Scanning -- Shortwave -- Satellites -- Ham Radio -- Computers -- Internet

Volume 21, No. 2 February 2002

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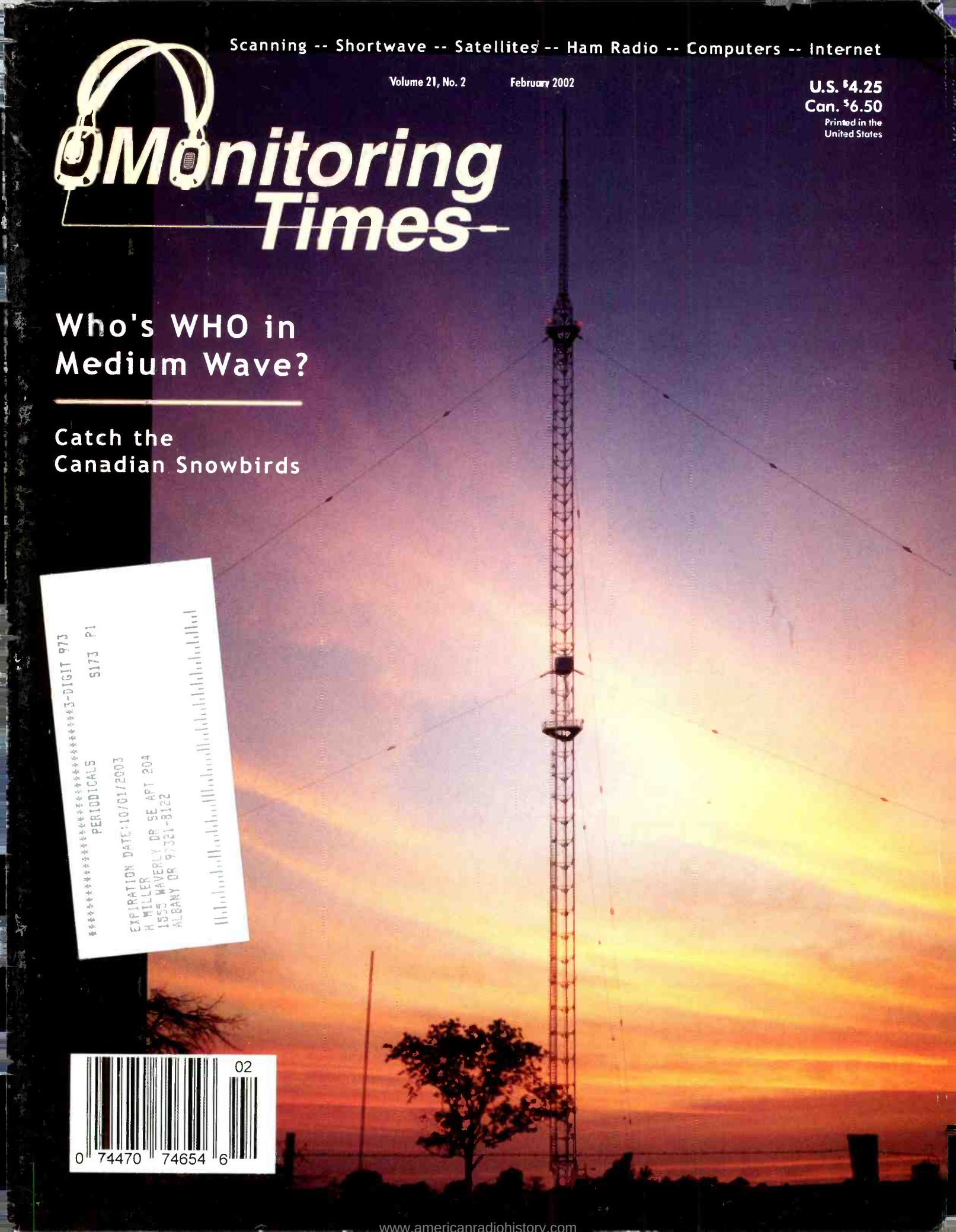
Monitoring Times

Who's WHO in Medium Wave?

Catch the Canadian Snowbirds



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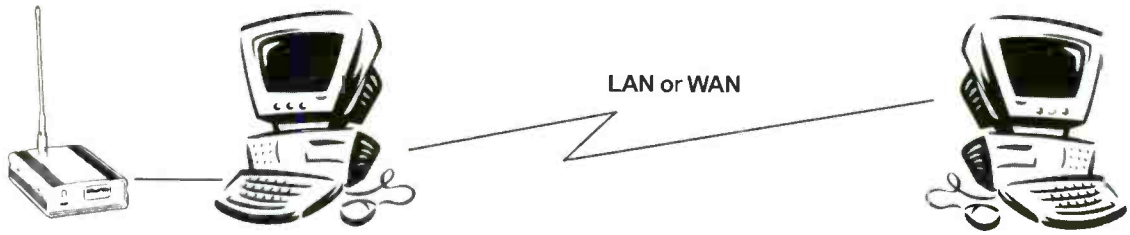

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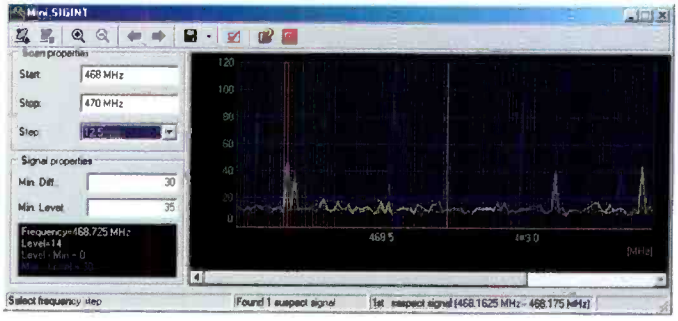
Now with the NEW Mini SIGINT (signals intelligence) plug-in, you can detect eavesdropping devices (bugs). The interception of such transmissions can provide vital information about the type and location of unknown transmitters and their characteristics.

This "Mini SIGINT" plug-in is a spectrum analyzer capable of searching for unknown, suspect signals. The plug-in controls the WiNRADiO receiver and displays a spectrum graph similar to the WiNRADiO standard Spectrum Scope, with the added functionality of spotting and investigating spectra differences quickly and easily.

Try it today. It is available for FREE download from xrs.winradio.com.



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Monitoring Times

Vol. 21, No. 2 February 2002

On our Cover

Who's Who in the Radio Spectrum

By Larry Van Horn

In the second installment of *MT's* analysis of spectrum assignments, we look at the band most familiar to the largest number of people – the mediumwave broadcast band from 530 through 1705 kHz. AM broadcast stations are divided into several different classes with differing power, frequency, and day or night broadcasting regulations. For the hobbyist, it makes DXing an interesting challenge, and yet it's an aspect of the hobby that's readily available to anyone.

When listening to this band, it helps to have an understanding of how medium waves propagate, since optimum listening times vary by time of day, by season, and by sunspot cycle! Equipment for listening can range from simple to sophisticated, but there are some basic tips to keep in mind. Story starts on page 14.

On our cover is the tower for clear channel station WHO in Des Moines, Iowa, taken by Scott Fybush. For many more tower pictures by Scott Fybush and Garrett Wolman, go to the website at **http://www.fybush.com/** Check out the Tower Site of the Week and the Big Travelogue.

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MONITORING TIMES
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Reviews:

Bob Parnass tests a new frequency counter from MFJ Enterprises and finds it is "hot as a pistol." He says the MFJ-886 is one accessory he can recommend without hesitation (see p.80).

Readers will be delighted to see another computer column by John Catalano on "gizmos and gadgets" – nifty hardware solutions that make the computer-user's life a little easier (see p.82).

We're three for three in rave reviews this month. Jock Elliott can't say enough good things about the new Alinco DJ-596 dual band handi-talkie – giving it his highest personal recommendation (see p.86).

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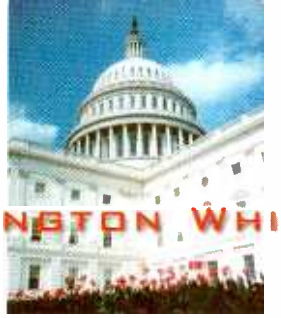

WASHINGTON WHISPERS

Fred Maia, W5YI

RFID Tags: Connecting People And Objects

High-tech tags could mean the days of bar codes may be numbered. President Bush signed the Aviation Security bill into law on November 19th making airport security a direct federal responsibility. Included is the requirement that new security technologies be introduced to protect passengers.

These include "biometrics" to pre-screen passengers and airport personnel. Biometrics is the precision measuring and analyzing of human body characteristics ...such as fingerprints, eye retinas and irises, voice patterns, facial patterns, and hand measurements.

Also included was new baggage identification technology to accurately match passengers with bags for the duration of travel. Radio Frequency IDentification (RFID) technology will enable a bag and passenger to be matched while aboard a plane, ensuring that no checked baggage is placed on a plane unless the passenger who checks the baggage is aboard the aircraft.

The tiny RFID tag is attached to luggage and its information read from a distance by a radio scanner installed over the baggage system conveyer. The scanner can change or add to the information on the chip – a big improvement over bar codes.

The tags will be printed at the airline ticket or baggage counter just like today's bar-coded luggage tags. By matching signals from RFID tags on luggage with ticketing information, an airline will always know if a passenger and his or her bag are on the same flight. If a bag is on a flight, but the passenger is not, a handheld RFID reader can quickly locate the bag on a plane or baggage cart.

What is RFID technology ...and how does it work?

RFID technology has been around since the late 1940s when the U.S. military developed it for tracking equipment. RFID systems use radio transmissions to send energy to a passive or active transponder (an RFID tag) which in turn emits a unique identification code back to a data collection reader (or Interrogator.) The reader is linked to an information management system such as a PC. RFID typically operates at 125 kHz, 13.56 MHz and 900 MHz. It is more than just an ID code; it can be used as a data carrier, with information being written to and updated on the tag on the fly.

RFID systems effectively utilize two separate antennas – one on the RFID (transponder) tag, and one on the reader – to transfer the stored information by radio back to the data management system. Passive RFID tags are powered solely by the RF energy emitted from the reader.

RFID technology was perfected by Motorola which found a way to print a microscopic antenna on a tiny silicon chip about the size of a grain of sand. The chip can hold about 110 characters worth of programmable information – enough for passenger identification and destination.

A recent example of RFID is the "Speedpass" device used by people to fill car gas tanks without using their credit card at Mobil gas stations. The pass can be either a passive transponder attached to your key ring or a battery-powered active transponder attached to your car. Both emit an RF signal to a reader in the pump. The "Speedpass" contains a code that identifies your gasoline account. The pump is then activated and automatically charges your gas purchase to your credit card account.

Another example are toll-way pass systems which wave you on through toll collection booths. A battery-operated (active) transponder emits an RF signal directly from your vehicle as you approach the toll-way gate.

Theme parks are also thinking of using RFID. Kids could carry tickets coded to match their parents' tickets. If a child were to leave the park without a parent, alarms would go off. Rides and attractions would even be able to address customers by name. RFID loaded "debit bracelets" could automatically charge admission prices.

As a technology, RFID tagging is still in its infancy with as-yet untapped potential. The first step has been to tag reusable containers. If the cost of RFID tags becomes very small, then single-items like grocery and department store products could be labeled with "printed" chips.

When that happens, you won't even have to take the products out of the grocery cart to have them charged to your credit card ...just quickly wheel them past a checkout point. Returning products would be a "snap" since the tags could be rewritten with your purchase information. Products could be monitored from creation to delivery and, in the process, solve such issues as theft, counterfeiting and warranty claims.

An article in the November 15th issue of *EE Times* says, "The use of UHF will represent a dramatic departure from the RFID status quo. Up to now, the vast majority of such systems have employed data transmissions across lower frequencies...."

"The major drawback is that most low-frequency systems needed proximities of no more than one to two feet between data readers and smart labels in order for information to be transmitted successfully."

UHF technology, on the other hand, allows greater broadcasting range and speedier performance. UHF data-reading devices can gather information off products as far away as 15 feet, and can monitor as many as 40 packages per second.

"The industry's newfound interest in UHF stems from the emergence of silicon transceiver chips capable of operating in the 300-MHz to 1-GHz UHF spectrum," EE Times said. European companies want to use a frequency at 868 MHz for RFID to prevent interference to GSM cell phones, while North America prefers 915 MHz. UHF frequencies are totally unavailable for use within Japan.

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Leaders in Their Class

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

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

The LCD Big! Bold! Brightly Illuminated 6" by 3½". 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.
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The Operational Controls Knobs where you want them; Buttons where they make sense. The best combination of traditional and high-tech controls.
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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.

Satellit 800

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:
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Size: 7.75" L x 4.5" H x 1.5" W **Weight:** 1 lb. 5 oz.

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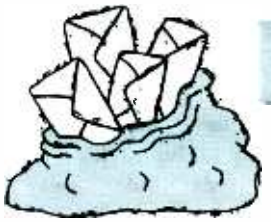


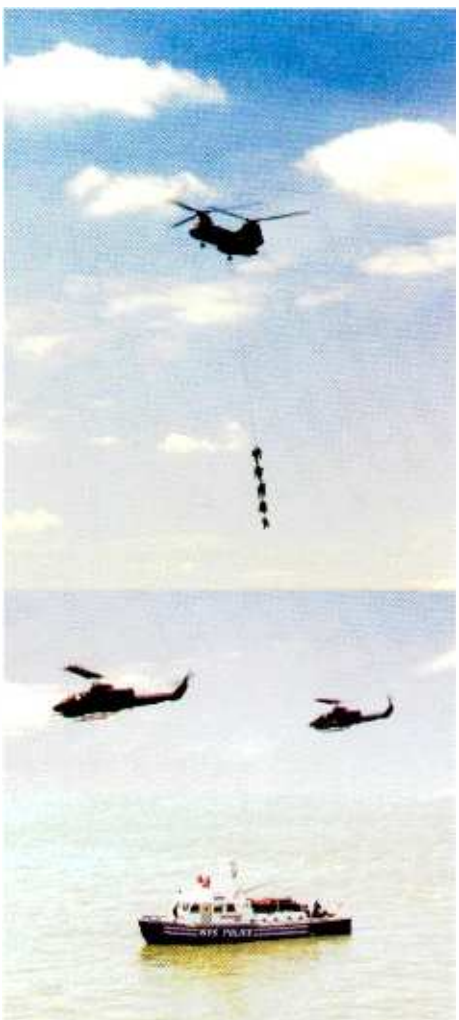
LETTERS TO THE EDITOR

Salt Lake City Frequencies

Jon Van Allan reports that the Rocky Mountain Radio Association (RMRA) was asked by the Homeland Security agency to remove the Utah Communications Agency Network (UCAN) frequency webpage from their site prior to the Winter Olympics. They complied but you can still find it by going directly to **http://www.rmra.org/ucan.htm**

RMRA president Marc Peterson told Jon that a reporter from the Associated Press New York Office said they "have been using the RMRA.org scanner pages for the past few years for an 'authoritive freq base' for all of their reporters working on assignment in this area." The same reporter expressed an interest in "hanging out" with the RMRA at their scanning control post for part of the Olympics.

Guess this kind of mixed message is typical of the love-hate relationship between the scanner hobby, public safety agencies, and the media.



Hudson River scenes by Ed Muro

Life after September 11

Ed Muro, author of this month's feature article on the portable command post, sent some pictures of the changing scene on the Hudson River following the September 11 attacks on the World Trade Towers. Many *Monitoring Times* readers have indicated that the increased military activity has also changed the scene on the airwaves.

"I wanted to write to let you know how much I enjoy your magazine. I have enclosed a picture of my little radio buddy, Gianna Marie. When I have my scanners on, she says 'Daddy, I want to hear the cops.' She sits at my desk and starts to push all the buttons on my radio. I think I have a future ham/scanner enthusiast on my hands!

"My radios consist of a Yaesu VX-5, Alinco DJ-X10, PRO-89, PRO-2030.

"On a serious note: on September 11, when America was attacked, the tragedy in NY, DC, and PA was more than I could ever have imagined. I had my scanner on, and was listening to the Fire Department New York Manhattan dispatch. All of a sudden all hell broke loose. The radio was nonstop with traffic.

"The one thing that really hit home at that moment while hearing calls from all the firefighters, cops, EMTs, rescue workers, etc., was how these men and women put their lives on the line every day to keep us safe. How they run into burning buildings as people are running out. How they apprehend dangerous criminals and help people who are sick or hurt.

"These men and women are true heroes. I would like to say thank you to them and may God bless them."

– Gartano Petrone KC2HCZ

"I've recently become interested in shortwave radio, when I simply couldn't listen to or watch another radio or TV broadcast in which every fifth word was 'anthrax' or 'bin Laden.' I needed a decent receiver and decided on the Sony ICF SW7600GR.

"I suspect there's much to learn about optimizing the performance of this little gem. If other users of the Sony SW7600G would be interested in sharing such information, I can be reached at 158 Fisher Avenue, Staten Island, NY 10307 or at *jrh158@aol.com*. I'll collect and edit anything sent to me. In addition, whatever I get will be made available to anyone else who expresses an interest, either by e-or snail mail. Think of it as a Sony SW7600G 'fan club.'"

– James R. Hannah

Tom Risher forwarded a couple of exceptional items from the October 23, 2001, Los Angeles *Times*. One was a letter to the editor from a former Peace Corps member to Yemen, who noted that many Yemenis knew little about the US, and the little they knew tended to come from American action films. Frank Baron, author of the letter, suggested, "We keep reading that American Muslims are very patriotic and want to do something to help the U.S. in this time of crisis. Perhaps their most valuable contribution would be appearing in Voice of America radio and television broadcasts to Muslim countries and explaining in their native languages about the freedoms they enjoy under the American democratic system."

Tom also says "I agree with Ken Reitz's editorial in the October issue regarding high technology. The reasons he presents are why I have always resisted getting a cell phone ($30/month) or a satellite receiver (another $32/month). I'll stick to my shortwave receiver and commereial TV and get free news and entertainment."

– Tom Risher, Perris, CA

Welcome New Listeners!

If you are one of the many folks who purchased their first shortwave receiver or scanner following the September 11 attack, or if you were gifted with a receiver at Christmas, or if you want to expand your interest into a new aspect of radio – now is a great time to read and save your copies of *Monitoring Times*. Many of our columnists are making a special effort to cover the basics in their departments, and much of this information will be subsequently posted on the **http://www.monitoringtimes.com** website to aid new listeners in the future.

What kind of help do you find you need the most? We'd like to know so we can point our columnists in the direction of most use. You can write or email the editor or directly to the columnist. We hope you'll discover radio is much more than an occasional help or amusement, but it can become a lifetime companion.

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 *mteditor@grove-ent.com*. Letters may be edited for length and clarity. Happy monitoring!

-Rachel Baughn, KE4OPD, editor

New Look at Evacuation Plans

Heeding repeated Bush administration warnings of imminent terrorist attacks, the District of Columbia and many other cities are preparing detailed plans for evacuating residents in the event of another massive assault. The unknown nature of the threat defies any fail-safe master plan, but officials want to be better prepared than they were before the Sept. 11 attacks on the World Trade Center and the Pentagon.

District officials have prepared a comprehensive plan that includes updated evacuation routes, overhauled communications and transportation strategies and legal memos on the line of authority. Any emergency order could be broadcast via the Internet, by radio and television through the Emergency Broadcast System and to 75 local government agencies through a land telephone network.

Cabinet aides to the mayor of Washington D.C. have been given kits of special Nextel telephones, two-way pagers and codes that they must carry with them at all times to commandeer communication lines in a crisis. The mechanics of evacuation may be especially difficult in Washington, where the federal government has nearly 200,000 employees and occupies 40 percent of the real estate, yet power to order a mandatory evacuation of local government, businesses and residents rests solely with the mayor.

Depending on the type and location of an attack, officials would confront myriad tough decisions. For example, massive explosions or the use of nuclear or radioactive weapons likely would prompt efforts to get people out of town, but a biological attack such as a smallpox outbreak might mean enforced quarantines and population controls.

The Sept. 11 attacks have also inspired conversations among families and friends about escape plans. "This is something that needs to be thought through by everybody, from large cities to small communities," said Rep. C. Saxby Chambliss (R-Ga.), chairman of a House Intelligence subcommittee on homeland security.

– The Washington Post

U.S. Considers Restricting Cellphone Use

Federal officials are working on a plan to close cellphone networks to almost everyone but government officials in the event of another major emergency like the Sept. 11 attacks. The move is intended to prevent the networks from being so clogged with calls that emergency workers cannot communicate.

The new system would give calls from local, state and federal government officials first priority during emergencies. Federal officials had planned to have a temporary system running in Washington, New York and Salt Lake City by the end of January, but the cellular companies are backing away from a quick deployment. Government officials said that the public inconveniences notwithstanding, the system is necessary to protect national security.

"Cellphone usage by the general public in emergency situations results in congestion in wireless networks, which has prevented national security and emergency response personnel from obtaining access during emergencies and natural disasters," National Communications System officials said, adding that when landline networks are damaged, cellphones may be clogged further.

NCS officials said that the initial system they were working on would guarantee that 2,000 government officials in Washington, New York and Salt Lake City would be able to make wireless calls in an emergency. It would later be expanded to give priority to calls from 15,000 government workers in each city and then 50,000 workers in each city, officials said. The NCS goal is to have a nationwide system in place by 2002.

Under the system outlined by the NCS, government officials would be given an access code to allow priority calls. Each code would be assigned one of five priority levels. The system will not be unlike the one for regular landline calls, which gives priority to calls from certain telephone numbers. The main difference for consumers would be that the cellular networks have nowhere near the capacity of landline networks, making it more likely that most of the public would not be able to use cellphones in an emergency.

