, WWFV McCaysville GA	12172va					
1900	2000		USA, WYFR Okeechobee FL	15775af	18980eu				
1900	2000		Zambia, Christian Voice	4965do					
1900	2000	vl	Zambia, National BC Corp	6165do	6265do				
1900	2000	vl	Zimbabwe, Zimbabwe BC Corp	4828do	6045do				
1930	1945	f	Congo, RTV Congolaise	4765do					
1930	2000	th	Belarus, R Belarus International	7105eu	7210eu				
1930	2000		Belgium, RVI Flanders R Intl	9925eu					
1930	2000		Iran, VOIRI 9022eu	11670eu	13730eu				
1930	2000	vl	Papua New Guinea, NBC	4890do					
1930	2000		Poland, Radio Polonia	6035eu	7185eu	7265eu	9525eu		
1930	2000		Sweden, Radio	6065eu					
1930	2000		Switzerland, Swiss R International	13770af	15220af	17580af	17735af		
1935	1955		Italy, RAI International	5970eu					
1940	2000	mtwhfo	Armenia, Voice of	4810eu	9960eu				
1950	1950		Vatican City, Vatican Radio	4005eu	5885eu	7250eu	9645eu		
1950	2000		New Zealand, R New Zealand Intl	15160pa					

2000

2000	2010		Vatican City, Vatican Radio	4005eu	5885eu	7250eu	9645eu
			9660af 11625af 13765af				
2000	2015		Swaziland, Trans World Radio	3200af			
2000	2025		Netherlands, Radio	6020af	7120af	9895af	11655af
			17605af 21590af				
2000	2025		Poland, Radio Polonia	6035eu	7185eu	7265eu	9525eu
2000	2027		Czech Rep, Radio Prague Intl	5930eu	11600eu		
2000	2030		Australia, Christian Voice	9720as			
2000	2030		Ecuador, HCJB	17660eu			
2000	2030		Iran, VOIRI 9022eu	11670eu	13730eu		
2000	2030		Mongolia, Voice of	12015eu	12085eu		
2000	2030		Switzerland, Swiss R International	13790af	15220af	17580af	13660af
			USA, Voice of America	4950af	6035af	6095af	7375af
			9760as 9770af 11855af	11975af	15410af	15445af	15580af
			1745af 17895af				
2000	2045		Germany, Deutsche Welle	7130eu			

2000	2045		Iraq, Radio Iraq International	7157irr	9684irr	11785irr	
2000	2059		Canada, R Canada International	5995eu	11690eu	15325eu	18780eu
			21570eu				
			Algeria, R Algiers International	11715eu	11750eu	15160va	
			Anguilla, Caribbean Beacon	11775am			
			Australia, ABC/Alice Springs	2310do			
		vl	Australia, ABC/Katherine	2485do			
		vl	Australia, ABC/Tennant Creek	2325do			
		vl	Australia, Radio	9500as	9580va	9815pa	11880va
		vl	Botswana, Radio	3356do	4820do		
		vl	Canada, CBC Northern Service	9625do			
			Canada, CFRX Toronto ON	6070do			
			Canada, CFVP Calgary AB	6030do			
			Canada, CHNX Halifax, NS	6130do			
			Canada, CKZN St John's NF	6160do			
			Canada, CKZU Vancouver BC	6160do			
			China China Radio International	5965eu	9440af	9840eu	11735af
			13640af				
			Costa Rica, R for Peace Intl	15049irr	21815usb		
			Costa Rica, University Network	5030am	6150am	7375am	9724sa
			11870am 13749na 17645as				
		mtwhf	Eqt Guinea, Radio Africa	15185af			
		a/monthly	Finland, Scandy Weekend Radio	11720va			
			Germany, Voice of Hope 7290eu	15750as			
		vl	Ghana, Ghana BC Corp	3366do	4915do		
		vl	Indonesia, Voice of	9525eu	11784eu	15149eu	
		vl	Italy, Italian Radio Relay Service	3985va	4915irr		
		vl	Kenya, Kenya BC Corp	4885irr	11990va		
		vl	Lesotho, Radio	4800do			
		vl	Liberia, ELWA	4760do			
		vl	Liberia, R Liberia International	5100do			
		vl	Namibia, Namibian BC Corp	3270af	3289af		
		vl	New Zealand, R New Zealand Intl	15160pa			
		vl	New Zealand, ZLXA	3935do			
		vl	Nigeria, Radio/Enugu	6025do			
		vl	Nigeria, Radio/Ibadan	6050do			
		vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do
		vl	Nigeria, Radio/Lagos	3326do	4990do		
		vl	Nigeria, Voice of	7255af	11770af	15120na	
		vl	Papua New Guinea, NBC	4890do			
		vl	Russia, Voice of Russia WS	9480eu	9775eu	9890eu	11675eu
			12070eu 15455eu				
			Russia, World Beacon	7360eu			
			S Africa, World Beacon	3230af	9675af	11640af	15465eu
		vl	Solomon Islands, SIBC	5020do			
		mtwhf	Spain, R Exterior Espana	9595af	15290eu		
			Sri Lanka, Sri Lanka BC Corp	4940irr			
		vl	Syria, Radio Damascus	12085eu	13610eu		
			Uganda, Radio	4976do	5026do		
			UK, BBC World Service	3255af	6005af	6190af	6195eu
			9630af 11835af	12095eu	15400af	17830af	9410eu
			UK, World Beacon	7420af	9675af		
			USA, Armed Forces Radio	4278va	4319va	4993va	5765va
			6350va 6458va	6847va	10320va	10940va	12579va
			13254va 13362va	16847va			
			USA, KAJI Dallas TX	13815va			
			USA, KJES Vado NM	15385na			
			USA, KTBN Salt Lake City UT	15590na			
			USA, KWHR Naalehu HI	17510as			
			USA, WBCC Monticello ME	7415na			
			USA, WBCC Monticello ME	7415na			

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2100

2100	2110		Kenya, Kenya BC Corp	4885irr	4915irr				
2100	2115		Egypt, Radio Cairo	15375sf					
2100	2130	vi	Australia, ABC/Alice Springs	2310do					
2100	2130	vi	Australia, ABC/Katherine	2485do					
2100	2130	vi	Australia, ABC/Tennant Creek	2325do					
2100	2130		Australia, Christian Voice	9865pa	11840va	21550va			
2100	2130		Australia, Radio	7240va	9500as	9580va	9660pa	11880va	
2100	2130		12080va 17715va	21740va					
2100	2130		Austria, AWR Europe	15165sf					
2100	2130		China China Radio International	5965eu	9840eu	11735af	13640af		
2100	2130		Cuba, Radio Havana	13660eu					
2100	2130		South Korea, R Korea Intl	3975eu					
2100	2130		Turkey, Voice of	7170as					
2100	2130		UK, BBC World Service	3255af	3915as	5965as	6005af	6190af	
2100	2130		6195va 9410eu	11835af	11945as	12095sa	15400af		
2100	2130	as	UK, BBC World Service	5975am	3915as				
2100	2130		Yugoslavia, Radio	6100eu					
2100	2145		Germany, Deutsche Welle	11915pa 15135af	9670pa	9765pa	9875af	11865af	
2100	2145		USA, WYFR Okeechobee FL	13855af	15120af	17845af	18980eu		
2100	2156		Romania, R Romania International	9725eu	11740eu	11940eu	15365eu		
2100	2200		Angola, R. Nacional de Angola	3374va	4950va	7245va			
2100	2200		Anguilla, Caribbean Beacon	11775am					
2100	2200	vi	Botswana, Radio	3356do	4820do				
2100	2200		Bulgaria, Radio	9400eu	11900eu				
2100	2200		Canada, CBC Northern Service	9625do					
2100	2200		Canada, CFRX Toronto ON	6070do					
2100	2200		Canada, CFVP Calgary AB	6030do					
2100	2200		Canada, CHNX Halifax, NS	6130do					
2100	2200		Canada, CKZN St John's NF	6160do					
2100	2200		Canada, CKZU Vancouver BC	6160do					
2100	2200		Costa Rica, R for Peace Intl	15049irr	21815usb				
2100	2200		Costa Rica, University Network	5030am	6150am	7375am	9724sa		
2100	2200		11870am 13749na	17645as					
2100	2200	mtwhf	Ecuador, HCJB	17660eu	21455usb				
2100	2200		Eq Guinea, Radio Africa	15185af					
2100	2200	f/monthly	Finland, Scandv Weekend Radio	11720va					
2100	2200	vi	Ghana, Ghana BC Corp	3366do	4915do				
2100	2200		India, All India Radio	7150au	7410eu	9650eu	9910au	9950eu	
2100	2200		11620au 11715au						
2100	2200	vi	Italy, Italian Radio Relay Service	3985va					
2100	2200		Japan, Radio	6035pa	6055eu	6180eu	11830eu	11855af	
2100	2200		17825na 17860pa	21670pa					
2100	2200	vi	Lesotho, Radio	4800do					
2100	2200	vi	Liberia, ELWA	4760do					
2100	2200	vi	Liberia, R Liberia International	5100do					
2100	2200		Namibia, Namibian BC Corp	3270af	3289af				
2100	2200		New Zealand, R New Zealand Int	15160pa					
2100	2200		New Zealand, ZXIA	3935do	7290do				
2100	2200	vi	Nigeria, Radio/Enugu	6025do					
2100	2200	vi	Nigeria, Radio/Ibadan	6050do					
2100	2200	vi	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do		
2100	2200	vi	Nigeria, Radio/Lagos	3326do	4990do				
2100	2200		Nigeria, Voice of	7255af	11770af	15120na			
2100	2200	vi	Papua New Guinea, NBC	4890do					
2100	2200		Russia, World Beacon	7360eu					
2100	2200		S Africa, World Beacon	3230af	9675af	11640af			
2100	2200	vi	Solomon Islands, SIBC	5020do	9545do				
2100	2200	as	Spain, R Exterior Espana	9595af	9840eu				
2100	2200		Sri Lanka, Sri Lanka BC Corp	4940irr					
2100	2200	vi	Syria, Radio Damascus	12085eu	13610eu				
2100	2200		UK, World Beacon	9675af					
2100	2200		Ukraine, R Ukraine International	12040na	5905eu	7410eu	11705eu	11950eu	
2100	2200		USA, Armed Forces Radio	6350va 6458va 6847va	4278va	4319va	4993va	5765va	
2100	2200		13254va 13362va 16847va	10320va	10940va	12579va	12689va		
2100	2200		USA, KAJL Dallas TX	13815va					
2100	2200		USA, KLTN Salt Lake City UT		15590na				
2100	2200		USA, KWHR Noalehu HI	17510as					
2100	2200		USA, Voice of America	6035af	6040me	6095me	7375af	7415as	
2100	2200		9530af 9705as 9760eu	11870pa	11975af	15185as	15410af		
2100	2200		15445af 15580af 17740as	17820as	17895af				
2100	2200		USA, WBCQ Monticello ME	7415na					
2100	2200	mtwhf	USA, WBCQ Monticello ME	9330na					
2100	2200		USA, WEWN Birmingham AL	11875na	13615na	15745eu			
2100	2200		USA, WHRA Greenbush ME	17650af					
2100	2200		USA, WHRI Noblesville IN	5745va	9495am				
2100	2200		USA, WINB Red Lion PA	13570am					
2100	2200		USA, WJCR Upton KY	7490am	13595as				
2100	2200		USA, WRMI Miami FL	15724na					
2100	2200		USA, WRNO New Orleans LA	7395am	15420af				
2100	2200		USA, WSHB Cypress Crk SC	15665va	18910af				
2100	2200		USA, WTJC Newport NC	9370na					
2100	2200		USA, WWCN Nashville TN	9475na	12160na	13845na	15685na		
2100	2200		USA, WWFV McCaysville GA	12172va					
2100	2200	a	USA< WBCQ Monticello ME	17494na					
2100	2200	vi	Vanuatu, Radio	3945do	4960do	7260do			
2100	2200		Zambia, Christian Voice	4965do					
2100	2200	vi	Zambia, National BC Corp	6165do	6265do				
2100	2200	vi	Zimbabwe, Zimbabwe BC Corp	4828do	6045do				
2115	2130	mtwhf	UK, BBC Caribbean Report	5975ca	11675ca	15390ca			
2100	2145		Egypt, Radio Cairo	9990eu					
2120	2200	s	Greece, Voice of	9425eu	15650au				
2130	2145	tf	UK, BBC Calling Falklands	11680as					
2130	2157		Czech Rep, Radio Prague Intl	11600au	15545af				
2130	2200		Albania, R Tirana International	7130eu	9540eu				

2130	2200	vi	Australia, ABC/Alice Springs	4835do					
2130	2200	vi	Australia, ABC/Katherine	5025do					
2130	2200	v	Australia, ABC/Tennant Creek	4910do					
2130	2200		Australia, Christian Voice	9725va	9865pa	11840va	21550va		
2130	2200		Australia, Radio	7240va	9660pa	11880va	12080pa	17715va	
2130	2200		21740va						
2130	2200	mtwhf	Austria, R Austria International	5945eu	6155eu				
2130	2200		Guam, KSDA/ Adventist World R	11980as	15240as				
2130	2200		Hungary, Radio Budapest	3975eu					
2130	2200		Iran, VOIRI 9570as	13745as					
2130	2200		South Korea, R Korea Intl		15575eu				
2130	2200		Sweden, Radio	6065eu	15255as				
2130	2200		UK, BBC World Service	3255af	3915as	5965as	5975am	6005af	
2130	2200		6190af 6195va 9410eu	11835af	11945as	12095sa	15400af		
2130	2200		Uzbekistan, Radio Tashkent	7105eu	9540eu				
2145	2200		USA, WYFR Okeechobee FL	13855af	15120af	17845af			

2200

2200	2210	vi	Zambia, National BC Corp	6165do	6265do				
2200	2215		New Zealand, R New Zealand Int	15160pa					
2200	2220	s	Greece, Voice of	9425au	15650au				
2200	2225		Italy, RAI International	9675as	11900as	15265as			
2200	2230		Canada, R Canada International	9755am	13670am	17695am			
2200	2230	mtwhf	Canada, R Canada International	15305am	17880am				
2200	2230		Canada, R Canada International	9755am	13670am	17695am			
2200	2230		India, All India Radio	7150au	7410eu	9650eu	9910au	9950eu	
2200	2230		11620au 11715au						
2200	2230		Iran, VOIRI 9570as	13745as					
2200	2230		Mexico, R Mexico International	9705am	11770am				
2200	2230	vi	Papua New Guinea, NBC	4890do					
2200	2230	mtwhf	USA, Voice of America	5855af	6035af	7375af	7415af	11975af	
2200	2230	mtwhf/a	Yugoslavia, Radio	7230au					
2200	2245		Egypt, Radio Cairo	9990eu					
2200	2245		USA, WYFR Okeechobee FL	11740na	15120af	17845af			
2200	2300		Anguilla, Caribbean Beacon	6090am					
2200	2300	vi	Australia, ABC/Alice Springs	4835do					
2200	2300	vi	Australia, ABC/Katherine	5025do					
2200	2300	vi	Australia, ABC/Tennant Creek	4910do					
2200	2300		Australia, Christian Voice	9865pa	17850va	21550va			
2200	2300		Australia, Radio	11880as	15240as	17715va	17795va	21740va	
2200	2300		Canada, CBC Northern Service	9625do					
2200	2300		Canada, CFRX Toronto ON	6070do					
2200	2300		Canada, CFVP Calgary AB	6030do					
2200	2300		Canada, CHNX Halifax, NS	6130do					
2200	2300		Canada, CKZN St John's NF	6160do					
2200	2300		Canada, CKZU Vancouver BC	6160do					
2200	2300		China China Radio International	7170eu					
2200	2300		Costa Rica, R for Peace Intl	15049irr	21815usb				
2200	2300		Costa Rica, University Network	5030am	6150am	7375am	9724sa		
2200	2300		11870am 13749na	17645as					
2200	2300	mtwhf	Eq Guinea, Radio Africa	15185af					
2200	2300	f/monthly	Finland, Scandv Weekend Radio	11690au					
2200	2300	vi	Ghana, Ghana BC Corp	3366do	4915do				
2200	2300	fas/vi	Italy, Italian Radio Relay Service	3985va					
2200	2300	vi	Liberia, R Liberia International	5100do					
2200	2300		Malaysia, Radio	7295do					
2200	2300		Namibia, Namibian BC Corp	3270af	3289af				
2200	2300		New Zealand, ZXIA	3935do	7290do				
2200	2300	vi	Nigeria, Radio/Enugu	6025do					
2200	2300	vi	Nigeria, Radio/Ibadan	6050do					
2200	2300	vi	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do		
2200	2300	vi	Nigeria, Radio/Lagos	3326do	4990do				
2200	2300	vi	Nigeria, Voice of	7255af	11770af	15120na			
2200	2300	vi	Solomon Islands, SIBC	5020do	9545do				
2200	2300		Sri Lanka, Sri Lanka BC Corp	4940irr					
2200	2300		Taiwan, Radio Taipei International	11565eu	15600eu				
2200	2300		Turkey, Voice of	7190va	118				

		2300			
2230	2300	vl	Papua New Guinea, NBC	4890do	11880irr
2230	2300	vl/os	Solomon Islands, SIBC	5020do	
2230	2300	vl/a	Solomon Islands, SIBC	9545do	
2245	2300		India, All India Radio	9705os	9950as 11620as 13605as
2245	2300		USA, WYFR Okeechobee FL	11740na	
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		2300			
2300	0300	sm f	USA, WINB Red Lion PA	12160am	
2300	0000		Anguilla, Caribbean Beacon	6090am	
2300	0000	vl	Australia, ABC/Alice Springs	4835do	
2300	0000	vl	Australia, ABC/Kathene	5025do	
2300	0000	vl	Australia, ABC/Tennant Creek	4910do	
2300	0000		Australia, Christian Voice	9865pa	17850va 21550va
2300	0000		Bulgaria, Radio	9400na	11700na
2300	0000	vl	Cameroon, CRTV Radio Buea	6005do	
2300	0000		Canada, CBC Northern Service	9625do	
2300	0000		Canada, CFRX Toronto ON	6070do	
2300	0000		Canada, CFVP Calgary AB	6030do	
2300	0000		Canada, CHNX Halifax, NS	6130do	
2300	0000		Canada, CKZN St John's NF	6160do	
2300	0000		Canada, CKZU Vancouver BC	6160do	
2300	0000		China China Radio International	5990na	
2300	0000		Costa Rica, R for Peace Intl	15049irr	21815usb
2300	0000		Costa Rica, University Network	5030am	6150am 7375am 9925sa
			11870am 13749na	17645as	
2300	0000		Ecuador, HCJB	17660as	
2300	0000		Egypt, Radio Cairo	9900am	
2300	0000	f/monthly	Finland, Scandy Weekend Radio	11690va	
2300	0000	vl	Ghana, Ghana BC Corp	3366do	
2300	0000		India, All India Radio	9705os	4915do 11620as 13605as
2300	0000	vl	Liberia, R Libero International	5100do	
2300	0000		Malaysia, Radio	7295do	
2300	0000		Malaysia, RTM Kota Kinabalu	5980do	
2300	0000		Namibia, Namibian BC Corp	3270af	3289af
2300	0000		New Zealand, R New Zealand Int	17675pa	
2300	0000		New Zealand, ZLXA	3935do	
2300	0000	vl	Papua New Guinea, NBC	4890do	11880irr
2300	0000		Singapore, SBC Radio One	6150do	
2300	0000	vl/os	Solomon Islands, SIBC	5020do	
2300	0000	vl/a	Solomon Islands, SIBC	9545do	
2300	0000		Sri Lanka, Sri Lanka BC Corp	4940do	
2300	0000		UK, BBC World Service	3915as	5965as 5975am 6035os 6195as
			7105as 11945as	11955as	
2300	0000		USA, Armed Forces Radio	4278va	4319va 4993va 5765va
			6350va 6458va	6847va	10320va 10940va 12579va 12689va
			13254va 13362va	16847va	
2300	0000		USA, KAIJ Dallas TX	13815va	
2300	0000		USA, KTBN Salt Lake City UT	15590na	
2300	0000		USA, KWHR Naalehu HI	17510as	
2300	0000		USA, VOA Special English	7190as	7200as 9545as 11905pa
			11925as 13735as	13775as	
2300	0000		USA, Voice of America	7215as	9705as 9770as 11760as 15185as
			15290as 15305as	17740as	
2300	0000		USA, WBCQ Monticello ME	7415na	
2300	0000	mtwhf	USA, WBCQ Monticello ME	9330na	
2300	0000	a	USA, WBCQ Monticello ME	17494na	
2300	0000		USA, WEWN Birmingham AL	9385na	9975eu 13615na
2300	0000		USA, WHRA Greenbush ME	7580eu	
2300	0000		USA, WHRI Noblesville IN	5745va	9495am
2300	0000		USA, WINB Red Lion PA	13570am	
2300	0000		USA, WJCR Upton KY	7490am	
2300	0000		USA, WRMI Miami FL	9955am	
2300	0000		USA, WRNO New Orleans LA	7355va	
2300	0000		USA, WSHB Cypress Crk SC	13770eu	15285sa
2300	0000		USA, WTJC Newport NC	9370na	
2300	0000	as	USA, WWBS Macon GA	11910na	
2300	0000		USA, WWCR Nashville TN	7435na	9475na 12160na 13845na
2300	0000		USA, WWFV McCaysville GA	5085va	6890va 7260do
2300	0000	vl	Vanuatu, Radio	3945do	
2300	0000		Zambia, Christian Voice	4965do	
2300	2305	vl	Nigeria, Radio/Enugu	6025do	
2300	2305	vl	Nigeria, Radio/Ibadan	6050do	
2300	2305	vl	Nigeria, Radio/Kaduna	4770do	6090do 7275do 9570do
2300	2305	vl	Nigeria, Radio/Lagos	3326do	4990do
2300	2330		Australia, Radio	9660pa	11880os 12080va 15240as 17715va
			17795va 21740va		
2300	2330	mtwhf	Canada, R Canada International	6040am	11865am 15305am
2300	2330		Cuba, Radio Havana	9550am	
2300	2330	mtwhf	Mexico, R Mexico International	9705am	11770am
2300	2345		Germany, Deutsche Welle	9815as	12055as 13610as 21790as
2300	2345		USA, WYFR Okeechobee FL	11740na	
2300	2356		Romania, R Romania International	9750eu	11775eu 11940na 15105na
2300	2359		Canada, R Canada International	9755am	13670am 17695am
2300	0000		Australia, Radio	9660pa	11695as 12080va 15240as 15415as
			17715va 17795va	21740va	
2300	0000		Malaysia, RTM Sarawak	7160do	
2300	0000		Netherlands, Radio	6165na	9845na
2300	0000		Switzerland, Swiss R International	9885sa	11905sa
2300	0100		Lithuania, Radio Vilnius	9875na	
2300	2345	vl	Libya, Voice of Africa	11815af	15435af 17725af
2300	2357		Vietnam, Voice of	12019os	15115as

[BBCWS stream abbreviations: (am) = Americas; (eu) = Europe/N. Africa; (me) = Middle East, SW Asia, CIS (former Soviet Union); (wcaf) = West and Central Africa; (easaf) = East and Southern Africa; (af) = both (wcaf) and (easaf); (sas) = South Asia; (eas) = East Asia.]

0000 UTC - Page 43 Freqs

Newscasts (*extended)		S/M		World Briefing*	
0000	BBCWS(am)	T-A		T-A	News
				D	News
	R. Australia	D		D	World News
	R. Japan	D		M-F	Midday Report*
	R. New Zealand Int.	S/A		D	News
	R. Prague	D			
	Spanish Foreign R.	T-A			Ibero-American News*
					World News
	VOA News Now	T-A			Regional News
0010	VOA News Now	T-A			USA News
0014	VOA News Now	T-A			The World Today*
0030	BBCWS(am)	M			World News
	VOA News Now	T-A			
<hr/>					
Current Affairs Magazines/Features		F		Omnibus (documentaries)	
0005	BBCWS(am)	F			The National Interest
					Background Briefing
0010	R. Australia	W			44 Minutes
		H			Encounter
0015	R. Japan	T-A			Best of 'Talk to Americ'
0033	VOA News Now	T			A
		F			Press Conference USA
		A			
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Business/Economics (also in Newscasts & Current Affairs)		A		A Good Life (development issues)	
0000	R. Netherlands	A			Money Minute
					Economic Report
0028	HCJB	T-A			A Good Life (development issues)
0020	R. Prague	F			
0030	R. Netherlands	W			
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Science/Technology (incl. Health & Environment)		T		The Research File	
0000	R. Netherlands	T			The Science Show
0010	R. Australia	T			The Research File
0030	R. Netherlands	F			Our World
0033	VOA News Now	W			
<hr/>					
Arts & Culture		S		Aural Tapestry	
0000	R. Netherlands	S			Meridian-Screen (cinema)
0005	BBCWS(am)	W			Merid on-Writing (books)
					Readings from Czech Literature
	R. Prague	S			Readings from Czech Literature
					Readings from Czech Literature
0010	R. Australia	M			Readings from Czech Literature
					Readings from Czech Literature
	R. Prague	M			Readings from Czech Literature
0030	BBCWS(am)	S			Readings from Czech Literature
	R. Netherlands	S			Readings from Czech Literature
					Readings from Czech Literature
0033	VOA News Now	H			Readings from Czech Literature
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Local Lives and Views		M		Dutch Horizons	
0000	R. Netherlands	M			Talking It Over (interviews)
					Letter from Prague
0005	R. Prague	M			Current Affairs
		T-A			Current Affairs
0010	R. Australia	F			Hindsight (Australian history)
					Weekend Square
	R. Japan	M			This Week in Parliament
	R. New Zealand Int.	S			Focus on Politics
					Spotlight (Czech current events) or One on One (interview)
0015	R. Prague	T			Czechs in History or Central Europe Today
					From the Weeklies
0020	R. Prague	M			In Conversation-Rural Europe (Europe in context)
0030	R. Australia	A			Dutch Horizons
	R. Netherlands	T			Spectrum (life in N.Z.)
	R. New Zealand Int.	S			
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Informational Features		H		Documentary	
0000	R. Netherlands	H			The Europeans
0005	R. Australia	S			
0022	VOA News Now	T-A			Feature story

0030	R. Netherlands	F			Documentary
0047	Spanish Foreign R.	T-A			Spanish Language Course
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Music		W		Music 52-15 (world/folk)	
0000	R. Netherlands	W			WBCQ(7415kHz)
					Different Kind of Oldies Show
					Radio New York International
0005	BBCWS(am)	T			Meridian-Masterpiece*
		H			Meridian-Music
0010	R. Prague	S			Saturday Music (classical/jazz)
0015	R. Netherlands	F			From Sapphire to Laser (classical)
					Music Mix*
0030	BBCWS(am)	T			UK Top 20
		W			World of Music
	R. New Zealand Int.	F			The Sampler (latest CDs)
0045	BBCWS(am)	H			UK Album Chart
		A			Music X-Press*
					*may be preempted for a Proms concert
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Entertainment/Variety, Magazine Shows		H/A		Westway (drama serial)*	
0030	BBCWS(am)	H/A			*may be preempted on Sat. for a Proms concert
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SWL Media and Communications		A		Allan Weiner World-wide (station manager)	
0000	WBCQ(7415kHz)	A			Radio Waves
0047	Spanish Foreign R.	A			
<hr/>					
Listener Contact/Interactive		A <th colspan="2">Feedback </th>		Feedback	
0005	R. Australia	A			Hello from Tokyo
0010	R. Japan	S			Mailbox
0015	R. Prague	A			Saludos Amigos
0030	HCJB	S			Radio Club
0035	Spanish Foreign R.	A			Radio Club (prt.)
0047	Spanish Foreign R.	M			
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Sport		S/A		Sports	
0018	VOA News Now	S/A			Sports Roundup
0020	BBCWS(am)	S/M			
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0100 UTC - Page 43 Freqs					
Newscasts (*extended)		S		The World Today*	
0100	BBCWS(am)	S			M-A
					News
	China R. Int.	D			News
	Deutsche Welle	D			News
	HCJB	D			Latin American & World News
					News
	R. Australia	D			News
	R. Budapest	D			News
	R. Canada Int.	T-A			News
	R. Habana Cuba	D			International News
	R. Netherlands	S/M			News
	R. New Zealand Int.	D			News
	R. Prague	D			News
	Spanish Foreign R.	T-A			Ibero-American News*
	VOA News Now	T-A			World News
	VOA News Now	D			News
	Voice of Russia	D			News
	Voice of Vietnam	D			News



0111 Voice of Russia S News and Views
M Sunday Panorama
T-A Commonwealth Update
0115 R. Habana Cuba T-S Viewpoint
0130 Deutsche Welle T Insight
R. Austria Int. D Report from Austria
0136 VOA News Now T-F Dateline
0140 R. Habana Cuba A Weekly Review
VOA Spec. Eng. A In the News

Business/Economics
0110 R. Budapest M Europe Unlimited (trade-biweekly)
0115 Swiss R. Int. A Business Spotlight
0120 R. Prague F Economic Report
0130 China R. Int. W China Horizons
0130 R. Canada Int. S Canada Review (business/tech edition)
0145 Swiss R. Int. A Business Spotlight
0149 VOA News Now T-F Business News

Science/Technology (incl. Health & Environment)
0105 BBCWS(am) T Health Matters
W Science View
F One Planet (ecology)
A Discovery (research)
0130 Deutsche Welle W Man and Environment
R. Australia M The Health Report
0140 VOA Spec. Eng. T Agriculture Today
W/H Science Report
F Environment Report
0145 VOA News Now T-F Science News
VOA Spec. Eng. T Science in the News
W Explorations
0150 R. Habana Cuba M Breakthrough

Arts & Cultural
0105 R. New Zealand Int. S The Film Show
R. Prague S Readings from Czech Literature
0110 R. Budapest M Spotlight (monthly)
R. Prague M The Arts
0115 Deutsche Welle M Arts on the Air
Swiss R. Int. H Book Zone (2nd wk.)
0120 China R. Int. S In the Spotlight
0130 R. Australia A Arts Talk
R. Canada Int. M Canada Review (arts edition)
R. New Zealand Int. M Bookmarks
0145 Swiss R. Int. H Book Zone (2nd wk.)
VOA Spec. Eng. A American Stories
H The Making of a Nation

Local Lives and Views
0100 Swiss R. Int. D Newsnet (Swiss magazine)
R. Canada Int. S Canada Newsweek
0105 R. Canada Int. T-A Canada Today
R. Netherlands S Europe Unzipped
R. Prague M Letter from Prague
T-A Current Affairs
0110 Voice of Vietnam D Studio 9 (Latin America)
HCBJ T-A The Name Game (Swiss geo quiz)
Swiss R. Int. M Swiss Scene
R. Budapest M Heading for Hungary (monthly)
T-A Hungary Today
0115 Deutsche Welle S Inside Europe
R. Prague T Spotlight (Czech current events) or
One on One (interview)
H Czechs in History or Central Europe Today
0120 R. Prague W Talking Point
A From the Weeklies
0124 Voice of Russia M Russia: People and Events
0130 China R. Int. M People in the Know
F Life in China
Deutsche Welle H Living in Germany
Swiss R. Int. D Newsnet (Swiss magazine)
Voice of Russia S Moscow Yesterday and Today
0140 R. Austria Int. M Radio E (on Europe)
R. Habana Cuba T/H/H Caribbean Outlook
Swiss R. Int. S* The Name Game (Swiss geo quiz)
M Swiss Scene
0145 BBCWS(am) S Letter from America
VOA Spec. Eng. F American Mosaic
0154 Voice of Russia H Russia: People and Events
(*1st wk.)