– NY Times

Public-Warning System Reevaluated

Civil defense planners are clamoring to update the nation's fragmented emergency-warning broadcast network to respond to threats of domestic terrorism. The emergency warning system wasn't activated to sound the alarm during the attacks of Sept. 11. Some think it could have saved lives by hastening the evacuation of the second World Trade Center tower before it collapsed. Others doubt it could have done much good.

"The existing warning system in this country is quite ineffective," said Peter Ward, a leader of a new organization called the Partnership for Public Warning. The group hopes to open up a broader discussion about the role the warning system might play in responding to future attacks, as well as how to bolster its overall efficiency. These issues are finally being discussed now, more than a year after a presidential report by Ward and others put many of them on the table.

The backbone of the country's warning network is the Emergency Alert System, or EAS, overseen by the Federal Communications Commission since 1997 and connecting all the country's AM, FM, and television broadcast stations. The vast majority of alerts relate to events like tornadoes and hurricanes and are sent out by the National Weather Service. State and local emergency officials occasionally use EAS to warn of industrial accidents and other problems in local areas.

At the national level, rules dating back to the 1960s also allow EAS to be used by the president "to address the American people in the event of a national emergency." That's never happened, though EAS came close on Sept. 11. After the World Trade Center towers and the Pentagon were hit, an official at the Federal Emergency Management Agency told commercial radio stations in 34 major cities to stand by in case they were needed to transmit a message from the White House.

Ray Vaughan, a manager at a Miami Beach cable TV station, argued that a warning from officials could have sped the evacuation of the second tower. "I know some people in those buildings, and the nearby buildings, had the first urge to turn on a radio to find out what's going on," Vaughan wrote. "And they did find out. What [they] *did not* find was what to do about it. This is what EAS is all about."

New technologies might be implemented that would make it easier for officials to send warnings to specific areas, reducing the chance of panic. For instance, new circuitry in cellphones and pagers could allow them to receive and display messages automatically beamed out by local transmitting towers when a storm is approaching or if a civil emergency were underway. Also, television sets and radios could be wired to automatically switch themselves on to play certain emergency warnings.

Ward said that in the long run, the EAS "can support far more than we have asked it to support so far."

The National Weather Service has submitted to the Federal Communications Commission (FCC) proposed rule changes to the Emergency Alert System (EAS), making the codes more specific and more flexible.

– The Boston Globe; Society of Broadcast Engineers

Possible Sept. 11 Radio Problems

New York City is investigating whether firefighters at the World Trade Center on

BULLETIN BOARD

March 8-9: Kulpsville, PA

Don't forget the Winter SWL Festival (aka Winterfest), sponsored by the North American Short Wave Association, (NASWA) at the Best Western - The Inn at Towamencin (215-368-3800) in Kulpsville, PA, just north of Philadelphia. Full registration is $50 after March 2nd until March 7th (includes seminars and meals; register directly with hotel for rooms). For more information, check the website at **http://SWLfest.com/** or write SWL Winterfest, PO Box 4153, Clifton Park, NY 12065.

Sept. 11 did not hear an order to evacuate the towers because their hand-held radios do not function well in high-rises.

"We really don't know who heard what," Tom Manley, health and safety officer for the Uniformed Firefighters Association, the largest fire department union, said, "We know we have problems with the radios when it comes to high-rise buildings. "

Mayor Rudolph Giuliani said "In a chaotic situation like that, there would be plenty of problems in communications. . . . But there were radio communications. There were firefighters who did receive the communication to evacuate – I've talked to them ... Did all the radios work? I don't know the answer to that."

– *The Record*, Bergen Co, NJ; *New York Times*

Volunteer Tech Guard

Sen. Ron Wyden (D-Ore.) has proposed the formation of a technology force of federal, state, local and private volunteers, similar to the National Guard, to be available in national emergencies. Wyden, who chairs the Senate Commerce, Science and Transportation subcommittee on Science, Technology and Space, said such a unit would have made a big difference after the Sept. 11 terrorist attacks by rapidly restoring telecommunications and computer networks. He held a hearing recently to assess support for what would be called the National Emergency Technology Guard, or NET Guard.

"The nation's technology leaders tell me they can contribute most effectively if they have organization and a clear chain of command," he said. "The government must create a structure to accept and implement a treasure trove of technological counsel, state-of-the-art equipment and hands-on help."

Wyden is not introducing legislation for NET Guard, nor does he see it as a large government program. Instead, he wants the administration and the private sector to cooperate on building such a force. He said he also wants to explore federal policy prohibiting some agencies from accepting donations of technology and equipment.

– *Government Computer News*

One Year to Recovery

Although television and radio broadcasters and telecommunications providers pulled off a heroic feat in getting back on the air in record time following the collapse of the World Trade Center towers, return to normalcy is a long way off.

It could be a year before over-the-air broadcasts are restored to their former power. Most local stations moved to a site in Alpine, New Jersey, near the George Washington Bridge. However, the location and height of the tower there result in a much weaker signal. The Empire State Building doesn't have room to house them, so alternatives are still being explored.

Likewise, restoring phone service to its former level may also take about a year. A steel girder sliced through a major Verizon hub's cable vault, severing hundreds of thousands of phone lines and more than 3 million data circuits. Now many temporary cables run above ground and in some cases through windows. Verizon is still working on more than 4,000 "trouble reports." Many downtown businesses have had to make do with a smaller complement of lines.

– *The NY Post; The Daily Gazette*

Motorola supplies TETRA system to the State of Vatican City

Folks with an irrational fear of TETRA (see *Closing Comments*) will really get nervous about this news... Motorola has signed a contract with the State of Vatican City to supply a TETRA (TErrestrial TRunked RAdio) system to ensure its needs for a secure, professional mobile radio communications system are met. The TETRA system was chosen due to its guarantee of high-level security against interception, eavesdropping and its previous track record of protecting its many users in Europe, Africa, the Middle East, and Asia. The advanced mobile radio system can simultaneously transmit encrypted voice, video, and data traffic. It's also the only open standard for professional mobile radio communications in Europe.

The equipment, infrastructure, dispatchers, and portable terminals have already been delivered and should be fully operational by the end of 2001.

– *Motorola*

Pinellas Tests New Wideband System

Motorola unveiled a sophisticated wideband data transmission system, designated the Greenhouse Project, already under test by police, fire and EMS in Pinellas County, Florida. The new trial wideband data technology – designed for public safety communications – enables live wide-area wireless mobile video, voice and data transmission for police, fire, emergency medical service and other public safety applications.

Greenhouse operates at 460 kbps – 48 times faster than the current U.S. public safety standard, which enables simultaneous live wireless mobile video, voice and Intranet/Internet high-speed data transmission on one system. The system operates in the new 700 MHz public safety band, under an experimental 150 kHz FCC license.

The Greenhouse enables such applications as live video conferencing between dispatchers and mobile units and allows for police, fire and EMS to interoperate with each other with voice, video and data capabilities. Some practical applications include the ability to distribute a picture of a missing child or criminal suspect to all equipped vehicles in the field; distribute videotapes of a robbery shortly after the event; display building plans and location of hydrants to fire departments; transmit fingerprints; transmit live video feeds for police officer pursuits; and enable remote situation analysis.

The Greenhouse Project is a private digital radio system, which was first operational on December 20, 2000. Product availability is contingent on licensing availability from the FCC and completion of the associated standards.

– *Motorola*

Native Americans Go Hi-Tech

Solectek Corporation has completed the design, installation and provisioning of an end-to-end wireless network for the Native American community of Isleta Pueblo, New Mexico. Terry Honeycutt, MIS Coordinator for Isleta Pueblo, says, "We want the autonomy to give our own businesses what they need to grow." "Local telephone companies and ISPs sell us what they have – not what we need. We've replaced our leased lines that route our traffic off our reservations and back in again with a Solectek wireless network that gives us enormous capacity and the control to use it all inside our own community."

Isleta Pueblo is one example of Native American communities realizing fixed wireless networks offer them a tempting option for controlling their own economic destinies. Already serving as their own law enforcement force and as self-sufficient utility companies for distribution of water and electricity, these communities now turn to becoming their own telecommunications service providers.

Solectek has a long tradition of working with Native American communities. Explains Dr. Eric Lee, Solectek's CEO: "Solectek's line of SkyWay products focuses on delivering flexible voice and data services at much lower prices than carriers and ISPs charge. This makes it easy for a community to rely on itself." Many native communities have also sought Solectek's non-invasive wireless solutions – as a more environmentally sound option to carving up 'Grandmother Earth.'

– *Solectek*

"Communications" is compiled by editor Rachel Baughn KE4OPD from news clippings submitted by our readers. Thanks to this month's reporters: Anonymous, Albany, NY; Jim Boehm, San Antonio, TX; James MacDonald, Derry, NH; Doug Robertson, Oxnard, CA; Brian Rogers, Melvindale, MI; Matthew Stanley, New York, NY; Robert Thomas II, Bridgeport,CT; **Via e-mail**: Chet Copeland, E. Cummings, Wilson Hulley, Maryanne Kehoe, John Shumate, Bill Siedsma, Larry Van Horn, Robert Wyman

The CANADIAN SNOWBIRDS

By John David Corby

"Snowbirds ... smoke on ... NOW!"

The formation leader's voice came through in short, stunted, assertive syllables. The Canadian Snowbirds aerobatic demonstration team was ripping through the sky above Toronto. The event was the first Canadian National Exhibition International Airshow of the new millennium. The team appeared as if from nowhere – the nine jets, in tight diamond formation, entering the sky over lake Ontario from the south. Their lights were ablaze and their powerful jets seemed silent until they were almost overhead. Tens of thousands of excited airshow fans had anxiously awaited the climax of the CNE Airshow. From vantage points all over the city, eager fans watched in awe as the symbol of Canada's military pride swept into the skies near the edge of the lake to begin their exhilarating show.

I was watching from the shores of the lake, just across the western harbor gap from Toronto City Centre Airport. A large crowd had chosen this spot to view the airshow. Many of the other airshow participants used Toronto City Centre Airport as a staging point. The airport is on Toronto Island just off the northern shore of Lake Ontario, one of North America's famous "Great Lakes." This was a good place to view the take-offs and landings of all the demonstration aircraft, like the tiny Pitts Special that seemed to be able to take off in a matter of yards. Scanners were everywhere, and aviation-monitoring enthusiasts were huddled together in a camaraderie of frequency and information sharing.

I heard the Snowbirds on the air before the team broke the horizon. I cranked the volume on my Icom IC-R10 and attracted attention from the considerable crowd of scanner owners around me. "What frequency is that?" I was asked. "272.1," I replied. I watched in smug satisfaction as fingers all around pounded keypads trying to find the elusive frequency. Most scanners do not cover the military aircraft band, but the two months' grocery bills that I had invested in my Icom gave me that advantage. It was money well spent. I could hear the formation leader spitting out cockpit commands instants before powerful jet engines broke formation to execute complex aerobatic maneuvers in the sky above Canada's largest city.

The Canadian Snowbirds aerobatic demonstration team represents the finest that Canada's armed forces has to offer. The team is Canada's "top guns." The Snowbirds are the key attraction at every major airshow in this country, and at numerous venues in the United States, too. The Snowbirds exemplify Canada's national pride and speak volumes of the prowess and prestige of our armed forces.

431 Squadron – a Proud Tradition

The Canadian Snowbirds are officially 431 (Air Demonstration) squadron of the Canadian Armed Forces, based at Moose Jaw, Saskatchewan, in the Canadian prairies. 431 squadron has a long, varied and proud history going back to its original roots as a combat squadron in England. 431 Bomber Squadron saw action in Europe during World War II, earning battle honors in the English Channel, the Baltic, the Ruhr Valley and many other parts of the European theater. The squadron flew many of the most famous of the Allied Forces' heavy bomber aircraft such as the Vickers Wellington, Handley Page Halifax and the Canadian built Avro Lancaster. After VE-day the squadron was relocated back to Canada and was stationed at the RCAF (Royal Canadian Air Force) station in Dartmouth, Nova Scotia, on Canada's Atlantic coast. Here the squadron was disbanded during the general demobilization of wartime forces in September 1945.

The tradition of 431 Squadron was given new life only eight years later, when the beginning of 1954 saw the inauguration of 431 Fighter Squadron at Bagotville, Quebec. The squadron's specific purpose was to provide public exposure to the new Canadair F-86 Sabre aircraft at airshows. Sadly, as so often happens, government funding cutbacks saw the demise of 431 Squadron again only a few months later at the end of that summer's airshow season.

The Snowbirds are not Canada's first formation flying team. The tradition of formation flying in Canada goes back to the 1930s when the "Siskins" team flew. There were many other teams filling the pages of Canada's aviation history, including the "Golden Centennaires" formed in 1967 to celebrate the 100th anniver-

sary of Canada' s confederation (the British North America Act, signed in the British parliament on July 1st, 1867, which established the Dominion of Canada). Sadly, the Golden Centennaires lasted only a single season and left a void that was not filled until three years later.

The Snowbirds first flew as an aerobatic demonstration team in the summer of 1971, operating year-to-year without permanent funding, or official status in the Armed Forces. Team members were drawn from volunteers at Canadian Forces Base Moose Jaw who practiced in the evenings using the base's jet trainer aircraft. Finally, on April 1st, 1978, 431 Squadron was once again revived in its present incarnation as an aerobatic demonstration squadron equipped with the Canadair CT-114 tutor jet. Twenty-three years later, the squadron is still flying the same aircraft type. The CT-114 is a thirty five year old design, which is slated for replacement by 2006. The Canadian government, as recently as November 2001, has called for proposals from aircraft manufacturers for a new aircraft for the Snowbirds. This may be a positive indication that funding for an all-Canadian aerobatic demonstration team will continue for some significant time into the future.

Aerobatic Precision Flying

In the early years, the Snowbirds were a "formation flying" team that was not permitted to perform aerobatic maneuvers. As time went on the aerobatic part of the performances seen today began to evolve. Now, the Snowbirds execute a well-rehearsed series of maneuvers involving everything from two aircraft racing toward each other in a planned near miss pass at almost mach 1, to various formations involving the whole nine aircraft team.

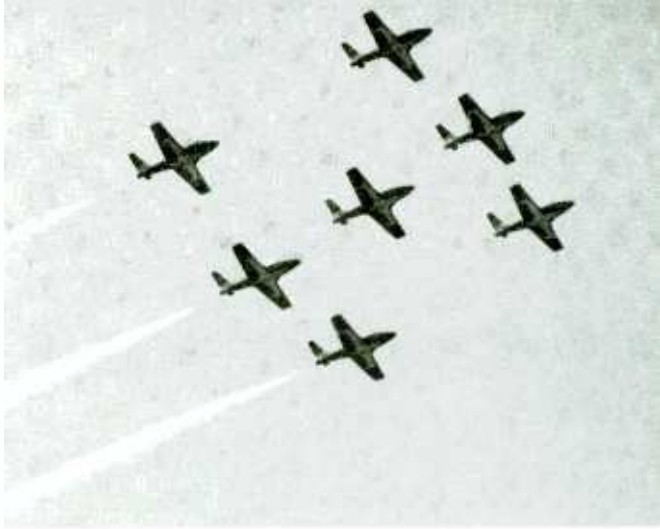
Often the show sequence can be followed by listening to cockpit commands on a scanner, but many sequences are well rehearsed and flow from one into another with slick precision and split-second timing. True Snowbirds fans can recognize the formations and put a name to them; they can also tell when the team has introduced a new formation at the start of a new flying season. The shows for the 2001 season included a selection from a repertoire of 23 formations. It is easier to recognize the formations by dividing them into groups, based on the number of participating aircraft. Non-participating aircraft usually circle the field at a distance from the main show.

9 aircraft formations: Big Arrow, Big Diamond, Big Vic, Card Nine, Colors Roll, Concord, Eagle, Palm, Swept Delta, Viggen
7 aircraft formations: Double Diamond, Feather, Goose, Mini Concord, Wedge, Vic, Inverted Split
6 aircraft formations: Heart
5 aircraft formations: Line Abreast
4 aircraft formations: Crazy Three on One, Inverted Box
3 aircraft formations: Echelon in Review
2 aircraft formations: Double Inverted

Diagrams of the formations can be found at the official Snowbirds website at: **http://www.snowbirds.dnd.ca**.

Each member of the team has an assigned position in formation. The following terms may be heard while monitoring the cockpit transmissions:

Leader – Flies at the front of the standard nine aircraft "Big Diamond" formation.
First Line Astern – Flies directly behind the leader.
Second Line Astern – Flies directly behind "First Line Astern"
Inner Left Wing – Flies to the left, and behind, the Leader
Outer Left Wing – Flies directly behind the Inner Left Wing
Inner Right Wing – Flies to the right, and behind, the Leader
Outer Right Wing – Flies directly behind the Inner Right Wing
Solo – two aircraft occupy these positions at the left and right tips of the "Big Diamond" formation.



Canadian Forces Base Moose Jaw

The home of the Snowbirds is Canadian Forces Base Moose Jaw in the Province of Saskatchewan in Canada's Prairies. Moose Jaw (airport identification code CYMJ) is operated by 15 Wing of the Canadian Air Force. The base has three runways: 11L/29R 8320 feet long, 11R/29L 7280 feet long, and the shorter 03/21 which is only 3400 feet long. Military monitoring enthusiasts who are fortunate enough to live near the base may not actually enjoy seeing the Snowbirds any more often the rest of us. The team spends most of the flying season touring North America, and even goes to the milder climate of British Columbia for early season training. However, the base is still a good target for monitoring the frequencies in Table One.

Table One: Moose Jaw Air Traffic Control

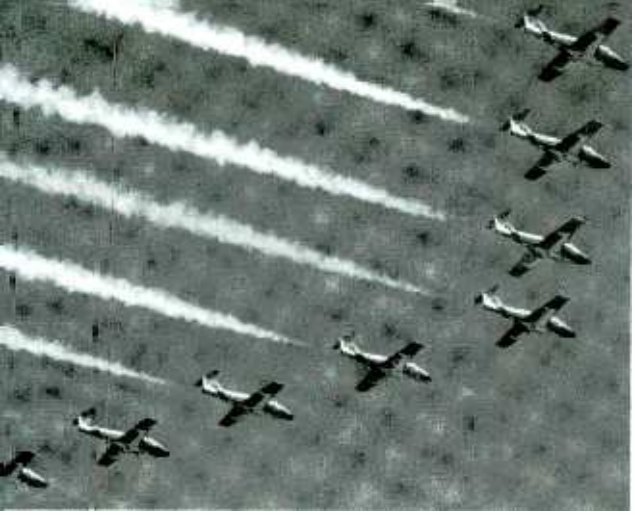
Automatic Terminal Information Service (ATIS): 114.8, 257.8
Clearance Delivery: 135.3, 234.4
Ground: 121.8, 275.8
Tower: 126.2, 295.6, 310.8
Terminal: 119.0, 227.6, 342.9
Arrivals*: 134.1, 230.1, 274.5, 289.4, 308.3, 318.8, 374.1, 378.5, 381.3
Departures: 135.3, 234.4
Wing Operations: 230.1
UHF Direction Finder: 227.6
Pilot To Metro Service: 344.6
* Arrival frequencies are all "by request" from the airfield operator.

Moose Jaw Navigation Aids

VOT (VHF Omnidirectional Range Test facility): 114.8
NDB (Non-Directional Beacon) id code "YMJ": 375 kHz (located at 50 17 30N, 105 26 32W)
ILS (Instrument Landing System): id code="IMJ", 109 3
VORTAC (Combined VOT and TACAN – Tactical Air Navigation), id code="UMJ": 113.4 (located at 50 19 52N, 105 33 48W).
PAR (Precision Approach Radar): 134.1, 135.3, 274.5, 289.4, 308.3, 318.3, 374.1, 378.5, 381.3 (all frequencies "by request").

CT-114 Tutor

The aircraft used by the Snowbirds has remained unchanged for nearly thirty years, although that may change in the next few years based on current indications from the Canadian federal government. The aircraft type used is a modified Canadair CT-114. The unmodified version is the basic jet trainer used by the Canadian Armed Forces. Snowbirds modifications include a highly-tuned General Electric J-85 turbo-jet engine with 2700 pounds of thrust, giving the CT-114 a rated top speed of 750 km/hour. The modifications provide for enhanced performance at low levels – a basic requirement for airshow participation.



The second, and most visible modification, is the addition of two tanks under the belly of the aircraft. These tanks contain diesel fuel used for the generation of smoke during performances. As everybody who has witnessed a Snowbirds performance will be aware, the team uses a whole lot of smoke during a typical show. The diesel fuel is fed through pipes to the rear of the aircraft where it is injected into the hot exhaust stream to produce smoke. Dye is mixed with the fuel to produce colored smoke when required.

The last modification is the highly distinctive paint scheme comprised of a red and white fuselage with blue logo and speed striping along the midline. The belly of the aircraft bears a white Snowbirds emblem which makes the aircraft instantly recognizable.

Accidents and Fatalities

Nobody wishes to see Canada's finest involved in an accident. Nonetheless, when the performance of an aircraft and its pilot is taken to the limit, as is the case with the Snowbirds, accidents do happen. The most recent occurred in London, Ontario, on June 21st 2001 when an aircraft was lost in Lake Ontario. There were no fatalities in this accident, but the honor roll of airmen who have died in the service of their country includes several members of the Snowbirds. The memory of those pilots will live forever in the minds of their comrades, and all those who cherish the spirit of adventure and daring that is the hallmark of the Canadian Snowbirds.

Five members of the Snowbirds team have been killed since 1972, including one killed in a road accident following an airshow in Pennsylvania in 1988. A tribute to these men can be found on the web at the Royal Canadian Air Force (RCAF) site at **http://www.rcaf.com/snowbirds**.

The Snowbirds Schedule

The 2002 schedule was still being put together at presstime. Table Two is a preliminary schedule from the "schultzairshows" web site, but their final schedule will contain double this number of appearances. If possible, *MT* will carry the new schedule next month, both in the magazine and at **http://www.monitoringtimes.com**.

Many of the venues are annual appearances at some of the largest airshows in Canada. For example, the Snowbirds are always present at the Hamilton Airshow, held on Father's Day weekend; the National Capital Airshow held on Canada Day, and the Canadian National Exhibition International Airshow held on Labour Day weekend. The only exception would be for safety reasons, as indeed happened in 2001 following the lost aircraft at the London (Ontario) airshow in June. Several subsequent performances were cancelled while investigators looked into the cause of the incident.

Table Two: 2002 Canadian Snowbirds Schedule

May	
4-5	Redding, CA
11-12	El Paso, TX
18-19	Niagara Falls, NY
25-26	Muskoka, ON
28	Barrie, ON
June	
1-2	CFB Winnipeg, MB
12	Stevensville, NF
15-16	Ottawa, ON
19	Mont-Joli, PQ
27	Cobourg, ON
29-30	London, ON
July	
1	Ottawa, ON
4	Battle Creek, MI
6-7	CFB Moose Jaw, SK
13-14	Edmonton, AB
27	Yellowknife, NT
28	Peace River, AB
August	
3-4	Lethbridge, AB
7	Esquimalt, BC
9-11	Abbotsford, BC
17-18	Saskatoon, SK
24-25	Thunder Bay, ON
28	Brantford, ON
31	Toronto, ON
September	
1-2	Toronto, ON
7-8	CFB Shearwater, NS
14-15	Sarnia, ON
21-22	NAS Oceana, VA
28-29	NAS Patuxent River, MD
October	
2	Whiteman AFB, MO
5-6	Page, AZ
12-13	Springfield, IL

In past years, the Snowbirds have been invited to perform at numerous special events. For example, the team gave a midnight performance at Inuvik in the Canadian Arctic in 1975. The sun still shines at midnight in many parts of the Arctic, so the performance would have been seen in full "daylight." In the following year the Snowbirds were particularly honored to be invited to participate in America's bicentennial celebrations with a performance in Philadelphia. In the same year, the team was part of the ceremonies at the 1976 Olympic Games in Montreal.

The Snowbirds Team

There are about 85 people in 431 AD Squadron. The flying team includes one woman pilot who shares a "Solo" formation position. To become a member of the team requires demonstration of outstanding ability and a personal recommendation from the applicant's commanding officer to the commanding officer of the Snowbirds squadron. At least 1300 hours of flying experience is needed, and competition is fierce. Only three people are chosen to join the team each year, relieving existing team members who have usually served a term of three years. Each year one third of the team is replaced so that the experience of the team is preserved to help the new recruits. Together, the team shares a common spirit, and a potent motto: THE HATITEN RONTERIIOS (Warriors of the air).

So, if you are at an airshow in Canada during this upcoming season, and you see an awe-struck person with an Icom staring up at the sky, introduce yourself. If it's me, I'll be glad to make your acquaintance, but if this article stimulates lots of others to go out and buy Icom products, you will at least make a new friend in the scanning hobby. Happy Snowbird monitoring!

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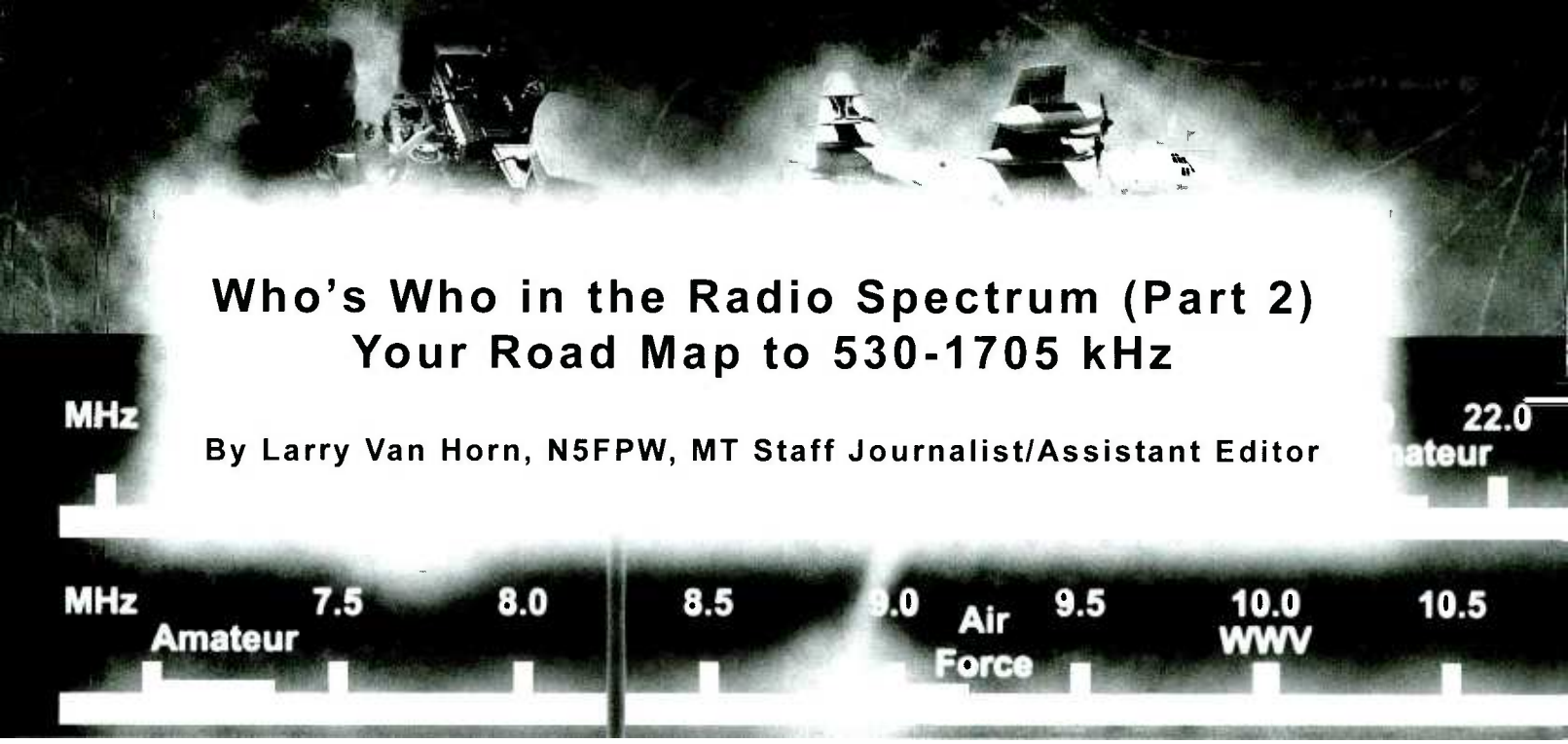


Who's Who in the Radio Spectrum (Part 2)
Your Road Map to 530-1705 kHz

By Larry Van Horn, N5FPW, MT Staff Journalist/Assistant Editor

My start in the radio hobby had very simple roots like many other radio hobbyists. Back in 1964 my parents gave me a five tube General Electric clock radio for Christmas. I was one proud young man, and little did my parents know what it would eventually lead to.

With my new gift I could now listen to my favorite local rock and roll DJs on my own radio. And more importantly, I wouldn't have to fight my younger sister or my parents for the radio dial every time I wanted to listen to my favorite stations.

That Christmas afternoon after all the gifts were open I fired that "fiver" up and started tuning around to see what I could hear. I managed in short order to hear all my local San Antonio radio stations on the AM broadcast dial, but I soon discovered there was more. Much to my surprise I was also hearing stations from as far away as Dallas, Houston, and many points in between during daylight hours. I was truly stunned at this new development in my short radio listening career.

But the real adventure started when the sun set in the west. Everything seemed to change and now I was hearing stations from all over the United States. Stations from New York, Chicago, Pittsburgh, and many more filled my speaker with long distance programming. I soon discovered a new use for my five tube clock radio – the world of AM broadcast band DXing.

Medium-Wave 530-1705 kHz

Between 530-1705 kHz are AM (Amplitude Modulation) broadcast signals. Although intended mostly for local or regional coverage, stations in this band can be heard over great distances. Some AM broadcast band DXers have heard over 100 countries and over 2,000 different radio stations in this portion of the radio spectrum – an accomplishment which requires a lot of patience and time at the dials, a good location, and some top notch receiving equipment.

There are certain advantages to listening to this band. First, almost every home has at least one receiver capable of receiving the AM broadcast band. Therefore the initial investment is nil. Plus, there are many stations that can be heard. As of September 30, 2001, there were 4,727 AM broadcast band stations licensed for operation by the Federal Communications Commission (FCC). To protect the band, no allocations are made in the top 5 kHz.

A Closer Look at the U.S. AM Band

The broadcast band frequencies in ITU Region 2 (North/Central/South America) are spaced 10 kHz apart for a total of 117 channels. The band starts at 540 kHz and runs up to 1700 kHz. In the United States the AM broadcast band is divided up into three types of channels and four types of broadcast stations. In 1997, the FCC scrapped the old system of class I-IV stations replaced them with Class A-D stations.

A Class A station is an unlimited time station (that is, it can broadcast 24 hours per day), operates on clear channels only (which aren't so clear anymore), and may not be less than 10-kW (kilowatts) nor more than 50-kW. These powerhouse stations are heard over large areas of the country. Class A stations are mostly "big city" operations and are some of the oldest and most recognizable broadcasters in the nation. Call signs such as KDKA, KFI, WLS, WOAI, WSB, and WWL have been on the air for many years and are frequently the first stations beginners put in their logbooks. The 60 clear channels frequencies are on 540, 640-780, 800-900, 940, 990-1140, 1160-1220, and 1500-1580 kHz.

Class B Stations are also unlimited time stations. These stations operate with a minimum power of 250-watts up to a maximum of 50-kW. They will be found on the clear channels mentioned above, on regional channels, and on local channels in selected locations. If these stations are authorized operations in the new X-band (below), the maximum power authorized is 10-kW. Regional channels can be found on 550-630, 790, 910-930, 950-980, 1150, 1250-1330, 1360-1390, 1410-1440, 1460-1480, and1590-1700 kHz.

A Class C station is an unlimited time station that operates on a local channel. The power limits run from 250-watts to 1-kW maximum. These stations operate on what DXers call "graveyard" frequencies (1230, 1240, 1340, 1400, 1450, and 1490 kHz). Interference can be severe on these crowded frequencies with close to 200 stations licensed on each of these channels. An exception to the FCC rules above allows Class B stations to operate on graveyard frequencies if they are located in Alaska, Hawaii, Puerto Rico, and the U.S. Virgin Islands.

Class D stations can operate either daytime-only, limited time, or as an unlimited-time operation with a nighttime power less than 250-watts. This class station operates with daytime powers not less than 250-watts nor more than 50-kW. Class D stations can operate on any of the AM frequencies except local channels.

Several years ago the FCC expanded the AM broadcast band by 10 more regional frequencies. Known by DXers as the X-band (1610-1700 kHz), listening in this frequency range can produce fairly good results since it is not yet highly populated. You will find only Class B and D stations on these frequencies.

North of the Border

Canadian AM broadcast stations are similar to their counterparts in the United States. Quite a few Canadian stations broadcast on regional channels with power levels up to 10,000 watts, but they use directional antenna patterns

that usually beam the majority of their power to the north away from the United States.

The biggest listening challenge from the land of the Maple Leaf are the Low-Powered Relay Transmitters (LPRT) that operate in the remote parts of Canada. These stations use only 40 watts of power and are truly local in nature. Put one of these in your logbook, and you have quite an achievement. Canada's equivalent of the FCC is the Canadian Radio-Television Commission (CRTC).

Signals from Foreign Lands

It is possible to hear almost any country in the world in the AM broadcast band. Here in North America we receive signals from primarily three areas. The most common foreign DX we hear comes from Latin America (Caribbean and Central/South America). Most of the stations from this area of the world use the same 10 kHz channel spacing as the U.S. and Canada. Under certain ionospheric conditions (auroral) these stations can be heard with ease. More on that in a moment.

A handful of our neighbors to the south use split frequencies (frequencies between our 10 kHz channels). These splits are fairly easy to hear and usually provide a DXer's first foreign logging. Try for Grenada (535), St. Kitts & Nevis (555), Dominica (595), El Salvador (655), St. Vincent & Grenadines (705), Cuba (813), and St. Kitts & Nevis (895), for starters.

Two other areas often heard include TA or Trans-Atlantic (Europe/Africa) and TP or Trans-Pacific (Oceania/Asia). Location is very important in foreign DXing. Obviously those of us on the East Coast will have a better shot at hearing TA stations. West Coast folks will find that TP stations rule.

One other factor does come into play. The closer to either coast you are, your chances for TA/TP reception increase significantly. Listeners on Cape Cod and New York's Long Island regularly log more TA DX than I do here in the mountains of North Carolina.

The other important item to note in TA/TP DXing is that the channel spacing used by overseas stations is *9 kHz* versus the 10 kHz we use (i.e. 531, 540, 549, 558, etc). Some of these channels can be quite audible under the right conditions. For more information on your first 50 TA countries and other east coast listening targets, see the articles compiled by the dean of the AM Foreign DXers, Mark Connelly, at **http://nrcdxas.org/articles/1st50.html** and **http://www.nrcdxas.org/idxd/capecod.txt**.

Your best online resource for foreign information is Jim Renfrew's IDXD column from the National Radio Club (NRC) newsletter at **http://www.nrcdxas.org/idxd/**.

Beacons, TIS and Other Odd Stuff

Broadcasts aren't the only signals transmitted in this frequency range. In Part One of this series we mentioned non-directional beacons (NDB). There are NDBs that have been widely heard here in the US just below 535 kHz and in the X-band from 1610-1700 kHz. However, not all Morse code (CW) signals heard in the X-band are necessarily NDB signals. Some are from low powered stations called MedFERs (Medium Frequency Experimental Radio), put on the air by radio hobbyists. Other CW signals have been attributed to fishing drift nets in off shore areas of the United States.

Finally, primarily on 530 and 1610 kHz we have the Travelers Information Service (TIS) stations. These stations – operated by private, local, state and federal government agencies – provide short-range information on specific traffic conditions, parking availability, and tourist information for the areas they serve. These stations are a real challenge to DX.

Understanding Medium-Wave Propagation

There are several ways radio stations can be received in this range. The most common mode for AM signal propagation is by ground wave (line-of-sight). During daylight hours, ground wave is the primary means AM stations propagate, and signal coverage out to 150 miles is fairly routine. During winter months in North America when we have more darkness hours than daylight, daytime distant reception range is usually increased. I have heard stations out to 1200 miles during the winter months here in Brasstown.

Propagation is better in the winter months; during the summer a combination of poor atmospheric reflectivity (longer days) and storm-generated static reduces the usefulness of the band. The rapidly changing sunrise/sunset times in the spring and fall also help produce good DX conditions. Listeners in the eastern part of the U.S. may find TA reception possible around the time of local sunset. Western listeners should try for TP reception around their local sunrise.

Although the thunderstorm-generated static of warmer months may cover up weaker stations in the band, this sometimes helps with reception of closer-in stations not normally heard.

Not only do we have seasonal conditions, but there are constantly changing daily conditions. From about two hours prior to sunset until two hours after sunrise, we transition from fairly stable and constant daytime reception conditions to the constantly changing world of ionospheric skip.

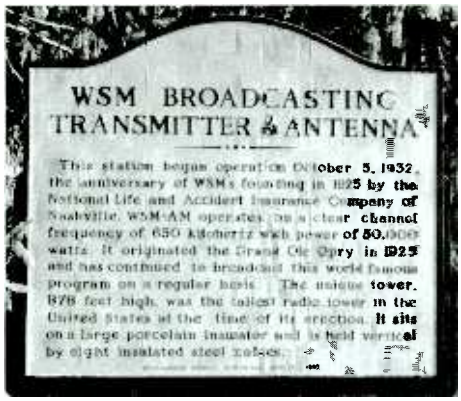
The best time to listen to long distance signals is at night. A path of darkness between transmitter and receiver is required for long-distance propagation. The periods around sunrise and sunset are also very productive.

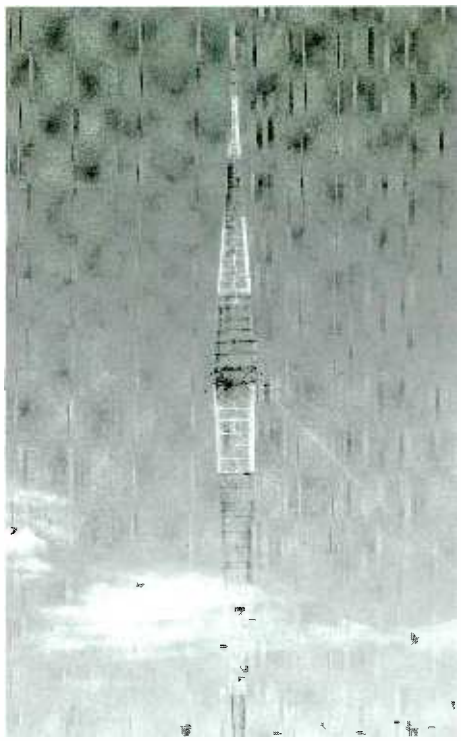
At sunset, many daytime-only stations are signing off for the day. Combined with the enhanced propagation at sunset, this gives you a chance to hear many lower-powered stations as they leave the air, usually to the west of your location.

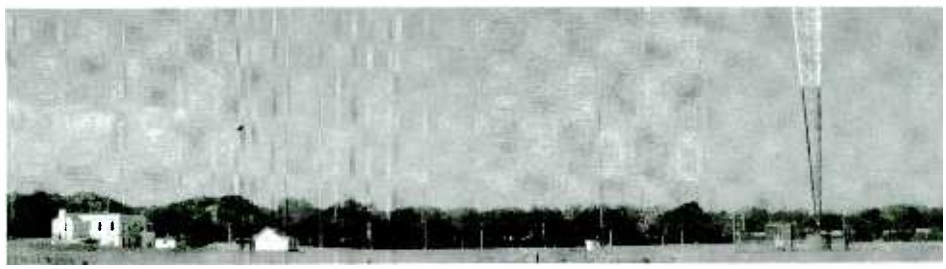
At sunrise many stations are allowed to transmit with reduced power between sign-on at 6:00 a.m. until local sunrise. Powers from 500 watts down to less than 4 watts are authorized these stations by the FCC. The pre-sunrise operations allow you to hear stations to the east of your location before the rising sun eliminates the enhanced reception conditions.

In addition to the seasonal variations, radio signals are affected by the 11-year sunspot cycle. In theory, medium-wave DX should be best during sunspot minimums when absorption is at a low level. During solar maximum (our current status), when solar storms rage on the sun and create havoc with Earth's magnetic field, domestic radio conditions are pretty poor. However, this is when the hard core DXer turns his attention to the south.

The most spectacular solar condition is known as the aurora, which produces the Northern Lights. Emission of highly charged particles from the sun can spawn these storms which can disrupt communications on MW and shortwave over some parts of the globe. If the aurora is severe, and depending on the listener's loca-







WSM, broadcasting from Nashville, Tennessee, is a clear channel broadcasting powerhouse, audible across the country under the right conditions (photos courtesy of Doug Smith)

tion, there may be no sky-wave reception noted at all, which leaves only ground wave stations to be heard on the band. Thus, during aurora conditions, paths to the north shut down due to signal absorption by the aurora curtain, leaving signals to the south of the radio listener more audible. You'll hear a lot of Spanish-language radio stations during exceptional aurora periods.

Equipment Corner

All of the radio equipment mentioned in last month's article is usable for radio reception in the medium-wave spectrum. A few items in this regard need to be stressed, however.

First, one of the most common questions I get on the Grove Enterprises Tech lines is, "how can I improve my medium-wave reception?"

If you are using an under-$500 portable receiver, your choice is limited to purchasing the Select-A-Tenna (Grove ANT 21 or 40). Portable radios use only their built-in ferrite loop coils for medium-wave reception. This bears repeating, as many do not seem to understand this fact. The external antenna jack works only on shortwave (usually 2 MHz and above), and plugging in an antenna into the jack will have no effect on long- or medium-wave reception.

Second, keep in mind that, in general, as the price of a receiver increases, so does its quality. We are paying for more of the four things by which we judge all radios – sensitivity, selectivity, dynamic range, and audio. The better these four specifications are met, the more stations we will be able to pull in. Another axiom you will find is that table top radios always significantly outperform portable models.

Third, while they are cute and you can hear strong signals on them, handheld wideband radios should *not* be purchased for DXing purposes. They just aren't capable of delivering the kind of performance you need to successfully DX any of the bands below 30 MHz.

Finally, antennas are truly the key to doing a top notch job of DXing the medium-wave spectrum. Look for a loop, long wire, Beverage or phased wire antenna for use in this band. The combination of a top notch, table top communications receiver with a good antenna will provide the best results in every case, regardless which part of the radio spectrum we are trying to monitor.