Informational Features
0105 Deutsche Welle M Religion and Society
0115 Deutsche Welle A German by Radio
0122 VOA News Now T-A Feature report
0130 BBCWS(am) S Reporting Religion
T Everywoman (magazine)
W Focus on Faith
H Pick of the World (best of the BBC)
F People and Places
A Essential Guide
China R. Int. H Voices from Other Lands
R. Australia S Educational series

T The Law Report
W The Religion Report
A Christian Message from Moscow
T-A Spanish Language Course
T-F Feature report
W Russia: People and Events

Music
0105 R. New Zealand Int. M-F Codenza (light classics)
A Home Grown (NZ music)
0110 R. Prague S Saturday Music (classical/folk/jazz)
Swiss R. Int. S Sounds Good (Swiss music)*
0130 HCBJ A Musica del Ecuador
R. Australia S Oz Sounds
0130 R. New Zealand Int. A Musical Chairs (featured artist)
T Folk Box
0132 Voice of Russia W Jazz Show
H Musical Portraits (history)
F Yours for the Asking
S Sounds Good (Swiss music)*
0140 Swiss R. Int. S Music At Your Request
0146 Voice of Russia F (*3rd/5th wks.)

Entertainment/Variety, Magazine Shows
0100 WBCQ(741.5kHz) S Marion's Amic (vintage recordings)
A Tasha Takes Control
0105 BBCWS(am) M Wright Around the World (pop requests)
T-A WWCR(3210kHz) Golden Age of Radio Theatre
0110 Voice of Vietnam S Sunday Show
0132 Voice of Russia M Timelines

SWL, Media and Communications
0100 R. Canada Int. M (IDX Report (biweekly))
0110 HCBJ S DX Partyline
R. Budapest S DX Blackbuster
0130 HCBJ H Ham Radio Today
R. Australia H The Media Report
0133 VOA News Now S Communications World

Listener Contact/Interactive
0100 R. Canada Int. M Maple Leaf Mailbag
0110 HCBJ M Musical Mailbag
R. Budapest M And the Gatepost (monthly)
R. Prague A Mailbox
Swiss R. Int. S Capital Letters (2nd/4th wk.)
0115 Voice of Vietnam H Letterbox
0120 China R. Int. A Listeners' Garden
0135 Spanish Foreign R. A Radio Club
0140 R. Habana Cuba M Mailbag Show
Swiss R. Int. S Capital Letters (2nd/4th wk.)
0145 R. Austria Int. S Listeners' Letters
0147 Spanish Foreign R. M Radio Club

Sport
0105 BBCWS(am) H Sports International (magazine)
0115 Deutsche Welle F Hard to Beat: The World of Sport
0118 VOA News Now T-A Sports Report
0130 China R. Int. T Sports World
R. Australia F The Sports Factor
S/M Sportsnews
0135 R. Habana Cuba T-A Time Out

0200 UTC - Page 43 Freqs

Newscasts (*extended)
0200 BBCWS(am)(me) D The World Today*
R. Australia D News
R. Habana Cuba D International News
R. Korea Int. D News
R. New Zealand Int. D News
R. Taipei Int. D News
Voice of Russia O News
0230 R. Budapest D News
R. Habana Cuba T-S News Bulletin
Voice of Russia O News in Brief
Voice of Vietnam D News

Current Affairs Magazines/Features
0210 R. Australia M-F The World Today
R. Habana Cuba T-S National News
0215 R. Korea Int. T-A Seoul Calling
0230 BBCWS(am)(me) S From Our Own Correspondent
M Assignment
R. Sweden T-A 60 Degrees North
0245 BBCWS(am) T/W/E/A News Analysis
H From Our Own Correspondent

Business/Economics
0211 Voice of Russia W/A Newmarket
0230 BBCWS(am) T-A World Business Report
BBCWS(me) A Global Business

R. Korea Int. H Economic Radar
0240 R. Budapest M Europe Unlimited (trade-monthly)
0245 R. Sweden H Money Matters
Swiss R. Int. A Business Spotlight

Science/Technology (incl. Health & Environment)
0205 R. Australia A Ockham's Razor (issues)
R. New Zealand Int. S Eureka!
0211 Voice of Russia T/F Science and Engineering
0230 R. Australia A Earthbeat (environment)
0245 R. Sweden F Greenscan (ecology-2nd wk.)
Heartbeat (health-3rd wk.)

Arts & Cultural
0200 HCBJ W The Book & the Spade (archaeology)
0215 R. Taipei Int. H Journey into Chinese Culture
0230 R. Korea Int. W Cultural Promenade
R. Sweden S Spectrum (3rd wk.)
0240 R. Budapest M Spotlight (monthly)
0245 Swiss R. Int. H Book Zone (2nd wk.)

Local Lives and Views
0205 R. New Zealand Int. M-F In Touch with New Zealand
0210 R. Korea Int. S Seoul Report
0215 R. Taipei Int. W Taiwan Today
F Taipei Magazine
A Kaleidoscope (life in Taiwan)
0230 R. Korea Int. F Korea and Its Splendors
R. Sweden S Weekend (Europe magazine-1st wk.)
Sweden Today (2nd wk.)
Studio 49 (topical discussion-4th wk.)
Newswet (Swiss magazine)
D Current Affairs
0232 Voice of Russia M This is Russia
T Kaleidoscope (events)
H Moscow Yesterday and Today
0235 R. Budapest M Heading for Hungary
T-A Hungary Today
0240 Swiss R. Int. S The Name Game (geo quiz-1st wk.)
M Swiss Scene
0245 R. Sweden F Nordic Report (1st wk.)
The S-Files (things Swedish-4th wk.)
Review of the Newsweek

Informational Features
0200 HCBJ F Viewpoint (issues)
0215 R. Taipei Int. S Great Wall Forum (mainland issues)
0230 R. Korea Int. T Exploring the New Millennium
0232 Voice of Russia F Russian by Radio
0235 R. Habana Cuba S The World of Stamps
0245 R. Taipei Int. M-A Let's Learn Chinese

Music
0200 HCBJ A Walkin' in the Sunshine (country)
0205 R. New Zealand Int. A Home Grown (from 0105)
0206 R. New Zealand Int. M-F Wayne's Music (personal selections)
0210 R. Habana Cuba M From Habana
R. Korea Int. M Korean Pop Interactive (requests)
0215 R. Taipei Int. M Jade Bells and Bamboo Pipes (traditional)
0230 R. Habana Cuba M The Jazz Place
R. Korea Int. A Notes of Nostalgia (traditional)
R. Sweden M Sounds Nordic (exc. 1st wk.)
0232 Voice of Russia S Songs from Russia
W Musical Portraits
0240 Swiss R. Int. S Sounds Good (Swiss music-3rd/5th wk.)

Entertainment/Variety, Magazine Shows
0200 HCBJ M Sunday Nite
H Adventures in Odyssey (children's stories)
0205 R. Australia S Margaret Throsby Interview
0232 Voice of Russia A Audio Book Club

SWL, Media and Communications
0200 HCBJ S Ham Radio Today
WBCQ(9335kHz) S World of Radio
WWCR(5070kHz) S Communications World
0230 R. Korea Int. M Multwave Feedback
WWCR(3215kHz) A World of Radio
WWCR(5070kHz) S World of Radio
0240 R. Budapest S DX Blackbuster

Listener Contact/Interactive
0211 Voice of Russia S/M/H Moscow Mailbag
0230 R. Korea Int. S From Us to You
R. Sweden M In Touch with Stockholm (1st wk.)
0240 R. Budapest M And the Gatepost
Swiss R. Int. S Capital Letters (2nd/4th wk.)
0245 R. Taipei Int. S Mailbag Time
0246 Voice of Russia S You Write to Moscow

Sport
0205 R. Australia S/A Grandstand (live sports action*)
0235 R. New Zealand Int. S/A Live Sport (in season)
0245 R. Sweden T Sportsman
(*special on 9660, 12080, 17580, 17750, 21725 kHz. only.)

Shortwave Guide



0300 UTC - Page 44 Freqs

Newscasts (*extended)		
0300	BBCWS(am)	S/M T-A World Briefing* News
	BBCWS(me)(af)	D World Briefing*
	BBCWS(sas)	S World Briefing*
		M-A News
	China R. Int.	D News
	Deutsche Welle	D News
	R. Australia	D News
	R. Habana Cuba	D International News
	R. New Zealand Int.	S/A News
		M-F Pacific Regional News
	R. Prague	D News
	R. Taipei Int.	D News
	Voice of Russia	D News
0310	R. Habana Cuba	T-S Notional News
0330	R. Habana Cuba	D News Bulletin
	Voice of Russia	D News in Brief
	Voice of Vietnam	D News
Current Affairs Magazines/Features		
0305	BBCWS(sas)	T-A Outlook
	Deutsche Welle	S/M Weekend Review
		T-A Newslink
	R. New Zealand Int.	W Pacific Report
		F Dateline Pacific
0310	China R. Int.	S Report on Developing Countries
		M-F Current Affairs
		A Global Review
	R. Habana Cuba	M Weekly Review
0311	Voice of Russia	M Sunday Panorama
		T-A News & Views
0315	R. Habana Cuba	T-S Viewpoint
0330	BBCWS(af)	M-F Network Africa
	Deutsche Welle	T Insight (international affairs)
	R. New Zealand Int.	F Pacific Correspondent
	R. Sweden	T-A 60 Degrees North
0340	R. Habana Cuba	T/F Caribbean Outlook
		A Weekly Review
0345	BBCWS(me)	TWFA Analysis
		H From Our Own Correspondent
Business/Economics		
0315	R. Taipei Int.	M Taiwan Economic Journal
0320	R. Prague	F Economic Report
0330	BBCWS(me)	M World Business Review
		T-A World Business Report
	China R. Int.	W China Horizons
	R. New Zealand Int.	W Tradewinds
0345	R. Sweden	H Money Matters
Science/Technology (incl. Health & Environment)		
0315	Deutsche Welle	S Spectrum
0330	BBCWS(am)(me)(sas)	S Science in Action
	Deutsche Welle	W Man and Environment
	R. Australia	S Ockham's Razor
0345	R. Sweden	F Greenscan (ecology-2nd wk.)
		H Heartbeat (health-3rd wk.)
0350	R. Habana Cuba	M Breakthrough
Arts and Culture		
0305	R. Prague	S Readings from Czech Literature
0310	R. Prague	M The Arts
0315	Deutsche Welle	M Arts on the Air
0320	China R. Int.	S In the Spotlight
0330	R. Sweden	S Spectrum (3rd wk.)
	Voice of Russia	W/F Russian history/culture program
Local Lives and Views		
0305	R. Australia	A Rural Reporter (outback)
	R. Prague	M Letter from Prague
		T-A Current Affairs
0315	R. Prague	T Spotlight (Czech current events) or One on One (interview)
		H Czechs in History or Central Europe Today
0320	R. Australia	M-F Pacific Focus
	R. Prague	W Talking Point
		A From the Weeklies
0324	Voice of Russia	M Russia: People and Events
0330	BBCWS(am)	T Just a Taste (food and culture)
		A From Where I Stand (2nd or 3rd wk.)
	BBCWS(af)	S Postmark Africa
		A This Week and Africa or Africa Quiz
	China R. Int.	M People in the Know
		F Life in China
	Deutsche Welle	H Living in Germany
	R. Sweden	S Weekend (Europe magazine-1st wk.)
		' Sweden Today (2nd wk.)
		' Studio 49 (topical discussion-4th wk.)
	R. Taipei Int.	M Women in Taiwan
		H Life Unusual
		A Carol's Café
0332	Voice of Russia	S Kaleidoscope (Russian events)
0345	BBCWS(me)	M From Where I Stand (2nd or 3rd wk.)

BBCWS(sas)	A	From Where I Stand (2nd or 3rd wk.)
R. Sweden	F	Nordic Report (1st wk.)
	A	The S-Files (things Swedish-4th wk.)
		Review of the Newsweek
Informational Features		
0320	China R. Int.	H Voices from Other Lands
0330	BBCWS(am)	W Patterns of Faith
		H Language Steamrollers (tracing "dead" languages)
		F Heart and Soul (religion)
	Deutsche Welle	A German by Radio
0332	R. Australia	A Educational series
	Voice of Russia	T/H/S 20th Century
Music		
0305	BBCWS(am)	W The Alternative (rock)
		H The Greenfield Collection (classical requests)
		F Jazzmatazz
		A Composer of the Month
0305	R. New Zealand Int.	T Top 5 (pop/rock)
		A Musical feature or series
0310	R. Prague	S Saturday Music (classical/folk/jazz)
0315	HCB	T-A Rendezvous (inspirational)
0330	HCB	A Inspirational Classics
	R. New Zealand Int.	T New Releases
	R. Sweden	M Sounds Nordic (rock-acc. 1st wk.)
0335	R. New Zealand Int.	S World of Music
0340	R. Australia	M Australian Music Show (modern rock)
		T/F Music Deli (international)
		W Blacktracker (Aboriginal)
		H Oz Country Style
0345	HCB	W Wonderful Words of Life (hymns)
Entertainment/Variety, Magazine Shows		
0330	BBCWS(am)	M Westway Omnibus (two episodes)
	HCB	M Radio Reading Room (Christian lit.)
		T Unshackled (radio's oldest drama series)
0332	Voice of Russia	M Audio Book Club
0340	Voice of Vietnam	M Sunday Show
0345	BBCWS(sas)	M-F Off the Shelf (book readings)
	BBCWS(am)	T-A Off the Shelf (book readings)
SWL, Media and Communications		
0300	WWCR(5070 kHz.)	S Spectrum
	WHRI(5745 kHz.)	A Doing with Cumbre
0305	R. New Zealand Int.	H Pacific Diners Report (biweekly)
		RN21 Talk (meet the staff-biweekly)
0340	R. Habana Cuba	S/W Diners Unlimited
Listener Contact/Interactive		
0305	BBCWS(sas)	M Talking Point (global phone-in)
	R. Australia	S Feedback
	R. New Zealand Int.	H Mailbox (biweekly)
0315	R. Prague	A Mailbox
0320	China R. Int.	A Listeners' Garden
0330	BBCWS(am)	A Write On (acc. 2nd or 3rd wk.)
	R. Sweden	M In Touch with Stockholm (1st wk.)
0340	R. Habana Cuba	H Mailbag Show
0345	BBCWS(me)	M Write On (acc. 2nd or 3rd wk.)
	BBCWS(sas)	A Write On (acc. 2nd or 3rd wk.)
Sport		
0300	Channel Africa	A Channel Africa Sport
	R. Australia	S/A Grandstand (live action)*
	R. New Zealand Int.	S/A Live Sport (in season)
0310	R. Australia	M-F Sport (daily report)
0320	BBCWS(am)	S/M Sports Roundup
	BBCWS(me)(af)	O Sports Roundup
	BBCWS(sas)	S Sports Roundup
0330	China R. Int.	T Sports World
	Deutsche Welle	F Hard to Beat: The World of Sport
	R. New Zealand Int.	H The World in Sport
0335	R. Habana Cuba	T-A Time Out
0345	R. Sweden	T Sportsman
		(*special on 9660, 12080, 17580, 21725 kHz. only)
0400 UTC - Page 44 Freqs		
Newscasts (*extended)		
0400	BBCWS(me)(me)(af)	O The World Today*
	BBCWS(sas)	S/A The World Today*
		M-F News
	China R. Int.	O News
	HCB	O Latin American & World News
	R. Australia	D News
	R. Habana Cuba	O International News
	R. New Zealand Int.	D News
	R. Vlaanderen Int.	T-S News
	Voice of Russia	D News
0430	R. Habana Cuba	T-S News Bulletin
	R. Netherlands	S/M News
	Voice of Russia	O News in Brief
Current Affairs Magazines/Features		
0405	BBCWS(sas)	F Omnibus (documentary)

0410	China R. Int.	S Report on Developing Countries
		M-F Current Affairs
		A Global Review
	HCB	T-A Studio 9 (on Latin America)
	R. Habana Cuba	T-A Spotlight on the Americas
0430	BBCWS(me)(sas)	A Assignment
	BBCWS(af)	M-F Network Africa
	R. Netherlands	T-A Newsline
0455	R. Netherlands	S Insight (commentary)
Business/Economics		
0411	Voice of Russia	H Newmarket
0413	R. Vlaanderen Int.	F Economics
0415	Swiss R. Int.	A Business Spotlight
0430	BBCWS(eu)	S Global Business
	China R. Int.	W China Horizons
0445	Swiss R. Int.	A Business Spotlight
Science/Technology (incl. Health & Environment)		
0405	R. Australia	A Pacific Focus-Environment
0411	Voice of Russia	W/A Science and Engineering
0413	R. Vlaanderen Int.	W Green Society (ecology)
0430	WWCR(5070 kHz.)	M New Horizons
Arts and Culture		
0405	BBCWS(sas)	T Meridian-Screen (anim)
		H Meridian-Writing (books)
	R. Australia	S Pacific Focus-Arts
	R. New Zealand Int.	M Tagata o te Moana (*Pacific culture)
0413	R. Vlaanderen Int.	H/A Around the Arts
0415	Swiss R. Int.	H Book Zone (2nd wk.)
0420	China R. Int.	S In the Spotlight
0430	R. Australia	S Arts Talk
0445	Swiss R. Int.	H Book Zone (2nd wk.)
Local Lives and Views		
0400	Swiss R. Int.	D Newsnet (Swiss magazine)
0404	R. Vlaanderen Int.	T-A Belgium Today
0405	R. New Zealand Int.	M-F In Touch with New Zealand (from 0205)
0408	R. Vlaanderen Int.	M Tourism in Flanders
		T-A Press Review
0410	Swiss R. Int.	S The Name Game (geo quiz-1st wk.)
		M Swiss Scene
0413	R. Vlaanderen Int.	T Focus on Europe
0418	R. Vlaanderen Int.	H Around Town
		A Tourism in Flanders
0420	R. Prague	W Talking Point
0430	BBCWS(me)(sas)	S In Praise of God (warshia service)
	BBCWS(af)	S The Story of Africa
		A Talkabout Africa
	BBCWS(eu)	A Weekend (magazine)
	China R. Int.	M People in the Know
		F Life in China
	Swiss R. Int.	D Newsnet (Swiss magazine)
0432	Voice of Russia	S Moscow Yesterday and Today
0435	R. Netherlands	S Europe Unzipped
0440	Swiss R. Int.	S The Name Game (geo quiz-1st wk.)
		M Swiss Scene
0446	Voice of Russia	W Russia: People and Events
Informational Features		
0405	R. New Zealand Int.	S Feature or series on religion
0418	R. Vlaanderen Int.	F International Report
0420	China R. Int.	H Voices from Other Lands
0435	R. Habana Cuba	S The World of Stamps
Music		
0400	R. Vlaanderen Int.	S Music from Flanders
0405	BBCWS(sas)	M Meridian-Masterpiece*
		W Meridian-Music
0410	R. Habana Cuba	M From Habana
	Swiss R. Int.	S Sounds Good (Swiss music-3rd/5th)
0411	Voice of Russia	M Musical Portraits (history)
0424	R. Vlaanderen Int.	M-A Soundbox (Flemish rock)
0430	BBCWS(sas)	M Music Mix*
		T UK Top 20
		H World of Music
	HCB	A Musica del Ecuador
	R. Australia	A Jazz Notes
	R. Habana Cuba	M The Jazz Place
0432	Voice of Russia	M Jazz Show
		T Yours for the Asking
		W Musical Portraits (history)
		H Folk Box
0440	Swiss R. Int.	S Sounds Good (Swiss music-3rd/5th)
0445	BBCWS(sas)	W UK Album Chart
		F Music X-Press
0446	Voice of Russia	T Music At Your Request
		*may be preempted for Proms concert
Entertainment/Variety, Magazine Shows		
0400	WBGO(7415 kHz.)	M-A Amos 'n Andy (classic radio comedy)
0405	R. New Zealand Int.	S Playhouse (radio theatre)
0410	R. Australia	M-F Margaret Throsby Interview
0430	BBCWS(sas)	W/F Westway (drama serial)*

Shortwave Guide



0432 Voica of Russia F Audio Book Club
A Timelines

*may be preempted on Fri. for Proms concert

SWL, Media and Communications

0400 R. Vlaanderen Int. M Radio World
WBCQ(7415kHz) S Tom and Darryl
0410 HCJB S OX Partyline
0430 HCJB H Ham Radio Today
WHRI(5745 kHz.) S Dang with Cumbre

Listener Contact/Interactive

0410 HCJB M Musical Mailbag
Swiss R. Int. S Capital Letters (2nd/4th wk.)
0411 Voica of Russia T/F Moscow Mailbag
0414 R. Vlaanderen Int. M Brussels 1043
0420 China R. Int. A Listeners' Garden
0430 R. Habana Cuba M The Mailbag Show
0435 R. Netherlands M Sincerely Yours
0440 Swiss R. Int. S Capital Letters (2nd/4th wk.)
0445 WWCR(5070 kHz.) M Ask WWCR

Sport

0400 R. Australia S/A Grandstand (live action)*
R. New Zealand Int. S/A Live Sport (in season)
0418 R. Vlaanderen Int. T Sports
0430 China R. Int. T Sports World
0450 BBCWS(eu)(me) M-F Sports Roundup
(*special on 9660, 12080, 17580, 17750, 21725 kHz. only.)

0800 UTC - Page 48 Freqs

Newscasts (*extended)
0500 BBCWS(eu)(me)(af)(eos) 0 The World Today*
BBCWS(sas) S The World Today*
M-A News
China R. Int. D News
Deutsche Welle D News
R. Australia D News
R. Habana Cuba D International News
R. Japan D News
Spanish Foreign R. T-A Ibero-American News*
0510 R. Habana Cuba T-A National News
0530 R. Habana Cuba T-A News Bulletin
Voica of Nigeria S/A News

Current Affairs Magazines/Features

0500 R. New Zealand Int. M-F Checkpoint
0505 Deutsche Welle S Talking Point (journalists)
T-A Newslink
0510 China R. Int. S Report on Developing Countries
M-F Current Affairs
A Global Review
R. Australia M-F Pacific Beat
R. Habana Cuba M Weekly Review
0515 R. Habana Cuba T-S Viewpoint
R. Japan M-F 44 Minutes
BBCWS(af) M-F Network Africa
Deutsche Welle T Insight (international affairs)
0540 R. Habana Cuba T/F Caribbean Outlook
A Weekly Review

Business/Economics

0500 R. Netherlands A A Good Life (development)
0505 R. Australia A Pacific Focus-Business
0515 Deutsche Welle S Marks and Markets
0530 BBCWS(me) S Global Business
China R. Int. W China Horizons

Science/Technology (incl. Health & Environment)

0500 R. Netherlands T Research File
0505 BBCWS(sas) M One Planet (ecology)
T Discovery
W Health Matters
H Science View
0530 Deutsche Welle W Man and Environment

Arts and Culture

0500 R. Netherlands S Aural Tapestry
0510 R. New Zealand Int. S Whenua! (Maori culture)
0520 China R. Int. S In the Spotlight
0530 BBCWS(eu)(me)(eos) A Arts in Action
BBCWS(af) S Artbeat (arts in Africa)

Local Lives and Views

0500 R. Netherlands M Dutch Horizons
F Talking It Over (interviews)
0510 R. New Zealand Int. A Best of Kim Hill (interviews)
0530 BBCWS(af) A Africa Quiz or This Week and Africa
BBCWS(wca) A Talkabout Africa
BBCWS(eas) S From Where I Stand
China R. Int. M People in the Know
F Life in China
Deutsche Welle H Living in Germany

Informational Features

0500 HCJB W The Book & the Spade (archaeology)

R. Netherlands H Documentary
0505 Deutsche Welle M Religion and Society
0510 R. New Zealand Int. S Religious series
0515 Deutsche Welle M Cool (teen magazine)
0530 BBCWS(eu)(sas) S Reporting Religion
BBCWS(sas) M People and Places
T Essential Guide
W Everywoman
H Focus on Faith
F Pick of the World (BBC's best)
China R. Int. H Voices from Other Lands
Deutsche Welle A German by Radio
R. Australia A Lingua Franca (about language)
0547 Spanish Foreign R. T-A Spanish Language Course

Music

0500 HCJB F Inspirational Classics
A Walkin' in the Sunshine (country)
R. Netherlands W Music 52-15 (international)
0510 R. Japan S Pop Goes Asia
0515 R. Netherlands F From Saphira to Laser (classical)
0530 R. Australia S Fine Music Australia (classical)
R. Habana Cuba M The Jazz Show

Entertainment/Variety, Magazine Shows

0500 HCJB M Sunday Nite
H Adventures in Odyssey (stories)
0505 BBCWS(sas) A Whirl Around the World (pop requests)
0545 R. Australia A Short Story

SWL, Media and Communications

0500 WWCR(3210 kHz.) M World of Radio
WHRI A Dang with Cumbre
0530 WWCR(3210 kHz.) M Communications World
0540 R. Habana Cuba S/W Doors Unlimited
0547 Spanish Foreign R. S Radio Waves

Listener Contact/Interactive

0500 HCJB S Saludos Amigos
WWCR(5070 kHz.) T Ask WWCR
0510 R. Japan A Hello from Tokyo
0520 China R. Int. A Listeners' Garden
0530 BBCWS(eas) S Write On
0535 Spanish Foreign R. A Radio Club
0540 R. Habana Cuba M/H Mailbag Show
0547 Spanish Foreign R. M Radio Club

Sport

0500 R. Australia S/A Grandstand (live action)*
0505 BBCWS(sas) F Sports International (magazine)
R. Australia A Pacific Focus-Sport
0530 China R. Int. T Sports World
Deutsche Welle F Hard to Beat: The World of Sport
R. Australia M-F Sport (daily report)
0535 R. Habana Cuba T-A Time Out
(*special on 9660, 12080, 17580, 17750, 21725 kHz. only.)

0600 UTC - Page 48 Freqs

Newscasts (*extended)
0600 BBCWS(eu)(wca) D World Briefing*
BBCWS(me)(esaf) S World Briefing*
M-A News
BBCWS(eas) S/A World Briefing*
M-F News
R. Australia D News
R. Habana Cuba D International News
R. Japan D News
R. New Zealand Int. D News
0630 R. Habana Cuba T-S News Bulletin

Current Affairs Magazines/Features

0605 BBCWS(me)(esaf) T-A Outlook (magazine)
0610 R. Habana Cuba T-S Spotlight on the Americas
0615 R. Japan M-F Asian Top News (region's radio)
0630 BBCWS(eu)(me)(af) S Agenda (trends)
R. New Zealand Int. M Letter from America
F The Pacific Report
0645 BBCWS(eu) T/W/F Analysis
H From Our Own Correspondent

Business/Economics

0630 BBCWS(eu) M-F World Business Report

Science/Technology (incl. Health & Environment)

0600 R. Habana Cuba M Breakthrough
0630 R. New Zealand Int. M Eureka!

Arts and Culture

0605 BBCWS(eas) W Meridian-Screen (film/cinema)
F Meridian-Writing (books)
R. New Zealand Int. M-F What's Going On

Local Lives and Views

0605 R. New Zealand Int. A Focus on Politics
0610 R. Japan S Weekend Square (Japanese life)

0620 R. Australia M-F Pacific Focus
0630 BBCWS(eu)(eos) A People and Politics
BBCWS(wca) M-F Network Africa
A African Quiz or This Week and Africa
R. New Zealand Int. T-H Today in Parliament
0645 BBCWS(eu) M Letter from America
BBCWS(me)(esaf) A From Where I Stand (2nd or 3rd wk.)