Offline Resources

There are two clubs exclusively for medium-wave DXers. They are the National Radio Club (NRC Membership Center, c/s Ron Musco, P.O. Box 118, Poquonock, CT 06064-0118) and the International Radio Club of America (IRCA, P.O. Box 60241, Lafayette, LA USA 70596)

You can get a sample copy of the NRC publication *DX News* by sending a first class stamp to Paul Swearingen, 2840 S.E. Illinois Ave, Topeka, KS 66605-1427. You can also get a sample online at **http://www.nrcdxas.org/sample/**. If you need more than one sample, please contact: the N.R.C. Publications Center, Box 164 Dept W, Mannsville NY 13661 USA. Multiple samples can be ordered at 35-cents per DX News, or $3.00 per cassette tape.

For the IRCA, the above P.O. Box can also be used to receive a sample copy of their publication *DX Monitor*, for one first class (US) stamp. For a sample copy of IRCA's electronic version of the *DX Monitor*, the *Soft DX Monitor* (SDXM), send an e-mail to *Phil-Bytheway@teknologic.net*.

Finally, no discussion of medium-wave DXing would be complete unless I mentioned the single best station resource available – The *NRC AM Radio Log*. It is the world's most accurate source of information on AM radio stations, verified by actual listeners. Now in its 22nd edition, this is the bible for the domestic AM band DXer and is more valuable in content than other annual publications costing double the price.

This year's annual publication contains 319 pages, 8-1/2" x 11" size, 3-hole punched, loose-leaf format. For more information log on to the NRC website or please write to Ken Chatterton, National Radio Club Publications Center, P.O. Box 164 - Dept W, Mannsville NY 13661. You can also email Ken at *ken@nrcdxas.org* if you have any questions.

Time to Fire'em Up

So, even if you have never thought of the AM broadcast band as good DX territory, why not give it a try? Fire up your receiver this evening and see how many stations you can hear and be sure to drop our *American BandScan* columnist Doug Smith a line and let him know what you're hearing. I'll bet you will be surprised at what broadcasters you are able to snag. I know I was on 37 years ago on Christmas Day.

Table 1 – Who's Who Internet Resource Library

FCC AM Broadcast Information

AM Query Technical Info on US AM Stations:
http://www.fcc.gov/mmb/asd/amq.html
Index of Call Sign Changes (Biweekly in pdf format):
http://www.fcc.gov/Bureaus/Mass_Media/Public_Notices/Call_Sign_Changes/
Travelers' Information Stations by Frequency:
http://www.fcc.gov/mmb/asd/bickel/tis/freqtis.html
US Broadcast Station Mailing Address Query:
http://www.fcc.gov/mmb/asd/seacall.html

U. S. /Canada AM Broadcast Station Information

Broadcast Band DX Logbook (Lee Freshwater):
http://www.geocities.com/amlogbook/main.htm
Canada-US AM Info Lookup (Barry McLarnon):
http://hydra.carleton.ca/ambc/aminfo.html
Elliott Broadcast Services Radio Station Info Page:
http://www.radiostation.com
Radiointro (Pro Sports Networks):
http://www.geocities.com/baursam/radiointro

Propagation/Space Weather Conditions

NASA Space Weather Bureau:
http://www.spaceweather.com
NOAA Radio Users Page (Geomagnetic Info):
http://www.sec.noaa.gov/radio/radio.html
NOAA Space Weather Now:
http://www.sec.noaa.gov/SWN/
Norway DX Listeners Club Propagation Page:
http://www.dxlc.com/solar/
Sunrise/Sunset Monthly Calendar:
http://www.sunrisesunset.com/calendar.asp

Selected Foreign AM Broadcast Station Information

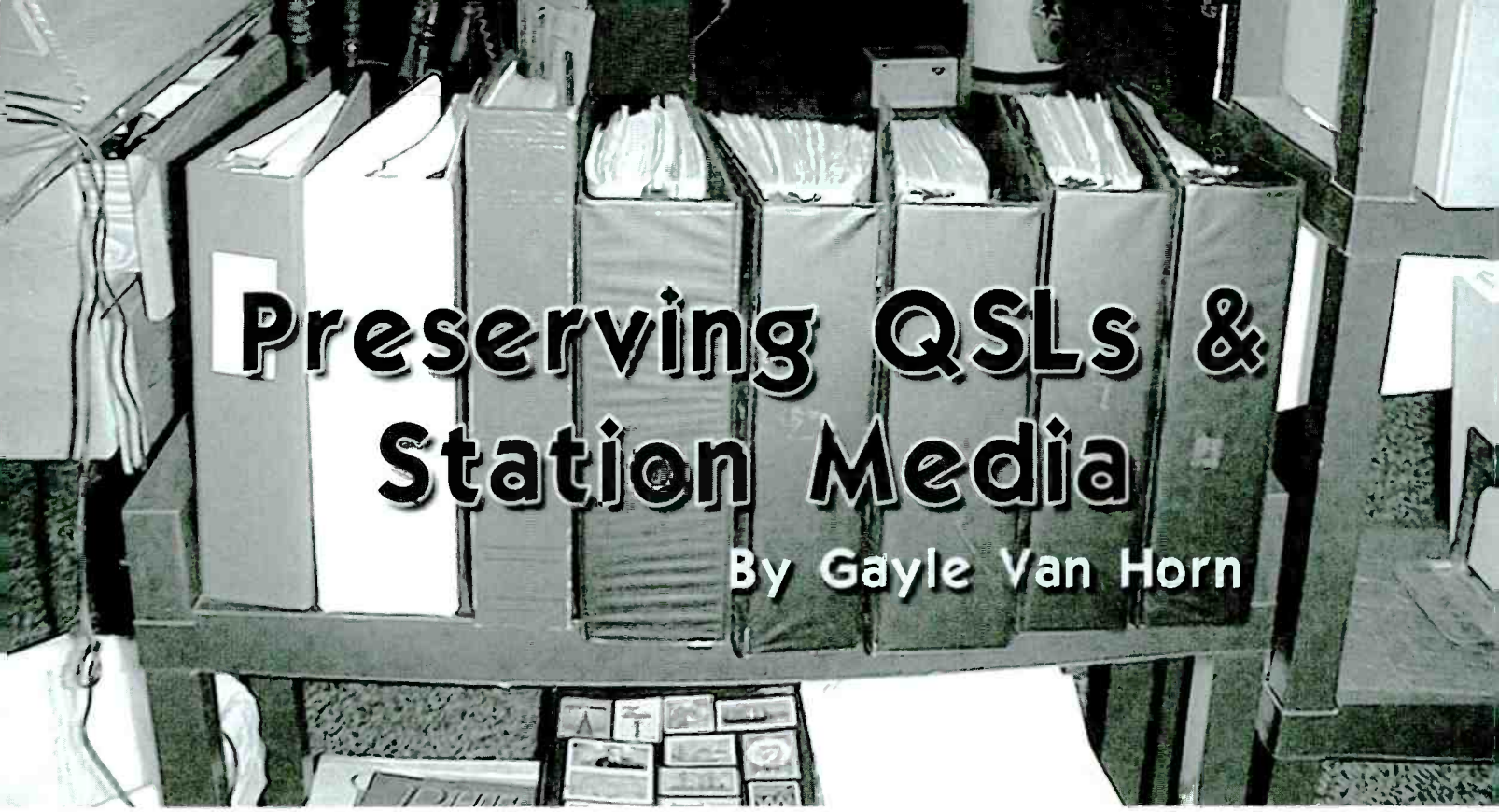
Central America DX Page (Barry McLarnon):
http://hydra.carleton.ca/ambc/amdx-ca.html
Colombian RCN Station Network List:
http://www.rcn.com.co/emisoras/frecuencias.html
Costa Rican AM-FM Station Directory:
http://www.canara.org/radio/directorio.asp
European Medium-Wave Guide
http://go.to/emwg
Guatemala AM-FM-TV Station List (pdf format)
http://espectro.sit.gtm.tripod.com/radiodifusion/radiodifusion.htm
Mexico Radio-TV (Fred Cantu's website in Spanish):
http://www.fredcantu.com/mexicoradiotv.htm

Club and Information Websites

The Hard Core DX Website:
http://www.hard-core-dx.com/index.html
International Radio Club of America (IRCA):
http://www.geocities.com/Heartland/5792
IRCA New Members Packet (excellent resource):
http://members.aol.com/irca3/nwmember.htm
The Medium Wave Circle:
http://www.mwcircle.org/
National Radio Club (NRC):
http://www.nrcdxas.org/
New Zealand Radio DX League:
http://radiodx.com/

Other Excellent Reference Sites

Bill Harm's Ultimate T.I.S. Page
http://users.erols.com/wharms/tis/
Bob Colyard's DX News, Tips and Info:
http://www.cybercomm.net/%7Eslapshot/dxnews.html#AMDX
Bill Hepburn's TV and Radio DX Information Center:
http://www.iprimus.ca/~hepburnw/index.html
The Expanded (X-Band) Pages (Shawn Axelrod)
http://www.angelfire.com/mb/exband/na.html
Latin Music Samples (David Gleason):
http://www.davidgleason.com/Latin%20Music.htm
Long Distance Medium-Wave Reception (Radio Netherlands):
http://www.rnw.nl/realradio/practical/html/longdistancemw.html
Texas Radio Stations (Office of the Governor):
http://www.governor.state.tx.us/music/radio.htm
U.S. Broadcast Station Location Page (John Kodis):
http://www.radiostation.com/kodis/



Preserving QSLs & Station Media

By Gayle Van Horn

Do you recall the anticipation of waiting for your first station or country to verify your reception with a QSL card? You'd read all the how-to's on QSLing and figured this might be fun. What a perfect opportunity to remember logging a favorite station or country! If you were lucky and mentioned being a new hobbyist, the station might send you a whole packet of goodies filled with stickers, pennants, colorful postcards and brochures.

When your mail finally arrived, were you ecstatic? I'll admit I was! That day I received not one but *three* verifications. Two of them were large packets filled with goodies. When the mail arrived, we were hosting a DXpedition in Memphis, Tennessee – a perfect opportunity to share with other hobbyists. I still have those first three verifications, a reminder of how I began this "QSL game."

If you're like me, each card or letter tells its own tale. Perhaps it was a late night listening session or an awesome gray-line propagation window that resulted in a rare Indonesian card. Was there an evening of exceptional European signals that racked up your totals, or a late afternoon of booming African stations that left you breathless?

As your cards and letters begin to arrive, you'll be faced, as I was, with a new decision. How do I store them? A shoe box was out of the question, as was tacking them on walls! (Ever see what pin marks and the sunlight do to cards or pennants displayed on a wall?) Initially, I began my storage in one album. Within a few months, I realized the need to separate my cards by continents. That was a simple initial solution, until I began to specialize in some countries, resulting in more albums! If you're a "newbie," there are plenty of pitfalls to preserving your prized collection and just as many questions. Albums, boxes...what is the best decision?

Please tell me you didn't do this!

In theory the "one album" is a great beginning, but what kind? Unfortunately, many hobbyists begin their QSL preservation using "magnetic" photo albums. Admittedly, these oversized albums are the most inexpensive and initially look attractive. Cards or letters are placed atop the page's sticky surface, and the plastic sheet overlay is pressed in place. What could be easier?! Not only does this make me cringe when I hear a collector using this method, I wonder if they realize this is the most damaging practice to use.

Sooner or later, you will need to remove your cards and collectibles from the magnetic album, but that may not be an easy job, depending on how long you've had them in place. Magnetic photo albums are not archival safe; acid will soon cause the pages to yellow and turn brittle. Do not risk ruining your collection using magnetic photo albums.

If your cards have been held in place by photo corners, you're in luck. Gently slip the card or photo out of the corners. If your cards, letters or photos will not lift gently from a magnetic album, use a hair dryer (on low setting) to gently warm the page. Blow the warm air over the surface for a few minutes, and shake the dryer from side to side gently so that the full source of the hot air doesn't hit one spot. After a few minutes, test an edge of the plastic sheet or the cards to see if you have loosened the waxy film. You can also slide a piece of dental floss or the edge of an index card underneath to lift them off the page. If they still will not come loose, photocopy the whole page. At least you will have a copy of the page in the event you can't pry the originals loose.

Once you've gotten your cards or memorabilia out of the magnetic album, try organizing them by continents or country. If albums are not an option and you're on a shoestring budget, an accordion file folder works well for temporarily separating the different groups of cards. Do not use staples, pins or paper clips to organize letters or cards, or any metal object that will eventually rust and leave marks on the paper. Do not separate your cards with rubber bands, because the rubber will harden and bond to paper. The accordion file should be kept out of direct sunlight and stored horizontally.

Another alternative is to store your cards in a three ring photo album. This

Air India

method is a good choice only for storing regular sized postcards or small stickers. Each card is slid into the respective slot against white acid free paper. Most albums hold about two hundred cards and your album cost is minimal. Unfortunately, these albums are of no use for displaying letters or oversized cards.

Now what ?

Unless you opt to store your collection in a file or an archival safe box, I recommend you use a 3-ring looseleaf notebook. Select one with a hinge large enough to comfortably expand, and a size that is easy to shelf or store. "O" type inner rings may be used, but the inside pages press against the rings and can damage the pages. For this reason, I recommend the "D" size ring. These rings allow the outer notebook cover and inside pages to lie flat.

To store your cards and memorabilia within your binder, use top loading sheet protectors, available at office supply stores or chain department stores. Sheets are available in standard, economy or heavyweight. A good choice is Standard Weight-Crystal Clear Polypropylene 2.4 mil. An inexpensive box contains 50 sheets that are archival safe and acid free, with a reinforced binding edge for durability. Do not use vinyl sheet protectors; they are not archival safe. Non-Glare Heavyweight Polypropylene is also a good choice. They are archival safe and a jumbo box contains 200 sheets.

Some photo sheets, available in discount chains and via mail order, offer pages with various sized slots for storing cards. These do not require a backing page and may be an excellent alternative for displaying your cards, since both sides will be visible. Some varieties have small strips of paper attached for your personal notations.

One excellent source for products is *Light Impressions*. Here you can find the finest in archival albums, collector pages and more to assist your preservation project. Call toll free 1-800-828-6216 for their free catalog or visit their website at **http://www.lightimpressionsdirect.com**.

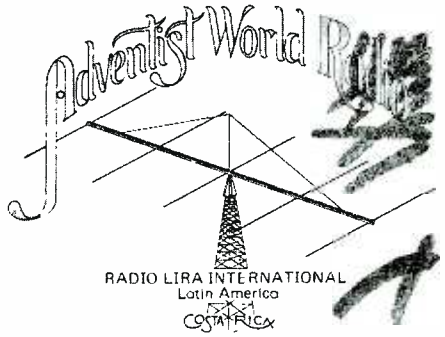
What acid?

You may have noticed the above reference to "acid free" and wondered what that means. Acids within paper pulp cause yellowing and deterioration. Within time the pages turn yellow and brittle. Admittedly, no paper will last forever, but manufacturers now have paper that has had the acid removed from the manufacturing process or have been treated to neutralize acids. Today there are supplies, techniques and preservation methods to insure your QSL collection will last for decades.

When considering what kind of paper to use as a backing for your cards or collectibles, avoid any paper that is not acid free. Although a black mounting sheet looks attractive, the color will fade. Georgia-Pacific Acid-Free Card Stock paper is an excellent source to store your cards on. Each package contains 150 8-1/2"x 11" sheets. It is a heavier stock paper, available in assorted colors.

Used with Fiskars transparent Acid-free Photo Corners, cards will last for decades or longer. By using the corners, you can slip the

Bonaire, Radio Netherlands



Costa Rica

cards out easily. Both products are inexpensive and may be found in your local discount chain or office supply store. Additional paper styles are available in various colors and weights and are economical to fit any budget.

Bottom line: the key word here is "Acid-Free." If the product does not say "archival quality" or "acid-free," you are taking a risk.

I've noticed some DXers recently opting to laminate their QSL cards. This might become a bit pricey as your collection grows, plus I personally prefer the notebook method. A package of ten 9x12 laminating sheets are available in a clear heavyweight strength.

Photos

Through the years, I've received photographs of staff and studios, plus transmitter sites and broadcast headquarters. What a thrill to have a photo from a station I enjoyed! Photos remain one of my favorite "goodies" to receive along with the verification, and are a terrific enhancement to my albums. To display my photos, I use acid free card stock paper and acid free photo corners. This also works well for station pennants or stickers. Don't peel the backing off the stickers unless you desire a permanent placing.

Do not consider gluing your photos to paper...ever! Some hobbyists have done so using adhesive tape or rubber cement. These well-meaning collectors soon discovered their irreplaceable photos were now stuck with a permanent adhesive. I hope this doesn't sound familiar. If it does, try using Un-du or Goo Goners Sticker Lifter on a photo or card that has been glued. What a waste if your veri signer included a personal greeting or full data details on the back of the card.

Newspapers from "over there"

Occasionally, a station may include a newspaper or clipping from their country. This is a nice touch, but we all know that excessive light will cause newspaper to eventually turn brown and brittle. This is caused by the presence of highly acidic lignin in ground wood pulp, a principal ingredient in newsprint. Lignin causes oxidation in light, thus shortening the lifespan of your newspaper.

Depending on the size, newspapers require a larger storage solution. Papers should be stored horizontally. Loose issues may be stored in folders or a similar flat container, large enough to avoid folding the contents. Folds concentrate acidic reaction and cause stress at the fold line. A single page or large cutting may be stored in an acid-free paper or transparent sleeve. Uncoated polyester (DuPont Mylar Type D or ICI Melinex 516) polypropylene or polyethylene provide safe enclosures, while buffered paper or card stock will enhance this safeguard and provide support.

Newspaper clippings should not be displayed next to your cards, photos or letters. They too will soon discolor, become brittle and transfer dark acidic stains to adjacent enclosures. Instead, slip your clipping into an archival plastic page so the acid won't migrate and ruin your verifications.

If you decide to laminate the clipping, try first using a popular solution to lower the acid content of the newspaper. Dissolve one milk of magnesia tablet in one quart of club soda. Let the solution stand overnight. Stir the solution and pour it into a shallow pan. Lay the newspaper clipping flat in the pan and let it soak for one to two hours. Keep each sheet separate. After two hours, carefully remove the clipping and place on a soft towel. Allow to dry throughly before handling to laminate.

The best method would be to scan the clipping or photocopy on acid free paper, using an off-white color if you want to maintain the look of newspaper.

Storage

Currently the best method of preserving your cards is to use a scanner and save the digital image on some permanent media, such as recording to a CD. If you do not yet have these facilities, scanners and CDRs are now common and relatively inexpensive. Recordable CDs cost less than a dollar and one will hold many high resolution images.

The popularity of using digital imaging is that it will never deteriorate and can be copied an unlimited number of times. If this is not an option, office supply stores may copy your image on color photocopiers.

Since your QSLs mean so much, taking steps to preserve them makes sense. Unfortunately, the places we most often store our treasured collections are very likely to ruin them. Avoid basements, garages, or attics. Keep your collection in a dry place, away from moisture and humidity. Store at room temperature, out of direct sunlight. The most significant source of UV radiation is natural light, but fluorescent tubes also emit UV rays. Consider also air pollutants when storing your QSLs. Curtains, shades, or filters will greatly reduce light damage. Store albums upright on open shelves. This will discourage warping of covers and distortion of pages.

The Committee to Preserve Radio Verifications

Despite all your efforts to preserve your collection, there may come a time when you find you can no longer keep it, due to ill health or downsizing into a retirement home. If no one in your family or

Quito, Ecuador

club has interest in taking over your collection, there is an alternative. The Committee to Preserve Radio Verifications was formed by the Association of North American Radio Clubs to preserve QSLs and memorabilia for future hobbyists to enjoy and appreciate.

Through direct contact from hobbyists or families of deceased hobbyists, CPRV campaigns to preserve collections that might be otherwise lost or destroyed. They will be happy to provide information on preplanning your collection to be donated to the CPRV in the event of your death, or you may donate it now if you have left the hobby.

CPRV

The CPRV collection is housed at the Library of American Broadcasting, University of Maryland. For additional information, send an SASE or two IRCs to: Committee to Preserve Radio Verifications, Jerry Berg, Chair, 38 Eastern Avenue, Lexington, MA 02421, or visit their website at **http://www.ontheshortwaves.com**.

It's all up to you

As a collector, you'll have to decide your storage preference. Do you prefer a notebook or a system of archival storage boxes? How much time and money are you willing to devote to your collection?

Preserving your collection requires some planning, just as your listening and reporting do. As stations update their QSL cards, you may seek to add to your album, or you may finally nab a station from your "hit list." You may also have cards and letters in your collection from a station that no longer broadcasts. Why not give these special cards and memorabilia the kind of care you would give family photos and documents? – It's all a part of your heritage and may one day be part of radio history.

SERVICE SEARCH

Larry Van Horn
larry@grove-ent.com

HF Aero Frequencies

(*Continued from January*)

6525-6685 kHz AERONAUTICAL MOBILE (R)

6526 LDOC: Berne, Switzerland; Sydney/Perth (Qantas Control), Australia
6532 CWP MWARA: Honolulu, HI USA; Tokyo, Japan
SAM RDARA (12F): Colombia Domestic Aeradios-Barranquilla, Corwal (Sincelejo), La Mina(?), Monteria, Providencia, San Andres, Turbo, Valledupar
653S SAT MWARA: Abidjan, Cote D'Ivoire; Canarias, Canary Islands; Casablanca, Marocco; Dakar, Senegal; Recife, Brazil; Sal, Cape Verde Islands; Roberts (Monrovia), Liberia
6538 Spanish aero traffic-unidentified stations
6541 SEA RDARA (14C): Australian Domestic Aeradios North Central-Adelaide
6550 LDOC: Cedar Rapids (Rockwell Flight Test), IA USA
6553 SP MWARA: Nadi Radio, Fiji; Noumea (Tantuta Radio), New Caledonia; Port Vila Radio, Vanuatu
6556 SEA MWARA: Bali, Indonesia; Bangkok, Thailand; Calcutta, India; Darwin, Australia; Jakarta, Indonesia; Kuala Lumpur (Lumpur), Malaysia; Madras, India; Perth, Australia; Singapore, Singapare; Udjung Pandang, Indonesia; Yangon, Myanmar
6559 AFI MWARA: Johannesburg, South Africa
6565 SEA RDARA (14E): Australian Domestic Aeradios Southwest
6577 CAR MWARA: Boyeras, Cuba; Merida, Mexico; New York, NY USA; Panama Radio, Panama
6580 SEA RDARA (14): Australian Domestic Aeradios South Central-Adelaide
65B6 CAR MWARA: New York, NY USA
AFI RDARA (7): Accra Radio, Ghana; Abidjan Radio, Cote d'Ivoire; Cotonou, Benin; Lome, Togo; Ouagadougou (Ouaga), Burkina Faso
6592 RDARA: Irkutsk Aeradio, Russia
6604 SEA RDARA (14B): Australian Domestic Aeradios Northwest
VNAT VOLMET: Gander Radio, NF Canada and New York Radio, NY USA
6610 SEA RDARA (14F): Australian Domestic Aeradios Central East-Brisbane
6616 SEA RDARA (14E): Australian Domestic Aeradios Northeast-Brisbane
6617 SAM RDARA: Peru Domestic Aeradias-Chiclayo, Lima
VOLMET: Kiev, Ukraine (K + 50); Moscow, Russia (H + 40); Riga, Latvia; Rostov-na-Danu, Russia (H + 25); St. Petersburg, Russia (H + 35)
6622 NAT MWARA: Gander Radio, NF Canada; Santa Maria, Azores; and Shanwick, UK
CWP RDARA: Papua New Guinea Domestic Aeradios-Madang, Port Moresby
6628 NAT MWARA: Canarias, Canary Islands; New York, NY USA; and Santa Maria, Azores
6637 LDOC: Auckland (Air New Zealand), New Zealand; Cedar Rapids (Rockwell Radio), IA USA; Houston (Universal Radio), TX USA; Hong Kong (Dragon), Hang Kong; Miami (Connie Ops), FL USA; Sydney/Perth (Qantas Control), Australia; Paris (Air France), France; Tokyo (Japan Airlines), Japan
6640 LDOC: Cairo (Egyptian Air), Egypt; Mexico City (AeroMexico), Mexico; New York ARINC, NY USA; San Francisco ARINC, CA USA
6643 LDOC: Aeroparque Jorge Newbery-Buenos Aires (Aerolineas Argentinas), Argentina; Berne, Switzerland
6646 LDOC: Montreal (Royal), PQ Canada
6649 SAM MWARA: Guayaquil, Ecuador; Lima, Peru; Panama, Panama; Quito, Ecuador; Recife, Brazil
6651 Karup Rescue, Denmark
6655 NP MWARA: Honolulu, HI USA; Tokyo, Japan
MID RDARA (6E): Indian Regional Aeradios-Calcutta
6673 CEP MWARA: San Francisco, CA USA
6676 VSEA VOLMET: Bangkok, Thailand; Sydney, Australia; Singapore, Singapore
6677 LDOC: El Al Operations Tel Aviv, Israel
6679 VPAC VOLMET: Auckland, New Zealand; Hang Kong, Hong Kong; Honolulu, HI USA; Tokyo, Japan
6692 NCA RDARA: Khabarovsk, Russia; Sovetskaya Gavan (Sov Gavan), Russia; Yuzhno-Sakhalinsk, Russia
6705 LDOC: Berne, Switzerland
6712 LDOC: Paris (Air France), France
6724 LDOC: Papua New Guines aeradios (possible Milne Bay Air company frequency?)
6730 VOLMET: Aktyubinsk, Kazakhstan (H + 05); Almaty (Alma Ata), Kazakhstan (H + 15); Baku, Azerbaijan; Karaganda, Kazakhstan; Krasnadar, Russia; Tashkent, Uzbekistan (H + 20/25); Tbilisi, Georgia
6742 LDOC: Berne, Switzerland
6770 Canada FSS Radio: Fantanges, PQ
6826 LDOC: Stockholm, Sweden
6855 Unidentified possible Canadian flight following operation
6876 LDOC: Stockholm, Sweden
6905 VJI-Mount Isa Flying Doctor Service, Australia
6945 LDOC: Berne, Switzerland
7524 LDOC: Stockholm, Sweden
7595 AFI RDARA: Addis Ababa, Ethiopia; Djibouti, Djibouti; Mogadishu, Somalia; Nairobi, Kenya; Sanaa, Yemen
8095 LDOC: Silvair (Miami Radio), Miami, FL USA
8188 LDOC: Lima (Faucett Airlnes), Peru

8815-8965 kHz AERONAUTICAL MOBILE (R)

8819 LDOC: Tors Cove (Rainbow Radio), NF Canada
8822 SEA RDARA (14): Australian Domestic Aeradios Southwest
LDOC: Jeddah (Saudi Airlines), Saudi Arabia
8825 NAT MWARA: Gander, NF Canada; New York, NY USA; Santa Maria, Azores; Shanwick, UK
8828 VPAC VOLMET: Auckland, New Zealand; Hong Kong; Honolulu, HI USA; Tokyo, Japan
8829 LDOC: Ankara/Istanbul (Turkish Airlines?)
8831 NAT MWARA: Gander Radio, NF Canada; Shanwick, UK
SEA RDARA (14F): Australian Domestic Aeradios Central Eastern
8837 LDOC: El Al Operations Tel Aviv, Israel
8843 CEP MWARA: Honolulu, HI USA; San Francisco, CA USA
SEA RDARA (14D): Australian Domestic Aeradios North Central-Adelaide
8840 MID RDARA (6): India Domestic Network-Bombay, India
8846 CAR MWARA: New York, NY USA
SP RDARA (9): Aituttaki, Cook Islands; Funafuti, Kiribati; Tarawa, Fua'amotu, Tonga; Nadi, Fiji
8849 LDOC: Air Seychelles; Brazil Central, Brazil
VSEA VOLMET: Beijing, China
8855 SAM MWARA: Belem, Brazil; Bogota, Colombia; Brasilia, Brazil; Cayenne, French Guiana; Georgetown, Guyana; La Paz, Bolivia; Leticia, Columbia; Maiquetia, Venezuela; Manaus, Brazil; Paramaribo, Surinam; Piarco, Trinidad; Porta Velho, Brazil; Recife, Brazil; Santa Cruz Bolivia; Tarija, Bolivia
8858 SEA RDARA (14D): Australian Domestic Aeradios South Central-Adelaide
8861 SAT MWARA: Belem, Brazil; Canarias, Canary Islands; Dakar, Senegal; Leticia, Colombia; Manaus, Brazil; Recife, Brazil; Sal, Cape Verde Islands
AFI MWARA: Abidjan, Cote d'Ivoire; Bamako, Mali; Canarias, Canary Islands; Dakar, Senegal;
Nauadhbou, Mauritania; Novakchott, Mauritania; Roberts (Monrovia), Liberia
AFI RDARA: Johannesburg, South Africa and Windhoek, Namibia
MID RDARA (6E): Calcutta, India
SP RDARA (9B): Papua New Guinea Aeradios-Lae, Port Moresby
VOLMET: Khabarovsk, Russia (H + 35)
8864 NAT MWARA: Gander, NF Canada; New York, NY USA; Reykjavik (Iceland Radio), Iceland; Santa Maria, Azores; Shanwick, UK
8867 SP MWARA: Auckland, New Zealand; Brisbane, Australia; Honolulu, HI USA; Nadi, Fiji; Papeete (Tahiti Radio), French Polynesia; Pascua, Easter Island; Perth, Australia
SP RDARA: Lord Howe Island8876 SEA RDARA (14G): Australian Domestic Aeradios Southeast-Adelaide
8879 NAT MWARA: Gander, NF Canada; Reykjavik (Iceland Radio), Iceland; Shanwick, UK
INO MWARA: Antananarivo, Madagascar; Antananariva; Beira, Mazambique; Bombay, India; Colombo; Dar es Salaam, Tanzania; Jeddah, Saudi Arabia; Lusaka, Zambia; Mauritius, Mauritius; Nairobi, Kenya; Perth, Australia; Seychelles, Seychelles
8880 Unidentified aircraft in unidentified language
8882 SEA RDARA (6D): Indonesia Domestic Aeradios-Bali
8885 LDOC: Lima (Flight Support), Peru
8888 AFI RDARA (7): Gaborone, Batswana; Lubango, Angola; Luanda, Angola
VOLMET: Syktyvar, Samara, Jekaterinburg, Tyumen
8891 NAT MWARA: Bodo, Norway; Cambridge Bay (Baffin Radio), NWT Canada; Churchill, NWT Canada; Gander, NF Canada; Montreal, PQ Canada; Reykjavik (Iceland Radio), Iceland; Shanwick, UK
SEA RDARA (14E): Australian Domestic Aeradios Northeast
8894 AFI MWARA: Algiers, Algeria; Brazzaville, Conga; Kano, Nigeria; N'djamena, Chad; Niamey, Niger; Tamanrasset, Algeria
8896.5 SAM RDARA: Peruvian Regional Aeradios-Cojamarca; Chachapoyas; Chiclayo; Chimbote; Huanuco, Iquitos; Lima; Piura; Pucallpa; Puerto Maldonado; Rioja; Talara; Tarapoto; Tingo Maria; Trujillo; Yurimaguas
8900 LDOC: Toronto (Canada 3000 Airlines/Elite Ops), ON Canada
SEA RDARA (14B): Australian Domestic Aeradios Northwest
8903 AFI MWARA: Accra, Ghana; Bangui, Central African Republic; Brazzaville, Congo; Bulawayo, Zimbabwe; Douala, Cameroon; Entebbe, Uganda; Garoua, Cameraon; Gbadolite (Gbado), Zaire; Goma, Zaire; Johannesburg, South Africa; Kano, Nigeria; Khartoum, Sudan; Kinshasha, Zaire; Kisangani, Zaire; Lagos, Nigeria; Libreville, Gabon; Luanda, Angola; Lubumbashi (Lubum), Zaire; Lusaka, Zambia; Maiduguri, Nigeria; N'djamena, Chad; Niamey, Niger
CWP MWARA: (Guam Radio), Guam; Manila, Philippines; Naho, Okinawa; Port Moresby, Papua New Guinea; Seoul, South Korea; Tokyo, Japan; also Spanish aero traffic hos been monitored here.
LDOC: New York, NY USA
8906 NAT MWARA: Gander, NF Canada; New York, NY USA; Santa Maria, Azores; Shanwick, UK
MID RDARA (6A/6E): Indian Domestic Aeradios-Bangalore, Bombay, Hydenbad, Madras, Madurai, Trivandrum
8909 MID-RDARA (6E): Indion Domestic Aeradios-Bangalore, Bombay, Madras
8915 NP MWARA: Tokyo, Japan
8918 CAR MWARA: Merida, Mexico; New York, NY USA; Panama Radio, Panama; Piarco, Trinidad
MID MWARA: Baku, Azerbadzhan; Yerevan
8921 LDOC: Dusseldorf (LTU), Germany; Hong Kong (Dragon), Hong Kong; Speedbird Radio (British Airways) London, England; Sydney/Perth (Qantas Control), Australia
8924 LDOC: Brussel (Sabena), Belgium; Dublin (Aer Lingus), Ireland; Lisbon (Air Portugal TAP), Portugal; Piarco Operations (BWIA), Trinidad; Prague (CSA Czech Airlines), Czech Republic; Warsaw (LOT), Poland
8927 LDOC: Jeddah and Riyadh (Saudi Air), Saudi Arabia; Boyeros, Cuba
8930 LDOC: Johannesburg (Springbok Radio-South African Airways), South Africa; Stockholm, Sweden
8931 LDOC: Rome (Alitalia), Italy
B933 LDOC: Air Mauritius; Cedar Rapids (Rockwell Radio), IA USA; Cairo (Egyptian Air), Egypt; Springbok Radio (South African Airways) Johannesburg, South Africa; New York ARINC, NY USA; and Spanish aero traffic noted here.
8936 LDOC: Berne, Switzerland; Madrid (Iberia), Spain.
VOLMET: Russian network-Kiev, Ukraine; Moscow, Russia; Rostov, Russia; St. Petersburg, Russia
8939 LDOC: Belem (VARIG), Brazil; Recife (VARIG), Brazil
VOLMET: Kiev, Ukraine (H + 20); Moscow, Russia (H + 10)
8942 SEA MWARA: Ho Chi Minh, Vietnam; Hong Kang, Hong Kong; Kuala Lumpur, Malaysia; Manila, Philippines; Singapore, Singapore; Tokyo, Japan; Vientienne, Laos
8945 LDOC: Salvador, Brazil
NAT RDARA (10F): Greenland Domestic Aeradios-Kangerlussuaq
8948 MID RDARA (6A): Indian Regional Aeradios-Amedhabad; Bombay; Calcutta; Dehli; Nagpur
8949 LDOC: Harare
8951 NP MWARA: Tokyo, Japan
MID MWARA: Aktyubinsk, Arask, Ashkhabad, Kyzl-Orda, Tashkent, Uralsk
8957 SEA RDARA (6D): Jakarta, Indonesia
SAM RDARA (13D): Bolivian Aeradios
VEUR VOLMET: Shannan, Ireland
8959 LDOC: Miami (Silvair), FL USA
8960 LDOC: Speedbird Amsterdam, Netherlands; Possible Mexicana LDOC frequency
8967 LDOC: Air Seychelles
8970 LDOC: Safat (Kuwaiti Airlines), Kuwait
8972 LDOC: Paris (Air France), France
9003 LDOC: Amman (Royal Jordanian-ALIA Ops), Jordan
9006 LDOC: Mexico City (Aeromexico), Mexico
9013 LDOC: Aeroparque Jorge Newbery-Buenos Aires (Aerolineas Argentinas), Argentina
9037 LDOC: Air Britannia
9111 RDARA: Aeradios (Arabic language)
9180 SAM RDARA: Peruvian regional Aeradios-Andahuaylas, Arequipa, Ayacucha, Cuzco, Lima, Pisco
9211 LDOC: Berne, Switzerland
9225 LDOC: Berne, Switzerland

(*To be continued*)

Key to Abbreviations:

AFI	Africa
CAR	Caribbean
CEP	Eastern Pacific & Hawaii
CWP	Western Pacific
EA	Eastern Asia
EUR	Europe
INO	Indian Ocean
LDOC	Long Distance Operational Control
MID	Middle East
MWARA	Major World Air Route Areas
NAT	North Atlantic
NCA	Siberia & China
NP	North Pacific
(OR)	Off-Route
(R)	Routed
RDARA	Regional and Domestic Air Route Areas
SAM	South America
SEA	Australia & S. Pacific
SP	South Pacific
VOLMET	Aviation weather broadcasts

Portable Command Posts

By Ed Muro –K2EPM

As a licensed amateur radio operator I am heavily involved in public service communications through my work with the Amateur Radio Emergency Service (ARES), Skywarn and the American Red Cross. Most of what we do at ARES on a regular basis is to provide communications support for scheduled events such as the Long Island Marathon or a March of Dimes walk-a-thon. These scheduled events serve as training for real time emergencies such as opening a Red Cross shelter after an apartment building fire or major storm.

Because you can never be certain when we will be activated, and because of the nature of real life disasters, you have to be ready to respond at a moment's notice. Part of being ready to respond means that we need to be certain that our gear is packed and in working order.

I keep a "go-bag" packed and ready for service (see photo). The "Go-bag" is a weatherproof bag with several compartments that can be found in the fishing department of your local department store. I have lined the bottom of the main compartment with a 1-inch piece of foam and then on top of that I cut down a computer mouse pad so that it fit nicely on top of the foam. The mouse pad provides extra protection for the radio.

In the bag I also keep an assortment of coax connectors and adapters, several different types of HT (handi-talkie) antennas as well as a copy of my FCC License, Red Cross ID Card, and ARES ID Card. I also keep several sets of extra batteries or battery packs, cigarette lighter power cords, a pocket field guide for my Yaesu VX-5, a pad, pen and pencil, a couple of Band-Aids, and several antibacterial hand wipes.

When the activation call comes in, all I have to do is grab my HT and hand-held scanner off my desk, toss them in the bag, and I am out the door. The critical thing you have to remember, if you have not been activated in a while, is to keep tabs on the status of your batteries. The last thing you want to do is to get out in the field and find that you have a bag full of dead batteries.

Expect the unexpected

My "Go-bag" works great in most instances when I am going to be out in the field. But, you can generally count on Murphy raising his ugly head whenever an emergency arises (i.e., if any is going to go wrong, it will happen at the worst possible time). What if you need more power than the 5 watts an HT will provide? Maybe you will be operating on a fringe area where 5 watts just won't make the repeater, or maybe some pinhead has decided to get his jollies by causing malicious interference. Or, maybe you are suddenly called upon to set up as a portable Net Control.

Since emergencies usually follow Murphy's Law, an emergency volunteer must be ready to go on the air under the worst possible conditions.

Well, over the years I have seen a number of articles where fellows told how they installed a 50-watt mobile transceiver inside of a toolbox. In the toolbox they will secure the radio, make provisions for running power cables, and many also install some type of lead acid gel cell battery for emergency power. When they get the call to mobilize, all they have to do is grab their tool box and off they go... Once they get to the scene of the incident they open up the box on a table or tailgate and there they have an instant, portable command post.

When making our Y2K contingency plans in 1999, it became apparent that we were going to be "on call" to report to local hospitals to provide communications support should the power grid go down. It became apparent to many planners that the "tool box" command post would be an excellent way to carry our equipment and set up shop in short order. However, it also was apparent that, while we would be operating on only a few frequencies, we would want the capability to monitor quite a number of public safety and support agencies.

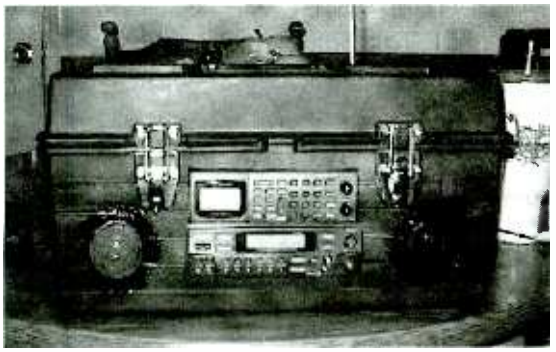
While many of us own scanners, not all of us had hand held scanners with similar capabilities. Furthermore, the audio output of a hand held scanner is fine if you are sitting on your porch listening to the local police while reading the evening paper, but the small speakers on a hand held scanner are lacking the punch needed for operating in a high noise environment like the corner of the ER in your local hospital.

Sure, carrying a base scanner around might cure the problem, but it could be a bit cumbersome. Furthermore, remember the key to preparedness is having the radio programmed and ready to go at all times. The last thing you are going to have time to do in setting up the command post is to reprogram your scanner. But, how many of us have a base scanner that we just want to have sitting around with specialized frequencies programmed in while waiting for a possible ARES activation?

It then occurred to me that there are a number of mobile scanners on the market these days that would mount perfectly in a toolbox. We could then have a receiving companion to our transmitting station. These mobile scanners can usually be found on sale for reasonable prices or even found used for a song.

I have been wanting to build one of these boxes to supplement my command post for over a year, but spent most of the year procrastinating. Then one day I came across Gregg Alemey's web site. On Gregg's site I found a photo of exactly what I had been planning, so I sent Gregg an e-mail and asked him to explain to our readers how he put this box together.

Gregg built the box due to the fact he is always on the move – usually in different vehicles. He states "This box is very functional



Greg Allemey's scanner-box command post.

for people who are on the go." Gregg's box is designed to house two typical mobile scanners, such as the Radio Shack Pro-2067 and Pro-2066. The Uniden BC-560 or BC-760 would work quite well, too.

Parts List

We will start of with a list of parts for the Scanner Communications Box. Most of the parts can be gathered at your local hardware store, Lowes, or Home Depot as well as your local Radio Shack. (Note: Parts that can be acquired at Radio Shack have been listed with Radio Shack catalog numbers.)

- 1 - Steel Tool Box 20"x8-3/4"x 8-3/4"
- 1 - 1"x2" piece of wood the length of the inside of the toolbox; this is used to mount the speakers and scanners.
- 2 - 1 foot coax with "F" connectors on each end. Put the "F" to BNC Connector at one end of each cable and attach them to the antenna jacks on the scanners.
- 1 - Pair 3" Full range surface mount speakers from Radio Shack #12-1732 @ $19.99 / attach the 1/8 mini plugs to each set of speaker wires
- 1 - Power Jack #274-1563 @ $1.69
- 2 - "F" Connector splitters # 278-213 @ $0.99 each
- 2 - "F" to BNC Connector #78-251 @ $2.99 each
- 2 - BNC to "F" Connector #278-256 @ $2.99 each
- 1 - Package of 1/8 mini plugs #74-333 @ $1.99 package of 2
- 2 - Power cords to mate with the radios and the 274-1563 power jack. It would also be wise to insert an inline fuse for safety.

How the box was assembled

Gregg first cut two openings in the front of the toolbox, one for each scanner. Be sure to take exact measurements and use care when cutting. If you don't have the proper tools, ask someone who is familiar with working with sheet metal or ask at your local Lowes or Home Depot. It is critical that you get this step right so that you have a nice smooth fit.

Also cut two holes in the top lid, one for audio from each speaker, and then cover these holes with some type of black plastic mesh to give it a speaker grille effect. The speakers are mounted on the inside of the box on the top of the 1x2 wood strip; the bottom side of the 1x2 has the scanner mobile mounting brackets secured to it.