Informational Features

0605 BBCWS(eas) M Omnibus (documentary)
R. Australia S The Europeans
0625 R. Japan T Let's Learn Japanese
H Brush Up Your Japanese
0635 R. Habana Cuba S The World of Stamps

Music

0600 HCJB T Chords of Love (sacred)
A Wonderful Words of Life (hymns)
WWCR(5070kHz) M Ken's Country Classics
0605 BBCWS(eas) T Meridian-Masterpiece*
H Meridian-Music
WHRI(7315kHz) A Turn Your Radio On
WWCR(3210kHz) S The Big Backyard (aussie country)
0610 R. Habana Cuba M From Havana (Cuban musicians)
R. Japan A Pop Goes Asia
0625 R. Japan M Unforgettable Masterpieces
W Japan Music Log
F Music Beat (pop)
R. New Zealand Int. A In a Mellow Tone (easy jazz)
0630 BBCWS(eas) M Composer of the Month
T Music Mix*
W UK Top 20
F World of Music
HCJB T-A Nightsounds (inspirational)
R. Australia A Oz Sounds
0640 R. Australia M Australian Music Show (modern rock)
T/F Music Deli (international)
W Blacktracker (Aboriginal)
H Country Style

*may be preempted for a Proms concert

Entertainment/Variety, Magazine Shows

0605 R. New Zealand Int. S Storytime
0630 BBCWS(eas) S Westway Omnibus (drama serial)
BBCWS(eas) H Panel game or Quiz
0645 BBCWS(me)(esaf) M-F Off the Shelf (readings)
R. New Zealand Int. M-F Storytime

SWL, Media and Communications

0600 WWCR(3210kHz) M Spectrum
0630 WHRI (5745kHz) A Dang with Cumbre
WWCR(5070kHz) S World of Radio

Listener Contact/Interactive

0600 HCJB S Saludos Amigos
0605 BBCWS(me)(esaf) M Talking Point (global phone-in)
R. Australia S Feedback
0645 BBCWS(me)(esaf) A Write On (exc. 2nd or 3rd wk.)

Sport

0600 R. Australia S/A Grandstand (live action)*
0610 R. Australia M-F Sport (daily report)
0620 BBCWS(eu)(wca) D Sports Roundup
BBCWS(me)(wca) S Sports Roundup
BBCWS(eas) S/A Sports Roundup
(*special on 9660, 12080, 17580, 17750, 21725 kHz. only.)

1000 UTC - Page 47 Freqs

Newscasts (*extended)
1000 BBCWS(am)(eu)(me) D World Briefing*
BBCWS(af)(eos) S News Summary
BBCWS(esaf) M-A World Briefing*
BBCWS(wca) A World Briefing*
BBCWS(eas) M-F World Briefing*
A News
R. Australia D News
R. New Zealand Int. O News
VOA News Now D World News
1010 VOA News Now D Regional News
1014 VOA News Now O USA News
1030 VOA News Now O World News

Current Affairs Magazines/Features

1005 R. Australia M-F Asia Pacific
R. New Zealand Int. M-F Late Edition
1030 BBCWS(am)(me) S Agenda (trends)
BBCWS(esaf) T-F Analysis

Business/Economics

1030 BBCWS(am)(eu)(eos) M-F World Business Report
1049 VOA News Now M-F Business and Economic Report

Science/Technology (incl. Health & Environment)

1030 BBCWS(am)(eu)(me)(af) A Science in Action
R. Australia M Health Report

Shortwave Guide



Arts/Culture		
1305 BBCWS(eu)(af)	W	Meridian-Screen (film/cinema)
	F	Meridian-Writing (books)
1320 China R. Int.	S	In the Spotlight
1330 BBCWS(wcaf)	A	Arts in Action
R. Sweden	A	Spectrum (3rd Sat.)
Local Lives and Views		
1310 R. Canada Int.	A	The House (Canadian politics)
1330 China R. Int.	M	People in the Know
	F	Life in China
1330 BBCWS(am)(esaf)	A	People & Politics (Parliament)
R. Sweden	A	Weekend (Europe magazine-1st wk)
		Sweden Today (2nd wk.)
		Studia 49 (discussion-4th wk.)
1345 R. Sweden	H	Nordic Report (1st wk.)
		The 5-Files (things Swedish-4th wk.)
	F	Review of the Newsweek
Informational Features		
1305 BBCWS(eu)(af)	M	Omnibus (documentary)
1320 China R. Int.	H	Voices from Other Lands
1330 BBCWS(am)	S	In Praise of God
BBCWS(me)	M	Essential Guide
	T	Everywoman
	W	Focus on Faith
	F	People and Places
HCJB	M-F	Focus on the Family
1356 HCJB	M-F	Today's Father
1358 HCJB	M-F	Parent Talk Tip
Music		
1305 BBCWS(am)	S	Jazzmatazz
BBCWS(eu)(af)	T	Meridian-Masterpiece*
	H	Meridian-Music
BBCWS(me)	S	The Alternative (eclectic)
BBCWS(me)(wcaf)	A	Jazzmatazz
BBCWS(af)	S	Concert Hall (classical)
R. Australia	S	Country Club (from 1205)
1315 R. Australia	M-F	The Planet (international)
1330 BBCWS(eu)(af)	M	Composer of the Month
	T	Music Mix*
	W	UK Top 20
	F	World of Music
BBCWS(esaf)	A	Jazzmatazz
R. Sweden	S	Sounds Nordic (rock/pop-exc. 1st wk.)

(*may be preempted for Proms concert)

Entertainment/Variety, Magazine Shows		
1300 Channel Africa	S/A	Channel Africa Extra (weekend variety)
HCJB	S	Weekend Magazine
1330 BBCWS(eu)(af)	H	Panel game or Quiz
BBCWS(me)	H	Pick of the World (BBC's best)
1345 BBCWS(am)	M-F	Off the Shelf (book readings)

Listener Contact/Interactive		
1315 WWCR(15685kHz)	A	Ask WWCR
1320 China R. Int.	A	Listeners' Garden
1330 R. Sweden	S	In Touch with Stockholm (1st wk.)

Sport		
1310 R. Australia	M-F	Sport (daily report)
1330 China R. Int.	T	Sports World
1345 R. Sweden	M	Sportscan

1400 UTC - Page 50 Freqs

Newscasts (*extended)		
1400 BBCWS(am)(eu)(wcaf)	D	News
BBCWS(me)(esaf)(eas)	S/A	News
BBCWS(me)(esaf)	M-F	World Briefing*
China R. Int.	D	News
R. Australia	D	News
R. Canada Int.	D	News
R. Japan	D	News
1430 BBCWS(me)(esaf)(eas)	M-F	British News

Current Affairs Magazines/Features		
1400 BBCWS(eas)	M-F	East Asia Today
1405 R. Canada Int.	S	The Sunday Edition (from 1310)
	M-F	This Morning (from 1210)
1410 China R. Int.	S	Report on Developing Countries
	M-F	Current Affairs
	A	Global Review
1415 R. Japan	M-F	44 Minutes

Business/Economics		
1420 BBCWS(me)(esaf)	M-F	World Business Report
China R. Int.	W	China Horizons

Science/Technology (incl. Health & Environment)		
1405 BBCWS(eu)(wcaf)	M	Discovery
	T	Health Matters
	W	Science View
	F	One Planet (ecology)

Arts and Culture		
1405 BBCWS(am)	T	Meridian-Screen (film)
	H	Meridian-Writing (books)
R. Australia	S	Books and Writing
1420 China R. Int.	S	In the Spotlight
Local Lives and Views		
1410 R. Japan	S	Weekend Square
1430 China R. Int.	M	People in the Know
	F	Life in China
R. Canada Int.	F	C'est La Vie (life in Quebec)
1445 R. Canada Int.	M-H	Out Front (personality produced radio)

Informational Features		
1405 R. Australia	A	New Dimensions ("progressive" ideas)
1420 China R. Int.	H	Voices from Other Lands
1430 BBCWS(eu)(wcaf)	M	Essential Guide
	T	Everywoman
	W	Focus on Faith
	F	People and Places

Music		
1405 BBCWS(am)	M	Meridian-Masterpiece
	W	Meridian-Music
R. Australia	M-F	The Planet (from 1315)
R. Japan	S	Pop Goes Asia
1430 BBCWS(am)	M	Music Mix
	T	UK Top 20
	H	World of Music
1445 BBCWS(am)	W	UK Album Chart
	F	Music X-Press

Entertainment/Variety, Magazine Shows		
1400 Channel Africa	S/A	Channel Africa Extra (from 1300)
1405 BBCWS(eu)(wcaf)	H	Pick of the World (BBC's best)
R. Canada Int.	A	Vinyl Cafe (humor)
1430 BBCWS(am)	W/F	Westway (drama serial)
HCJB	A	Alive! (Christian lifestyles)

SWL Media and Communications		
1430 WHRI (6040kHz)	S/A	Dzing with Cumbre

Listener Contact/Interactive		
1405 BBCWS(all)	S	Talking Point (current events call-in)
1420 China R. Int.	A	Listeners' Garden

Sport		
1405 BBCWS(all)	A	Sportsworld (live action)
BBCWS(eu)(wcaf)	H	Sports International
1430 China R. Int.	T	Sports World
1445 BBCWS(me)(esaf)(eas)	M-H	Sports Roundup
	F	Football Extra

1500 UTC - Page 50 Freqs

Newscasts (*extended)		
1500 BBCWS(am)(me)(af)(eas)	D	News
BBCWS(eu)	S/A	News
	M-F	World Briefing*
China R. Int.	D	News
R. Australia	D	News
R. Canada Int.	S/A	News
1530 BBCWS(eu)	M-F	British News

Current Events Magazines/Features		
1505 BBCWS(me)	M-F	Outlook (topical magazine)
BBCWS(af)	M-F	Focus on Africa
R. Australia	M-F	Asia Pacific
R. Canada Int.	S	The Sunday Edition (from 1310)
1510 China R. Int.	S	Report on Developing Countries
	M-F	Current Affairs
	A	Global Review
1530 R. Austria Int.	D	Report from Austria
1545 BBCWS(eu)	M/T/H	Analysis
	W	From Our Own Correspondent
	F	Analysis (exc. last wk.)

Business/Finance		
1530 China R. Int.	W	China Horizons

Science/Technology (incl. Health & Environment)		
1505 BBCWS(am)	M	One Planet (ecology)
	T	Discovery (research)
	W	Health Matters
	H	Science View
R. Canada Int.	A	Quirks and Quarts
1530 R. Australia	M	The Health Report
1545 BBCWS(me)	F	Body and Mind (health)

Arts and Culture		
1505 BBCWS(eas)	T	Meridian-Screen (film/cinema)
	H	Meridian-Writing (books)
1520 China R. Int.	S	In the Spotlight

Local Lives and Views		
1530 China R. Int.	M	People in the Know
	F	Life in China
R. Australia	T	The Low Report
	W	The Religion Report
1540 R. Austria Int.	A	Radio E (on Europe)
1545 BBCWS(eu)	F	The New Europe (last wk.)
Informational Features		
1505 BBCWS(eas)	F	Omnibus (documentary)
R. Australia	S	Encounter (spiritual beliefs)
1520 China R. Int.	H	Voices from Other Lands
1530 BBCWS(am)	M	People and Places
	T	The Essential Guide
	W	Everywoman
	H	Focus on Faith
	F	Pick of the World (best of the BBC)
BBCWS(af)	M-F	World Learning
1545 BBCWS(me)	M	Patterns of Faith
	T	A History of the World
	W	Heart and Soul (religion)
	H	Best of "The Edge" (youth culture)

Music		
1505 BBCWS(am)(eu)(me)	S	Concert Hall
BBCWS(eas)	S	The Alternative (eclectic)
	M	Meridian-Masterpiece*
	W	Meridian-Music
R. Australia	A	Melisma (innovative)
1530 BBCWS(eas)	M	Music Mix*
	T	UK Top 20
	H	World of Music
1545 BBCWS(eas)	W	UK Album Chart
	F	Music X-Press

(*may be preempted for a Proms concert.)

Entertainment/Variety, Magazine Shows		
1500 HCJB	A	Alive! (from 1430)
1505 BBCWS(af)	S	Play of the Week (radio theatre)
1530 BBCWS(eas)	W/F	Westway (drama serial)
HCJB	A	Weekend Magazine

SWL Media and Communications		
1500 WHRI(15105kHz)	S	Dzing with Cumbre
1530 R. Australia	H	The Media Report

Listener Contact/Interactive		
1520 China R. Int.	A	Listeners' Garden
1545 R. Austria Int.	A	Listeners' Letters

Sport		
1505 BBCWS(am)	F	Sports International
	A	Sportsworld (from 1405)
1530 China R. Int.	T	Sports World
R. Australia	F	The Sports Factor

1600 UTC - Page 51 Freqs

Newscasts (*extended)		
1600 BBCWS(am)(eu)(eas)	S	News Summary
	A	News
BBCWS(me)(af)	O	News
R. Australia	O	News

Current Events Magazines/Features		
1600 BBCWS(am)(eu)(eas)	M-F	Europe Today

Business/Finance		
1630 BBCWS(am)(eu)(eas)	M-F	World Business Report

Arts and Culture		
1605 BBCWS(me)(af)	T	Meridian-Screen (film/cinema)
	H	Meridian-Writing (books)
1630 BBCWS(af)	H	Artsbeat

Local Lives and Views		
1605 R. Australia	S	The Notional Interest
	T	The Comfort Zone (homes/gardens/food)
	W	Verbatim (oral histories)
	H	Hindsight (history)
	F	Away! (Aboriginal culture)
1630 BBCWS(af)	W	Talkabout Africa
R. Australia	W	Earshot (Australian voices)

Informational Features		
1605 BBCWS(me)(af)	F	Omnibus (documentary)
1630 BBCWS(af)	T	The Story of Africa

Music		
1605 BBCWS(me)	M	Meridian-Masterpiece*
	W	Meridian-Music
R. Australia	A	Melisma (from 1505)
1630 BBCWS(me)(af)	M	Music Mix*
	T	UK Top 20
	H	World of Music

Shortwave Guide



1645 BBCWS(me)(af) W UK Album Chart
F Music X-Press
(* may be preempted for Proms concert.)

Entertainment/Variety, Magazine Shows

1605 R. Australia M Margaret Throsby Interview
1630 BBCWS(me) W/F Westway (drama serial)

Sport

1605 BBCWS(all) S Sunday Sportsworld
A Sportsworld (from 1405)
1630 BBC(af) M/F Fast Track
1645 BBCWS(am)(au)(eas) M-F Sports Roundup

1700-2100 UTC

Space limitations do not permit inclusion of the BBC World Service schedules for these hours in this issue. However, you can refer to the July issue of *MT* which does have these schedules in a by-hour, by-stream format.

2100 UTC - Page 54 Freqs

Newscasts

2100 BBCWS(am)(eu)(wca)D News
R. Australia D News
2120 BBCWS(am)(eu) M-A British News

Current Events Magazines/Features

2110 R. Australia S-H AM (morning news magazine)
2145 BBCWS(am) M/T/H/F Analysis
W From Our Own Correspondent

Business/Finance

2105 BBCWS(am) S Global Business
A World Business Review
BBCWS(am)(eu) M-F World Business Report

Science/Technology (incl. Health & Environment)

2105 BBCWS(wcaf) M Health Matters
T Science View
H One Planet (ecology)
F Discovery
A Science in Action
2130 R. Australia M Health Report
T Innovations

Local Lives and Views

2105 BBCWS(am) M-F Caribbean Report*
R. Australia A Australia All Overf
2130 BBCWS(am) T/F Calling the Falklands ^
BBCWS(wcaf) A People and Politics
R. Australia H Rural Reporter
2145 BBCWS(am) A Letter from America
(*special service on 5975, 11675, 15390 kHz. only.)
(^ special service on 5975, 11680 kHz.)

Informational Features

2130 BBCWS(am) M Everywoman
T Focus on Faith
H People and Places
F Essential Guide
R. Australia S Educational series
W Religion Report
2145 BBCWS(am) S Reporting Religion

Music

2130 BBCWS(eu) A Composer of the Month
R. Australia F Jazz Notes

Entertainment/Variety, Magazine Shows

2105 BBCWS(wcaf) S Wright Around the World (pop requests)
2130 BBCWS(eu) S Panel game or Quiz
BBCWS(wcaf) W Pick of the World (BBC's best)
2145 BBCWS(eu) M-F Off the Shelf (readings)

Listener Contact/Interactive

2105 R. Australia F Feedback

Sport

2105 BBCWS(wcaf) W Sports International
2130 BBCWS(am) D Sports Roundup
BBCWS(eu) M-F Sports Roundup

2200 UTC - Page 54 Freqs

Newscasts (*extended)
2200 BBCWS(am) D The World Today*
BBCWS(wcaf) D News
R. Australia D News
R. Canada Int. M-F World at Six*
2230 R. Vlaanderen Int. M F News

Current Events Magazines/Features

2200 R. Canada Int. S/A The World This Weekend
2205 BBCWS(wcaf) M-F Outlook (topical magazine)
2210 R. Australia S-H AM (morning news magazine)

F Asia Pacific
A Correspondents' Report
S Agenda (trends)
2230 BBCWS(am) S From Our Own Correspondent
BBCWS(am)(wcaf) A As It Happens (interviews)
R. Canada Int. M-F Focus on Europe
2243 R. Vlaanderen Int. M International Report
2248 R. Vlaanderen Int. H

Business/Finance

2243 R. Vlaanderen Int. H Economics

Science/Technology (incl. Health & Environment)

2243 R. Vlaanderen Int. T Green Society (ecology)
2245 BBCWS(wcaf) F Body and Mind

Arts and Culture

2243 R. Vlaanderen Int. W/F Around the Arts

Local Lives and Views

2230 BBCWS(am) F People and Politics
2234 R. Vlaanderen Int. M-F Belgium Today
2238 R. Vlaanderen Int. S Tourism in Flanders
M-F Press Review
2248 R. Vlaanderen Int. W Around Town
F Tourism in Flanders

Informational Features

2205 BBCWS(wcaf) A Omnibus (documentary)
2245 BBCWS(wcaf) A Patterns of Faith
T A Radio History of the World
W Heart and Soul (religion)

Music

2230 BBCWS(wcaf) S World of Music
R. Vlaanderen Int. A Music from Flanders
2240 R. Australia S Australian Music Show (rock)
M/H Music Deli (international)
T Blacktracker (Aboriginal contemporary)
W Australian Country Style
2254 R. Vlaanderen Int. S-F Soundbox

Entertainment/Variety, Magazine Shows

2205 BBCWS(wcaf) S Panel game or Quiz
2230 R. Canada Int. A Summer Comedy Special
2245 BBCWS(wcaf) H Best of "The Edge" (youth culture)

SWL, Media and Communications

2230 R. Vlaanderen Int. S Radio World

Listener Contact/Interactive

2244 R. Vlaanderen Int. S Brussels 1043

Sport

2230 R. Canada Int. S Inside Track (anthologies)
2248 R. Vlaanderen Int. M Sports

2300 UTC Page 55 Freqs

Newscasts (*extended)

2300 BBCWS(am) S The World Today*
M-F News
A News Summary
D The World Today
R. Australia D News
R. Canada Int. News
2330 R. Netherlands S/A News

Current Events Magazines/Features

2305 BBCWS(am) M-F Outlook
R. Canada Int. M-F As It Happens (from 2230)
2310 China R. Int. S-H Current Affairs
F Global Review
A Report on Developing Countries
R. Australia S-H Asia Pacific
R. Netherlands M-F Newslines
2330 R. Canada Int. W Dispatches
2355 R. Netherlands F Insight (commentary)

Business/Economics

2330 China R. Int. T China Horizons
R. Australia M Innovations

Science/Technology (incl. Health & Environment)

2305 R. Australia A Ockham's Razor (opinion)
R. Canada Int. A Quirks and Quarks
2330 R. Australia S Earthbeat (ecology)
BBCWS(eas) F Global Business

Arts and Culture

2320 China R. Int. A In the Spotlight
2330 R. Australia T Arts Talk
BBCWS(eas) A Arts in Action
2345 BBCWS(am) F Just a Taste (food and culture)

Local Lives and Views

2330 China R. Int. S People in the Know
H Life in China
W Rural Reporter (outback)
2335 R. Netherlands A Europe Unzipped

Informational Features

2315 R. Australia F Lingua Franca (about language)
2330 China R. Int. W Voices from Other Lands
2345 BBCWS(am) M Patterns of Faith
T Language Steamrollers (tracing "dead" languages)
W Heart and Soul (religion)

Music

2305 R. Canada Int. S Global Village (world/folk)
2330 BBCWS(am) S Greenfield Collection (classical requests)
WBCQ(7415kHz) A Fred Flintstone's Music Show
WWCR(3215kHz) S Ken's Country Classics

Entertainment/Variety, Magazine Shows

2300 WBCQ(7415kHz) S Le Show
WBCQ(17495kHz) A Marion's Attic (vintage recordings)
2301 BBCWS(am) A Play of the Week (radio theatre)
2305 R. Australia F Book Reading
2330 R. Canada Int. A Madly Off in All Directions (comedy/satire)
2345 BBCWS(am) H Best of "The Edge" (youth culture)

SWL, Media and Communications

2330 R. Australia H The Media Report
WBCQ(7415kHz) W World of Radio
WRI(9495 kHz) A Dining with Cumbre

Listener Contact/Interactive

2320 China R. Int. F Listeners' Garden
2335 R. Netherlands S Sincerely Yours

Sport

2330 China R. Int. M Sports World
R. Canada Int. S The Inside Track

New at www.monitoringtimes.com

- Link list from John Catalano's June feature
- Baseball Listener's Guide 2001 - companion to Ken Reitz's July feature
- Updated freq exchange for Maryland area and others
- More on BBC controversy
- Complete list of NOAA weather stations
- and much more...!

Thank You ...

Additional Contributors to This Month's Shortwave Guide:

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Satellite Service Guide

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www.grove-ent.com/mtsg.html

All Frequencies MHz

Satellites Mexicanos Solidaridad 2

C-Band - 113 degrees West longitude

1N(V)	3720	Data Transmissions
1W/L(H)	3740	Data Transmissions
2N(V)	3760	Data Transmissions
1W/U(H)	3780	Data Transmissions
3N(V)	3800	Data Transmissions
2W/L(H)	3820	Data Transmissions
4N(V)	3840	Data Transmissions
2W/U(H)	3860	Data Transmissions
5N(V)	3880	(none)
3W/L(H)	3900	Data Transmissions
6N(V)	3920	Data Transmissions
3W/U(H)	3940	Data Transmissions
7N(V)	3960	(none)
4W/L(H)	3980	Data Transmissions
8N(V)	4000	Data Transmissions
4W/U(H)	4020	Data Transmissions
9N(V)	4040	Data Transmissions
5W/L(H)	4060	Data Transmissions
10N(V)	4080	Data Transmissions
5W/U(H)	4100	Data Transmissions
11N(V)	4120	(none)
6W/L(H)	4140	Data Transmissions
12N(V)	4160	Data Transmissions
6W/U(H)	4180	Data Transmissions

Satellites Mexicanos Solidaridad 2

Ku-band - 113 degrees West longitude

T01(H)	11730	Sky Mexico DBS (digital)
T02(H)	11791	Sky Mexico DBS (digital)
T03(H)	11852	Sky Mexico DBS (digital)
T04(H)	11913	Sky Mexico DBS (digital)
T05(H)	11974	Data Transmissions
T06(H)	12035	Sky Mexico DBS (digital)
T07(H)	12096	Sky Mexico DBS (digital)
T08(H)	12157	Sky Mexico DBS (digital)
T09(V)	11743	Sky Mexico OBS (digital)
T10(V)	11804	Sky Mexico DBS (digital)
T11(V)	11865	Data Transmissions
T12(V)	11926	Data Transmissions
T13(V)	11987	Data Transmissions
T14(V)	12048	Sky Mexico DBS (digital)
T15(V)	12109	Sky Mexico DBS (digital)
T16(V)	12170	Sky Mexico DBS (digital)

Satellites Mexicanos SATMEX-5

C-band - 116.8 degrees West longitude

1(V)	3720	Data Transmissions
2(H)	3740	Data Transmissions
3(V)	3760	Data Transmissions
4(H)	3780	Data Transmissions
5(V)	3800	(none)
6(H)	3820	Data Transmissions
7(V)	3840	Data Transmissions
8(H)	3860	Data Transmissions
9(V)	3880	Data Transmissions
10(H)	3900	Data Transmissions
11(V)	3920	Data Transmissions
12(H)	3940	Data Transmissions
13(V)	3960	TV Azteca (digital)
14(H)	3980	Data Transmissions
15(V)	4000	Data Transmissions
16(H)	4020	PCTV - Television Por Cable (digital)
17(V)	4040	Data Transmissions
18(H)	4060	Mexican Government and Legislative channels, XEIMT-TV 22, XEIPN-TV 11 (digital)
19(V)	4080	Data Transmissions
20(H)	4100	Data Transmissions
21(V)	4120	Data Transmissions

22(H)	4140	Data Transmissions
23(V)	4160	Data Transmissions
24(H)	4180	Edusat (digital)

Satellites Mexicanos SATMEX-5

Ku-Band - 116.8 degrees West longitude

1(H)	11720	Data Transmissions
2(V)	11740	(none)
3(H)	11760	Data Transmissions
4(V)	11780	(none)
5(H)	11800	Data Transmissions
6(V)	11820	(none)
7(H)	11840	Data Transmissions
8(V)	11860	(none)
9(H)	11880	Data Transmissions
10(V)	11900	Data Transmissions
11(H)	11920	Data Transmissions
12(V)	11940	Data Transmissions
13(H)	11960	Data Transmissions
14(V)	11980	Data Transmissions
15(H)	12000	Data Transmissions
16(V)	12020	Data Transmissions
17(H)	12040	Data Transmissions
18(V)	12060	Data Transmissions
19(H)	12080	CTN, CCTV-4, MSTV (digital)
20(V)	12100	Data Transmissions
21(H)	12120	Data Transmissions
22(V)	12140	Data Transmissions
23(H)	12160	(none)
24(V)	12180	Data Transmissions

Telesat Canada Anik E1

C-Band - 118.7 degrees West longitude

1A(H)	3720	(none)
1B(V)	3740	(none)
2A(H)	3760	(none)
2B(V)	3780	(none)
3A(H)	3800	(none)
3B(V)	3820	(none)
4A(H)	3840	(none)
4B(V)	3860	(none)
5A(H)	3880	(none)

5B(V)	3900	(none)
6A(H)	3920	(none)
6B(V)	3940	(none)
7A(H)	3960	(none)
7B(V)	3980	Telesat Canada ID slate (occasional)

8A(H)	4000	(none)
8B(V)	4020	(none)
9A(H)	4040	(none)
9B(V)	4060	(none)
10A(H)	4080	(none)
10B(V)	4100	(none)
11A(H)	4120	(none)
11B(V)	4140	(none)
12A(H)	4160	(none)
12B(V)	4180	(none)

Telesat Canada Anik E1

Ku-Band - 118.7 degrees West longitude

T01(V)	11717	(none)
T02(V)	11743	(none)
T03(V)	11778	(none)
T04(V)	11804	(none)
T05(V)	11839	(none)
T06(V)	11865	(none)
T07(V)	11900	(none)
T08(V)	11926	(none)
T09(V)	11961	(none)
T10(V)	11987	(none)
T11(V)	12022	(none)
T12(V)	12048	(none)
T13(V)	12083	(none)
T14(V)	12109	(none)
T15(V)	12144	(none)
T16(V)	12170	(none)
T17(H)	11730	(none)
T18(H)	11756	(none)
T19(H)	11791	(none)
T20(H)	11817	(none)
T21(H)	11852	(none)
T22(H)	11878	(none)
T23(H)	11913	(none)
T24(H)	11939	(none)
T25(H)	11974	(none)
T26(H)	12000	Data Transmissions

T27(H)	12035	(none)
T28(H)	12061	(none)
T29(H)	12096	Data Transmissions
T30(H)	12122	Data Transmissions
T31(H)	12157	(none)
T32(H)	12183	(none)

Satellites Mexicanos Morelos 2

C-Band - 120 degrees West longitude

1W/L(H)	3720	(none)
1N(V)	3740	(none)
1W/U(H)	3760	(none)
2N(V)	3780	Data Transmissions
2W/L(H)	3800	(none)
3N(V)	3820	(none)
2W/U(H)	3840	(none)
4N(V)	3860	Data Transmissions
3W/L(H)	3880	(none)
5N(V)	3900	Data Transmissions
3W/U(H)	3920	(none)
6N(V)	3940	(none)
4W/L(H)	3960	(none)
7N(V)	3980	(none)
4W/U(H)	4000	(none)
8N(V)	4020	Data Transmissions
5W/L(H)	4040	(none)
9N(V)	4060	(none)
5W/U(H)	4080	(none)
10N(V)	4100	(none)
6W/L(H)	4120	(none)
11N(V)	4140	(none)
6W/U(H)	4160	(none)
12N(V)	4180	(none)

Satellites Mexicanos Morelos 2

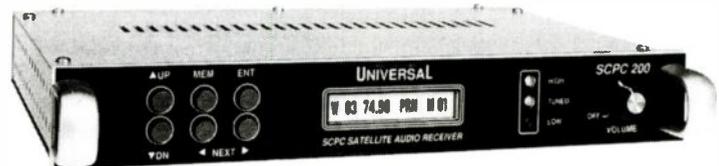
Ku-Band - 120 degrees West longitude

T01K(H)	11764	(none)
T02K(H)	11888	(none)
T03K(H)	12012	(none)
T04K(H)	12136	(none)



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Images from NOAA-16

Just occasionally we may notice an interesting cloud formation, or other feature in the sky, and then find that a weather satellite (WXSAT) is going to pass high enough overhead to provide an image "from the other side." This happened to Dick Mobley when he noticed two jet contrails from his window, at the same time that NOAA-16 was passing over Anchorage. Close examination of figure 1 shows two aircraft condensation trails (contrails) converging towards the northwest. Dick kindly sent me both the visible-light (channel 2) image and an infrared (channel 5) – the latter is reproduced here because it shows the trails more clearly.