Then drill two holes in the back of the box. They are for mounting the "F" connector splitters and then cut out another hole for mounting the power jack on the rear of the box.

Once everything is installed, connect the two scanners together electrically and be sure to check your inline fuse. Take the two 12 inch coax cables and connect one to each jack from each scanner. You will then have a self-contained box that will serve as your portable receiving command post.

If you buy a box large enough, you can also make provisions for a secondary power hook up. Something you might consider is installing a lead acid gel cell of the type commonly used as a back-up battery for home burglar alarm systems.

I have created my own separate box to house one such battery out of a plastic 5x7 index card box. I picked up a cigarette lighter socket at a local hamfest and I was all set to go. These batteries can be bought new ranging from $16 –30.

Also, if you have a friend in the alarm business, ask him if he can get you one. I discovered that, because certain municipalities have strict fire codes, many of the batteries are forced to be replaced on a yearly basis. Yet, because they only serve as a backup to the alarm system power they have the capability to work for several more years. I picked one up at a hamfest for a dollar. It has been working for several years and can run the scanner for several days before needing to be recharged.

The unavoidable cell phone

Those of us involved in public safety and amateur radio communications like to think of our communications systems as the be-all and end-all of communications. Yet, it is clear that the cell phone is certainly playing a big role in the communications picture. While it is safe to assume that the possibility exists for cell phone service to go down in the event of a natural disaster, in most other cases the cell phone is here to stay.

This enters another piece of communications gear into the picture and we still have the same weak link – power! What could be worse than being out in the field and having your cell phone battery go dead? Yes, as part of our preparedness exercises we should have a spare battery in our communications kit, yet the shelf life of such batteries compromises our position a bit. One new product I recently acquired has the cure for our cell phone ills. It is the Instant Power™Disposable Cell Phone Battery from Electronic Fuel Corporation.

For anyone who has ever had a cell phone die in action here's a completely new concept: a backup battery that comes fully charged out of the package, lasts up to five times longer than standard rechargeables, and is simply discarded when it's out of juice.

Utilizing patented technology that activates the fuel inside the battery by drawing oxygen from the atmosphere through holes in the case, these batteries snap into place like regular power sources, weigh less than four ounces, and have a 3300 mAh capacity that far exceeds the typical rechargeable batteries 700 – 900 mAh capacity. That translates into as much as 16 hours of talk time and up to 25 days of standby use. (Operating times are approximate and depend upon your handset model, system, and environmental factors.)

Offering a two-year shelf life and an environmentally safe composition with no hazardous compounds, they are the ideal emergency backup power solution for anyone who relies on a cell phone to stay in touch.

Each Instant Power™unit comes with a smart charger cord and the battery. The battery is stored in an airtight bag. When you need to use it, open the bag up and hook up your battery to the cord, plug the cord into your phone, and you'll have instant power. Once opened, each cartridge will charge your cell phone three times, provided you return it to the airtight pouch. When the cartridge is used up, just save the cord and toss the battery. Replacement batteries can be purchased without the cord for a fraction of the cost.

Instant Power™Disposable Cell Phone Batteries are currently available for many Nokia, Samsung, Ericsson, and Motorola phones with a price just under twenty dollars. They are sold at Circuit City, CompUSA, Fred Myers, CarToys, and other retail stores. Wal-Mart carries them under the EverActive™brand name.

At this time Electric Fuel Corporation is also introducing a line of these batteries to support hand held computing PDA devices. For more information, visit **http://www.electric-fuel.com**. I sure would love to modify one of these to work with a hand held scanner or amateur radio. I am sure someone is thinking up how to do it right now.

Motorola instant chargers

Ken Reitz, KS4ZR
ks4zr@firstva.com

Your First Steps in Amateur Radio

In our last exciting episode of the *Beginner's Corner* I was gleefully chiding long time *MT* reader Judy May into getting her amateur radio license. Not long after that issue appeared she wrote the following: "...I did it. I passed the Tech exam on Monday night! Your (November) article about how to go about learning Morse Code was VERY timely – I woke up Tuesday morning thinking about how that would be the next step..."

Our heartiest congratulations to Judy for taking her first steps in amateur radio. Naturally the second thing she wanted to do was go shopping for a rig and that prompted a few more questions.

1) "...In order to start getting a feel for equipment I may want to purchase, what ham magazines would you recommend for the beginner?"

2) "...In catalogs I see radios that include AM as an additional choice to SSB and FM. Yet in studying, I found virtually no reference to AM transmissions. How does AM fit into the realm of amateur radio, since obviously the manufacturers see it as adding value to their transceivers?"

3) "...I have received my first ham catalog...and was surprised to find very little in the way of ten meter radios (besides the multi-band [rigs])...I am thinking that 10 meters will suit me just fine. But...how much power do I need...a Ranger 10 meter rig comes in two models: 25 watts SSB and 150 watts SSB..."

❖ Amateur Radio Magazines

I recommend joining the American Radio Relay League (ARRL). This is the largest amateur radio organization in the U.S,. and membership ($39 US, $49 Canada, $62 other countries) includes a subscription to *QST*, the ARRL's monthly magazine first published in 1916. *QST* attempts to address the needs of all hams by offering authoritative articles for the beginner and old timer alike. But, the League is not just a magazine publisher. In addition to *QST*, the League works on behalf of all hams throughout the year lobbying for legislation, testifying before the FCC or Congress, and representing American hams at international conferences such as the World Administrative Radio Conference (WARC) where new international rules and procedures are set.

Radio Shack's HTX-10, no longer in production but widely available used, is typical of the 10 meter mobile transceiver (courtesy Radio Shack)

The League has been the main force behind PRB-1, the FCC rule which prevents local governments from trampling on the rights of amateur operators, and has led the effort to have state versions of PRB-1 written into state statues around the country. Further, as a League member you'll have access to huge archives of radio related material on the League web site: **http://www.arrl.org**. Don't worry if many of the articles seem above your current amateur capabilities, there'll come a time when they won't and you'll go back and read those pieces with a renewed interest! For other ham radio magazines see sources below.

❖ The Mystery of AM on HF Rigs

There was a time, at the beginning of amateur radio, when all voice operations were in the AM mode. There was no Single Side Band (SSB) or Frequency Modulation (FM). However, through the '60s and into the '70s, SSB overtook AM as the favored operating mode for two basic reasons: SSB takes considerably less bandwidth and it does so on less power. SSB came along at a time when amateur ranks were beginning to outgrow the small HF frequency slices given to amateur operation. With SSB it was easier to accommodate the growing numbers of hams on bands which have remained nearly unchanged in the last 40 years.

There is still a contingent of operators who enjoy operating AM, and they tend to do so with the old tube-fired AM-only transmitters of yesteryear. These vintage gear operators cherish their mint condition "boat anchors" whose signals can carry a broadcast quality sound when heard on a good receiver. Today there are small portions of the popular ham bands set aside for AM operation [see chart] and I invite you to tune in. To get the full effect of their audio, it's best if you can tune on a vintage receiver or at least one with a wide bandwidth in the AM mode.

All modern HF multi-band rigs include an AM mode for operating, but there are some things you need to know. When you switch to AM on today's transceivers the maximum power output is usually reduced to 40 watts, sometimes less. If you're using a modest transmitting antenna to begin with, your 40 watts will be lucky to be heard in the next state. While many AM operators run as close to the full legal limit as they can afford, the real trick is in the antenna. A well-designed antenna properly tuned for your operating frequency is like having an amplifier, and it doesn't cost a dime to run.

Most AM operators are polite and will encourage you to get into AM operating by rescuing some vintage gear sitting around at hamfests. Look for the "three Hs": Hammerlund, Heathkit, and Hallicrafters, in addition to Globe, Viking and others. You'll know them by their size and weight. You'll have to pay a premium for mint condition, ready-to-operate units, but if you're handy with schematics and tube technology you can find some real bargains. Keep in mind that these are receiver/transmitter combinations; once you buy a transmitter, you'll need the companion receiver and a good transmit/receive switch to go between them.

The other reason to include AM on today's multi-mode HF rigs is that many hams are also shortwave listeners, and the receiver portions of these transceivers offer excellent continuous tuning from 50 kHz to 30 MHz. To listen to the international broadcasters you just punch the AM button, look in the *Short Wave Frequency Guide* in this magazine and start tuning.

MFJ's 9410X is small, weighs only 2 pounds and puts out 20 watts (SSB) for fun HF mobile action (courtesy MFJ Enterprises)

Vintage AM operators enjoy putting their "boat anchors" on the air and you can hear them on any shortwave radio (courtesy www.antiqueradio.org).

❖ The Dope on Ten Meters

In the December '00 issue of *MT's Beginner's Corner* I covered the subject of ten meter operation. One reason there's not that much on offer in the way of 10 meter rigs now, is that we're in the downward leg of the current sunspot cycle. It was judged that last year was the peak of the 11 year cycle, and each year closer to the bottom, the less useful the upper reaches of the HF bands become. That leaves 10 meters – the top of the amateur radio HF spectrum (28.000 MHz to 29.700 MHz) – seeing less and less action. Even in the peak years of the cycle, winter is when operating is optimal.

Here's what you can expect from 10 meters: October through April will provide general global openings with few regional openings from daylight to dusk. When the paths hold up, you can chat for an hour with S9+ signals. Other times there's considerable fading (QSB). From April through October you can expect general regional openings from dawn to dusk which come and go without notice. There'll be few intercontinental openings.

Ten can be used all year for very close-by communications. As with its sister band, the Citizen's Band, 10 meters can be used via "ground wave" for several miles. In this way the signal you hear is that part of the signal which didn't get "lost in space," but instead, is radiated along the ground before being dissipated. This can be a useful mode of communicating with amateur friends living in the same town. However, every now and then there'll be a band opening and your quiet little QSO with friends in the same town is interrupted by European operators wanting to work your county!

One organization which tries to keep 10 meters open year 'round, regardless of conditions or Solar Cycle, is Ten-Ten International. 10-10, as it's known to its members, was established in 1962 when there was considerable agitation to take ten meters away from hams because (as businesses which lusted after the territory argued), it was little used. For nearly 40 years 10-10 has frantically, and at times singlehandedly, forced the use of ten meters through its continuous operation of daily nets, QSO parties and contests. With 70,000 registered 10-10 members, they're often the only operators on what would otherwise appear to be a dead band.

You can check out the activities of 10-10 at their web site **http://www.ten-ten.org**, which also features a lengthy list of ten meter propagation beacons. These beacons are operated by hams from all over the world and are continuous, low power, Morse code transmissions typically giving only the call sign of the operator. If you can copy the call sign then you know that 10 meter propagation is open at least to that region. You can determine the region by matching the call sign against the list which also notes the power output and type of antenna used by the operator.

When 10 meters is open, you don't need much power. In fact, 10 is a great band to work QRP (low power: less than 5 watts CW, 10 watts SSB). Ten meter rigs are also perfect for the car. Barely bigger than most mobile 2 meter rigs, these radios fit in the smallest cars and, since 10 is so close to the CB band, uses antennas not much bigger than those used for CB. Using a Uniden 2510 in my car and a Hustler 10 meter antenna, I've worked all over the world on the Uniden's 25 watt output. When the band is closed, it won't matter how much power you're running; no one will hear you.

Ten meter rigs are also fairly cheap. The Ranger RCI-2950DX (25 watts SSB) operates on both 10 and 12 meters for about $270. The 150 watt version is $400. MFJ makes a 20 watt SSB10 meter mobile transceiver (MFJ-9410X) for $250. Used Uniden 2510 and Radio Shack HTX-10 rigs (made by Uniden) are widely found used from $85-$150. If you can find a new HTX-100, the last Radio Shack 10 meter rig, buy it, and welcome to amateur radio!

Amateur Radio Magazines

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Wayne Green, Box 416 Hancock, NH 03449
603-525-4747
web site: **http://www.waynegreen.com**

Tune Into AM on the Ham Bands

Ham Band	Where to Tune
160 Meters	1840-2000 kHz All wideband modes
80 Meters	3885 kHz AM Calling Freq.
40 Meters	7290 kHz AM Operating Freq.
20 Meters	14.286 MHz AM Calling Freq.
10 Meters	28.30-29.300 MHz AM Operations
30 Meters	CW Only allowed
17, 15, 12 Meters	No plan for AM.

Ask Bob

Bob Grove, W8JHD
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Q. *Since we have restrictive federal laws against revealing what we hear over two-way radio and cellular and cordless telephones, what are the ramifications of notifying authorities of an S.O.S.?*

A. An S.O.S is normally considered a broadcast, and since it involves safety of life, it is highly unlikely that summoning help would be considered an invasion of privacy. More difficult to answer is, what should you do if you hear a crime being planned over a cordless or cellular phone since you aren't supposed to be listening? Your best bet in this case would be to contact an attorney who can bargain for immunity for your disclosure.

Q. *I would like to try radio and TV broadcast DXing; would a scanner/TV like the ICOM R3 be better than using consumer TV and AM/FM radios? (George Hamer, Brooklyn, NY)*

A. Modern TV receivers are quite sensitive, and while handy and popular, I doubt that the little Icom R3 would have any better sensitivity for DXing. Many TV DXers use black and white TVs rather than color, and prefer sets that allow turning off the AFC for fine tuning.

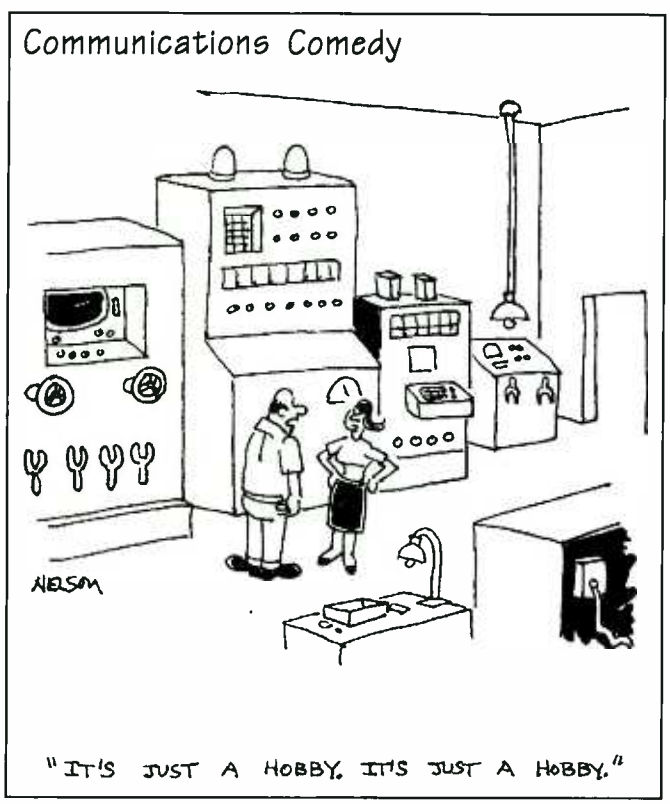
The wideband FM filters in scanners are nothing to write home about, but are probably no worse than those in FM radios, and some may be better. While a good scanner with FM broadcast band coverage is probably superior to most AM/FM radios, it is most important to select a high-gain, directional beam antenna; that's your best FM selectivity and sensitivity!

And for mediumwave AM DXing, plan on using an outdoor antenna or, better yet, good-size, turnable loop.

Scanners utilize the same AM filters for aircraft band reception (25 kHz signal spacing) as they do for shortwave (5 kHz signal spacing) and medium wave reception, so they are notoriously broad. A desktop communications receiver is vastly superior for that task.

Q. *On radio tower lights, some flash instantly, others flash on and slowly dim out. Why is this? (Mark Burns, Terre Haute, IN)*

A. It's simply a choice of lights. The instant flashers are gas-discharge strobe lights, like on camera flashers, while those that dim more slowly have glowing filaments like in an ordinary, high-wattage light bulb.



Q. *What is "VG-2 protection" offered by some traffic radar detectors? (Ron Blocker, Glenwood, IL)*

A. There are several frequency bands used for traffic speed detection: X Band (10.525 GHz +/- 25 MHz), K Band (24.150 GHz +/- 100 MHz), Ka Band (33.4-36 GHz), and Laser (300-770 THz). Additionally, Safety Alert transmitters are small beacons attached to traffic hazards like school busses, construction barricades, and trains; they operate on 24.07, 24.11, and 24.19 GHz.

A consumer radar detector is nothing more than a single-conversion receiver with a waveguide for an antenna. Most have an internal oscillator running at 11.558 GHz, the frequency that the VG-2 police radar detector detector is listening for.

Ironically, the same tactic used by the police radar detector detector is employed by the newer consumer radar detectors with "VG-2 protection;" they listen for the VG-2 oscillator! The little boxes may respond by shutting down their own oscillators until the VG-2 oscillator signal is gone, they may also use a different oscillator frequency than standard, and their oscillator circuitry may be better shielded to reduce detectable radiation.

Q. *A friend told me that lead acid gel cells are not deep-cycle batteries, and letting them discharge too low will dramatically shorten their lifetimes. Is this true? How often should I recharge them? (Ron Blocker, Glenwood, IL)*

A. The biggest threat to lead-acid batteries is "sulfation," a deposit of lead sulfate which, if not removed quickly by recharging, can prevent the battery from ever taking a full charge. Undercharging is also a problem, as it doesn't allow bubbling which stirs the electrolyte to prevent "stratification," a change in the concentration of the electrolyte from top to bottom, causing uneven charge rates at different liquid levels.

Q. *Where did the radio response "Roger" originate? (Bonnie Wallace)*

A. In the early days of Morse code, considerable abbreviating was used to speed that slow mode. "R" meant "Received." By World War II, when most tactical radio was voice, communicators used military phonetics: (A)ble, (B)aker, (C)harlie, and in the case of R, (R)oger.

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.monitoringtimes.com

Getting Started

Bright Ideas

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For the next three months, there will be a slightly different format for the column. I will be sharing some bright ideas that arose when I designed and built my new retirement home. Hopefully, it will be the type of column you make a photocopy of, and put it in a binder labeled "New House."

I kept such a binder for many years. Articles on lightning protection, grounding, and establishing a repeater site were in there, along with many scraps of notes. I also clipped station/shack pictures from many different publications. I found all this to be very helpful in my planning.

I realize that most of you are not going to be building or remodeling in the near future. Nevertheless, I think some of these bright ideas could prove useful in your current environment.

Make no mistake; this is not a house with many frills. It is only about 1250 sq. feet. Most of the ideas cost little money, but required careful planning to incorporate them into the construction. Everything was designed to maximize radio efficiency while minimizing problems. I started from the basic premise that all design ideas had to be electrically grounded, shielded from other RF sources, meet all local building codes, and be aesthetically pleasing. I also wanted my radio room to be able to operate as a remote emergency station for Amateur Radio Emergency Service/ Radio Amateur Civil Emergency Service work.

I built in the mountains about 20 miles north of Spokane, WA. At 3500 feet, my simplex range is impressive on three sides. Mt. Day blocks my effective reach to the east. I already had lots of coax, connectors, and equipment, but not much extra money. My outlay budget for this radio room was a very modest $1,000 for equipment after construction. Here is how I proceeded.

I insisted on all wood construction. No stucco (with chicken wire mesh), metal wall siding, or metal wall studs for obvious reasons. I owned 20 acres so I oriented the house on the highest ground, with the radio room facing the south because most of the VHF/UHF radio signals would emanate from Spokane to my south. Also, a southern orientation is ideal for my window mounted solar panels used to recharge the deep cycle batteries.

I planned on several extra 110/AC outlets, TV coax jacks, and telephone jacks in *every* room. I determined the location, and marked all the boxes during the construction phase. All TV outlets and telephone jacks were wired down under the house with a long run of coax/wire. This way I could decide how to join what and where after the house was completed. It was all about access and flexibility. If all the telephone jacks had been wired in the walls as "homeruns" to the Phone Company's outside box, it would have made my custom features much more difficult to wire. I insisted on a crawl space of 4 feet under the house. This sure makes maneuvering a lot easier.

I insisted that the electrician use quality copper eight-wire (four twisted pair) phone wire. I only needed two pair for phone service, one for voice, and one for the Internet connection. Hmmm, wonder what I could use those extra four wires for? Twelve-volt power? Intercom? Extension speakers? How many twisted pairs are in your phone lines?

I also asked for quality shielded TV coax. I ended up using two of the TV jacks for scanner antenna lead-ins.

Naturally, I designated a single special room for computer and radio operations. No more working from cramped tables and desks. The heart of my plan involved a large built-in desk with overhead bookshelves. Scanners on the left, ham transceivers on the right, the Yaesu HF rig in the middle. I wish had included 110 outlets on the *bottom* of the elevated bookshelves. I did have one in the center compartment of the overhead bookshelf.

I created a house floor plan that placed the closets in the master bedroom behind the main wall of radio equipment. I had 110 AC outlets wired in the closets. I could then drill thru the wall to install power supplies and antennas in the closets, out of view in the radio room for aesthetic reasons. Perhaps my greatest idea!

The entrance to the radio room is through French doors, which are very stylish and professional looking. This allows me to close the doors when company (i.e., the nephews) arrives. I took one corner of the standard square room, and redesigned the square corner with one at a 45-degree angle. I do wish I had made the room bigger than 10x11 feet!

I am addicted to the TV news, particularly when there is a local, national, or world event or disaster. I had numerous TV coax jacks installed; nine in all. The rooftop TV antenna coax went below the house to a one to four amplified splitter. (Yes, I had two electrical outlets under the house for just this purpose. I also used one for my water pipe heater tape.) I bought three inexpensive 13" color sets for multiple station coverage. These days TVs go for as little as $80 new in the box. Pawnshops sell them for as little as $40. All part of the intelligence gathering function.