My thanks to Dick for an interesting set of high resolution picture telemetry (HRPT) images.



Fig 1: view from above – NOAA-16 May 28, 2001, channel 5 at 2245 UTC from Dick Mobley



Fig 2: Cleveland volcano in action in February – NOAA-16 image from Dick Mobley

NOAA-16 has continued to provide good quality HRPT but cannot now transmit APT (automatic picture telemetry) due, apparently, to a faulty switch. NOAA re-

ports that the fault is unlikely to be rectifiable. My own HRPT reception system failed in March when a gust of wind blew the dish over, despite the feet of the mount having been weighed down with heavy paving slabs. The broken motor went back to the supplier but has yet to be repaired.

◆ GOES-2 goes to satellite "heaven"

Space in geostationary orbit (the Clarke belt) is valuable, being occupied by WXSATs, communication, military and television relay satellites, so when an occupant of that orbit is declared non-functioning, it is boosted to the "graveyard" orbit, some 185 miles above the 22,300 mile high Clarke belt. This was the fate of the elderly WXSAT GOES-2 during early May, after some 24 years of operations.

Officials decided to take the satellite out of commission because of the lack of propellant for future thruster firings. It is preferred to foresee any possible fuel problems ahead of time in order to allow the opportunity to raise the craft's orbit out of the geostationary belt. This also permits the depletion of onboard fuel in order to minimize the risk of future explosions.

Six thruster firings were performed for the orbit transfer, commanded from the Kokee Park Geophysical Observatory station in Hawaii. Launched aboard a Delta rocket in June 1977, GOES-2 was the second component of NOAA's Geostationary Operational Environmental Satellite system. Until 1993, the satellite provided weather sensing information to forecasters on the ground, allowing them to make more informed and more accurate forecasts. After a brief two-year stand-down, the craft was brought to life again as a relay satellite for the National Science Foundation to broadcast their transmissions from the South Pole to public broadcasting stations around the U.S.

◆ Polar WXSAT operations

Meteor 3-5 resumed transmissions during May, and Meteor 2-21 was switched off

around the same time. The images that I have received since then appear to have slightly lower noise levels. Images appear to show more of the eastern regions than I have recorded before. If you have an antenna with easy access, you may find that testing reception after changing the antenna's angle of elevation produces significantly different results. Some years ago I tilted my crossed-dipole to 45° to the horizon, and found much better reception near the limits of the satellite's rising or setting. I subsequently bought another antenna and feed so that I could choose the preferred characteristics for any selected pass!

Since the new synchronization regime was brought in for NOAA-15 (occurring at 0730 UTC each day) APT images have improved.

◆ GOES-M launch

The newest geostationary WXSAT (GOES-M) is ready at Astrotech, Titusville, where the media were able to see the last in the current series of advanced geostationary weather satellites in service. GOES-M has a new instrument not on earlier spacecraft: a Solar X-ray Imager that can be used in forecasting space weather – the effects of solar storms that create electromagnetic disturbances on earth and affect other satellites, communications and power grids. GOES is scheduled to launch from Cape Canaveral Air Force Station on an Atlas II rocket on July 15, 2001, due to a delay in the shipment of a booster rocket and the Shuttle launch on July 12.

The latest launch information is normally available on this site:
<http://www.osd.noaa.gov/news/>

Frequencies

NOAA-14 transmits APT on 137.62 MHz
NOAA-15 and NOAA-12 transmit APT on 137.50 MHz
Meteor 3-5 may transmit APT on 137.30 MHz when in sunlight
Resurs 1-4 transmits APT on 137.85 MHz
Okean-O, Okean-4 and Sich-1 sometimes transmit APT briefly on 137.40 MHz
GOES-8 and GOES-10 use 1691 MHz for WEFAX

Federal Bureau of Prisons (FBOP)

The Federal Bureau of Prisons (FBOP) was established in 1930 to provide more progressive and humane care for Federal inmates, to professionalize the prison service, and to ensure consistent and centralized administration of the 11 Federal prisons in operation at that time.

Today, the Bureau falls under the Department of Justice and consists of 98 institutions, six regional offices, a Central Office (headquarters), three staff training centers, and 28 community corrections offices. The regional offices and the Central Office provide administrative oversight and support to the institutions and community corrections offices. Community corrections offices oversee community corrections centers and home confinement programs.

The Bureau is responsible for the custody and care of approximately 148,000 Federal offenders. Approximately 126,000 of these inmates are confined in Bureau-operated correctional institutions or detention centers. The remainder are confined through agreements with State and local governments and through contracts with privately-operated community corrections centers, detention centers, prisons, and juvenile facilities.

The Federal prison system is a nationwide system of prisons and detention facilities for the incarceration of inmates who have been sentenced to imprisonment for Federal crimes and for the detention of individuals awaiting trial or sentencing in Federal court. In the United States, there are also 50 State correctional systems and a correctional system for the District of Columbia. These systems are responsible for the imprisonment and detention of offenders who have been sentenced or are awaiting trial for crimes committed within their jurisdictions.

In 1997, Congress passed a law requiring the Bureau of Prisons to assume responsibility for incarcerating the District of Columbia's sentenced felon inmate population by the end of 2001.

❖ FBOP VHF Frequencies

For many years the Bureau of Prison has used a well-known set of VHF-high band frequencies. These FBOP/FCI (Federal Correctional Institute) frequencies and callsigns are as follows:

Nationwide: 170.650 170.875 170.925

Discrete Frequencies: 162.025 163.000 164.100 165.4125
165.825 165.875 165.925 166.275 168.425 168.825
168.925 169.050 170.000 170.350 170.550 170.600
170.625 171.175 171.2625 171.500 171.975 172.250
172.575 172.625 173.050 173.125 173.6125 173.7375
173.7875 173.8375 173.8625 173.9625

Callsigns:

KFQ 252 FPC Bryan, TX
KFQ 254 FPC Pensacola, FL
KFQ 256 FPC Yankton, SD
KFQ 257 FCI Jesup, GA
KFQ 258 FCI Manchester, KY
KFQ 259 FCI Three Rivers, TX
KOE 951 FCI Morgantown, WV
KOE 952 FCI Memphis, TN
KOE 954 FCI Terminal Island, CA
KOE 955 FCI Safford, AZ
KOE 956 FCI Lompoc, CA
KOE 957 FCI La Tuna, TX
KOE 958 FPC Eglin AFB, FL
KOE 959 USP Marion, IL
KOE 960 Central Office Washington, DC
KOE 961 MDC Brooklyn, NY
KOE 962 USP Lewisburg, PA
KOE 963 FCI/FPC/USP Allenwood, PA
KOE 964 FCI Danbury, CT
KOE 965 FCI Petersburg, VA
KOE 966 FCI Ashland, KY
KOE 967 USP Atlanta, GA
KOE 968 FCI Tallahassee, FL
KOE 969 FPC Montgomery, AL
KOE 970 FCI/FDC/MCC Miami, FL
KOE 971 USP Terre Haute, IN
KOE 972 FPC Alderson, WV
KOE 973 FCI Texarkana, AR
KOE 974 FCI El Reno, OK
KOE 975 FCI Sandstone, MN
KOE 976 FCI/FMC Butner, NC
KOE 977 FCI Seagoville, TX
KOE 978 FCI Englewood, CO
KOE 979 FCI Milan, MI
KOE 980 FCI Bastrop, TX
KOE 981 USP Leavenworth, KS
KOE 982 MCFP Springfield, MO
KOE 983 FMC Carswell (Fort Worth), TX
KVL 310 FCI Oxford, WI
KVL 311 FMC Lexington, KY
KVL 312 MCC Chicago, IL
KVL 313 MCC New York City, NY
KVL 315 MCC San Diego, CA
KVL 316 FCI Talladega, AL
KVL 318 FCI Big Spring, TX
KVL 319 FCI Otisville, NY
KVL 320 FDC Philadelphia, PA
KVL 321 FCI Tucson, AZ
KVL 322 FCI Phoenix, AZ
KVL 323 FMC Rochester, MN
KVL 324 FCI/FDC Oakdale, LA
KVL 325 FCI Marianna, FL
KVL 326 FCI Fairton, NJ
KVL 328 MDC Los Angeles, CA
KVL 329 FCI Sheridan, OR

KVL 330 FCI Schuylkill (Minersville), PA
KVL 331 FPC Nellis AFB, NV
KVL 334 FBOP Staff Training Academy Glynco, GA

Key:

FCI Federal Correction Institute
FDC Federal Detention Center
FMC Federal Medical Center
FPC Federal Prisons Camp
MCC Metropolitan Corrections Center
MCFP Medical Center for Federal Prisoners
MDC Metropolitan Detention Center
USP U.S. Penitentiary

❖ FBOP Communications Upgraded

In 1996, the federal government wanted a way for agencies to purchase Motorola mobile/portable radios with trunking and encryption capabilities. The U.S. Army Communications-Electronics Command special project office located at Fort Monmouth, NJ, became the agent for a large contract known as BSTRS (Base Support Trunked Radio System) which accomplished the goal of putting trunk systems on the air. And, according to the BSTRS website, one of the government agencies that has bought systems under this contract was the Federal Bureau of Prisons.

We have received a few reports from the field on FBOP trunk systems in the 406-420 MHz federal land mobile band. The information below represents all of the current information known to this point about the Bureau of Prisons trunk systems. If the FBOP facility near you isn't on the list we would appreciate scanner owners searching in the 406-420 MHz range for trunk activity. Additions, corrections, and updates are always appreciated.

BUREAU OF PRISONS TRUNK SYSTEMS

U.S. Penitentiary - Florence, Colorado
Frequencies: 406.550 408.300 408.350
408.550 409.150 409.550 409.950

Federal Correctional Institute - Miami, Florida
Frequencies: 406.550 408.950 409.350
409.750

Federal Correctional Institute - Greenville, Illinois

Frequencies: 406.350 407.150 407.950
408.750 409.150

Federal Correctional Institute - Pekin, Illinois

Frequencies: 406.350 407.150 407.950
408.750 409.150

U.S. Penitentiary - Terre Haute, Indiana

Frequencies: 406.350 407.150 407.950
408.750

Federal Correctional Institute - Manchester, Kentucky

Frequencies: 406.750 407.550 408.350
409.150 409.950

Federal Correctional Institute - Cumberland, Maryland

Frequencies: 406.350 409.150 409.350
409.550 409.750

Federal Correctional Institute - Fort Devens/Ayers, Massachusetts

System: Motorola Type II (System ID 6046)
Frequencies: 406.950 408.350 408.550
408.950

Federal Correctional Institute - Butner, North Carolina

Frequencies: 406.350 406.550 406.750
407.150 407.950 408.150 408.350
408.750 409.150 409.950

Federal Correctional Institute - Fort Dix, New Jersey

Frequencies: 407.950 408.225 408.750
409.425 412.425 413.650

Metropolitan Detention Center - Brooklyn, New York

Frequencies: 407.950 408.550 408.750
409.750

Will Rogers Airport - Oklahoma City, OK

Frequencies: 407.950

Federal Correctional Institute/U.S. Penitentiary - Allenwood, Pennsylvania

Frequencies: 406.350 406.750 406.950
407.150 407.950 408.350 408.750
408.950 409.550 409.950

Federal Correctional Institute - Schuylkill (Minersville), Pennsylvania

Frequencies: 406.550 408.550 409.150
409.250 409.350 409.750

Federal Correctional Institute - Estill, South Carolina

Frequencies: 406.350 407.150 407.950
408.750 409.550

Federal Correctional Institute - Fort Worth, Texas

Frequencies: 408.350 411.175 412.425
413.650

And that is it for this month's edition of *The Fed Files*. We will complete our promised Coast Guard VHF/UHF frequency list in the September issue of *MT*. But now it is time to look at this month's federal spectrum scan in Table One. In this issue we continue our detailed look at the reorganized 406-420 MHz UHF federal land mobile service. 73 and good hunting.

Table One: Federal UHF Land Mobile Service

Frequency Ch/ Paired Freq	Agencies	Frequency Ch/ Paired Freq	Agencies
416.0000 72/407.0000	Air Force, Energy Department, Justice Department (Nationwide), NASA, TVA, Veterans Administration	416.5500 116/407.5500	Federal Trunk Group 4 (paired with 408.5500): Air Force, Army, Bureau of Prisons, Coast Guard, Energy Department, NASA, National Park Service, Navy, Social Security Administration
416.0125 73/407.0125	(No reported activity)	416.5625 1.7/407.5625	(No reported activity)
416.0250 74/407.0250	Air Force, Energy Department, Bureau of Indian Affairs, Bureau of Mines, Bureau of Reclamation, General Services Administration, Interior Department (Nationwide), National Park Service, Navy	416.5750 118/407.5750	Army, Bureau of Reclamation, Coast Guard, Corps of Engineers, Energy Department, FAA, Navy
416.0375 75/407.0375	(No reported activity)	416.5875 119/407.5875	Coast Guard
416.0500 76/407.0500	Drug Enforcement Administration (Nationwide repeater input to 418.625) < channel 1 >	416.6000 120/407.6000	Army, Coast Guard, Energy Department, Railroad Transportation Test Center
416.0625 77/407.0625	(No reported activity)	416.6125 121/407.6125	US Information Agency
416.0750 78/407.0750	Army, Energy Department, Interior Department (Nationwide), National Park Service, Post Office, TVA, Veterans Administration	416.6250 122/407.6250	Army, Energy Department, FAA
416.0875 79/407.0875	(No reported activity)	416.6375 123/407.6375	Coast Guard
416.1000 80/407.1000	Air Force, Army, Drug Enforcement Administration, Energy Department, EPA, FBI, Federal Reserve System, Navy, Post Office, Veterans Administration	416.6500 124/407.6500	Army, Corps of Engineers, Energy Department
416.1125 81/407.1125	(No reported activity)	416.6625 125/407.6625	Energy Department
416.1250 82/407.1250	Bureau of Land Management, FBI, Interior Department (Nationwide), National Park Service	416.6750 126/407.6750	Bureau of Reclamation, Corps of Engineers, Energy Department, Navy
416.1375 83/407.1375	(No reported activity)	416.6875 127/407.6875	Energy Department, US Information Agency
416.1500 84/407.1500	Federal Trunk Group 3 (paired with 407.3500): Air Force, Army, Bureau of Prisons, Drug Enforcement Administration, Energy Department, NASA, Navy	416.7000 128/407.7000	Army, Bureau of Reclamation, Coast Guard, Energy Department, NASA, Navy
416.1625 85/407.1625	(No reported activity)	416.7125 129/407.7125	Coast Guard, Corps of Engineers, Energy Department
416.1750 86/407.1750	Air Force, NOAA	416.7250 130/407.7250	Army, National Park Service, Navy
416.1875 87/407.1875	(No reported activity)	416.7375 131/407.7375	(No reported activity)
416.2000 88/407.2000	Drug Enforcement Administration (Nationwide repeater input to 418.950) < channel 6 >, Energy Department (Nationwide)	416.7500 132/407.7500	Federal Trunk Group 1 (paired with 407.9500): Air Force, Army, Bureau of Prisons, Energy Department, NASA, Navy, Social Security Administration
416.2125 89/407.2125	(No reported activity)	416.7625 133/407.7625	(No reported activity)
416.2250 90/407.2250	Army, Coast Guard (Nationwide), Energy Department, Federal Highway Administration, Navy, Post Office	416.7750 134/407.7750	Post Office (Nationwide-Postal Security Police repeater input to 418.300 output)
416.2375 91/407.2375	(No reported activity)	416.7875 135/407.7875	(No reported activity)
416.2500 92/407.2500	Energy Department (Nationwide)	416.7906	Low power, non-voice 5 kHz bandwidth splinter frequency (416.790625) [until December 31, 2004]
416.2625 93/407.2625	(No reported activity)	416.7937	Low power, non-voice 5-10 kHz bandwidth splinter frequency (416.793750) [until December 31, 2004]
416.2750 94/407.2750	Air Force, Commerce Department, Drug Enforcement Administration	416.7968	Low power, non-voice 5 kHz bandwidth splinter frequency (416.796875) [until December 31, 2004]
416.2875 95/407.2875	(No reported activity)	416.8000 136/407.8000	IRS (Nationwide), NASA
416.3000 96/407.3000	Energy Department (Nationwide), Navy, Veterans Administration	416.8031	Low power, non-voice 5 kHz bandwidth splinter frequency (416.803125) [until December 31, 2004]
416.3125 97/407.3125	(No reported activity)	416.8062	Low power, non-voice 5-10 kHz bandwidth splinter frequency (416.806250) [until December 31, 2004]
416.3250 98/407.3250	Drug Enforcement Administration (Nationwide repeater input to 418.900) < channel 2 >	416.8093	Low power, non-voice 5 kHz bandwidth splinter frequency (416.809375) [until December 31, 2004]
416.3375 99/407.3375	(No reported activity)	416.8125 137/407.8125	(No reported activity)
416.3500 100/407.3500	Federal Trunk Group 2 (paired with 408.3500): Air Force, Army, Bureau of Prisons, Energy Department (Nationwide), NASA, Navy	416.8250 138/407.8250	(No reported activity)
416.3625 101/407.3625	(No reported activity)	416.8375 139/407.8375	(No reported activity)
416.3750 102/407.3750	National Weather Service (National NOAA weather radio links)	416.8500 140/407.8500	Coast Guard (Nationwide), Energy Department, Forest Service, Navy, Post Office, Transportation Department
416.3875 103/407.3875	Coast Guard	416.8625 141/407.8625	(No reported activity)
416.4000 104/407.4000	Energy Department	416.8750 142/407.8750	FAA (Nationwide), NOAA
416.4125 105/407.4125	(No reported activity)	416.8875 143/407.8875	(No reported activity)
416.4250 106/407.4250	Air Force, Army, Bureau of Prisons, Energy Department, FAA, GSA, NASA, Navy, Post Office, State Department, TVA, USIA, Veterans Administration	416.9000 144/407.9000	Environmental Research Lab, National Bureau of Standards (Nationwide), National Ocean Service, NOAA
416.4375 107/407.4375	(No reported activity)	416.9125 145/407.9125	(No reported activity)
416.4500 108/407.4500	Energy Department (Nationwide), Navy	416.9250 146/407.9250	Coast Guard (Nationwide), Energy Department, Navy, Social Security Administration, Transportation Department (Nationwide)
416.4625 109/407.4625	(No reported activity)	416.9375 147/407.9375	Coast Guard
416.4750 110/407.4750	Army, Bureau of Reclamation, Coast Guard, Energy Department, Navy, TVA	416.9500 148/407.9500	Federal Trunk Group 3 (paired with 408.1500): Air Force, Army, Bureau of Prisons, Commerce Department (Nationwide), Energy Department, NASA, Navy, Post Office
416.4875 111/407.4875	Corps of Engineers	416.9625 149/407.9625	(No reported activity)
416.5000 112/407.5000	Air Force, Army, Bureau of Reclamation, Energy Department (Nationwide), FAA, Navy	416.9750 150/407.9750	Census Bureau, Center for Disease Control, Energy Department, National Bureau of Standards, National Weather Service (Nationwide-NOAA weather radio links), NOAA, Post Office
416.5125 113/407.5125	(No reported activity)	416.9875 151/407.9875	(No reported activity)
416.5250 114/407.5250	Government Itinerant: local area, common use repeater input (output 407.525)/simplex (Nationwide)		
416.5375 115/407.5375	Corps of Engineers, Energy Department, Forest Service, US Information Agency		

The Digital Side of APCO-25

More and more public safety radio systems are transitioning from analog to digital service. While these transitions mean that the voice content can no longer be heard, it is often possible to identify talkgroups and other system activity using a trunk-tracking scanner.

Hi,

I live in Palm Beach County, Florida, and the county has recently switched to APCO-25 digital radios. All the agencies including the city radios have been switched to digital mode. The county fire and the Sheriff have been placed on the system but in analog mode. With a BC780 will I be able to track these two in analog mode?

Thanks for your help.

Mike

The quick answer, Mike, is yes. To understand how analog and digital voice traffic fit together will take some explaining.

In a trunked radio system, the controller uses one of the assigned radio frequencies to continuously transmit data from the repeater out to the radios in the field. This is called the *control channel* and it carries an unending stream of messages for the mobile radios. Each message has a specific, predefined format and communicates such things as background data and system identification, channel grant and channel busy information, and various types of handshaking.

In order to follow a Motorola trunked radio system, a scanner must be able to decode and interpret the messages carried in the control channel.

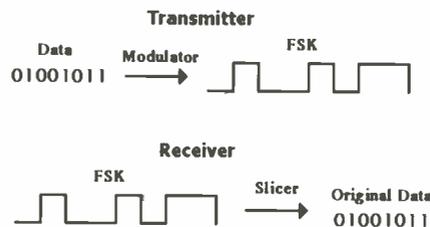
Motorola systems with analog voice channels have a control channel that transmits data at the rate of 3,600 bits per second (bps) using a modulation method known as two-level Frequency Shift Keying (FSK). The repeater transmits one of two frequencies depending on the data fed into it. Bits with a value of '0' are sent as one frequency and bits with a value of '1' are sent as a different frequency. All the receiver has to do is follow the two frequencies to figure out what data bits are being sent.

The simplicity of this signaling method means that the discriminator output of a scanner can be fed into a simple op-amp level comparator (the circuit is commonly called a "data slicer") and the resulting output will be the transmitted stream of bits. The popular "hamcomm" interfaces make use of this principle, and the same idea is used in most trunk-tracking scanners.

Scanners on the market today that follow Motorola systems are designed to decode two-level FSK modulation at 3600 bps and interpret the corresponding messages. As long as the system uses this scheme on the control channel, the scanner will track talkgroup activity.

◆ Analog and Digital Voice

Radio channels that carry voice traffic can be either analog or digital. Analog traffic on a Motorola system has a sub-audible signal that transfers handshake data between the mobile radio and the repeater while a conversation is in progress.



Digital traffic is typically the output of a voice encoder-decoder (vocoder). The analog signal from the microphone is compressed and digitized by the vocoder according to a set of procedures. In the case of APCO Project 25 (P-25), these procedures are summarized as Improved Multi-Band Excitation, or IMBE.

IMBE requires a much higher signaling rate in the voice channel than what is used in the standard Motorola control channel. The vocoder converts the voice signal from the microphone into digital data at a rate of 4,400 bps. An additional 2,400 bps worth of signaling information is added, along with 2,800 bps of forward error correction to protect the bits during transmission. The combined channel rate for IMBE in Project 25 radios is 9600 bps, or nearly three times the rate of the control channel. Project 25 specifies a more efficient, but more complicated, modulation method known as C4FM that is very different from the two-level FSK used on the control channel.

P-25 radios are supposed to be backward compatible, meaning they should be able to operate in analog mode with older analog radios

and in digital mode with other P-25 radios. If an agency wants to mix old analog radios with P-25 radios, the system must use a control channel that both types of radios can understand. That means a trunked radio system with analog radios must use a 3600 bps control channel.

Since the control channel is separate from the voice channel, nearly any Motorola system can make use of IMBE radios as long as the 3600 bps control channel is maintained.

◆ Project 25 Trunking

Project 25 is a set of standards, some mandatory and some optional. One of the optional standards is a specification for digital trunking that is completely different from the method used by Motorola in their analog systems. It uses a 9600 bps control channel and shares the same C4FM modulation method as the digital voice channels. A system that uses Project 25 digital trunking will not interoperate with older analog radios, since the analog radios are unable to decode the 9600 bps C4FM control channel. Fortunately for scanner listeners, there are very few active Project 25 digital trunking systems.

	Analog Only	Analog and P-25 Digital	P-25 Digital Only
3600 bps control channel	YES	YES	MAYBE
9600 bps control channel	NO	NO	MAYBE
Analog voice	YES	SOME	NO
IMBE voice	NO	SOME	YES

◆ ASTRO VSELP

To add a little more confusion, Motorola has sold digital systems that use a different type of vocoder, known as Vector Sum Excited Linear Prediction (VSELP). Cleveland, Ohio, and Memphis, Tennessee, are two cities that use VSELP. These systems also use the Motorola 3600 bps control channel but are not interoperable with the digital voice features of APCO-25 radios.

◆ Palm Beach County, Florida

Now, back to Palm Beach County. The previous VHF system used by the Palm Beach County Sheriff and the conventional (non-trunked) 800 MHz in Boca Raton have been replaced by a 10-site, 26-channel Motorola Smartzone system with Project 25 capability. This will also allow adjacent communities to

talk with each other, as well as with the nearby counties of Broward, Martin, and Miami-Dade.

Boca Raton, Boynton Beach, and Delray Beach made the switch earlier this year. So far Police and Fire department transmissions are IMBE digital, while Public Works are analog.

Frequencies are 856.3125, 856.3375, 857.3125, 857.3375, 858.3125, 858.3375, 859.3125, 859.3375, 860.3125, 860.3375, 866.100, 866.125, 866.325, 866.500, 866.600, 866.625, 866.725, 866.750, 866.250, 866.850, 867.100, 867.325, 867.350, 867.375, 867.400, 867.575, 867.800, 868.225, 868.375, 868.400, 868.650, 868.700, and 868.725 MHz.

Incident Number	Incident Status	Alerts	Day	Group	Priority	Call Type	Entry Time	Location
*****	Dispatch	3	04			*****	23:41	*****
04 08040101	Unk Status	3	04			*****	23:08	3340 LUGAR, LOR 00
04 08040102	Dispatch	3	04			*****	23:40	882 LANE A WPT RAIL RD J80
04 08040103	Dispatch	3	04			*****	23:11	884 PALMETTO CIR R 00

If you have web access, Palm Beach County has a live Computer Aided Dispatch (CAD) web page that is updated every two minutes. The address is <http://www.co.palm-beach.fl.us/fireapp/fire.asp>.

◆ Wayne County, Michigan

I live in the southern Downriver area of Wayne County, Michigan (near Detroit). I monitor using an Icom IC R7100. Until Tuesday I was monitoring my local police departments (Grosse Ile, Trenton, Woodhaven, Flat Rock and Rock Wood) at 155.6400 MHz. They have disappeared!

I asked a police officer about that and he responded that they have gone to an 800 MHz system with 38 channels. When I checked the FCC data base at your website I can find no 800MHz frequencies listed for Grosse Ile, Trenton, Flat Rock, Michigan. Any suggestions as to what I can do?

Any help you can give me would be appreciated.

A Michigan Scanner

The old Wayne County Downriver Mutual Aid system, callsign WPIU702, has transitioned to a digital system for the municipalities of Allen Park, Brownstown Township, Ecorse, Flat Rock, Gibraltar, Grosse Ile Township, Lincoln Park, Melvindale, River Rouge, Riverview, Romulus, Southgate, Taylor, Trenton, Woodhaven and Wyandotte.

Assigned frequencies are 866.5750, 866.600, 866.625, 866.825, 867.050, 867.125, 867.200, 867.2625, 867.575, 867.775, 867.800, 867.8250, 868.075, 868.100, 868.1250, 868.3375, 868.4875, 868.650, 868.750 and 868.8375 MHz.

Wayne County is also home to an interesting consolidation of police and fire dispatch cen-

ters. The cities of Dearborn Heights Garden City, Inkster, Westland and Wayne have gone in together to share the cost of their new 800 MHz radio system. Each city will pay for their own radios, but will split the \$2 million cost for repeaters and other common equipment. A 300-foot radio tower behind the Westland police station will be the primary repeater site, although Dearborn Heights, Garden City and Wayne will continue to dispatch from their own stations.

The assigned frequencies for the system are 866.550, 866.6125, 866.775, 867.250, 867.550, 867.750, 868.050, 868.1375, 868.1875, 868.5625, 868.775 and 868.800 MHz, but it appears that voice transmissions are digital.

◆ State of Michigan

At the state level, the Michigan Public Safety Communications System (MPSCS) has completed the third phase of their \$187 million project to replace the old low band VHF radio network with an 800 MHz P-25 digital Motorola system.

Phases one and two provided service to southeast, southwest, and west-central Michigan, including the cities of Detroit, Jackson, Lansing, and Grand Rapids. Phase three completed coverage for the entire lower Peninsula in March, although data services will not be available for another three years. Phase four will cover the Upper Peninsula and finish out the project.

When complete, the state will have 181 towers, each with at least five repeaters and some with as many as twelve. Seven dispatch centers will operate the system from locations in Bridgeport, East Lansing, Gaylord, Negaunee, Northville, Paw Paw and Rockford.

More than 50 public safety agencies and nearly 8,000 radios are currently using the system. Besides local and state agencies, Federal users include the Federal Bureau of Investigation, Secret Service, and Customs Service.

◆ Scanners in Michigan

As silly as it sounds, a permit is required to have a scanner in a vehicle while in Michigan. Under Michigan law 750.508, having a scanner capable of receiving police frequencies is a misdemeanor punishable by a fine of as much as \$500.00 and up to a year in jail. Unless the car is owned or used by a "peace officer" or a licensed amateur radio operator, you must have a state-issued permit to legally possess such a scanner. Here is the actual text of the law:

Any person who shall equip a vehicle with a radio receiving set that will receive signals sent on frequencies assigned by the Federal Communications Commission of the United States of America for police purposes, or use the same in this state unless such vehicle is used or owned by a peace officer or a bona fide amateur radio operator holding a technician class, general, advanced, or extra class amateur license issued by the federal communications commission, without first securing a permit to do so

from the director of the department of state police upon application as he or she may prescribe, shall be guilty of a misdemeanor, punishable by imprisonment in the county jail for not more than 1 year, or by a fine of not more than \$500.00, or by both fine and imprisonment in the discretion of the court.

An application may be requested by calling (517) 336-6240 or downloaded from the web at <http://www.mpssc.com/com-022.pdf>.

That's all for this month. I welcome your questions and comments via electronic mail at dan@signalharbor.com, and more information is available at <http://www.signalharbor.com>. Until next month, happy monitoring!

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Alphabet Soup

NAS? NM? RWY? TSD? How many times have newcomers to our hobby – and experienced monitors as well – run into acronyms, abbreviations, and other brain bugglers pertaining to monitoring the aero bands? Well, K. Z., a controller from ZJX (Jacksonville Air Route Traffic Control Center) sent us the listing below in order to try to alleviate the confusion ensuing when an abbreviation is used on the air that a monitor doesn't understand. Thanks, Ken!

♦ Air Traffic Management Glossary of Terms

AAR - Airport Acceptance Rate or Airport Arrival Rate; the number of arrivals an airport is capable of accepting each hour.

AC or A/C - Aircraft

ADZY - Advisory

ARPT - Airport

ARSR - Air Route Surveillance Radar. ARTCC radar used primarily to detect and display an aircraft's position while en route between terminal areas. The ARSR enables controllers to provide radar air traffic control service when aircraft are within the ARSR coverage. In some instances, ARSR may enable an ARTCC to provide terminal radar services similar to, but usually more limited than those provided by a radar approach control.

ARTCC - Air Route Traffic Control Center. A facility established to provide air traffic control service to aircraft operating on IFR flight plans within controlled airspace and principally during the en route phase of flight. When equipment capabilities and controller workload permit, certain advisory/assistance services may be provided to VFR aircraft. There are 21 ARTCCs in the United States. (See table 1.)

ASR - Airport Surveillance Radar. Approach control radar used to detect and display an aircraft's position in the terminal area. ASR provides range and azimuth information, but does not provide elevation data. Coverage of the ASR can extend up to 60 miles.

ATC - Air Traffic Control. A service operated by appropriate authority to promote the safe, orderly, and expeditious flow of air traffic.

ATCSCC - Air Traffic Control System Command Center.

ATCT - Airport Traffic Control Tower. A terminal facility that uses air/ground communications, visual signaling, and other devices to provide ATC services operating in the vicinity of an airport or on the movement area. Authorizes aircraft to land or takeoff at the airport controlled by the tower or to transit the Class D airspace area regardless of flight plan or

weather conditions (IFR or VFR). A tower may also provide approach control services (radar or nonradar).

CDR - Coded Departure Rules. Predefined routes used to route air traffic around areas of severe weather.

CERAP - Center Radar Approach Control. There are three of these facilities in the FAA system. (See table 1.)

CIGS - Ceilings. The height above the ground of the base of the lowest layer of clouds when over half of the sky is obscured.

CLSD - Closed

EDCT - Expected Departure Clearance Time. Time issued to a flight to indicate when it can expect to receive departure clearance. EDCTs are issued as part of Traffic Management Programs, such as a Ground Delay Program (GDOI).

EMRG - Emergency

FSM - Flight Schedule Monitor. A tool used by Air Traffic Management Specialists to monitor air traffic demand at airports.

FSS - Flight Service Station. Air Traffic Facilities which provide pilot briefing, en route communications, and VFR search and rescue services, assist lost aircraft and aircraft in emergency situations, relay ATC clearances, originate Notices to Airmen, broadcast aviation weather and NAS information, receive and process IFR flight plans, and monitor NAVAIDs. In addition, at selected locations, FSSs provide En route Flight Advisory Service (Flight Watch), take weather observations, issue airport advisories, and advise Customs and Immigration of transborder flights.

GPS - Global Positioning System

GS - Ground Stop. Flights that are destined to the affected airport are held at their departure point for the duration of the Ground Stop. Ground Stops are implemented for a number of reasons. The most common:

- To control air traffic volume to airports when the projected traffic demand is expected to exceed the airport's acceptance rate for a short period of time.

- To temporarily stop traffic allowing for the implementation of a longer-term solution, such as a Ground Delay Program.

- The affected airport's acceptance rate has been reduced to zero

IFR - Instrument Flight Rules. A set of rules governing the conduct of flight under instrument meteorological conditions.

ILS - Instrument Landing System. A ground based precision instrument system that provides course and vertical guidance to landing aircraft.

LAADR - Low Altitude Airway Departure Route

LAHSO - Land and Hold Short Operation. Operations which include simultaneous takeoffs and landings and/or simultaneous landings when a landing aircraft is able and is instructed by the controller to hold-short of the intersecting runway/taxiway or designated hold-short point. Pilots are expected to promptly inform the controller if the hold short clearance cannot be accepted.

LO CIGs - Low Ceilings. Low Clouds.

LOC - Localizer. The component of an ILS that provides course guidance to the runway.

MINIT - Minutes in Trail. A specified interval between aircraft expressed in time.

MIT - Miles in Trail. A specified interval between aircraft expressed in nautical miles.

MULTI-TAXI - Many aircraft trying to taxi at once, creating congestion.

N90 - New York TRACON.

NAS - National Airspace System. The common network of U.S. airspace; air navigation facilities, equipment and services, airports or landing areas.

NAVAID - Navigational Aid. Any visual or electronic device, airborne or on the surface, which provides point-to-point guidance information or position data to aircraft in flight.

NM - Nautical Mile. International unit equal to 6076.115 feet (1852 meters).

NOTAM - Notice to Airmen. A notice containing information concerning the condition, or change in any component in the National Airspace System, the timely knowledge of which is essential to personnel concerned with flight operations.

NRP - National Route Plan. The NRP is a set of rules and procedures which are designed to increase the flexibility of user flight planning within published guidelines.

OTS - Out of Service.

RLSD - Released.

RRTES - Reroutes.

RWY - Runway.

RWY CONFIG - Runway Configuration.

RY - Runway.

STPM - Special Traffic Management Program. Reservation program implemented to regulate arrivals and/or departures at airports that are in areas hosting special events such as the Masters Golf Tournament and the Indianapolis 500.

SWAP - Severe Weather Avoidance Plan. An approved plan to minimize the effect of severe weather on traffic flows in impacted terminal and/or ARTCC areas. SWAP is normally implemented to provide the least disruption to the ATC System when flight through portions of airspace is difficult or impossible due to severe weather.

TACAN - Tactical Air Navigation Aid. An ultra-high frequency electronic air navigation aid which provides suitably equipped aircraft a continuous indication of bearing and distance to the TACAN Station.

TFC - Traffic.

TRACON - Terminal Radar Control Facility. A terminal ATC facility that uses radar and nonradar capabilities to provide approach control services to aircraft arriving, departing, or transiting airspace controlled by the facility.

TSD - Traffic Situation Display. A tool used by Traffic Management Specialists to monitor the position of air traffic and to determine the traffic demand on airports and sectors.

TSTMS - Thunderstorms.

UTC - Coordinated Universal Time is the standard time common to every place in the world. Formerly and still widely called Greenwich Mean Time (GMT), UTC nominally reflects the mean solar time along the Earth's prime meridian.

VAPS - Visual Approaches. An approach conducted under Instrument Flight Rules that authorizes the pilot to proceed visually and clear of clouds to the airport. Usually used in conjunction with Visual Separation. When using Visual Separation, a pilot sees the other aircraft involved, and upon instructions from the controller, provides his own separation by maneuvering his aircraft as necessary to avoid it. Visual Separation requires less spacing between aircraft than radar separation allowing more aircraft to land in a given period.

VFR - Visual Flight Rules. Rules that govern the procedures for conducting flight under visual conditions. The term "VFR" is also used in the U.S. to indicate weather conditions that are equal to or greater than minimum VFR requirements. In addition, it is used by pilots and controllers to indicate type of flight plan.

VOR - Very High Frequency Omni Directional Range. A ground-based electronic navigation aid transmitting very high frequency navigation signals, 360 degrees in Azimuth, oriented from Magnetic North. Used as the basis for navigation in the National Airspace System. The VOR periodically identifies itself by Morse Code. Voice features may be used by ATC or FSS for transmitting instructions/information to pilots.

VORTAC - A navigation aid providing VOR Azimuth, TACAN Azimuth, and TACAN distance measuring equipment (DME) at one site.

VSBY - Visibility. The ability, as determined by atmospheric conditions and expressed in units of distance, to see and identify prominent unlighted objects by day, and prominent, lighted objects by night.

WND - Wind.

WX - Weather.

Z - Zulu Time. Another term used to designate Coordinated Universal Time (UTC), the mean solar time along the Earth's prime meridian.

♦ FAA Set to Modernize ATC Over the Oceans

This next story came from the FAA, via Kevin P. Inscoc. Thanks, Kevin!

In anticipation of awarding a contract,* The Federal Aviation Administration (FAA) has selected Lockheed Martin Air Traffic Management to proceed to contract negotia-



tions following an international competition to replace the Air Traffic Control Automation System at three Air Route Traffic Control Centers.

The Advanced Technologies and Oceanic Procedures (ATOP) contract calls for the replacement of oceanic systems at the Anchorage, New York, and Oakland Centers, which handle air traffic in international airspace over the Pacific and Atlantic Oceans.

The new oceanic system will collect, manage, and display oceanic air traffic data on the computer displays used by air traffic controllers. The new system will integrate capabilities, such as flight data processing, radar data processing, automatic dependent surveillance, controller-pilot data link and conflict probe. The new system is expected to result in efficiency improvements, fuel savings for the airlines and better on-time performance for air travelers. ATOP will allow more planes to fly preferred routes.

Oceanic air traffic control differs from domestic air traffic control largely because there is no radar tracking of aircraft and no direct radio communication. Oceanic air traffic controllers must rely on other sources of aircraft position information. This data includes voice position reports from pilots derived from on-board navigation systems that include the Global Positioning System and communications satellite information.

During a competitive 18-month process, a team of FAA experts from different disciplines conducted a thorough analysis of products available in the worldwide air traffic control marketplace.

The FAA concluded that Lockheed Martin offered the best value and acceptable development risk. Lockheed Martin's proposed system is based on the system currently used by New Zealand for oceanic air traffic control and the Department of Defense and FAA's Microprocessor Enroute Automated Radar Tracking system. The Lockheed Martin proposed system would be modified to handle the busier and more complex U.S. airspace.

** By the time you read this column, the contract may already have been awarded; however, this writer has not seen any evidence thereof to date.*

♦ Houston Radio HF Services

Houston Radio is a fee-for-services Long Distance Operational Control (LDOC) station. Although they are privately owned and operated, they do use ARINC equipment and fall under their guidelines. Long-time subscribers may remember *Plane Talk's* trip to Houston Radio back in 1988, with Gene Osburn, the Radio Services Supervisor, as our guide. These are the services offered by Houston Radio:

Message Forwarding: Air/ground message delivery is achieved through one of the three major vendors: ARINC, SITA, or AFTN. Fax, telephone, or other electronic options, such as email are also available for point-to-point message delivery.

SELCAL: SELCAL watch/hailing is available on all frequencies 24 hours a day. Flight crews are encouraged to maintain SELCAL watch once initial contact has been established. This will expedite the delivery of message traffic, such as redispatch clearances, weather updates, or other ground/air operational traffic.

Phone Patch: This service offers direct phone line connection over any of Universal's six radio circuits. No landline charges are assessed for connections within the continental United States.

Flight Following: Flight crews may continuously update company operations on the status of each flight via HF radio.

Weather Updates: Worldwide obs (observations) and TAFs available.

ADCUS: Flights entering the United States from international points are encouraged to make direct contact with Houston HF Radio as soon as possible once airborne. ETAs may then be forwarded to all appropriate government agencies. This is especially applicable for departures south of the 25-degree north latitude.

3013 - Night/close range
6637 - Night/day hours
10075 - Night/day hours
13330 - Day/night hours
17940 - Day hours only
21964 - Day hours only

That's it for this month. See you in October with more aero news, views, and frequencies. Until then, 73 and out.

Table 1: Air Route Traffic Control Centers (ARTCC)

Center	Radar Approach Control (CERAP)		
ZAB	Albuquerque	ZLA	Los Angeles
ZAN	Anchorage	ZLC	Salt Lake City
ZAU	Chicago	ZMA	Miami
ZBW	Boston	ZME	Memphis
ZDC	Washington	ZMP	Minneapolis
ZDV	Denver	ZNY	New York
ZFW	Dallas-Ft. Worth	ZOA	Oakland
ZHU	Houston	ZOB	Cleveland
ZHN	Honolulu (CERAP)	ZSE	Seattle
ZID	Indianapolis	ZSU	San Juan (CERAP)
ZJX	Jacksonville	ZTL	Atlanta
ZKC	Kansas City	ZUA	Agona (CERAP)

Regional Roundup

Most DXers know about the "Clear" channels, AM frequencies occupied by powerful 50,000 watt stations, some of which cover half the continent at night. Back in May, I wrote about the "Graveyard" channels – six AM frequencies considered the most challenging on the dial because of large numbers of non-directional stations. There's a third category of frequencies, not quite as challenging as the "graveyard" channels, but more difficult than the clears.

"A regional channel is one on which several stations may operate with powers not in excess of 5 kilowatts. The primary service area of a station operating on any such channel may be limited to a given field intensity contour as a result of interference."

That's how the regulations for regional channels read. Today, the stations using these channels are known as Class B stations. The power limit has since been increased to 50 kilowatts, though relatively few stations have been able to implement powers greater than 5kW. Most of these regional-channel stations either use very low powers at night, or use highly-directional antennas.

The regional channels are spread across the dial. 550-630, 790, 910-930, 950-980, 1150, 1590, and 1600 are regionals; as are all the frequencies between 1250 and 1480 except those assigned as local channels. (Again, see the May *American Bandscan* for a list.) Stations using these frequencies also vary wildly in power and coverage. Some regional-channel stations near the bottom of the dial have coverage areas that blow away many 50 kW clear-channel operations.

What you'll hear on these channels depends very much on what part of the country you're in. In crowded areas like the Northeast and South, the regional channels may sound much like the "graveyards." In the Great Plains you may hear regional stations from hundreds of miles away. Even in crowded areas, certain channels will have interesting DX.

From here in the South, some of the best regional channels to try include 610 (WDAF, Kansas City); 620 (WTMJ, Milwaukee); 910 (WSUI, Iowa City); 960 (CFAC, Calgary); and 1420. (WVJS, Owensboro) During the daytime, WILL-580 Urbana, Illinois, is one of the most distant stations heard here.

When I lived in Wisconsin, two of my best catches were regional-channel stations: WIP-610 Philadelphia, and KGHL-790 Billings, Montana. Indeed, reports from other DXers suggest KGHL may be your best bet for logging Montana in the East.

◆ DX & crime fighting

Chip Kelley in central Texas operates a website (<http://www.10000watts.com>) with radio and TV listings for much of North America. Chip's site is intended for use by DXers looking for help in identifying their catches. He never

imagined someone would use it to try to solve a crime!

You may remember a series of kidnappings of children in communities along Interstate 10 this spring. All victims were eventually released; it came out that one of them told police she was held at a cabin where only three TV stations could be received. (KBEJ-2, KPXL-26, and KRRT-35) A San Antonio resident remembered the coverage maps on Chip's website. He found the area covered by these three stations, then eliminated areas also covered by San Antonio's other eight stations, and came up with an area near Kerrville as the likely location of the kidnapper's hideout.

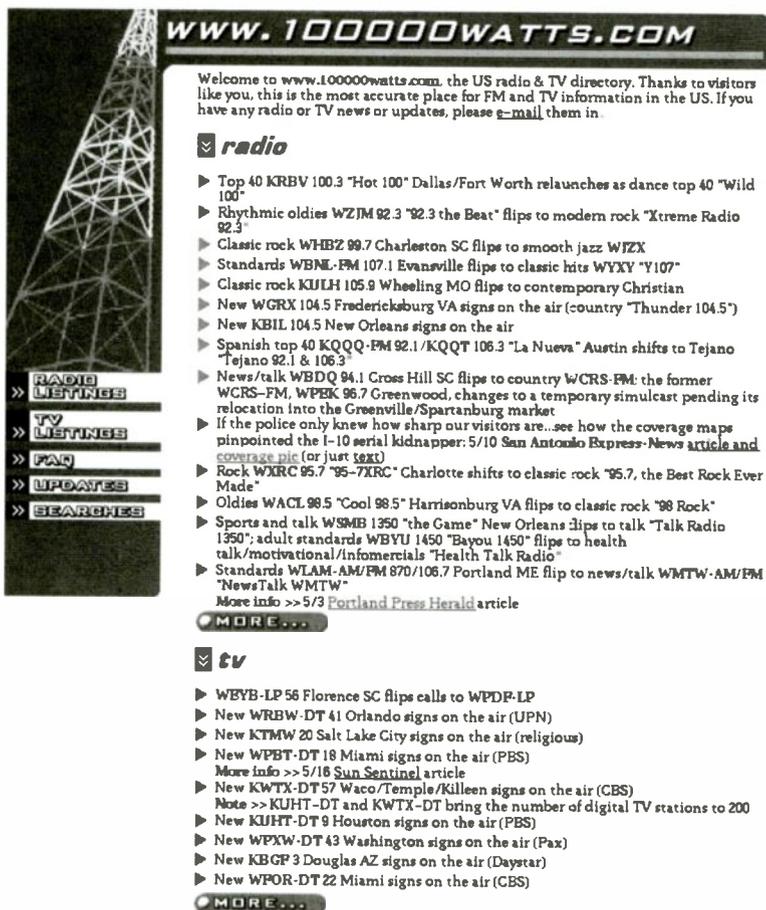
The information was provided to police, who promptly ignored it. They concentrated their search in areas east of San Antonio, more than 40 miles from the site suggested by the maps. A few days later, police stopped someone on an unrelated tip. A frightened kidnapping victim promptly fled her captor, and the kidnapper committed suicide. And it happened... near Kerrville.

◆ Mailbag

Matt Cenatiempo of KMIC-1590 Houston wrote to thank me for the item about KAVT-1680 in the April column. His general manager at fellow Radio Disney station KMIC got a kick out of it. Matt says there are currently 49 Radio Disney stations and counting. (After his letter, they added #50: WICE-550 Pawtucket, Rhode Island.) We should expect KAVT to follow the other Disney affiliates in adopting a callsign reminiscent of one of the Disney characters or Disney itself.

NRC AM Radio Log Editor Wayne Heinen has put pictures of his AM verification letters and QSLs from Colorado stations up on the web. Check out <http://hometown.aol.com/nrclog/index.html>.

KGHL-790 Montana is my best regional channel logging. What's yours? Write me at Box 98, Brasstown NC 28902-0098, or by email to w9wi@w9wi.com. Good DX!



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radio

- ▶ Top 40 KRBB 100.3 "Hot 100" Dallas/Fort Worth relaunches as dance top 40 "Wild 100"
- ▶ Rhythmic oldies WZJM 92.3 "92.3 the Beat" flips to modern rock "Xtreme Radio 92.3"
- ▶ Classic rock WHBZ 99.7 Charleston SC flips to smooth jazz WJZZ
- ▶ Standards WBNE-FM 107.1 Evansville flips to classic hits WYXY "Y107"
- ▶ Classic rock KUJH 105.9 Wheeling MO flips to contemporary Christian
- ▶ New WGRX 104.5 Fredericksburg VA signs on the air (country "Thunder 104.5")
- ▶ New KBIL 104.5 New Orleans signs on the air
- ▶ Spanish top 40 KQQQ-FM 92.1/KQQT 106.3 "La Nueva" Austin shifts to Tejano "Tejano 92.1 & 106.3"
- ▶ News/talk WBDQ 94.1 Cross Hill SC flips to country WCRS-FM: the former WCRS-FM, WPEK 96.7 Greenwood, changes to a temporary simulcast pending its relocation into the Greenville/Spartanburg market
- ▶ If the police only knew how sharp our visitors are...see how the coverage maps pinpointed the 1-10 serial kidnapper: 5/10 San Antonio Express-News article and coverage pic (or just text)
- ▶ Rock WXRC 95.7 "95-7XRC" Charlotte shifts to classic rock "95.7, the Best Rock Ever Made"
- ▶ Oldies WACL 98.5 "Cool 98.5" Harrisonburg VA flips to classic rock "98 Rock"
- ▶ Sports and talk WSMB 1350 "the Game" New Orleans flips to talk "Talk Radio 1350"; adult standards WBVU 1450 "Bayou 1450" flips to health talk/motivational/infomercials "Health Talk Radio"
- ▶ Standards WLAM-AM/FM 870/106.7 Portland ME flip to news/talk WMTW-AM/FM "NewsTalk WMTW"

More info >> 5/3 [Portland Press Herald](#) article

tv

- ▶ WBVB-LP 56 Florence SC flips calls to WPDF-LP
- ▶ New WRBW-DT 41 Orlando signs on the air (UPN)
- ▶ New KTMW 20 Salt Lake City signs on the air (religious)
- ▶ New WPBT-DT 18 Miami signs on the air (PBS)

More info >> 5/18 [Sun Sentinel](#) article

- ▶ New KWTK-DT 57 Waco/Temple/Killeen signs on the air (CBS)
- Note >> KUHT-DT and KWTK-DT bring the number of digital TV stations to 200
- ▶ New KUHT-DT 9 Houston signs on the air (PBS)
- ▶ New WPXW-DT 43 Washington signs on the air (Pax)
- ▶ New KBGP 3 Douglas AZ signs on the air (Daystar)
- ▶ New WPOR-DT 22 Miami signs on the air (CBS)

MORE...

<http://10000watts.com> is an excellent resource for identifying your F.M./TV DX catches. In one case, it also served as a crime-fighting tool!

Pirate Radio Thriving

Neither summer static, longer daylight hours, nor the slump in international broadcasting has impacted the volume of pirate radio activity. A bumper crop of stations news fills our page this month.

What We Are Hearing

We have another solid list of more than two dozen stations logged by *MT* readers. Most were on or near 6955 kHz, but many stations scoot down to near 6950 kHz as darkness approaches to avoid interference from Peruvian broadcasters.

Blind Faith Radio- Dr. Napalm, in a press release to *MT*, says that his classic rock pirate is once again active after a brief hiatus. He advises that we should also look for a sister station **KMART Radio**. (Uses blindfaithradio@yahoo.com e-mail)

Buckwheat Radio- Rock music is their normal fare, but sometimes they make things interesting with a low power test. (Uses buckwheatradio@hotmail.com e-mail, but also asks for reports to the *Free Radio Network* web site)

Ground Zero Radio- Recent shows with host Dave Gunn parodied United Patriot Radio. Most broadcasts are full of satire, comedy, and drama features. (Blue Ridge Summit)

KBLK- Rap music dominates their shows. (None)

KRMI- One summer show from Radio Michigan International was a nostalgic radio replica of World War II pop music. Obviously this pirate can be eclectic. (Uses krmi6955@hotmail.com e-mail)

Radio Bingo- The radio bingo game, of somewhat questionable propriety since John Arthur always wins, has joined the ranks of pirates with a RealAudio feed. Try http://members.nbci.com/piratestuff/radiobingo_06-06-01.ram on your internet dial. (Uses radiobingo@chek.com e-mail)

Radio Cochiguaz- South America's most active pirate mixes their own shows with relays of other pirates. They are active once or twice a month on weekends, normally using variable 11425 kHz. (Santiago)

Radio FCC- This new one came on this summer with rock music. Most people don't believe that they really are a voice of the Federal Communications Commission. (None)

Radio Free Speech- Bill O. Rights is active again, sometimes with his classic comedies about freedom, but other times with relays of other pirates. Look for him in AM mode. (Belfast)

Radio Piraña Internacional- This South American pirate has resurfaced, with irregular weekend shows on 11417 kHz. (Merlin, plus now uses rpi@write.me.com e-mail)

Radio Three- As we see here this month, Sal Amoniac's pop rock station sometimes uses an ID of 3-Rock. (None, only verifies logs in *The ACE*)

Radio 3 -* 3 Rock

Sales address:

PO Box 3333
Ft Lauderdale, FL 33333-3333

phone: 1 333 333-3333

RBCN- Radio Bob is now a longtime veteran pirate. His original programming, normally with a southern humor slant, remains a favorite on the unlicensed bands. (Lula)

Shadow Radio- The format here has settled on a combination of modern rock music and radio dramas from over 60 years ago. (None)

Sycko Radio- Rock by people like Eminem is their staple, but they recently solicited Screwdriver Man to fix their transmitter. (None)

Take It Easy Radio- Their combination of thirty year old soft rock and pop with historical documentaries is a new feature this year. (Belfast)

United Patriot Radio- The only domestic USA clandestine in history continued its amazing run through June 15th, making it the longest-running domestic United States shortwave clandestine. However, Steve Anderson made a public statement that June 15th was its last day. He blamed lack of financial and moral support, not threatened government enforcement actions, on the closure.

Voice of Bizarro World- Xhem's classic backwards station still begins shows with a sign off, with a sign-on at the end. (None current)

Voice of Captain Ron Shortwave- Captain Ron's rock is now supplemented by a question and answer feature. (captainron6955@hotmail.com e-mail)

Voice of the Angry Bastard- The station name sounds threatening, but recent shows have been primarily a mix of rock and country music. (Belfast)

WHYP- James Brownyard recently hosted a station croquet tournament between the rock tunes. Sometimes other pirates such as Captain Ganja join in the fun. (Providence; also uses why1530@yahoo.com e-mail)

WKUE- This month's mystery was a return of these classic call letters to the pirate bands. Nobody seems to know if it was a reactivation, a relay, or whatever. (None)

WMFQ- The rock music tunes on this one are not out of the ordinary. But, since all IDs are given by a chanting male chorus with an obscene slogan guaranteeing QSLs, you will certainly recognize them if you hear them. (Providence)

WMOE- The Three Stooges provide the audio between the rock tunes. Soitenly! (None)

WVDA- Ham radio will never be the same. The first broadcast of this new pirate with host Willy Wang was announced as a transmission from the Dayton Hamvention. But, the flea market must have been sparse this year, since they had technical difficulties. (Uses wvdapirate@yahoo.com e-mail)

Reports and QSLs

Reception reports to pirate stations require three first class stamps for USA maildrops or \$2 US to foreign locations. This finances postage for a souvenir QSL to your mailbox. Send your letters to these addresses: PO Box 1, Belfast, NY 14711; PO Box 28413, Providence, RI 02908; PO Box 109, Blue Ridge Summit, PA 17214; PO Box 24, Lula, GA 30554; PO Box 293, Merlin, Ontario NOP 1W0, Canada; and Casilla 159, Santiago 14, Chile. A few pirates prefer e-mail, bulletin logs or internet web site reports instead of snail mail correspondence. Reports to the *Free Radio Network* (FRN) go to <http://www.frn.net/> on the web. *Free Radio Weekly* loggings go via niek@ican.net e-mail. Sample copies of *The ACE* are \$2 via the Belfast maildrop.

Thanks

Your input is always welcome via PO Box 98, Brasstown, NC 28902, or via the e-mail address atop the column. We thank every one of our contributors: John T. Arthur, Belfast, NY; Artie Bigley, Columbus, OH; Cachito, Santiago, Chile; Ross Comeau, Andover, MA; Captain Disturbio, Dayton, OH; Bill Finn, Philadelphia, PA; Harold Frodge, Midland, MI; Vince Havrilko, Beale AFB, CA; Harry Helms, Ridgecrest, CA; Jim Keeling, Lenexa, KS; Greg Majewski, Oakdale, CT; Bill McClintock, Minneapolis, MN; Dr. Napalm, Belfast, NY; Lee Reynolds, Lempster, NH; Martin Schoech, Merseburg, Germany; Bud Stacey, Setsuma, AL; and Niel Wolfish, Toronto, Ontario.

LF Receiving Antennas, Part III

My first "real job" after college was at Scientific Radio Systems (SRS) in Rochester, NY. I was excited to start my new position as a Technical Writer Trainee, in large part because SRS had just landed a contract with the FAA to build 160 longwave beacons, and a number of monitor receivers – complete with active antennas. I'd be writing about something I enjoyed as a hobby... What more could I ask for?

A few days into the job, I was introduced to the engineer in charge of the active antenna for the FAA system. He showed me a prototype design consisting of an aluminum rod about 1 meter long, attached to a small box housing the antenna's amplifying circuit. I was amazed at the short length of the antenna because I assumed antennas had to be huge to work on LF. How could such a tiny thing work on a band where wavelengths approach a mile?

I soon discovered that these antennas could work very well on longwave. In fact, when properly installed, I saw that they could rival (or beat) wire antennas hundreds of feet long. This month, we'll discuss the characteristics of active antennas for LF reception. In case you're just joining us, this is the third and final part of a series on receiving antennas. The two previous columns discussed the merits of random wire antennas and loop antennas, respectively.

◆ What's in a name?

Active antennas get their name from the fact that they contain active (powered) circuitry for boosting the very weak signals picked up by the antenna rod itself. In a nutshell, what the antenna lacks in length, it tries to make up for in amplification. A good design will also contain low-pass filtering to attenuate signals above 500 kHz. This minimizes the chance of AM broadcast interference.

Active antennas have several advantages for today's listener. First, their small size makes them easy to mount on a vent tube, gutter, or small mast. Also, because they are small, they tend to be less of a "noise collector" as compared with a random wire antenna – a clear advantage for urban dwellers. Finally, active antennas have an omni-directional response. While this might be a disadvantage to some, an omni antenna gives you the "big picture" while tuning across the band. You can always switch to a directional "loop" antenna when you find a signal of interest. With a loop alone, you're apt to miss many signals that are not in the favored plane of the antenna. If I could only have one antenna for beacon chasing, I'd want it to be omni-directional.