I keep just one chair in the command center. I can easily roll the three or four feet from the computer desk to the radio desk. During emergencies, it will easily accommodate a second operator chair. This is a big and comfortable chair, an important factor for those long hours at the radio console.

I wanted the soldering iron and basic tools available with a reasonable work area. I am a constant tinkerer. The built-in desk with tool drawer accommodated this requirement.

I wanted all my reference materials at my fingertips. For years, I had to stash one book there and a pile of files over there ... well, you get the idea. In addition to the built-in bookcases, I brought in a three foot, freestanding one with four shelves.

I wanted all my scanners in one place – a true "Monitoring Station." Likewise, I wanted my ham transceivers conjoined, bolted down, and always ready for instant use.

I needed desk space for writing when I am net control or ragchewing on the local repeaters. Even with a clear desktop, I use clipboards to keep my various activities separate. I installed hooks on the sides of the desk and the end of the bookcase to accommodate the many clipboards I use for various projects and lists.

I located the computer on the same wall as the window. This proved a wise decision the first day I set up operations. I had bright sunshine from the window with NO glare on the screen!

Whether you use a desk, table, closet, or den for your monitoring station, I hope these ideas might inspire you to make some improvements. More pictures of the new room will appear with the April column.

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Olympian Scanning

This month we'll discuss an Olympic event that may be in your town, plus life on patrol in Houston, and some information mapping options.

❖ On-Scene Commander

The December issue of *Monitoring Times* sparked my interest in the nationwide Olympic Torch Relay. I first monitored this event during the 1996 games in Atlanta, and found it to be an incredibly well organized and state-of-the-art endeavor. Corporate sponsors participate heavily, with the entire program coming together under the control of the Ignition company, a corporate event management firm.

The relay will have traveled through the Eastern U.S. by the time this issue is published, but readers in the Western states may still get a chance to participate in the action. The torch will be in California, Nevada, Oregon, Washington, Alaska, Idaho, Montana, Wyoming, Colorado and Utah during the final weeks of January and beginning of February. Check the website links at the end of this column for details and maps.

Starting on December 4, 2001, in Atlanta, the torch will navigate 13,500 miles in 46 states and 250 cities before reaching Salt Lake City on February 8, 2002. 11,500 torchbearers will each run about two tenths of a mile, and the torch will cover about 208 miles per day.

Over 4,000 support runners will participate, plus an enormous staff along the convoy route. Security is tight due to recent world events. Law enforcement officials monitor all the runners, convoy vehicles and community celebration locations. Relay administrators politely declined to discuss security details, but did imply that on-hand law enforcement resources are greater than what may be apparent.

Customized mobile "command post" vehicles are built to support the event. Motor homes and equipment trucks are the most visible elements of the convoy, while 50 sponsor-provided cars and light trucks serve in supporting functions. Event administration, news media coordination, torchbearer transportation and community celebrations are all managed from mobile platforms.

Wireless Internet connectivity, cellular telephones, and Motorola business-band radios provide the core of the communications system. News media representatives can even transmit photos and video, through wireless circuits, directly from the moving convoy.

During this year's event, 464.575 MHz is the primary convoy frequency. Radio communications are brief, informative and professionally executed. The term "military precision" comes to mind after listening to the system and realizing the enormous responsibilities shouldered by the crew: 65 days of travel along a cross-country route, all within a strict timeline of transit, community celebration stops, local V.I.P. coordination and overnight breaks.

The staff members are truly on a mission. Their expertise, dedication and enjoyment can be seen in every mile, every smile, and every community they visit. My thanks go to the Ignition company and specifically Mark Driscoll, Principal (and Commander-in-Chief of this outstanding event), Scott Williamson, the knowledgeable General of the Command Post, and Alan Bryson, Operations Manager and "mountain of security" (nothing moves in or out of the Command Post without his knowledge and approval...and yes, they call him the "mountain"...use your imagination!).

Monitoring note: Due to current security concerns, event staffers declined to discuss frequencies and channel plans. The main convoy channel listed above was identified on an OptoElectronics Scout and verified with a scanner; other channels also exist but were not used during my tour. In 1996, the event used several business-band channels in the same UHF range (461-470 MHz). Law enforcement activities are on separate frequencies and radio systems.

❖ Who's Listening?

"I work in a UHF city in a trunked county in a VHF state," says Sergeant Stephen Casko of the Houston Police Department. Stephen has been in law enforcement for eleven years, the last three as a Sergeant.

Stephen started using scanners well before his law enforcement career. With some training in mechanical engineering, he is no stranger to electronics, radio systems, hardware and operational functions. In fact, Stephen has been known to break a few rules on behalf of public safety, but more on that later.

Houston, Texas, is the fourth largest city in the United States, with a city population of 1.8 million. Houston PD has about 5,400 sworn personnel in 14 Commands and primary sections. Harris County, surrounding Houston, has an additional 3 million residents in a 1,800 square mile area. Over fifty individual police agencies operate throughout Harris County.

As is often the case in large metropolitan areas, interagency coordination often follows the protocol of "little agency calls big agency." That is, smaller agencies can arrange to use radio equipment on the larger agency's system, but the larger agency all but ignores smaller users. Houston Police dispatchers, for example, can only talk to HPD units. Other agencies can contact HPD for mutual aid requests when necessary, but no dedicated statewide or local mutual aid system exists for HPD.

The difficulty in establishing direct, two-way, mutual aid communications is the problem being solved by Sgt. Casko. Stephen has set out to be a "one-unit mobile communications center" during his midnight shift patrols.

Mutual aid response is critical, according to Stephen, and chases are a particular problem. "You would be surprised how bad a 20 or 30 second delay is when responding to a chase," Stephen advised. "It's so nice to be able to hear this stuff directly."

"If you have a chase," he related, "the call has to go by radio from the small police department's patrol officer to their dispatcher, then by phone from the small department's dispatcher to HPD, then by radio again from HPD to one of our officers. The chase is over by

Security for the torchbearers may be more than meets the eye.

then!" For emergencies, Stephen recommends that officers go ahead and switch to HPD if it's possible. "In an emergency, especially on midnight shift, he [a small department's patrol unit] can talk to 20 of us [nearby] or 2 of his...which is the better choice?"

Stephen brings his mobile communications setup with him on each shift. Since he has the need to talk as well as listen, he graduated from consumer-grade scanners to commercial two-way radios with scanning features: Standard HX-580T 800 MHz and HX-482UT UHF radios cover the county and city frequencies, while a modified Yaesu FT8500 VHF/UHF transceiver covers the state channels and other frequencies as needed. Regular-issue HPD radios include a Motorola Sabre UHF radio, mobile UHF radio and Mobile Data Terminals on 800 MHz.

Unfortunately, he can only listen to the county system but not transmit. All users of the county system are required to pay a fee for airtime, with a minimum fee based on 100 radios. No other agency imposes this restriction on him, however.

Stephen programmed the Yaesu to include the highest activity channels in the first 10 VHF and UHF memory slots. The remaining memory positions include all local agencies programmed in alphabetical order by agency name. Scanning features in all the radios allow him to selectively sample, listen...and talk...on any of the dozens of radio systems he has programmed.

Expanding on the emergency chase scenario, Stephen can better analyze the scene when he can listen to the event as it unfolds. "Chases are unpredictable, but if you can listen to the chase directly [by monitoring another department's radio system], you can get a feel for the guy being chased. Is he staying on local roads or is he on the freeway? How fast is he going? How reckless is he driving?" These details are easily lost when communications have to be passed between separate departments and dispatchers and radios.

"It's easier to predict where he's going by listening to the first-hand radio traffic. It's all in the timing...a dispatcher relaying the message can't tell me where the guy is going to be in ten minutes. I can usually determine a route (from real-time, first-hand monitoring) and prepare to block an entrance ramp, exit ramp or intersection."

The lack of full radio interconnectivity can be dangerous. "Imagine this," Stephen continued, "Little city PD is in a chase through the big city and then the county...no single agency can talk to anyone else...then the shooting starts."

Stephen's resourcefulness has also been tested. "One night we were called out by DPS (Highway Patrol) to help them look for a drug courier they had chased into the woods. Using my modified Yaesu, I linked our Channel 8 (UHF simplex) to their Channel 3 (VHF statewide intercity) and we could all talk to each other. No one knew how it was done, but they appreciated the ability to talk on 'one' radio channel."

"It *was* a real emergency scene," he said with a chuckle. "I operate under the principle that it's easier to get forgiveness than permission!" A new radio dispatch center is being built, and Stephen authored a Mutual Aid Agreement for the City of Houston a couple of years ago. He hopes that it will be acted upon soon. Also in the wings is Star-Net, the Southeast Texas Area Radio Network. This is a wireless voice and data system using Motorola SmartZone technology. It promises to have seamless roaming coverage throughout Houston, Harris County, and the surrounding area.

Star-Net is being constructed in phases, and currently has over 10,000 radios from over 100 departments online. Almost 500 talkgroups are operational, including users from 59 law enforcement agencies, 42 non-law enforcement agencies, 40 Harris County departments and 61 other agencies in the area. The City of Houston is a signatory to the network as well.

With three additional radios plus a cellphone, every cup holder in Sgt. Stephen Casko's Crown Victoria is occupied. Not being able to get coffee and donuts is a minor loss to Stephen, but a major boost to public safety in Houston. Thanks for keeping us safe.

❖ The Geographic Frequency List, Part 1

Many articles have been written about frequency logging systems and databases. We've even discussed some in this column. With this brief first installment of a new series, we'll start exploring a much-overlooked "database" program that not only stores frequency information, but also helps the user to visualize locations and jurisdictional boundaries.

First off, the subject of our exploration is *Microsoft Streets and Trips* software. I have no ties to Microsoft other than being a consumer, but this product is worthy of mention to scanner hobbyists. It will run on almost any computer, is quite affordable, and is a surprisingly good database for radio frequency information.

One of its best features is "Push Pins" – electronic markers that may be placed anywhere on any map. They can be placed "by hand" (that is, by mouse) at a specific location, or initialized through street addresses, or ordered up from latitude and longitude coordinates. Push Pins can be selected from a large index of geometric shapes, roadway traffic signs, icons and markers.

Next month we'll look at the utility of Push Pins and how they can store a wealth of frequency information.

❖ On the Keyboard

Part 2 of the Geographic Frequency List series, plus more special events and your requests.

Links of interest from this column:

2002 Olympic Winter Games:
http://www.saltlake2002.com (under Highlights, select Torch Relay)

Coca-Cola's Olympic Torch Relay sponsorship site:
http://www.cocacola.com (select Features, Olympic Torch Relay); includes maps and screensaver

Chevrolet's Olympic Torch Relay sponsorship site:
http://www.chevrolet.com/olympics/home_otr.htm ; includes maps, photos of convoy vehicles, and screensaver

Ignition company (event manager of Olympic Torch Relay):
http://www.ignition-inc.com

City of Houston, Texas:
http://www.ci.houston.tx.us

Houston Area Frequencies (Myles Barkman):
http//www.clarc.org/~kg5ai/freqs/freqs.html

Houston Police Department: http://www.ci.houston.tx.us/departme/police/home.htm

Houston Real-Time Traffic Map:
http://traffic.tamu.edu/incmap/incmap.asp

Southeast Texas Area Radio Network:
http://www.star-net.org

Microsoft Streets & Trips 2002:
http://www.microsoft.com/streets/

Houston Area Frequencies

Excerpts from Myles Barkman's website at **http://clarc.org/~kg5ai**
Publication assistonce by Larry Van Horn, N5FPW

Fire Frequencies

33.480	Champions VFD
33.520 (127.3)	Community VFD (simulcast HCSO)
33.580 (192.8)	Cy-Fair VFD Channel 3/Tac 3 Fireground
33.620 (192.8)	Atascocita VFD
33.640 (192.8)	Little York VFD (link to 453.4625 MHz)
33.660 (192.8)	Cy-Fair VFD Channel 4/Tac 4 Fireground
33.700 (192.8)	Fire Command
33.740 (192.8)	Westlake VFD Ch.A (simulcast HCSO)
33.760 (192.8)	East Mount Houston
33.780/33.460 (192.9)	Cypress Creek VFD (linked to 453.300)
33.800 (192.8)	Cy-Fair VFD Channel 5/Tac 5 Fireground
33.860 (192.8)	Aldine, Eastex Fwy, Little York, Northeast
33.820 (192.8)	Northwest VFO
33.840/33.440 (192.8)	Cy-Fair VFO Channel 2
33.880 (192.8)	Cy-Fair VFO Channel 1-Dispatch
33.900 (192.8)	Ponderosa VFD
33.920	West I-10 VFD tone out (simulcast HCSO)
33.940 (192.8)	Champions VFD
33.960/33.420	Atascocita VFD
33.980 (192.8)	Mutual Aid-Harris County, Cy-Fair VFD
151.100/159.195 (156.7)	Crosby VFD
151.115/159.075 (127.3)	Katy VFD
151.445	Friendswood "Chief's channel"
151.460	Cove VFD-Chambers County
153.830 (146.2)	Common Fireground (heard Seabrook)
153.890/154.310 (127.3)	Houston (unknown use)
153.950 (141.3)	Cleveland Channel 2
153.950 (146.2)	Jersey Village (HCSO talk group 8368)
153.950 (167.9)	Cloverleaf
154.010 (167.9)	Pasadena Dispatch
154.070 (146.2)	Sterling Chemical-Texas City
154.070 (146.2)	Timber Lakes VFD
154.070 (156.7)	Channelview VFD Channel 2
154.070/154.385 (71.9)	Cleveland
154.130 (136.5)	Tri City Beach VFD
154.130 (141.3)	Fire/EMS Memorial Villages VFD Chan 2
154.130/154.400 (146.2)	La Porte
154.145 (146.2)	Harris Co. Rural VFD #21
154.145 (146.2)	New Waverly
154.145 (146.2)	Splendora
154.145 (167.9)	Sheldon VFD
154.160 (None)	Houston Pager
154.175 (146.2)	Lake Conroe VFO
154.175 (146.2)	League City (Simulcast on talk group 403)
154.190/150.805 (118.8)	La Marque (GCSO trunk talk group 53904)
154.205 (146.2)	New Caney
154.205/154.445 (192.8)	Spring VFD
154.205/158.925 (179.9)	Nassau Bay
154.220/150.805 (146.2)	North Montgomery County VFD
154.220/153.770 (103.5)	Deer Park
154.220/153.950 (114.8)	Fort Bend Co.-several communities
154.235 (146.2)	Grangerland
154.235/159.120 (114.8)	Webster (HCSO trunk talk group 14448)
154.250	Tiki Island
154.250 (146.2)	Fresno VFD
154.250/153.890 (146.2)	Conroe Channel 2
154.265/154.650 (146.2)	Liberty
154.280 (None)	Mutual Aid
154.295	Highlands
154.310/153.890 (156.7)	Fire/EMS Highlands/Crosby
154.325/153.770 (179.9)	Scenic Loop VFD-Livingston
154.325/153.890 (146.2)	Crystal Beach VFD
154.325/154.010 (146.2)	Conroe Channel 3
154.3325/150.805	Memorial Villages VFO
154.340 (146.2)	Cut and Shoot VFD
154.340/153.950	Magnolia VFO
154.355/153.770 (146.2)	South Montgomery County
154.355/153.950 (110.9)	Fire/EMS Hitchcock
154.370	Kemah VFO (GCSO talk group 53680)
154.370 (None)	Santa Fe Disp(GCSO talk group 54544)
154.370 (136.5)	Bacliff/San Leon Dispatch (GCSO 59312)
154.370 (146.2)	Dickinson (GCSO trunk talk group 49936)
154.370/159.915 (167.9)	Channelview VFD Channel 1
154.385/153.830 (179.9)	Seabrook
154.415 (146.2)	Magnolia Bend (not licensed)
154.400 (146.2)	Montgomery
154.415/153.770 (156.7)	Chambers County
154.430 (146.2)	Galena Park (HCSO talk group 9200)
154.430 (146.2)	Porter VFO
154.430 (156.7)	Texas City (GCSO trunk talk group 55184)
154.445 (123.0)	San Jacinto District-Cold Springs
154.445/150.775 (136.5)	Huffman VFD
154.445/159.165 (141.3)	Fire/EMS Southeast VFO
155.025/150.805 (146.2)	Liberty
155.040 (None)	West University Place (HCSO 16048)
155.040/153.845 (100.0)	Woodlands
155.040/154.100 (146.2)	Jamaica Beach (GCSO 60848)
155.160/154.175 (100.0)	NE Fire and Rescue-Humble (proposed)
155.220/150.790 (141.3)	Cleveland Channel 4
155.595/154.755 (141.3)	Fire/EMS Memorial Villages VFD Chan 1
155.940/158.985 (146.2)	Fire/EMS/CITY South Houston VFD
157.450 (192.8)	Cy-Fair VFD (link to 33.880 Dispatch)
158.730/151.445 (146.2)	Montgomery County Fire Chief's Assoc
158.895/156.150 (146.2)	Kemah VFD (not licensed)
159.225/151.445 (179.9)	Friendswood
159.390/151.385 (146.2)	Harris Co. Rural VFD #21
451.425/456.425 (DCS 043)	Cypress Creek VFD Ch 4
451.425/456.425 (118.8)	Cypress Creek VFD-TAC 7 West
452.200/457.200 (DCS 043)	Cypress Creek VFD FD1 WPPG992
452.200/457.200 (DCS 606)	Cypress Creek VFD Alternate WPPG992
452.225/457.225 (192.8)	Cypress Creek VFD-TAC 5 East
452.225/457.225 (136.5)	Cypress Creek VFD-TAC 8 East
453.100/458.100 (114.8)	Cypress Creek VFD Channel 4
453.125/458.125 (192.8)	Cypress Creek VFD-EMS Channel 1
453.300/458.300 (141.3)	Cypress Creek VFD Channel 3
453.350/458.350	Cy-Fair VFD
453.375/458.375 (192.8)	Cypress Creek VFO Channel 2 Dispatch
453.425/458.425 (127.3)	Houston Channel A1/D1-simplex
453.4625/458.4625 (192.8)	Little York VFO (link to 33.640 MHz)
453.500/458.500 (127.3)	Houston Channel A2 Dispatch/D2-simplex
453.550/458.550 (DCS 732)	Fire/EMS Jacinto City
453.600/458.600	Cy-Fair VFD
453.675/458.675 (127.3)	Houston Channel A3/D3-simplex
453.750/458.750 (88.5)	Cypress Creek VFD-TAC 6 Central
453.750/458.750 (100.0)	Cypress Creek VFD-TAC 9 West
453.850/458.850 (146.2)	Pearland (HCSO trunk talk group 13680)
453.8625/458.8625 (192.8)	Little York VFD-TAC
453.950/458.950 (127.3)	Houston Channel A4 /D4-simplex
460.575/465.575 (127.3)	Houston Channel A5 /D5-simplex
460.600/465.600 (167.9)	Bellaire
460.625/465.625 (127.3)	Houston Channel A8 /D8-simplex
461.5375 (192.8)	Cypress Creek VFO-ADMIN 10
461.5875 (192.8)	Cypress Creek VFD-ADMIN 11
464.150/469.150 (162.2)	Spring/Northeast VFD Channel12)
855.9625/810.9625	West I-10 VFD Channel 5/6-simplex

Police Frequencies

154.115 (146.2)	Police/Fire Dayton
154.755/155.310 (146.2)	Police/Fire Mont Belvieu
154.7925/158.9325 (88.5)	Deer Park Primary
155.0025 (None)	Deer Park TAC "Back 1"
155.055/155.835 (100.0)	W. Colombia
155.595 (127.3)	Katy-may still have some use
155.625/158.910 (127.3)	La Porte, dispatches Morgan's Point PD
155.655/159.030 (114.8)	Police /EMS Cleveland
155.730	Waller
155.865 (146.2)	Liberty
155.895/154.025 (100.0)	Hunstville
155.895/154.770 (146.2)	Clute
155.955/153.995 (146.2)	Police/Fire Freeport
155.970/158.850 (146.2)	Pearland (HCSO trunk talk group 13712)
156.090 (127.3)	Katy-may still have some use
156.090/155.640 (100.0)	Lake Jackson
158.790 (146.2)	Willis
453.1375/458.1375 (146.2)	Friendswood Channel 7
453.150/458.150 (146.2)	Hedwig Village
453.150/458.150 (179.9)	Nassau Bay
453.250/458.250 (156.7)	Jacinto City
453.250/458.250 (173.8)	Dickinson (GCSO trunk talk group 49712)
453.275/458.275 (91.5)	Santa Fe (GCSO trunk talk group 54704)
453.275/458.275 (146.2)	Spring Valley
453.2875/458.2875 (146.2)	Friendswood Channel 5 Patrol
453.325/458.325 (123.0)	Friendswood Channel 3 TAC
453.325/458.325 (146.2)	Memorial Villages
453.475/458.475 (146.2)	Seabrook-El Lago
453.525/458.525 (91.5)	Police/Fire/EMS Santa Fe Ch2
453.525/458.525 (146.2)	Tomball
453.700/458.700 (127.3)	Houston Chan B10-Bush Airport 21110-50
453.725/458.725 (146.2)	Clear Lake Shores
453.775/458.775 (146.2)	Friendswood Channel1 Dispatch
453.825/458.825 (146.2)	Taylor Lake Village- Shoreacres PD
453.825/458.825 (114.8)	Texas City (GCSO trunk system)
453.875/458.875 (146.2)	Police/EMS Hitchcock (GCSO 53456)
453.900/458.900 (123.0)	Houston Channel B12
453.925/458.925 (146.2)	La Marque (GCSO trunk talk group 53776)
453.975/458.975 (114.8)	Texas City (GCSO trunk talk group 54896)
460.025/465.025 (123.0)	Houston Chan A3 SE/Clear Lake Patrol D
460.050/465.050 (123.0)	Houston A4 SW /Fondren/ Beechnut E
460.075 (123.0)	Houston Channel B4 "075" Surveillance
460.0875/465.0875 (146.2)	Friendswood Channel 4 S00
460.100/465.100 (123.0)	Houston Channel A6 Central Patrol A
460.125/465.125 (123.0)	Houston Ch A2 NE/Kingwood Patrol C
460.150/465.150 (123.0)	Houston Channel A12 W Patrol G
460.1625/465.1625 (146.2)	Friendswood Channel 6
460.175/465.175 (167.9)	Bellaire Channel1
460.200/465.200 (192.8)	Friendswood Channel 2
460.225 (123.0)	Houston Channel A8/B8 Car-Car Simplex
460.275/465.275 (114.8)	Southside Place
460.325/465.325 (123.0)	Houston Channel A1 North Patrol B
460.350/465.350 (123.0)	Houston Chan A7/B7 Special Ops M,Y,Z
460.375 (123.0)	Houston Channel B2 "TAC 1"
460.400/465.400 (123.0)	Houston Channel B9 Vice, Narcotics, CIO
460.425/465.425 (123.0)	Houston Ch A5/B5 (HISO 02-030)
460.450/465.450 (123.0)	Houston Channel A10/B1 460.475/465.475 (123.0) Houston Channel A11 Northwest Patrol F
460.525/465.525 (123.0)	Houston Channel B3 "525"
460.550/465.550 (123.0)	Houston Channel A9 S Central Patrol H
463.400/468.400 (146.2)	Police/City Friendswood Ch.27-Seargents
465.075 (123.0)	Houston Channel B? NARC TAC 4?
465.225 (123.0)	Houston Channel C3 or C8 SWAT
465.375 (123.0)	Houston Channel B6 "TAC 2"
856.9625/811.9625	Missouri City or Fort Bend Co. MDT

Sheriff Dept.