Active antennas require DC power to operate. Usually, the power supply is located inside the shack, and might be as simple as a 9-volt battery, depending on the power requirements of the antenna's amplifier. Nearly all designs use the coax feedline to deliver DC power to the antenna, so there's no need to run separate wiring.

◆ Build or buy?

It is not difficult to build your own active antenna. Articles for doing this have appeared in the *Lowdown* from time to time, and if you have the means to go way back, you'll find a legendary series by experimenter Ralph Burhans in the March, April, May and June 1983 editions of *Radio-Electronics Magazine*. (You can find these issues on microfilm or microfiche at many large libraries.)

A homebrew design by Andre' Kesteloot, N4ICK, can also be seen on AMRAD's web site at <http://www.amrad.org/projects/lf/lfpreamp.html>. It is a remotely-tuned design using a varicap diode whose capacitance is adjusted by a control in the shack. Because it has sharp tuning, this antenna may be well suited for those troubled by AM broadcast, or other strong signal interference.

At present, there are few commercially made active antennas specifically designed for LF. One exception is the L400B by LF Engineering Co. (17 Jeffrey Rd., East Haven, CT 06513). This antenna is a sealed, 26-inch "E-field probe" that cov-

ers the spectrum from 3 kHz to 530 kHz, and includes a sharp roll-off filter to limit signals above this band. I use an L400B at my station, and have found that it compares favorably with a 250-foot wire antenna. In certain parts of the band, the L400B gives considerably stronger signals than the wire antenna. Approximate cost: \$130.00. You can visit the LFE web site at <http://www.lfengineering.com/>.

Another, but more pricey solution, is the RF Systems LFA 520 active antenna (approx. \$280.00). It was originally designed to fill a professional application, and offers coverage from 9 to 520 kHz. Like the LF Engineering model, the antenna contains filtering for strong out-of-band signals to overcome the problem of overloading. At a height of 6.9 feet (2.1m) the antenna is longer than most active antennas, and it includes a topload section consisting of a 3/4 sphere with a diameter of 32 inches (0.8m), made of four radials. Like the other products I've seen from RF Systems, the construction of this antenna appears to be well above average. You can read more about it on the web at www.universal-radio.com/catalog/lwant/3060.html.

◆ Antenna Conclusion

I hope this series has helped you understand more about the antennas that are typically used on the frequencies below 500 kHz. As with many things in radio, there is no single antenna that will be right for every circumstance. Much depends on your listening interests, your location, and of course, your budget. Although the radio hobby has gotten complex in recent years, antennas are one area where the homebrew builder can still construct an effective design without knowing a lot of theory or needing to buy expensive parts. So, whether you build or buy, enjoy experimenting with antennas!

◆ Canadian Calls

Jacques d'Avignon (ON) provides the following call signs for Canadian NDBs. No locations or frequencies are given, as these are assigned to the Department of Defense, and are mobile. They may show up anywhere in the country and on any "normal" beacon frequency. Should you hear one of these call signs, it could be a special military exercise and would be considered a rare catch.

Transportable Beacon IDs (Canada)

UAA	UJJ	USS	UZZ
UFF	UKK	UTT	
UGG	UNN	UWW	

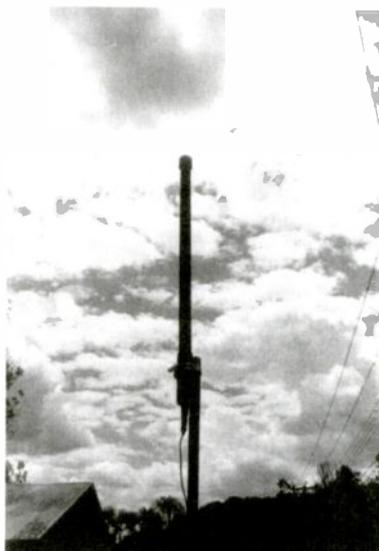


Figure 1. The L400B active antenna is a commercial design made by LF Engineering Co., East Haven, CT.

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Bearcat PCR100 50 channel handheld scanner.....	\$99.95
Bearcat 60XLT 30 channel handheld scanner.....	\$74.95
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Dog Days in the Great Outdoors

This is August and I am in the mood to relax, kick back and think loose notions about topics ham radio related. Yes, I fully intend to ramble and become somewhat tangential in my thinking here. Chalk it up to the Dog Days of Summer. I'd rather be out under a tree somewhere operating than sitting at a word processor cranking out words. Yes, friends, it is the time of year when I choose to spend any number of days playing radio in the outdoor environment.

Putting up antennas is always a bit of an adventure. Especially wire antennas. Getting the wire (or wires) as high as possible and as far away from things that will interfere both in terms of signal and for safety reasons can try a ham's patience. Now, if you're like Old Uncle Skip, and you occasionally like to take your amateur radio activities out into the outback, you have the added necessity of making your set-up work in an alien environment. This could be for Field Day, a camping trip or vacation. Further, you want to be able to take things down quickly and with no disturbance to the local flora and fauna.

This, as with most good things in amateur radio, involves both planning and technique to get the job done right. While the ideas I share here in this month's column are designed to help out the field venturing ham, I think you will find that much of what I say can be applied to the hanging of any wire antenna.

◆ Anticipate problems: bring a tuner

In the initial planning stages, you should, as the Cheshire Cat said, "Begin at the beginning." This would be with your transmitter. Modern solid state transmitting gear often have circuits designed to protect the final transistors from overly mismatched antenna/feed line combinations. Usually, if the SWR rises above around a 1:3 ratio the rig will either reduce power significantly or shut down altogether. This is a very good thing for obvious reasons.

However, field antenna set-ups are subject to all kinds of forces that cannot be simply calculated for when constructing the antenna at home, so it is good to know a radio's "wobble factor." I am sure, if you've read my old columns you know my feelings on the illusory nature of the 1:1 match and that I'm usually happy as a clam if I can bring things down to 1:2 or thereabouts. There are two ways to skin this particular (with apologies to Mr. Cheshire) cat.

Use an antenna and feed line combination that is going to give a reasonable impedance

(nominal 50 ohm) that will keep things within the limits of the rig's tolerance.

Use a tuner designed to bring the antenna and feed line combination into the transmitter's operational impedance window.

My general practice has been to combine the best of the above worlds. I'll cut my wires to formula, but put a tuner in line as well because it has been my experience that it is a rare case when you can get any field op antenna up in what passes for ideal conditions – the requisite quarter wave in the air and in the clear of interfering objects. In a "make do" world an antenna tuner can cover a multitude of SWR sins.

If you want to travel first class, look to any of the current transceivers that have a built in Automatic Antenna Tuner (ATU). There are also outboard ATUs available. One prominent name in the field is LDG Electronics Inc. (<http://www.ldgelectronics.com/>). I don't know if I've become lazy in my old age but I can't imagine playing radio without this feature. I've fought my share of RF battles and have a box full of fried finals to prove it! I am hopelessly hooked on ATUs.

◆ The right antenna for the band

Another thing to consider is your operating band plan. Okay, your rig might have five or more bands available. It is unlikely that the Propagation Gods are going to smile on all bands for the duration of your trip. Maybe you plan on working 20 meters in the afternoon and switch to 40 meters later at night. It's a lot easier to cut wires for two bands than it is for five or more.

I've recently built an Elecraft K1 (<http://www.elecraft.com/>) for use on vacation and on road trips. I built it for 40 and 20 meters and (of course) I added the optional ATU unit. I simply carry 1/4 wave wires for each band. When I am

using the 40 meter wire I use the 20 meter wire as its counterpoise. When I use the 20 meter band I use another piece of wire cut to 1/8 wave on 20 as the counterpoise. Three simple pieces of wire that can be thrown into trees, hung over a balcony or run along a room's baseboard get on the air and making contacts in short order wherever I travel. Since I am operating using "random length" wires, I don't even have any feed line considerations. (I do have to watch out for stray RF, but that is part of the adventure).

◆ Going mobile with a dipole

Okay, let's say random wires aren't your cup of tea. Dipoles are very effective if you can get the space to make use of them. Using the above band-limiting practice I would probably opt for a 40 meter dipole. Why, you may ask? Because an old Novice trick is to load your 40 meter dipole on 15 meters. Do the math; it works out just fine. Two bands, one antenna. Not a bad set-up. I seriously considered building up my K1 as a 15/40 radio for just this reason. I have talked to a number of hams who did this and they are very happy with the result.

Talk of dipoles moves us into a discussion of wire sizes. This is because dipoles mean transmission lines. Feed lines have a certain amount of weight and heft to them. You need to choose a wire gauge for your antenna design that is potentially capable of holding up the feed line at the center. The solution for most folks is #12 or #14 gauge wire, preferably "copper-weld." This applies absolutely when dealing with permanent sky wires. However, for temporary field use, you can go lighter by far. I commonly use #20 gauge wire, making sure my center insulator is strong enough to relieve the strain on the dipole wires. This problem is all but eliminated if you hang the dipole in an inverted "V" arrangement.

Now to the transmission line itself. You have two options that essentially depend on the nature of your antenna tuner. RG-8X coax has very good characteristics and is reasonably light. Many backpackers who are shedding ounces make use of the much thinner RG-174 coax. You need to keep the feed line relatively short as the losses per length are much higher than with RG-8X. Chances are your portable set-up will be low power or even QRP, and you don't want to sacrifice too many decibels. Personally I've never been convinced that the weight advantage of RG-174 overcomes any signal loss from its use. But on the other side of the matter, I've talked with many hams who use it under real world conditions with good results so, as they say, your



The LDG RT-11 Autotuner is a remote mounted ATU that can be used with most transceivers from 5 to 150 watts. (<http://www.ldgelectronics.com/>)

mileage may vary.

❖ Multi-band solutions

Now let's make things really interesting. Let's say you don't want to limit yourself to one or two bands. You're an "all bands all the time" type of amateur. Is it possible to have your cake and eat it too without carrying many great spools of wire? Well, it can be, especially if you make use of a tuner that can work with "balanced" feed lines. This is either common TV "twin lead" or the more radio specific "ladder line."

Now you're in a position to play with some neat field op multi-band antenna ideas. One classic antenna that can work well in the field or even at a home station is a dipole cut for the longest frequency of intended operation. Feed this puppy with a balanced feed line (I usually use TV twin lead for anything under 100 watts) and connect it to your radio through a balanced wire tuner and you will find you should be able to bring things into the manageable SWR range for just about any higher frequency of operation you desire. I used just such an antenna set-up at my home station for years and earned my WAS (Worked All States) and DXCC (DX 100 Countries) with it. I've also made use of this design in the field with great results.

Off center fed wires can also be pressed into service as multi-band antennas. There are several designs and formulae for determining the best location for the feed point. I usually refer people to L.B. Cebik's website treatise on the subject for

details. (<http://www.cebik.com/gup9.html>) Commercial versions of this design are available from a number of resources, most notably RadioWorks' well known "Carolina Windom" design. (<http://www.radioworks.com/>) This antenna is a great idea for field operations.

Last but not least, another popular field antenna that is underrated but well worth considering is the full wave loop. Again, cut for your highest frequency of operation and feed with balanced wire and tuner and you're off to the races. It can be hung as a square (or as close to a square as the trees will allow). I prefer a delta loop configuration. This requires only two trees and the feed can be at the bottom (yeah, I know it's the opposite of what the books all say) closer to your station. Whenever my QRP club gets together to play radio outdoors, a loop or two will be up in the air.

The loop is still a neat idea if you're not planning multi-band operations. Cut it to frequency and use a 4:1 balun at the feed point. Then you can run coax back to the rig. Cut right, an ATU will be very happy with such a design. I have observed that, once folks get over the initial questions about loops, they become very popular antennas.

❖ Safety in the Field

Allow me to expound briefly on matters of field safety. Don't string your wires anywhere that people or even larger animals are likely to get entangled. I often get

out to my field set up by way of a mountain bike and the last thing I want to experience is being "clotheslined" by another ham's antenna. Respect everything that is around you because you are only a visitor. Take nothing but pictures, make nothing but contacts, leave nothing but footprints.

If you want to learn more about playing ham away from home a great website is that of The Adventure Radio Society (<http://www.natworld.com/ars/>). Nice folks who really know how to have fun.

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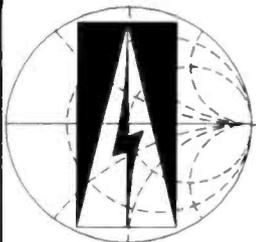
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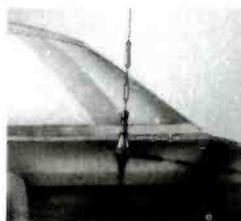
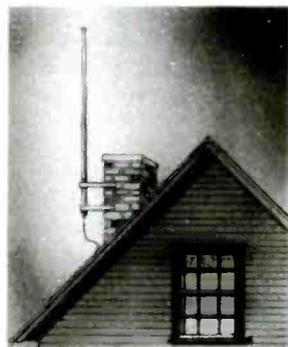
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The SW-54 Plays Again!

Last month's work session on this 1950-era shortwave set from The National Company was devoted mostly to housekeeping issues. We polished the metal cabinet with auto rubbing compound, followed up with a coat of hard wax, and attempted to rejuvenate the copper finish on the radio's chassis. When the latter proved to be impractical, the chassis was carefully cleaned and brush-painted with a good-quality copper paint that closely matched the original color.

To facilitate the cleaning and painting, the output transformer was dismantled (but not disconnected), and the tuning dial scale and all tubes were removed. Finally, the volume control, bandswitch, and slide switches were treated with aerosol contact cleaner spray.

◆ Is it Right to Recap?

In preparation for this month's work session, I had ordered a complete set of replacement paper and electrolytic capacitors for the SW-54. I'm sure that I've mentioned, when discussing past restorations, that the old-style wax-coated paper caps and electrolytics found in vintage radios are not to be trusted. However, the plastic-cased mica caps – which are used mostly in the radio's frequency-determining circuits – do remain stable over time and generally don't require changing. That's fortunate because those tend to be very difficult to remove without dis-

turbing critical r.f. wiring and also must be replaced with exact equivalent values.

I never plug in a set to be restored until I've changed out all of the paper and electrolytic caps. Have I given you this sermon before? A leaky or shorted capacitor can quickly cause the destruction of other parts that would be very difficult or expensive to obtain – such as i.f. and power transformers. Purists may object to the change in looks caused by the removal of the vintage caps with their distinctive markings and appearance. Some go so far as to melt the wax on the old units, remove the guts, insert modern caps inside the paper cylinders, and refill with melted wax.

I have no quarrel with that philosophy, but frankly I'd rather not use my time on that kind of restoration. If you agree with me, but still feel guilty about "desecrating" the set, you might consider putting the old set of caps in a plastic bag with an appropriate note for future owners. If you store it inside the set, however, keep the bag away from tubes or other components that heat up!

I will confess to one regret about wholesale recapping of a radio. It takes away much of the fun of troubleshooting – which usually boils down to logical tracing of inappropriate resistance or voltage measurements to a capacitor that failed. In other words, it can make a restoration project just a little too easy! When I first began restoring radios, I spot-replaced only the

capacitors that required it. But, I soon came to realize that if a radio was worth restoring, its long-term survival was worth ensuring with a new set of capacitors.

◆ Ordering Capacitors

New caps, which will be much smaller and far more reliable than the originals, are inexpensive and easy to get. You can't buy them, with the working voltages required, at your corner Radio Shack, however. As you might expect, the caps generally available there are low-voltage types for semiconductor circuitry.

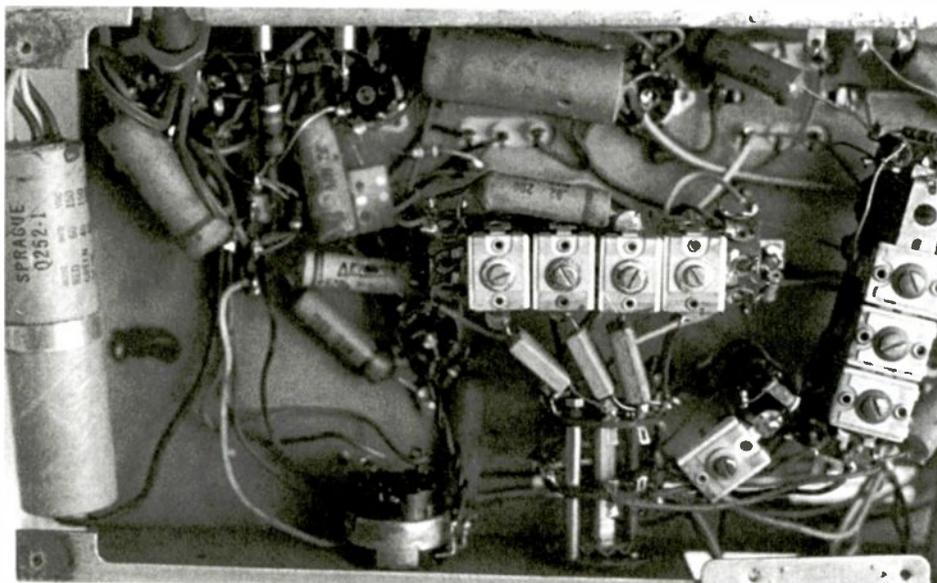
I purchased a complete set of 15 capacitors from Frontier Capacitor [403 S. McIntosh St., PO Box 218, Lehr ND 58460; phone toll free (877) 372-2341; fax (701) 378-2341; e-mail frntcap@bektel.com]. The cost was \$10.30, \$4.50 of which was for Priority Mail shipping. Service was prompt and courteous.

Looking over the flyer Frontier shipped with the order, I saw that their minimum order was actually twenty dollars, exclusive of the shipping cost. However, the gentleman who took my phone order never brought that up! Frontier will ship on an invoice once they have previous experience with you as a customer. This means you can phone, fax or e-mail your order and have it shipped immediately, even if you are paying later by check.

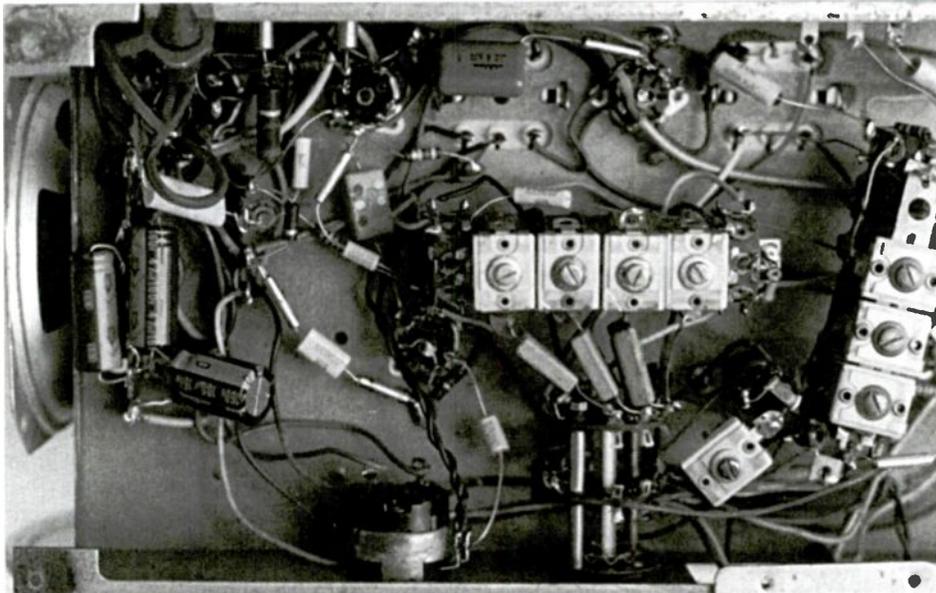
I should mention that Antique Electronic Supply [6221 S. Maple Ave., Tempe, AZ 85283; phone (480) 820-5411; fax (800) 706-6789] is also a good source of replacement caps. In addition, the company also stocks a great assortment of parts, supplies, and books for the antique radio restorer. Write or call for a free catalogue and/or check their web site at <http://www.tubesandmore.com>.

When ordering, don't get hung up on obtaining units with *exactly* the same voltage or capacitance ratings as your originals. Even though the capacitance of the proposed modern replacement may be expressed to four decimal places, you needn't be concerned. Most applications for paper or electrolytic capacitors in radio receivers are non-critical as to value. In this recapping job, I replaced .005 mfd paper units with .0047s; .02s with .022s; and a .25 with a .22. I could have deviated much farther than that and gotten away with it.

All of these replacement caps were rated at 630 volts, even though no voltage higher than 150 is encountered anywhere in the set. Just make sure the rated voltage of the replacement is at least as high as that of the original.



Underchassis view prior to recapping. All original wax/paper units still in place. Note large cylindrical multiple electrolytic at left.

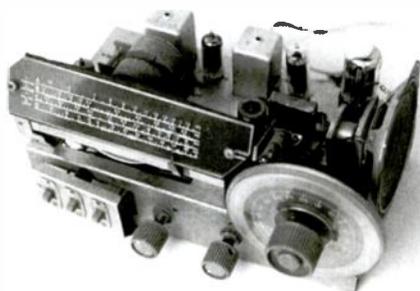


Underchassis view after recapping. Three of the four electrolytics replacing the original multiple unit can be seen at left.

The capacitance specs of my replacement power supply electrolytics differed even more greatly than those of the paper caps. Electrolytic units are used to obtain much higher capacitances at reasonable case sizes than possible with paper units – usually for the purpose of filtering hum in power supply circuits. But, electrolytic cap technology has improved so much, that we can now obtain very large values in amazingly small packages. Units with the smaller capacitances are now hard to find. And, within limits, the higher the capacitance the better the results in power supply filtering circuits.

As was common in sets of this vintage, all electrolytics used in the SW-54 were combined in a single large cylindrical case. Connections were made via color-coded leads emerging from the body of the cylinder. These multiple-unit electrolytics are now all but unobtainable, but can easily be replaced by a group of individual units taking up much less space.

As to capacitance, I just used the closest sizes I could get. I used a 100-mfd unit instead of the original 60; 47s in place of the 40s. When it comes to the working voltage of an electrolytic, however, it's important to get close. Electrolytics don't develop full capacity except when used near their rated voltage. I used 160-volt units to replace the original 150s – close enough.



Though still without its cabinet, the little SW-54 has been reassembled for initial testing.

Also in the original multiple unit was a 5-mfd, 15-volt cap used as the cathode bypass in the audio output stage. In this application, it's important to stick reasonably close to specs, and I was able to locate a 4.7-mfd, 25-volt that did the job.

◆ The Replacement Process

Obviously, when recapping a set, it's best to change one unit at a time. Make sure you will remember exactly what terminals or solder lugs the old capacitor was connected to before you remove it. If the wiring is crowded or confusing in the area where you are working, you might like to make a little sketch so there will be no doubt about where the replacement is to be connected.

As mentioned during the Philco "Transitone" restoration (January 2001 issue), I generally prefer not to take apart an old connection, particularly if it has multiple leads, in order to remove and replace a capacitor. Instead, I leave a stub of the old lead and use a "butt connector" (Radio Shack Cat. No. 64-3036A) to solder-splice the lead of the new component to the stub. It's neater, and less destructive to the radio.

However, in this case, because of the soldering style used in the original manufacture of the set, it proved to be fairly easy to take many of the old joints apart nondestructively. I resorted to the butt-splicing technique in only a few instances. I took my time, and did my best to remove all of the clipped leads and stray solder drops as I went along in order to avoid short circuits.

Replacing the multiple-unit electrolytic required making special arrangements. I clipped all of the old leads as close to the body of the unit as possible, after making sure I understood the color coding system that was used. Then I removed the old electrolytic by breaking off its mounting strap close to the spot where it was riveted to the chassis. One of the speaker mounting screws looked like it would serve as a conve-

nient fastener for a terminal strip I needed to connect the four new individual electrolytics. So I replaced the speaker at this time and installed the strip. Then I simply wired the new units onto the strip, using the original leads from the old multiple unit to connect them into the circuit.

◆ The Moment of Truth

After reinstalling the output transformer, I cleaned off and reinstalled the dial scale – making sure I would not be removing any of the markings with the damp cloth I was using. I'd heard too many horror stories about stenciled dial markings being wiped right off along with the grime by over-zealous restorers! Luckily, this scale presented no such problem.

I didn't reinstall the SW-54 set in its cabinet at this time, in case further work needed to be done, though I temporarily installed the control knobs on their shafts. I also cannibalized the pilot light from my "parts set" to replace the one missing from the restored radio. Finally, I hooked up a temporary power cord (the old one still needs to be replaced) and turned the old girl on. After warmup, I was pleased to hear the reassuring sound of static coming from the speaker. With a short length of wire as an antenna, I was able to hear stations all over the broadcast band and receive at least one signal on each of the other three bands.

Next month, we'll realign the set and try it out on an outside antenna. See you then!

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An Antenna for VHF and Higher Frequencies

With this month's column we finish a six-month series discussing antennas as utilized across the RF spectrum. To complete the series we will discuss building an axial-mode, helical antenna (AMHA). This antenna was invented by John Kraus – a physicist well known for his contributions to both antenna engineering, and for his pioneering work in radio astronomy. Due to size considerations Kraus's helical antenna is most often utilized at UHF, and particularly at microwave frequencies. On the other hand, some very large versions of the AMHA have been designed for frequencies as low as the HF band.

To the old timers among us Kraus is probably best known as the inventor of a different antenna: the W8JK; named for Kraus's ham callsign. The W8JK is the beam which initiated the trend toward today's close-spaced, high-gain, HF beam antennas.

The AMHA:

The AMHA radiates and receives best off the end of its helix opposite to its reflector (fig. 1). It is a beam antenna of substantial gain; the gain varying primarily as the number of turns in its helix.

An important characteristic in the performance of the AMHA is its circular polarization (CP). Due to various factors the polarization of signals received continuously from a single source may vary significantly over time. If the polarization of a linearly-polarized antenna (such as a dipole or groundplane antenna) and the polarization of the signal which it is receiving approach a difference of 90, this can produce signal-strength loss as great as 30 or more dB (5 or more S-units).

On the other hand, the maximum signal loss due to polarity mismatch between a circularly-polarized antenna and any orientation of linearly-polarized signals is a mere 3 dB (half an S-unit). This aspect of CP makes the AMHA a good choice for applications where signal polarization is quite variable such as in communication between satellites and earth stations, and in moonbounce work.

If the helix of an AMHA is wound in a clockwise manner, as viewed looking from its feed-point end, then the antenna is said to have a right-handed polarization sense. If wound counter-clockwise it has a left-handed sense. For AMHAs the sense of the received signal must be the same as that of the receiving antenna, or

there is a loss of 30 dB or more in signal strength. Therefore it's important to know that if there is signal reflection along the propagation path, the signal's sense reverses for each reflection!

Pleasantly enough, modest errors in constructing the AMHA have relatively little effect on its performance. Another plus is the broad-banded nature of the antenna. Typically it will cover a band about half the size of its design center-frequency. Thus an AMHA designed for 400 MHz will cover a band about 200 MHz wide, or from 300 to 500 MHz. Such bandwidth makes this antenna useful for wide signals like television.

Let's Make One:

The antenna configuration, dimensions for a 435 MHz, 4-turn version, and equations to design for other frequencies are shown in fig. 1. See this week's interesting website below for even more design information.

The wire for the helix can be 1/4 inch tubing (pinch and solder the ends closed), heavy wire, or the outer conductor of coaxial-cable (solder the inner conductor to the outer at both ends, or remove it). Conductors of smaller diameters have been used with good results, but give less-broad

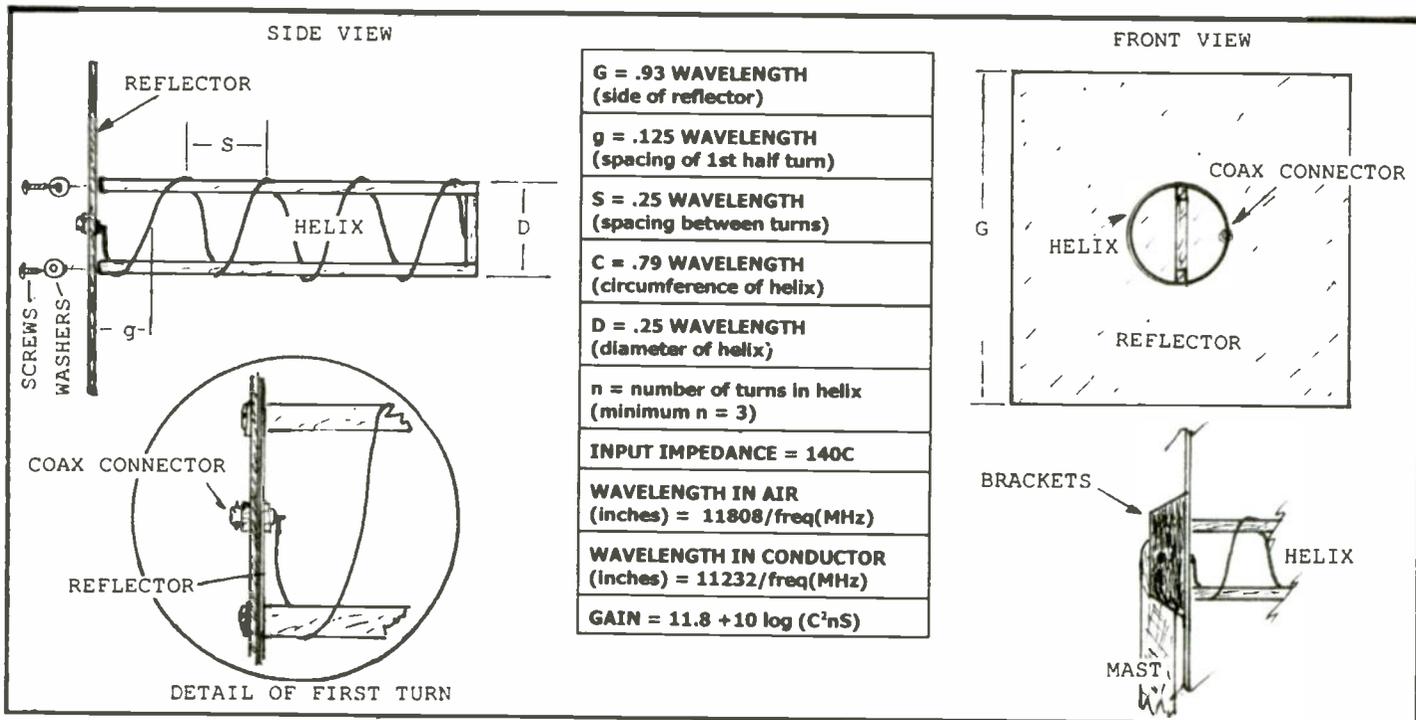


Fig. 1. An axial-mode, helical antenna with measurements for 435 MHz, and essential equations.

This Month's Interesting Antenna-Related

Web site:

This site has info for designing your own AMHA, plus links to free computer programs which help you do it!
http://www.applet.cz/~ulcak/helical_antenna.htm

bandwidths. I found that one of the cook pots in our kitchen made an excellent form to shape the circular windings of my helix. The more turns you use the greater the antenna's gain, and the more narrow its major lobe.

To match the antenna's input impedance to 50-ohm feedline the helix comes off the feedpoint connector very close (1/8 in.) to the reflector and slowly raises to 1 in. at 5 in. from the connector, then to 3-3/8 in. (this is measurement "g" in fig. 1) a half-turn out from the connector. The connection between helix and input connector must be good; soldering is preferred.

Conductors such as galvanized metal, aluminum or copper sheet metal, or galvanized hardware cloth can be used for the reflector. Metal brackets may be necessary to hold the reflector rigid. My hardware cloth (1/4 in. holes) reflector was reinforced with a masonite-board backing for strength.

The helix supports must be of non-conducting material such as dry wood (varnished for outside use), plastic or fiberglass. My helix supports were 3/4 x 3/4 in. wood held to the reflector using large sheet-metal screws with very-large washers. The windings may be kept in place on the supports using notches in the supports and glue with plastic string, or wood pegs and glue, etc. No conductive material used here, either. The construction you choose must fit your intended use of the antenna. Mine are used in temporary situations, and never left out in bad weather. You should use more durable construction if you plan to leave your AMHA permanently outside.

A mast of 3/4 in. wood is held to the back of the reflector bolted between two wood brackets. This is shown in side view in fig. 1.

As with any antenna, don't work on this one when it is transmitting, and stay out of the path of its beam when it is transmitting. If you mount it outdoors use some kind of lightning protection. The minimum is to never use it during weather likely to produce lightning, and disconnect and ground it when it is not in use.

An Interesting Bit:

The Radio Society of Great Britain's *Radio Communication Handbook* (4th edition), in discussing circular polarization and VHF-UHF antennas, suggests that slanting an antenna at 45 degrees from vertical gives a compromise between horizontal and vertical polarization. Using this technique average signal improvement of 6dB is claimed for reception of typical, mixed polarity signals.

Antenna Contest:

Entries are in for our Unusual Antenna

Contest. We'll be going over them, and the winner will be announced next month. Stay tuned!

Correction:

If you didn't catch the earlier correction notice be aware that there should be no connection from the +9 volts to the antenna element in the diagram for the active antenna in the June column.

RADIO RIDDLES

Last Month:

I discussed mounting an antenna lower toward the ground to improve communication over hills, and then asked "how this could be true?" After all, wouldn't we be more likely to get signals over the hills if we raised the antenna? I also asked what NVIS is.

Well, NVIS is the acronym for "Near Vertical Incidence Skywave." Skywaves which leave an antenna site at higher (more nearly vertical) angles come back to earth closer to the antenna site than those which leave at low-vertical angles. To explain this, think of squirting a garden hose straight upwards (high-vertical angle). The water falls back all around you. Squirt the water away horizontally (low-vertical angle) and it comes to earth far from you.

Radio waves reflecting from the ionosphere act somewhat similarly as they return to earth, not due to gravity as the water does, but due to being refracted from the ionosphere (groundwaves excepted).

Say that you mount your HF dipole or other horizontally-oriented, linear antenna close (about 1/4 wavelength) to the earth. Then the reflections of your signals from the ground combine with signals leaving the antenna to favor upward (high vertical angle) radiation. These transmitted signals refract from the ionosphere, and return to earth all around the area from which they are launched. Thus they can enter nearby valleys which are blocked to low-angle vertical radiation by the hills surrounding them. We'll discuss NVIS more in the future.

This Month:

Is a single-turn, circular-loop antenna circularly polarized? Must an antenna be circular to provide circular polarization?

You'll find an answer for this month's riddle, another interesting, antenna-related web site, and much more, in next month's issue of *Monitoring Times*. 'Til then Peace, DX, and 73.

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DeLorme's GPS Receiver and Mapping Programs

The three initials GPS have become part of our everyday language. Few people on this earth would fail to recognize that it stands for global positioning system. This constellation of satellites allows a user to find his position within 500 feet or better anywhere on the earth. All it takes is a calculator-sized GPS receiver. Alternatively, some GPS receivers can be connected to a personal computer or laptop. Although bulky, the color graphics afforded on a laptop can provide stunning detailed maps adding to the power of the GPS.

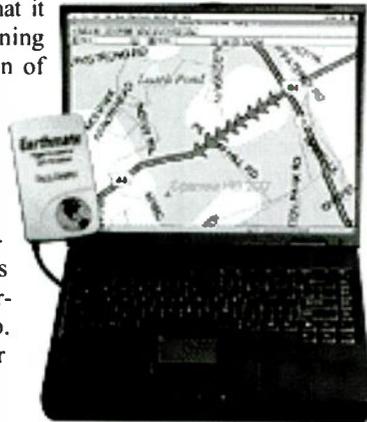


Figure 1 – Earthmate GPS Receiver Attached to Laptop

◆ This Must Be Earth, Mate!

DeLorme's *Earthmate* is an example of a computer-controlled GPS receiver. It has been designed to connect to a computer's COM (serial) port. Since it has no display or controls of its own it must be used with a computer or a Palm handheld. It is a 12 channel L1 C/A code type GPS and weighs in at 7 oz. with batteries. It can be powered for up to ten hours by four AAA batteries; or from the computer's USB port with optional cable.

Earthmate is priced at \$159.95. See Figure 1.

◆ Road Warrior!

DeLorme's main business since 1976 is map making. Their first venture into computer mapping occurred in the mid 1980s. Their first CD-ROM product was *Street Atlas USA*, released in 1991, and reviewed in this column. These guys have been at it for quite some time and produce some of the best available mapping programs on the market.

Their latest effort is *Street Atlas USA – Road Warrior Edition*. I'm sure Mel Gibson, star of the movie with the same name, is jealous! This program does it all, and very well. Finding places, route mapping, route navigation via GPS, printing maps and more, are features of Road Warrior.

◆ What Computer Does It Run On?

Road Warrior is not a lightweight when it comes to computer/hardware requirements. You will need as a minimum a Pentium 150 MHz, 32 MB RAM, CD-ROM drive, super VGA, 16 bit color monitor, mouse/trackball, 270 MB hard drive space and Windows 95, 98, NT 4.0 or Windows 2000. In addition, some of the best features of Road Warrior require an additional 22 MB of hard drive space, a sound card, speakers and microphone. We'll take a look at these voice features in a minute.

Of course, if you want to use the GPS functions, it requires a GPS receiver as well. Although we used Road Warrior with the DeLorme Earthmate, it can also be used with other GPS receivers such as

Garmin, Magellan, Rockwell, Eagle and Trimble.

◆ Installation

Road Warrior comes on two CDs; one installation and the other program. This install is not fast, since lots of data is being stored on your PC. Total time is a solid 11 minutes on my 266 MHz Pentium II using Windows 98 and 64 MB of RAM. This includes the "Where Am I?" module and Microsoft's speech recognition engine version 4.0, which is included on the install CD.

Next the Earthmate GPS (with batteries installed) was connected to the computer's COM's 1 port via the supplied cable.

◆ Set-up and Use

Road Warrior's screen is very intuitive and simple to use. See Figure 2. The screen is divided into a number of sections. The largest is the resulting map. Here we can see the word "DeLorme" and a dot just below Route 95. The dot is the result of a GPS fix taken while the product was at DeLorme's Maine Headquarters.

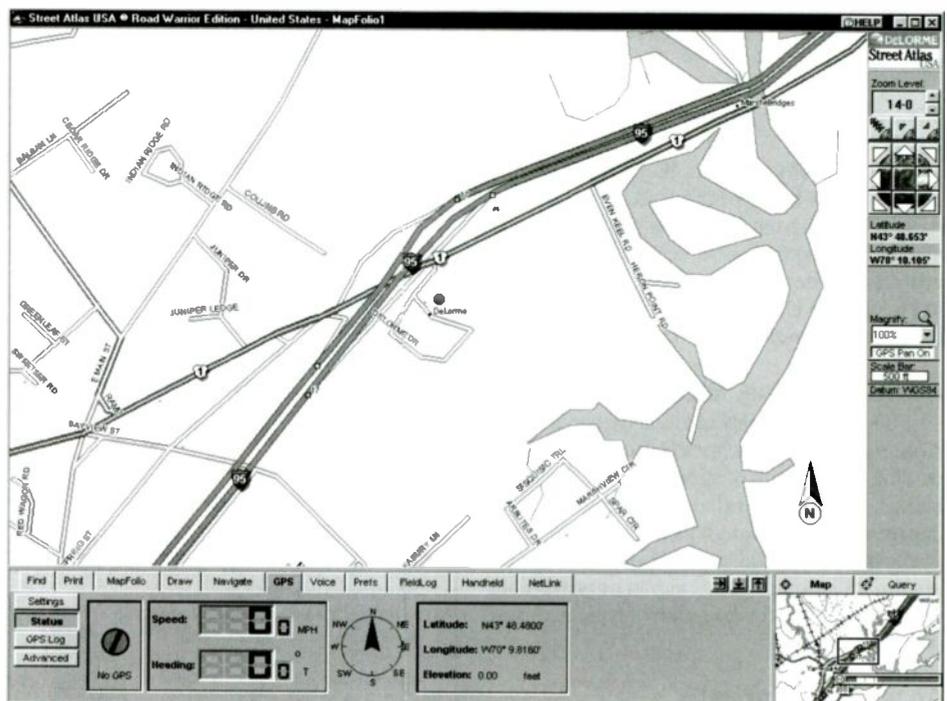


Figure 2 - Street Atlas USA – Road Warrior Edition Main Screen

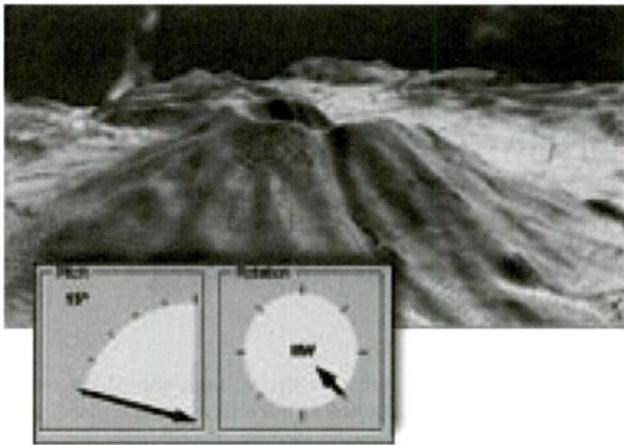


Figure 3 – *Topo Version 3.0 Showing Its Stuff on Mt. St. Helens*

Now jump down to the lower part of the screen. Here we can see the “live” GPS information such as longitude, latitude, elevation, speed and direction. Since this is a canned screen you can see that the dot to the left of Speed indicates “No GPS.”

If we look to the lower left side of the screen we can see that Status is highlighted. By clicking on Settings we can choose the COM port and type of receiver we are using.

Next take a look at the horizontal line of menu button just above this area. The GPS is highlighted since we are displaying one of the GPS info screens. These eleven “buttons” are the heart of Road Warrior’s control.

The Earthmate took about 13 minutes to download enough GPS satellite almanacs to be able to accurately determine my position. So the first time you use the system you must be patient.

◆ True Interactive Voice!

You know, many programs promise Voice Command on their product packaging, and don’t deliver the goods. Road Warrior is just the opposite. I had to dig into its manual to find the voice features. They are there. And, they are REAL!

DeLorme has done a very nice job of minimizing keyboard use. Clearly they were thinking of a car or truck driver as the end user. For example, if you wish to scroll the displayed map to the right all you have to say is “Pan right” and Road Warrior obeys. There are ten screen control voice commands including variations of Pan and Zoom, and they all worked great. However, this was in the confines of a quiet new Pontiac GrandAm. Still, it was very impressive.

The Maine boys did not stop there. The GPS-enabled Road Warrior will speak enroute directions to you such as “Left turn coming up.” Thanks, HAL! It’s pretty freaky the first time the computer “drives” you to town.

If you miss the instruction all you have to say is “Again” and Road Warrior will repeat the last instruction. There are sixteen additional Navigational Voice commands in-

cluding: Show next turn, Center map on turn, Directions, Show route, and (my favorite) Shush, which silences voice navigation.

This voice interface is one of the best implementations I have used. It’s perfect for this automobile driver-user application.

With a price of \$44.95, Street Atlas USA Road Warrior Edition, with its detailed street maps, navigation and routing functions, GPS

location capability and voice commands and directions, is a real bargain.

◆ Topo USA Version 3.0

This is another DeLorme product, which can be used with their GPS receiver. We reviewed an earlier version of this product a while back. The screens were so interesting the art director at *Monitoring Times* decided to give them a color printing. Topo must be special since that was the first time in my ten years of writing this column that I got color!

Topo version 3.0 delivers the same high resolution, 3-D elevation maps, but now includes a new 3-D engine, automatic trail and road routing, shaded relief on two dimensional maps, land cover and use information for more realism. Figure 3 shows a beauty from *Topo version 3.0* of Mt. St. Helens in the state of Washington.

Topo version 3.0 covers the entire USA on its six CDs plus an install CD. Its hardware requirements are similar to Road Warrior. However, it requires more hard drive space and suggests that a Pentium II of 233 MHz or higher be used.

At a price of \$99.95 this product is a must for avid hikers and campers.

◆ Use With Palm Handhelds

As we discussed in our previous article on the Earthmate, with the purchase of the optional Palm cable from DeLorme, the Earthmate can be controlled by Palm handhelds. Although many of the advanced features such as voice commands/control are not available to the Palm user, preprocessed maps can be downloaded to the Palm and used with real-time GPS positioning information. For use with Palms, the Solus Basic program is required and can be downloaded from their web site at <http://www.delorme.com>. Alternatively, Solus Pro can be purchased from DeLorme.

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not conceive of what the year 2001 would bring. Today, with our eyes opened, we are well aware of the times we live in.

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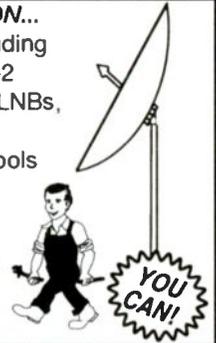
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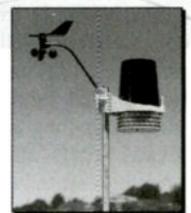
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Synthesizers and How they Work - Part 2 Phase Noise and Reciprocal Mixing

One of the main problems with frequency synthesizers is the fact that some designs generate high levels of phase noise. Over the years they have received a bad press as a result of this. However it is possible to design some very good low phase noise synthesizers. The problem is often that receivers and transmitters are designed for low production costs, and this naturally means that some short cuts are needed.

♦ What is phase noise?

Phase noise is present on all signals to some degree and it is caused by small phase (and hence frequency) perturbations or jitter on the signal. It manifests itself as noise spreading out either side from the main carrier as shown in Figure 1.

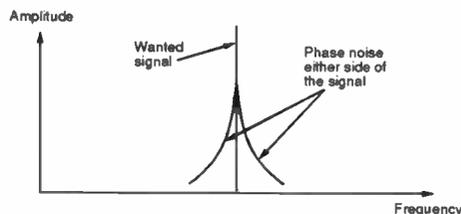


Fig. 1 - Phase noise on a signal

Some signal sources are better than others. Crystal oscillators are very good and have very low levels of phase noise. Free running variable frequency oscillators normally perform well. Unfortunately synthesizers, and especially those based around phase locked loops, do not always fare so well unless they are well designed. If significant levels of phase noise are present on a synthesizer used as a local oscillator in a receiver, it can adversely affect the performance of the radio in terms of reciprocal mixing.

Some oscillators have phase noise levels that are quoted in their specifications. Any high quality signal generator will have the level of phase noise specified, as do many high performance crystal oscillators used as standards. Their performance is generally specified in dBc/Hz and at a given offset from the carrier. The term dBc simply refers to the level of noise relative to the carrier, i.e. -10 dBc means that the level is 10

lower than the carrier.

The bandwidth in which the noise is measured also has to be specified. The reason for this is that noise spreads over the frequency spectrum. Obviously the wider bandwidth that is used, the greater the level of noise that will pass through the filter and be measured. To prove this, just try selecting a different bandwidth on a receiver and check what happens to the noise level. It will rise for a wider bandwidth and fall when a narrow bandwidth is used. Although it is most convenient to express noise per 1 Hz bandwidth, measurements are usually made using a wider bandwidth because it is difficult to obtain 1 Hz bandwidth filters. The correction is made mathematically.

Finally the level of noise varies as different offsets from the carrier are taken. Accordingly this must be included in a specification. A very good oscillator might have a specification of -100 dBc/Hz at 10 kHz offset.

It has already been mentioned that the level of phase noise changes as the offset from the carrier changes and for "simple" signal sources like crystal oscillators or variable frequency oscillators the phase noise reduces as the frequency from the main carrier is increased. For frequency synthesizers the picture is a little more complicated as we shall see.

♦ Phase noise in synthesizers

Each of the components in a frequency synthesizer produces noise that will contribute to the overall noise that appears at the output. The actual way in which the noise from any one element in the loop contributes to the output will depend upon where it is produced. Noise generated by the voltage-controlled oscillator (VCO) will affect the output in a different way to that generated in the phase detector for example.

To see how this happens take the example of noise generated by the voltage controlled oscillator. This will pass through the divider chain and appear at the output of the phase detector. It will then have to pass through the loop filter. This will only allow through those components of the noise that are below the loop cut-off frequency. These will appear on the error voltage and have the effect of cancelling out

the noise on the voltage controlled oscillator. As this effect will only take place within the loop bandwidth, it will reduce the level of noise within the loop bandwidth and have no effect on noise outside the loop bandwidth.

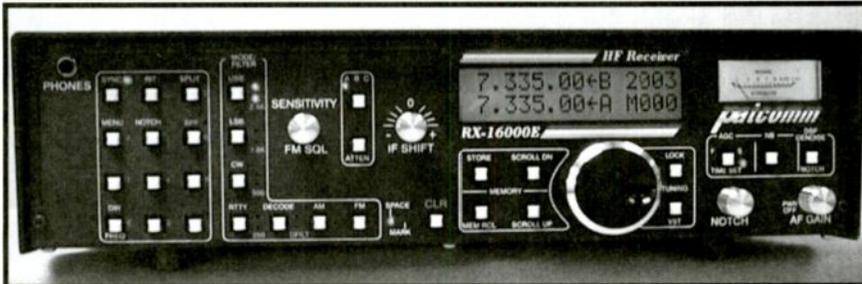
Noise generated by the phase detector is affected in a different way. Again only the components of the noise below the loop bandwidth will pass through the low pass filter. This means that there will be no components outside the loop bandwidth appearing on the tune voltage at the control terminal of the voltage controlled oscillator, and there will be no effect on the oscillator. Those components inside the loop bandwidth will appear at the oscillator control terminal. These will affect the oscillator and appear as phase noise on the output of the voltage controlled oscillator.

Matters are made worse by the fact that the division ratio has the effect of multiplying the noise level. This arises because the synthesizer has the effect of multiplying the frequency of the reference. Consequently the noise level is also multiplied by a factor of $20 \log N$, where N is the division ratio.

Noise generated by the reference undergoes exactly the same treatments as that generated by the phase detector. It too is multiplied by the division ratio of the loop in the same way that the phase detector noise is. This means that even though the reference oscillator may have a very good phase noise performance this can be degraded significantly, especially if division ratios are high.

Dividers normally do not produce a significant noise contribution. Any noise they produce may be combined with that of the phase detector.

The combined noise of the loop at the output generally looks like that shown in Figure 2. Here it can be seen that the noise within the loop bandwidth arises from the phase detector and the reference. Outside the loop bandwidth it arises primarily from the voltage controlled oscillator. From this it can be seen that optimization of the noise profile is heavily dependent upon the choice of the loop bandwidth. It is also necessary to keep the division ratio in any loop down to reasonable levels. For example a 144 MHz synthesizer with a 12.5 kHz step size will require a



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division ratio of 11520. In turn this will degrade the phase detector and reference phase noise figures by 81 dB inside the loop bandwidth - a significant degradation by anyone's standards! Provided that division ratios are not too high then a wide loop bandwidth can help keep the voltage controlled oscillator noise levels down as well.

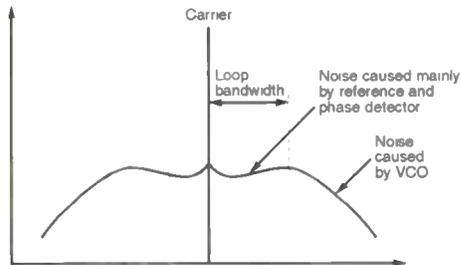


Figure 2 - Noise profile of a typical synthesizer

◆ Effects of phase noise

Phase noise can have a number of effects. For amateur radio SSB transmitters the main effect is that splatter appears either side of the main signal. This results from the phase noise either side of the signal rising and falling in line with the amplitude variations of the main signal.

For receivers the main problem is an effect known as reciprocal mixing. To look at how this occurs take the case of a superhet receiver tuned to a strong signal. The signal will pass through the radio frequency stages, and then in the mixer it will be mixed with the local oscillator to produce a new signal at the right frequency to pass through the IF filters. When the local oscillator is tuned away by ten kilohertz, for example, the signal will no longer be able to pass through the IF filters. However it will still be possible for the phase noise on the local oscillator to mix with the strong incoming signal to produce a signal that will

fall inside the receiver pass-band as shown in Figure 3. This could be sufficiently strong to mask out a weak station.

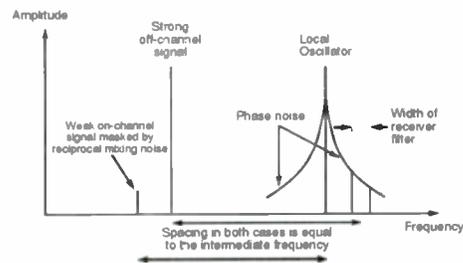


Figure 3 - The way in which phase noise on a signal results in reciprocal mixing

◆ Specifications

A number of different methods are used to define the level of reciprocal mixing. Generally they involve the response of the receiver to a large off channel signal. To perform a reciprocal mixing measurement is rarely easy. The signal generator must always be much better than the receiver, otherwise the performance of the signal generator will be measured! To overcome this many people use an old valve (tube) generator because their performance is often very good in this respect.

A measurement can be made by noting the level of audio from a small signal with a BFO turned on. The signal is then tuned off channel by a given amount, normally about 20 kHz, and then increased until the audio level rises to the same level as a result of the phase noise from the receiver. As the noise level is dependent upon the bandwidth of the receiver, this has to be specified as well. Generally a bandwidth usable for SSB is used such as 2.7 kHz.

A good HF communications receiver might have a figure of 95 dB at a 20 kHz offset using a 2.7. kHz bandwidth. This figure will improve as the frequency offset

from the main channel is increased. At 100 kHz one might expect to see a figure in excess of 105 dB or possibly more.

Another way of measuring the phase noise response is to inject a large signal into the receiver and monitor the level needed to give a 3 dB increase in background noise level. As a number of different systems are in use it is often best to study the reviews performed by the same people when comparing different rigs.

RadioCom DSP-filter analyzer, CAT with decoder of RTTY, Synop, CW PSK31, FAX and SSTV. CAT for more than 80 receivers and transceivers.

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Ask Another Bob

◆ How can I build a scanner?

To be blunt, it's not worth building a scanning receiver from the ground up. You would be better served to buy an old crystal controlled scanner and learn about how it works. Make sure you can obtain a schematic diagram – or better yet, a complete service manual – before choosing the scanner.

Heath offered both crystal and programmable scanner kits at one time but left the market several years ago. Hamtronics (<http://www.hamtronics.com>) sells simple crystal controlled and switch programmable receiver kits, but they don't scan. For more information, contact Hamtronics at 65 Moul Rd., Hilton, NY 14468-9535, telephone (716) 392-9430.

◆ How can I measure scanner performance quantitatively?

The answer to this question could span several columns, so I will just summarize the high points here.

Making quantitative measurements that can be compared with the manufacturer's specifications requires good, calibrated test equipment. Two-way radio service shops have the necessary equipment and technicians to perform the tests. Make a list of the measurements you want, including the frequencies at which you want the sensitivity and image rejection measured. Bring the list to a commercial two-way radio service shop, not a CB repair shop, and request a price estimate.

If you can't borrow the required test equipment, you can buy it at considerable cost. I've bought new and used test equipment from dealers, at hamfests, through Usenet's misc.industry.electronics.marketplace and rec.radio.swap news groups, and at auction through eBay (<http://www.ebay.com>). Amtronix has a good assortment of used radio test equipment (<http://www.amtronix.com>). Join the test-equipment email list at <http://www.qth.net>,

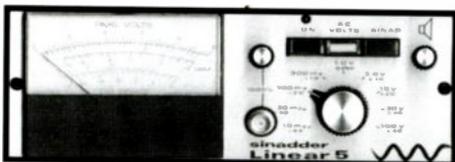


Figure 1 Helper Instruments SL105 Sinadder.

where members discuss and sell test equipment.

A stable RF signal generator is most important. It should be able to produce narrow FM signals with adjustable deviation and AM signals with adjustable modulation. The output level should be calibrated in dBm or microvolts.

Older, AM-only generators, like those made by Heath, EICO, and B&K, won't do. Instead, look for models like the Hewlett-Packard 8656A, HP 8657, HP 8640B (opt 002), Racal 9087, Ailtech 380K11, Fluke 6071A, Fluke 6060A, or the Marconi 2019. Gigatronics and Wavetek made suitable models, too. Expect to pay between \$800 and \$1600. These models have an upper frequency limit 1000 or 1300 MHz, so you won't be able to measure scanner performance in the 2000 MHz range without a more expensive signal generator.

Most of the receiver industry has adopted the 12 dB SINAD (signal plus noise and distortion) metric for specifying FM sensitivity. To make a SINAD measurement, you use an RF signal generator to inject an FM signal modulated at 3 kHz with a 1 kHz tone into the receiver's antenna jack. A SINAD meter or audio analyzer is connected across the speaker leads and you adjust the signal generator's output level until the SINAD meter reads 12 dB.

Better SINAD measuring devices contain a high quality 1 kHz audio tone generator that is used to modulate the RF signal generator. You can obtain used Motorola or Helper Instruments SINAD meters at hamfests or at online auctions for under \$100. Look for a Helper Instruments Sinadder Linear 5 in good condition (fig. 1). It contains a sensitive wideband voltmeter, which is useful for measuring signal to noise ratio and audio output power. A good, used HP 8903A or Boonton audio analyzer can cost \$1000 or more, but enables you to measure audio frequency response, too.

A good signal generator used in conjunction with a SINAD meter permits you to measure sensitivity, image rejection, MDS (minimum discernible signal level), and modulation acceptance. Modern communications test sets, like those made by Motorola, HP, and IFR, mate a signal generator and SINAD meter with circuitry for testing transmitters.

Measuring IMD dynamic range (a measure of intermod immunity) and blocking dynamic range requires a second signal generator, a hybrid combiner to sum the two signals, and a calibrated adjustable attenuator to control the combined signal level.

The *ARRL Handbook for Radio Amateurs* (fig. 2) shows how to build a hybrid combiner. If you want to learn how receivers work and how to measure them, pick up a copy of the *Handbook*. It is the American Radio Relay League's largest and best-known book and is published annually. I own a dozen or so editions, dating back to 1957.

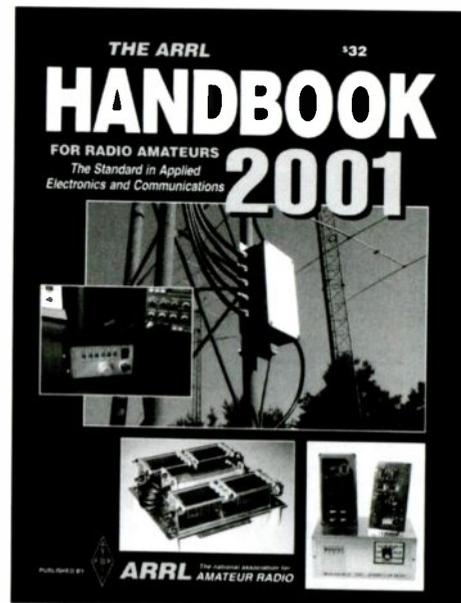


Figure 2. The ARRL Handbook for Radio Amateurs 2001.

The 2001 edition paperback edition sells for \$32 and is available at bookstores, radio dealers, and directly from the ARRL, 225 Main St., Newington, CT 06111-1494, telephone 1-888-277-5289. The ARRL web page is <http://www.arrl.org>.

◆ Can I add alpha labels to a scanner not so equipped?

I don't know of a way to add alpha labels to a scanner lacking them. Software is available for computer-controllable scanners which supports alpha labels, but the labels appear on the computer monitor instead of the scanner's display.

ISP DISTRICT CHICAGO TALK GROUPS		Chicago Month	
1500	1500-1500	1500	1500-1500
1501	1501-1501	1501	1501-1501
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1598	1598-1598	1598	1598-1598
1599	1599-1599	1599	1599-1599
1600	1600-1600	1600	1600-1600



Figure 3. Talk group cheat sheet.

The simplest and oldest way to remember frequency and talk group assignments is to carry a small list. I used a spreadsheet program to print a talk group "cheat sheet" in 6-point type for a friend with a BC-245XLT. I laminated the list (fig. 3) for durability and he carries it in his wallet.

❖ **I want to buy a crystal-controlled air band scanner. Can you suggest a model?**

Aircraft transmissions employ AM while most other services transmit FM. Most modern programmable scanners can receive 108 - 136 aircraft signals, but very few crystal air band models were manufactured. This was due to the additional cost of AM detector circuitry, front end filtering, and limited demand.



Figure 4. Regency ACT-R-92AP Flight Scan.

Suitable crystal models include the Regency ACT-R-92AP Flight Scan (fig. 4), Regency HX750 handheld, Electra Bearcat Five-Six handheld, the Bearcat 15, and Radio Shack PRO-48.

Scanner crystals cost \$5 or more each, so the cost of obtaining a used 8-channel air scanner and purchasing new crystals approaches the price of a used, programmable model.

❖ **Collectors' Corner**

The Regency TM-H2 is a crystal-controlled monitor receiver built in the 1960s. It is an early solid state model that covers 150 - 175 MHz. Its TM-L2 cousin tunes the 30 - 50 MHz VHF-low band. The double con-

version circuitry employs both 13 and 0.455 MHz IFs.

These radios are housed in a blue-green steel cabinet and are large by today's standards. They can be powered by an internal 117 VAC power supply or by a 12 VDC source. The internal speaker is mounted on the left side and an external speaker may be connected to a screw terminal strip on the rear. Options include an alert tone decoder and top mounted leatherette handle.

I found a dusty and rusty 6-channel specimen (fig. 5) at a local hamfest. The chassis bears a 1964 date stamp. Two of the knobs have been replaced and a BNC connector soldered to the chassis replaces the



Figure 5. Regency TM-H2 manufactured in 1964.

original antenna connector.

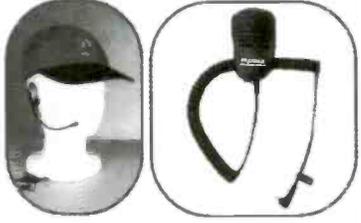
Don't pay more than \$10 for one of these radios. They require special crystals with wire leads that must be soldered to the channel selector switch and tweaked on frequency by a trimmer capacitor.

Accessorize Your Portable!

Whatever your interest in hobby radio, **PRIME Radio Products** has an accessory item for you! We manufacture a full line of aftermarket products for all types of portable radios, from microminiature Family Radios, to scanning receivers, to amateur or commercial handheld radios. Our accessories are reliable, innovative, and affordably priced. We provide accessories for all major brands of radio including Motorola, Kenwood, Icom, Vertex, Uniden and many, many more!

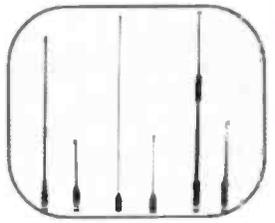
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Our innovative audio products have made us famous. From the comfort of our SPM-400 mini-boom microphone to the low-profile of our EH-1 "invisible" ear phone and SPM-700 surveillance mic, we have the right accessory for the job!



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Most stock antennas for scanners or portable radios are extremely poor. Upgrading to a better antenna can make a huge difference in performance. Our antenna products are specifically designed for maximum performance and durability.



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Icom's Super Neat IC-706MkIIIG - Part II

Before we get into the test drive portion of this slick little radio, a brief recap for those who are picking up *MT* for the first time.

There is a lot to like about the IC-706MkIIIG. It's small, just 6.6" wide x 2.3" high x 7.9" deep; light, just 5.5 pounds, and it has great coverage: receive, 30kHz-1999.999 MHz and 400-470 MHz; transmit, all ham bands from 1.8 MHz to 450 MHz, with modes including USB, LSB, CW, /RTTY (FSK), AM, FM and WFM (receive only).

Power output on HF and six meters is 5-100 watts (SSB/CW/FM/RTTY) and 2-40 watts AM; on two meters 2.5-50 watts (SSB/CW/FM/RTTY), 2-20 watts (AM) and 2-20 watts (AM); and on 440 MHz 2-20 watts (SSB/CW/FM/RTTY) and 2-8 watts (AM).

The "706" packs a lot of capability, including tone encode, tone squelch, 102 alphanumeric memories (99 regular, 2 scan edges, 1 call), second VFO, crossband split capability, CW keyer, speech processor, and voice-operated transmit, plus some digital signal processing capabilities as well.

A detachable front panel/display and optional remote separation cable make it possible to install the main "box" of the 706 in the trunk of an automobile and mount the front panel and microphone to the dash. There are just 12 buttons, two pairs of concentric knobs, and the tuning knob on the face of the 706, plus a large and legible backlit liquid crystal display (LCD) that shows what's going on with this transceiver. Many of the buttons have lighting for easier operation in the dark.

◆ Hands-on Experience

In my experience in testing radios both here and for *Passport To World Band Radio*, I've found that when a radio has rela-

tively few controls, as the 706 does, and a lot of capabilities, there is a very large potential for creating a rig that can be absolutely maddening to operate. When a limited control set and sophisticated operating options collide, the loser is usually the operator.

Fortunately, I am happy to report that is definitely not the case with the 706. Despite the paucity of controls, the 706 is actually easy to operate. In fact, this rig came within an angstrom or two of passing the Elliott Idiot test. - What's that? I'm glad you asked. The Elliott Idiot test asks the following question: can one Jock Elliott do

ton and a pair of up and down Band buttons. The Lock button is very handy for mobile operation. One of the functions of the Tuner/Call button is to operate the optional outboard AT-180 HF/50 MHz automatic antenna tuner. (Hold the button for two seconds, and the tuner does its thing. It's superb.)

Most of the other functions are handled by five buttons. Four of them are located under the LCD. Press the left-most button and you step through a series of menu choices that are shown on the bottom of the display. The M2 menu, for example, controls memory operations. When it is displayed, the three Function buttons

to the right control memory write (MW), memory clear (MCL) and swapping between VFO and memory (V/M). The M1 menu offers a different set of choices for the Function buttons.

If you press the Display button just to the right of the LCD, you are taken to different sets of menus, such as S2 for scan functions, and G1 for band scope. It takes about two min-

utes to understand how the Menu and Display buttons change what the Function buttons do, but after that the entire scheme works really well. Hats off, too, to the manual writers at Icom for a job well done.

I've saved the best part for last: the performance of the 706 simply sparkles. I got rave reviews for my audio quality on 2 meters, and I enjoyed operating on ten meters with the 706. For the casual ham operator who wants a whole lot of radio in a compact, reasonably priced package, the 706 delivers, and then some. The IC-706MkIIIG delivers all this at a street price under \$1,000; the AT-180 should sell for less than \$500. For more info, check out <http://www.icomamerica.com>.



The IC-706MkIIIG delivers a whole lot of hamming at a reasonable price.

most of the major functions of this rig without consulting the manual?

With the 706, I was able to do all the functions I wanted except set the repeater offset for two meters, for which I had to consult the manual. As a result, the 706 gets a B+, not an A, in the Elliott Idiot test.

The reason the 706 does so well is that the good folks at Icom have really done their homework. While there isn't a "knob for every job," there are controls for the things that need to get done most often.

For example, since there is no numeric keypad, there is a button for selecting the tuning step. That makes it really easy to get from one place to another without a lot of endless knob twirling. There is a Mode but-

WT



REVIEW

Flight Explorer Personal Edition

By Ian Doyle

For US aviation hobbyists or for those whose interest lies in HF, you may be interested in Flight Explorer Personal Edition. This is a fabulous product which enables listeners to track real-time aircraft flight-planned to/from the USA and certain transoceanic routes to/from the USA. Flight Explorer has been in existence for a number of years and, for just a small subscription fee, it enables the individual to access information usually available only to airlines.

Flight Explorer will run on a "reasonably fast PC" using a standard internet connection (dial up or dedicated). The aircraft data is provided from the Flight Explorer (FE) data center and will provide the user with a real-time graphical image of aircraft currently flying at any altitude over the US (Including Alaska and Hawaii), and US "tracked" aircraft over parts of Mexico, Canada and the Atlantic and Pacific Oceans.

Registering is easy via a secure signup from the Flight Explorer Personal Edition section of Avweb (<http://www.avweb.com/sponsors/fe/>). After registering, you can download the client software and once payment has cleared you will be sent the install code for the software. Once installed, you will be able to fully access the web page and use the product proper via the user selected ID and password.

Two versions of the software are available; the one for which most monitors opt is Personal Edition, which costs USD \$9.95 per month for 10 hours usage, charged monthly to your credit card. This should be adequate for most hobbyists. If, however, you are feeling flush, there is a \$250 Professional Edition which encompasses a number of enhancements aimed at the corporate airline or professional user; it has a variety of additional features as well as unlimited connect time.

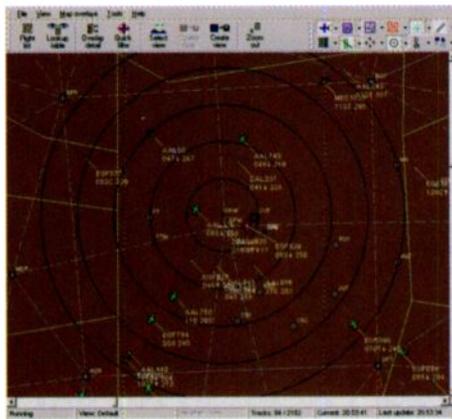
Using Flight Explorer

Once you have an account and user ID, and you have successfully run the set-up programs and logged onto the site, what can you expect? Well, this is truly an Aladdin's cave of treasures. Flight Explorer will allow the user to monitor any aircraft which is flight planned in

or out of the USA.

As a large percentage of HF aviation listening is done over the Atlantic Ocean, Northern Canada, The Caribbean and South America, the advantages of access to a package like this are obvious. Being able to see graphically what you can hear increases the interest enormously.

When you first log on to the site you will see a picture of the world with every aircraft lodged with the centre represented as a dot. It is, however, possible to click and drag on a particular area, for example, the Caribbean. So if we're listening to the HF Caribbean Net and want to identify a particular aircraft that is providing a position report on HF, simply right click on the aircraft icon and then click "Properties." The aircraft type, airline, position, height, speed and destination airport will all be displayed. If you "tag" an aircraft, this information will be retained as the aircraft moves across the screen.



A close-up of Dallas-Ft Worth, showing nav aids, airways and ATC sector boundaries

We may, of course, actually hear an aircraft and wish to interrogate the flight details. Press the horizontal aircraft icon in the top right of the screen; this will clear the screen in readiness for our query. Now press the "Quick Filter Option" and key in the flight number heard. If this is flight planned into or out of the USA it will appear as a dot on the main screen. Ensure that the aircraft you are

monitoring does actually correspond to the one are that you can see visually on screen; otherwise the aircraft may not appear, because of being outside the interrogated range.

Numerous other search/filter options are available in this mode. You can input Flight Numbers, Aircraft Types, or Airport Codes; all aircraft currently in the air with a live flight plan to

or from the USA will appear. Again, you must remember to clear the screen after each query. It is also possible to overlay the latitude and longitude coordinates, which is particularly useful over the North Atlantic, Canada and Pacific Area.

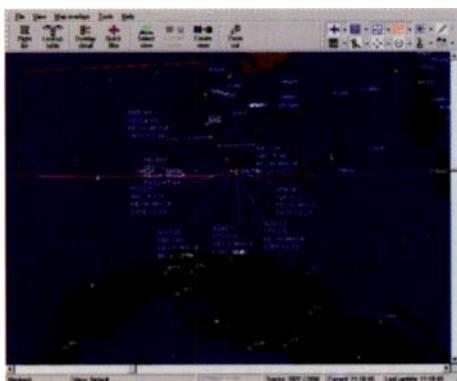
One word of caution; in some cases of transoceanic routes beyond radar range, the data provided can appear up to 40 minutes old, as only the last reporting point is provided. Hence, the reason the picture over the North Atlantic consists of rows of dots in vertical groupings. Despite this limitation there are still numerous advantages in using the software.

Although not relevant to the UK, various overlays can also be added with the additional of beacons, nav aids, airways and ATC sectors within the USA. This is useful for monitoring the Caribbean area, where, sadly, aircraft serials do not appear.

Another very useful feature is the "Flight List Look Up." A list of all tracked aircraft in the system will be displayed, showing aircraft ID, origin, destination, aircraft type, altitude, speed, departure time, ETA, or status for each aircraft. The list can be sorted by any of the criteria just by clicking on the title bar.

Once again, this is a superb product and is bound to be of tremendous interest to the serious HF monitor with an interest in aircraft. Although there has been much criticism of the Internet, there seems little doubt that technology that would have been unthinkable five years ago is now a reality, I feel sure that many readers would agree that such developments will only enhance the future of radio monitoring and the general radio listener!

Editor's Note: This review originally appeared in Shortwave Magazine. The author, based in the UK, uses Flight Explorer to monitor international flights while listening to HF communications. However, the program follows all tracked flights over land as well. If you don't have an airport nearby, tune in to streamed audio from several major control towers while you watch the planes on screen. See June 2001 for Jean Baker's review.



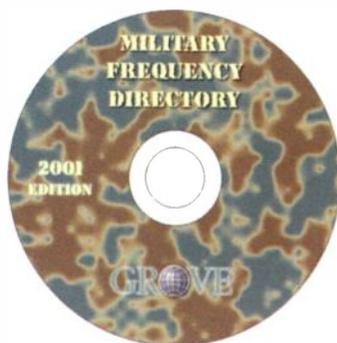
Tracking 150 GA aircraft from Key West, Fla. (EYW), to Grand Cayman, B.W.I., for the 1998 Cayman Caravan.

What's NEW

Tell them you saw it in *Monitoring Times*

Grove Military Frequency Directory

Monitoring military traffic can be as mundane as listening to small-town dispatch channels, as sophisticated as an interagency disaster drill, or as intriguing as a spy novel. The first challenge is to find the frequencies, and that's not been easy since the Government Master File (GMF) was classified Confidential in 1982. So, the *Grove Military Frequency Directory* comes as a welcome addition, especially given its comprehensive coverage and surprising accuracy.



"Gathering information for this directory has been extremely difficult," says author Larry Van Horn. "Most was gathered through personal contact with hundreds of active radio monitors who live near military bases."

The *Grove Military Frequency Directory*, which numbers many hundreds of pages, could only have been published on CD-ROM due to its size. The disk is a compendium of the information originally sold state-by-state. Not only does it incorporate frequency information for all 50 states, all military services, all military bases, plus related agencies such as the FAA, but it contains full frequency information for civilian airports with any kind of military presence as well as all Air Route Traffic Control Centers (ARTCC).

Most of the information is presented by state and is organized alphabetically by city, base, or facility. Since most frequencies are VHF/UHF for local coverage, there is no frequency cross-reference or

by-agency listing.

The supplemental material contained in the included Department of Defense (DOD) General Planning and worldwide Flight Information Publications (FLIPs) is enormous. You'll find terms defined, procedures spelled out, codes explained like Notice to Airmen Messages (NOTAMs) and aviation weather codes. You'll also find sketches of airports worldwide, and a global chart of LORAN coverage.

And, don't overlook the "Instructions" link on the *MFD* opening page! You might think these are tips for getting around the files in Acrobat Reader (those come on a separate sheet) or the usual caveats and acknowledgements. Instead, this is an excellent introduction and overview of military communications and nationwide nets, written by Larry Van Horn. (This introduction is also included in the individual states if purchased separately.)

Grove Military Frequency Directory is presented in PDF format suitable for printing. Using a recent version of Adobe Acrobat Reader (included on the disk), you can search for any string of characters or numbers, you can select and copy text so you can manipulate the information to suit your needs. The CD-ROM (SFT31) can be purchased from Grove Enterprises for \$39.95 by calling 800-438-8155, email order@grove-ent.com, or write P.O. Box 98, Brasstown, NC 28902. States may still be purchased separately for \$9.95, but delivery is by e-mail attachment only.

New Scanners from Radio Shack

...or should they be called upgrades? Two new models have been approved by the FCC: The Pro-93 (20-523) covers 25-54, 108-174, 216.0025-225, 406-512, 806-823.9875, 849-868.9875, 894-960, 1240-1300 MHz. It is a handheld unit made by GRE in China. It tracks Motorola Types I/II and EDACS trunking systems.

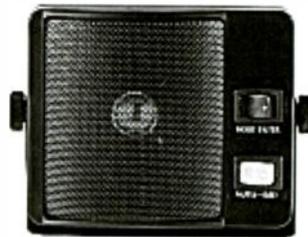
The Pro-2053 (20-466) has exactly the same frequency coverage, except that it is a base model. It also

has a digital weather alert, which will sound an audio tone and the text of the alert will print to the display.

Speco Communications Extension Speaker

CSI/SPECO has a nifty little extension speaker that can dramatically improve the intelligibility of ham, CB, GMRS, land mobile, scanners, and other radios with limited-audio speakers.

The CBS-500 features an 8-ohm, 3", 5-watt-capacity speaker in a low-glare, black cabinet, protected by a metal grill. A tilt bracket invites overhead or under-dash mounting.



The assembly is sound-contoured to reinforce voice frequencies, and it does so with clean, crisp audio that cuts through environmental noise. Two separate rocker switches provide pulse-noise attenuation as well as instant volume reduction for remote locations.

The CBS-500 includes a 6-foot shielded audio cable terminated in a standard 1/8" (3.5 mm) phone plug to fit external speaker and ear-phone jacks.

The Speco extension speaker (SPK1) is available from Grove Enterprises for \$19.95 plus shipping (PO Box 98, Brasstown, NC 28902; 800-438-8155; <http://www.grove-ent.com>).

Grove SP-200 Sound Enhancer

If you require something more sophisticated, Grove Enterprises has announced their new and improved

SP-200C Sound Enhancer. The Sound Enhancer is a high-quality, agile audio processor with sophisticated passband contouring controls for clarifying and recording voice, music, and data. Designed for audio enhancement in serious communications applications like government/military SIGINT and audio surveillance, the Grove SP-200C is also appropriate for broadcast engineering, amateur radio, shortwave listening, and scanner monitoring.



The Grove SP-200C offers variable-bandpass notch/peak function, separate bass and treble equalization, adjustable-threshold pulse-noise clipping, selectable-hold-time recorder activation, audio level, variable-hang noise squelch, and amplification. Processed sound is available through the high quality internal speaker, or from a headphone jack for secure installations or concentrated monitoring in noisy environments.

Powered by 12 VDC for mobile/portable environments, a 120 VAC adaptor is included for fixed installations. The (SPK3) SP-200 is priced at \$199.95 from Grove Enterprises.

Midland's World's Smallest FRS Radio

Midland's model F-10 radio is touted to be the smallest of all the 14 channel Family Radio Service units with a 2 mile range; it is expected to be in stores in July. The tiny new radio offers features previously found only on top-of-the-line models.

Features include: 14 channels, page/call, tone and visual transmit indicators, channel scan,

What's NEW

Tell them you saw it in *Monitoring Times*



key lock, low-battery indicator, liquid crystal display (LCD) read-out, backlit display, speaker/microphone jack, (and) allows in-unit charging of batteries; stealth squelch quiets popping noises between transmissions. Unit operates on three AAA cells; hand strap and flexible antenna included.

The F-10 has an expected street price of \$24.95 each or \$49.95/pair. A full line of accessories is available, including chargers, headsets and lapel microphones. For more information, visit:
<http://www.midlandradio.com>.

Wireless Spectrum Finder

by Bennett Z. Kobb

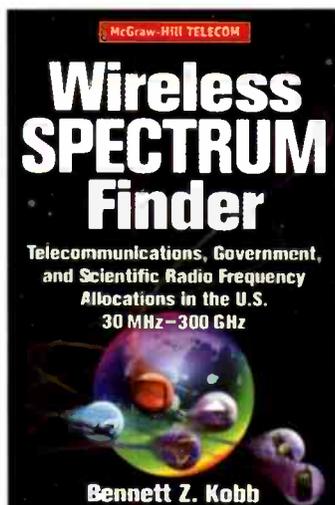
Few radio aficionados will deny that Benn Kobb probably has a handle on spectrum allocations unequalled in the industry. His previous spectrum guides were very informative, and this latest edition – all 500 pages – won't disappoint the most avid frequency hound!

Covering 30 MHz-300 GHz, this ultimate reference breaks the VHF/UHF/microwave spectrum into some 350 bands, detailed in easy-to-understand text. Kobb brings us all of the answers – legal issues, technical characteristics, allowable uses, geographical consid-

erations, and more.

Additional chapters provide insight into lawmaking, regulatory trends in technology, even helpful hints regarding sources and proceedings.

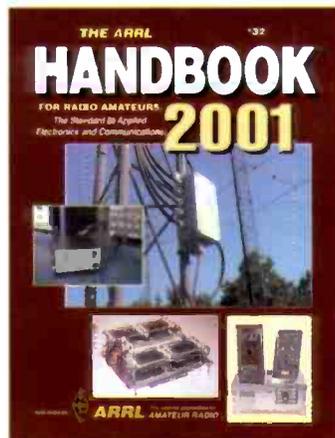
Whether you are seriously into radio as a hobby or a profession, this is the comprehensive guide to spectrum, VHF and above.



Wireless Spectrum Finder is \$49.95 from McGraw Hill, 2 Penn. Plaza, 12th Floor, New York, NY 10121; ph. (212) 904-5449, or email cathy_markoff@mcgraw-hill.com

The ARRL Handbook for Radio Amateur

Now in its 78th edition, the *ARRL Handbook* continues to be the leading technical publication for experimental radio communications. While amateur radio has seen revo-



lutionary developments over the decades, there is still much room for individual experiments and equipment building. In this venue – theory and practice – no one comes close to this annual ARRL publication.

Honed to perfection over the years, filled with crisp photos and line drawings, the *Handbook's* 1200 pages reflect the cumulative knowledge of nearly a century of experimentation in radio. Transmitters, receivers, antennas, power supplies, transmission lines, digital signal processing, test equipment, satellite communications, audio and RF circuits, repeaters, direction finding, troubleshooting, filters – it's all there in this giant compendium.

And, at only \$32, it's the best source of information on the bookseller's shelf! The *ARRL Handbook for Radio Amateurs - 2001* is available from amateur radio suppliers and the American Radio Relay League (ARRL), 225 Main St., Newington, CT 06111; ph. (800) 243-7767.

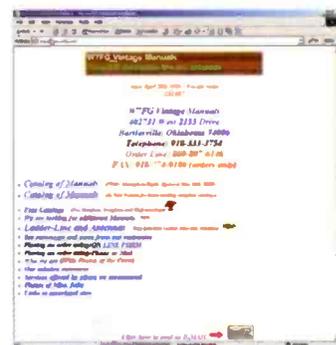
Atoc assumes Alinco Service and US Distributorship

Beginning in May, Alinco's US branch made a major shift in distribution and customer service. For warranty repairs and customer service, or for product distribution to dealers, the new company handling these services is Atoc Amateur Distributing, LLC; 23 S. High St., Covington, OH 45318; (937) 473-2840. The transition was completed around the end of June.

Alinco's corporate function will now concentrate on designing and manufacturing new products from its headquarters in Osaka, Japan. In addition to its amateur radio products, Alinco is branching into related areas, such as the design and manufacture of high quality scanning receivers.

Worthwhile Links:

<http://www.w7fg.com/> - Vintage manuals for receivers and scanners for sale



<http://www.radiostoreplus.com/> - All-spectrum website for radio products, news, and great links



MapSource Recall

Garmin International has issued a recall for the US Waterways and Lights CD-ROM version 3.00 (Serial Numbers A0903821-A0907080), which turned out to have defective navigational data for sections of Coast Guard District Number 5, New Jersey through South Carolina. Contact your dealer for a free replacement with the correct data set.

Books and equipment for announcement or review should be sent to "What's New?" c/o *Monitoring Times*, P.O. Box 98, 7540 Highway 64 West, Brasstown, NC 28902. Press releases may be faxed to 828-837-2216 or emailed to mtditor@grove-ent.com.

HERE'S WHAT OUR READERS ARE SAYING ABOUT MT EXPRESS:

"No doubt about it, the future is here! Sure nice to get the magazine so early, this has got to be the way! Thanks for a great job!"

- Charles (Chuck) Boehnke
K6EAJ, Hawaii

"You and the MT staff that put this project together have done a FANTASTIC job. You would seem to be the leaders in the field presenting material in this manner so it can be archived so easily. This is the way to receive a magazine."

- Don Nauer

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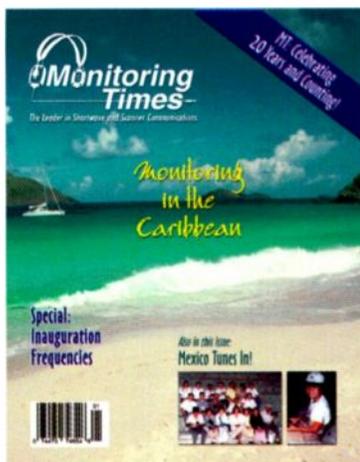
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LPFM Hypocrisy?

Guest Editorial by Doug Smith, W9WI

The first permits for new low-power FM stations (LPFMs) have now been issued. And again, full-license broadcasters are screaming about interference. Would you be surprised to learn that a legal low-power FM service has existed for years? Would you be surprised to learn that its stations can be licensed under frequency and distance separations that are not allowed for the new LPFMs?

LPFM enthusiasts probably know I'm referring to FM translators. These are low-powered relay stations, originally designed to extend FM service to isolated areas. Over the years, FM translators have also been authorized to fill coverage gaps in mountainous areas, and to overcome overload interference from more powerful nearby stations. Still later, noncommercial stations have been allowed to build nationwide networks of satellite-fed translators.

To avoid interference, FM radio stations must be separated by minimum distances both on the map, and on the dial. If there's a station on 95.5 in Nashville, a station on 95.3 will cause severe interference - unless it's 150 miles away. The FCC regulations establish specific minimum distances for specific dial separations and specific power classes. In general, stations in the same city must be at least 800kHz (0.8MHz) apart on the dial.

Of course, these minimum separations limit the number of stations possible in a given location. In theory a maximum of 25 stations is possible at any given location. And in most cities, all frequencies available under existing regulations are already in use; no additional stations are possible.

These regulations were established in the early 1960s. Older radios couldn't separate stations closer than 800kHz, or would drift from one station to another. As with most things in electronics, FM radios have improved immensely in the last 40 years. Arguably, the 800kHz separation is no longer necessary; it could be relaxed to 600kHz or even 400kHz. Such a change would make hundreds of new stations possible.

So the FCC argued when they first proposed the new LPFM service. The proposal retained protection for existing stations on the same frequency or 200kHz away, but deleted protection at 400 and 600kHz. Fearing interference, (or competition?) existing stations, through the National Association of Broadcasters, objected. The

Commission reacted by putting 400kHz protection back into the LPFM proposal.

That wasn't enough. After some lobbying, Congress chimed in. The Oxley bill would have killed the LPFM service altogether, but it was considerably weakened to only require the Commission to reestablish the 600kHz protection. Now, none of the additional channels made possible by relaxing 400 or 600kHz protection was available. Only those additional channels possible due to the lower power levels of LPFM stations can be used.

Let's say you live in West Memphis, Arkansas, 35°08'00"N/90°05'38"W. You want to build an 80-watt LP100 station on 90.5MHz. The LPFM regulations say your station must be at least 73km (44 miles) from any Class C1 station 600kHz away. Oops; you're out of luck. West Memphis is only 15 miles from the tower of WKNO-FM, a Class C1 station on 91.1. In fact, the FCC LPFM Channel Finder on the Internet says no LP100 station is possible in West Memphis; every channel is too close to an existing station.

I'm curious. Let's do a search in the FCC's online "FM Query" for West Memphis. What do we find? K213CN. An 80-watt translator, operating on 90.5MHz, at 35°08'00"N/90°05'38"W, only 15 miles from the WKNO tower. The same transmitting facilities that cannot be licensed as an LPFM station are actually operating as an FM translator.

You will have little trouble finding other examples. Check out K210BZ on 89.9MHz in Phoenix, Arizona. Or W201BE (88.1) and W207BB (89.3) in Buffalo, NY. Or W214AU (90.7) near Nashville. Browsing the *FM Atlas* and FCC database, I can find at least nine examples in the Phoenix area alone. In one case in Nashville, someone has applied to put a 90.7 translator on the same tower as an 80,000-watt station on 90.3!

Now, I've only been a broadcast engineer for 20 years and an Extra Class amateur for 25, so maybe I need someone else to explain the concept. An LPFM station, carrying programs originating in the local community, cannot be authorized in West Memphis because it would interfere. The same transmitter can be authorized if, instead of originating programs, it promises to pick up a St. Louis station off satellite and rebroadcast its signals.

It's amazing what lobbyists can do with the laws of physics.

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