151.295/159.315 (146.2)	Galveston County CID
154.725 (100.0)	Walker County TAC 1
154.740/159.150 (146.2)	Matagorda County-Bay City
154.755/158.880 (192.8)	Sheriff/Fire Tyler County-Woodville
154.770/158.925 (192.8)	Hardin County-Kountze
154.785/155.520 (192.8)	Polk County-Livingston
154.845/151.010 (192.8)	San Jacinto County-Coldspring
155.010/158.865 (DCS 445)	Wharton County
155.730/154.710 (100.0)	Walker County-Huntsville
155.745/155.025 (146.2)	Colorado County-Columbus
155.760/154.785 (146.2)	Waller County-Hempstead (using Nextel?)
155.805/154.995 (146.2)	Sheriff/Fire Chambers County-Anahuac
155.835/155.055 (146.2)	Sheriff/EMS Liberty County-Liberty
158.790/154.710 (162.2)	Fort Bend County (FBCSO trunk system)
159.330/151.220 (146.2)	Galveston Channel 6 Organized Crime
461.150/466.150 (114.8)	Harris County Constables Precinct 4
463.650/468.650 (146.2)	Galveston Precinct 8/Friendswood
854.9625/809.9625	Harris County (data bursts)

Texas Dept of Public Service

154.950 (None)	Intercity Channel 3 Mobiles
155.370 (None)	Intercity Channel 4 Bases
155.445/154.695 (162.2)	Highway Patrol Chan 7/8-(half duplex)
155.460/154.680 (162.2)	HP Houston Cha 1-(half duplex)/2-direct
155.505/154.920 (107.2)	CLE? Repeater and Simplex
155.505/154.920 (162.2)	CLE Channel 5-direct/6-repeater
155.535/154.695 (146.2)	HP Pierce KUZ831 (Richmond WPFC976)
155.685/154.845 (162.2)	Highway Patrol Texas City WNSZ487
158.730/159.150 (162.2)	Exec Security Detail (Governor)-Austin
159.090/154.935 (162.2)	Operations Houston (DVP)
159.210 (162.2)	Highway Patrol Channel 9 Car-to-Car
159.210/154.665 (107.2)	Highway Patrol Ch 11 Beaumont KKE469
159.210/154.665 (110.9)	Highway Patrol Ch 12 Lufkin KKH775
159.210/154.665 (118.8)	Highway Patrol Ch 13 Houston KKC588
159.210/154.665 (136.5)	HP Ch 16 Texas City WNSZ487

Trunk Systems

Brazoria County Public Safety
Motorola Type II Smartnet - 866.7875, 867-868.2875,867.8125, 868.5625 (Also Angleton, Oanbury, Manvel, and Surfside)

Chambers County Public Safety
Motorola Type II - 866.0125, 866.5125, 866.750, 867.0125, 867.0375, 867.4375, 867.5125, 868.0125, 868.550, 868.825

Fort Bend County Public Safety
Motorola Type II Smartnet - 866.3125, 866-867.7625, 867.2375, 868.2625, 868.5375, 868.825

Galveston County Public Safety (GCSO) WPKN398
Motorola Type II Smartnet - 866.0625, 866.1625, 866.4125, 866.4375, 866.5875, 866.8125, 866.8375, 866.9625, 867.0875, 867.3125, 867-868.3375, 867.5625, 867.7125, 867.8375, 868.0625, 868.2125, 868.4625, 868.5875, 868.6625, 868.800, 868.9125 (Also licensed for the five 800 MHz Mutual Aid channels: 866.0125, 866.5125, 867.0125, 867.5125, and 868.0125)

Harris Public Safety Trunk System WNBZ674,WPKL474
Motorola Type II Smartzone System
Site 0-Downtown - 856-860.2125, 856-857/859-860.4875, 856-860.7125, 857-860.2375, 859.4625, 866.075, 866.425, 866.4625, 867.0625, 867.5375, 867.9375, 868.4875
Site 1-Tomball - 856.2375, 858.4875, 860.4625, 866-867.575, 866.975, 867.650, 867.9875, 868.100, 868.950
Site 2-Huffman - 866.0375, 866.375, 866.450, 866.600, 867.4625, 867.5875, 867.925, 868.0375, 868.125, 868.975
Site 3-Clodine - 866.050, 866.4875, 866.850, 867.075, 867.450?, 867.550, 867.9625, 868.325, 868.7625, 868.925
Site 4-Alvin - 866.9375, 867.6625, 867.750, 867.900, 868.0875, 868.375, 868.600, 868.750
Site 5-Tamina WPPF214 - 866.475, 866.925, 867.225, 867.350, 867.600, 867.875, 867.975, 868.075, 868.225, 868.9625
Site 6-Baytown WPG0390/WPPF214 - 866.100, 866.550, 866.950, 867.375, 867.950, 868.050, 868.250, 868.650, 868.775, 868.9375
League City Public Safety
Motorola Type II Smartnet: 856-860.9875

Missouri City/Stafford Public Safety
Motorola Type II Smartnet: 857-860.9625, 866.0875,866.7375,868.5125 (Also has W-I10 VFD, Sugar Land, Fresno on system)

Montgomery County Public Safety
866.325, 866.350, 866.775, 866.825, 867.100, 867.250, 867.275?, 867.300, 867.325, 867.775, 867.800, 867.850, 868.275, 868.350, 868.6875, 868.8375

Pasadena Public Safety "Local System" WPAM240
Motorola Type II Smartnet: 866-868.1125, 866-868.3625, 866-868.6125, 866-868.8625

Pasadena Public Safety "Wide Area System" WPAM240
Motorola Type II Smartnet: 868.1375, 867-868.3875, 867-868.6375, 867-868.8875

Scanning Canada

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A Winter's Tale

The groundhogs will be stepping out of their burrows this month and looking for their shadows. As legend has it, if they see their shadow it will be at least six weeks before we can get up on the roof and check those coax connections. Otherwise we will see an early end to winter and a chance to get outside with our radios.

Winter is a major defining factor in Canada's character as a nation. On the west (wet) coast, winter means the rain is cooler than in the summer. Up in Canada's Arctic it is said that there are four seasons; early winter, mid-winter, late winter, and next winter. Arctic dwellers usually distinguish the seasons in terms of the presence or absence of sunlight, as in "the dark season" and "the light season"; a reference to the long months of 24 hour sunlight, and 24 hour darkness. Throughout the rest of Canada, winters are long, cold and snowy, but we experience the relief of similarly long but hot summers. Nowhere in Canada is this more true than in Canada's prairies where *Scanning Canada* touches down this month on its nationwide tour of major airports.

❖ Monitoring Saskatoon's John G. Diefenbaker Airport

Table 1: Saskatoon / John G. Diefenbaker Airport (CYXC)

Air Traffic Control (MHz, AM)	
Radio	122.5, 126.7
ATIS*	128.4, 275.8
Ground	121.9, 275.8
Tower	118.3, 244.7
Mandatory Frequency	118.3, 244.7
Arrivals	119.9, 323.0
Departures	119.9, 323.0
Peripheral Station: (Winnipeg Centre)	133.1, 299.6

Navigation beacons

VOT** 114.8
VORTAC** id=YXE 116.2 (52d10m52sN 106d43m11sW)
Instrument Landing System: id=IST 109.9 (Runway 09-27)

* *Automatic Terminal Information Service*
***VHF Omnidirectional range Test facility*
****VORTAC=VHF Omnidirectional Range/* Tactical Air Navigation

❖ Monitoring Canada's Military – part 2

One of the busiest Canadian forces bases in the whole country is located on the shores of Lake Ontario at Trenton. CFB Trenton is home to 8 Wing and acts as the hub of Canada's military heavy transport services. Flights leave Trenton daily for distant parts of the world. Canadian troop and supply deployments to Bosnia, Kosovo, and more recently to support the War on Terrorism, are mustered at Trenton.

437 Transport Squadron, part of 8 Wing, operates a fleet of CC-150 Polaris transport aircraft. The Polaris is a military version of the Airbus A310, a highly versatile aircraft used for personnel and cargo transportation. Five of these aircraft are located at Trenton.

One of the most interesting duties of CFB Trenton is to act as the resupply base for Canadian Forces Station Alert. Alert is the northernmost inhabited place in the world. It is located on Ellesmere Island, just a few hundred kilometers from the North Pole. CFS Alert maintains a single gravel runway for inbound aircraft from Trenton. The station is so remote that *MT* readers may never get the chance to monitor this icy outpost, but any Arctic explorers who may be in the neighborhood (and hundreds of explorers from all over the world *do* venture into the polar region every summer) can monitor arrivals and departures on 126.7 MHz AM and a navigation beacon (id code="ULT") on 110.7 MHz AM.

Another key role of CFB Trenton is search and rescue. As the base for 424 (Tiger) Squadron, Trenton covers 10 million square kilometers including all of Central Canada, the prairies, and the entire Arctic region. The squadron is equipped with powerful CH-113 Labrador helicopters and CC-130 Hercules fixed wing aircraft.

Alongside its other roles Trenton hosts the Disaster Assistance Response Team (DART) to provision and supply emergency relief anywhere in the world. The Canadian Parachute Centre (CPC) is also based at Trenton. CPC is the parent organization for the "Skyhawks," the Canadian Forces parachute demonstration team often seen at airshows throughout the country during summer months.

The Quinte International Airshow is held at CFB Trenton. It is one of the best airshows in Canada and provides an opportunity to get right inside the base. The show is scheduled for June 22-23, 2002, even though, at the time of writing, the base is under very tight security due to the War on Terrorism.

Trenton is a very accessible base with a public highway passing between the airfield and the administration buildings. There is also a museum (free admission) at the edge of the field with static aircraft displays and a large indoor area packed with military memorabilia from the wars of the 20th Century. Scanning Canada readers should load up their radios with the frequencies tabled below and be ready for a busy day's monitoring.

Table 2: Canadian Forces Base Trenton (CYTR)

Air Traffic Control	
ATIS	135.45, 257.7
Clearance Delivery	124.35, 286.4
Ground	121.9, 275.8
Tower	128.7, 236.6
Arrivals	128.4, 324.3
Departures	128.4, 324.3
Wing Operations inbound aircraft	122.35
Tiger Squadron (search and rescue) operations	232.1

Navigation beacons

TACAN id=UTR 109.7 (44d07m16sN; 77d31m44sW)
Instrument Landing System id=ITR 109.7
Precision Approach Radar 124.35, 125.25, 127.95, 286.4, 289.4, 367.8

Other Trenton Area Frequencies

Quinte West Fire Department: 153.83, 154.07, 154.235, 154.43, 169.68
Belleville Fire Department: 153.83, 154.265, 170.055
Canadian Coast Guard: 156.275, 156.30, 156.80, 157.125
Railway Association of Canada: 160.365, 160.455, 160.665, 160.935, 161.025, 161.265, 161.415, 161.535

That's it for this month, *ScanCan* is going back into hibernation for a month. I'll check for my shadow again in March. In the meantime, please keep your comments and contributions flowing; let's keep Canada firmly in focus at *MT*!

Who needs a frequency counter?

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More Changes On MARS

On November 30, 2001, the United States Navy-Marine Corps Military Affiliate Radio System (MARS) closed down its Region Eight. Until that date, this branch served Navy, Marine, and Coast Guard personnel in the Pacific and Indian Oceans. NAV 8, the headquarters station in Honolulu, HI, was also shut down. Its activities now come out of Region Five in San Diego, CA.

This sounds like another of those permanent losses to utility radio, but it really isn't. Navy-Marine Corps MARS has been shuffling things around for some months now. There is a long-term plan in place that will consolidate the original seven operating regions down to four. While there has been some debate on the overall relevance of MARS in today's communications environment, all this shifting remains pretty much an administrative realignment only. The goal is to equalize work loads, and also to operate more smoothly with FEMA, the Federal Emergency Management Agency. After all, emergency communication remains the primary mission of the entire MARS system.

The big change in the Pacific region seems to be the greatly reduced price of long-distance telephone calls. This has taken much of the load off MARS. While these "morale" patches were never a primary mission, MARS stations (and hams in general) were always happy to "serve those who serve."

When I was just starting out as a ham (no, they did not still use spark transmitters!), there were, and probably still are, a lot of military and civilian workers stuck out on Johnson Island, Kwajalein, and all the other various and sundry rocks. They were, and probably still are, all working on the kind of defense projects that can't be discussed much. Commercial phone service was either nonexistent or too expensive to even think about, and so everyone wanted phone patches.

MARS always had a huge advantage here, in that it could run the real big phone-patch operations outside of amateur bands. Ordinary hams had many third-party regulations concerning profanity and business communication. They would quickly learn to ride the magic cutoff switch, just like on talk radio, only without the "safety net" of a delay line. A few stations abused the amateur spectrum, running endless hours of patches any time the band was in. Needless to say, this led a couple of self-appointed jammers to abuse the spectrum a whole lot more. Now, though, this type of activity is pretty much limited to some maritime mobile nets.

Along with better and cheaper commercial phone service, we're also seeing a huge growth in e-mail systems which connect to the Internet on the mainland. A lot of readers have probably run across the data setup that MARS operates on a number of frequencies in cooperation with the US Coast Guard Communication Area Master Station, Pacific (CAMSPAC). It uses a hybrid mode called PACTOR, Packet Teleprinting Over Radio. Callups are in the slow mode, PACTOR-I, and they can easily be decoded by the low-end sound-card computer programs available free to hobbyists. Try 6960, 7576, 11576, 14505, and 18191 kilohertz (kHz), plus or minus one or two kHz for tuning and software.

While Region Eight is no more, we have not seen the complete demise of MARS morale patches from personnel overseas. A few people might have been surprised when the operations in Kosovo and Afghanistan actually increased this activity, though it obviously remains way down from the pre-satellite era. The US Army MARS even built a pair of large, rhombic antennas on many acres of open field. These allow communication with personnel on portable radios in the Middle East.

❖ Navy MARS Headquarters Moves

While the Navy-Marine Corps MARS was shifting things around, it also moved NAV, its headquarters station. This station is also the headquarters of Chief, Navy-Marine Corps MARS, who always uses the call NNN0ASA.

In December, this station began a phased move from its long-time site near Washington, DC, to new quarters near Williamsburg, VA. This is at the Cheatham Annex of the Yorktown Naval Weapons Station, in a place described as "a separate building with lots of clear space around it in which to put towers and antennas." Now, that is a statement from real radio people!

Even so, this move is not as simple as packing up and reinstalling equipment. A lot of infrastructure has to be put into place first. Along with the "towers and antennas," a lot of phone lines and computer data networks have to come in, since NAV is also the headquarters of Navy MARS data communications. However, they expect everything to be in place by spring, when all MARS headquarters stations become very active for Armed Forces Day.

❖ Navy MARS Frequencies

The "official" Navy-Marine Corps MARS frequency list is made available to members only. They have, however, published common "interoperability" frequencies of 4042.5, 7382.5, and 14385.0 kilohertz upper sideband (USB).

Other frequencies come largely from listening, and they are not always authoritative. The "Afloat Net," with lots of ships, is sometimes caught on and around 14441.5 USB. Various other nets have been found on 4001.5, 4011.0, 4045.0, 4470.5, 5238.0, 7365.0, 7372.5, 10255.0, 11063.5, and 14391.5 kHz, all USB. Some of these are "assigned channel centers," 1.5 kHz above where most USB receivers will tune them.

The MARS emergency mission operates alongside several government agencies. A few selected Navy-Marine Corps MARS stations, all with their distinctive "NNN0-" calls, check into FEMA's National Emergency Communications Net on 5211, 10493, and 14567 kHz, both upper and lower. There's also SHARES (Shared Resources), an emergency interagency frequency-sharing arrangement which takes just under half of its participants from MARS. When SHARES activates for exercises, emergency situations, or its weekly, Wednesday morning net, you'll hear a lot of voice check-ins on 5236.0 or 14396.5 kHz, either sideband. Navy MARS has also been logged using 7381.0 USB for SHARES traffic.

Utility World

Utility Logs

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Abbreviations used in this column

AFB	Air Force Base
ALE	Automatic Link Establishment
AM	Amplitude Modulation
ARQ	Automatic Repeat Request teleprinting system
CAMSLANT	Communication Area Master Stotion, Atlantic
CW	Morse code telegrophy ("Continuous Wove")
DX	Distont Tronsmitter
E10a	Isroeli phonetic numbers, null messoge
EAM	Emergency Action Message
FAX	Rodiofacsimile
FBI	US Federal Bureau of Investigotion
FEC	Forword Error Correction teleprinting system
FGS	Federal Germon Ship
GHFS	Globol High-Frequency System
MARS	Militory Affiliote Radio Service
Meteo	Meteorologicol
M8	Cubon "Cut Number" CW (sounds like letters)
M22	4XZ, Israel Novy "numbers"
Meteo	Meteorological
MFA	Ministry of Foreign Affoirs
NATO	North Atlontic Treaty Organization
Poctor	Packet Teleprinting Over Radio
RSA	Republic of South Africa
RTTY	Radio Teletype
SITFAA	Inter-American Air Forces Telecom Network
SITOR-A	Simplex Teleprinting Over Radio, ARQ mode
SITOR-B	Simplex Teleprinting Over Radio, FEC mode
UK	United Kingdom
Unid	Unidentified
US	United Stotes
V2a	Cuban "Atencion!" numbers, 3-message format
VFT	Voice Frequency Telegraphy
VOLMET	Aviation weother broadcosts

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.

387.0 BOB-Nondirectional beacon, in AM at 1640. (Jerry Brookman-AK)

1869.0 Yarmouth Coast Guard, England, with weather at 2040. (Patrice Privat-France)

2598.0 VOK-Canadian Coast Guard, Labrador, with bulletins at 1007. (Mid-Atlantic DXer-MD)

2749.0 VAR-Canadian Coast Guard, Fundy (St John), with bulletins in French and English, at 1040. (MADX-MD)

2813.3 MTI-UK Royal Navy, Plymouth, with an RTTY idler in channel 2 of 3-channel VFT, at 2338. (Day Watson-UK)

2813.9 MTI-UK Royal Navy, Plymouth, with an RTTY channel bulletin, channel 1 of VFT, at 2339. (Watson-UK)

2929.0 Unid-Fishing boat chatter in English, lots of the famous "F" word, at 2315. (Ary Boender-Netherlands)

3136.0 Unid-Apparently Polish fishing trawlers, with chatter at 2130. (Privat-France)

3173.0 Roma-Rome Meteo, Italy, with RTTY weather at 2229. (Boender-Netherlands)

3359.0 CIO2-Israeli Intelligence phonetic "numbers" (E10a), in AM at 2250. (Boender-Netherlands)

3413.0 Shannon VOLMET, Ireland, with flight weather, also on 5505 and 8957, at 0532. (MADX-MD)

3485.0 Gander VOLMET, with flight weather, also on 6604 and 10051, at 0550. (MADX-MD)

3828.0 Unid-Russian "Squeaky Wheel" channel marker, in AM at 2251. (Boender-Netherlands)

4479.0 Cuban "Atencion," female AM Spanish "numbers" (V2), two Wednesdays at 0304. Unknown CW numbers, repeating "378," then 5-number groups, at 0403. (Camillo Castillo-Panama)

4742. 0 Architect-UK Royal Air Force, Flight Watch Center, making radio checks with many transport aircraft, including (in chronological order): Ascot 7365, 7484, 5468, 7495, 7344, 7345, 2104, 6441, 3838, 5928, and 9070, all starting at 0825. Architect, making a "Celebrity" broadcast at 0900. (Boender-Netherlands)

5418.0 Cuban "Atencion," female AM Spanish "numbers" (V2), at 0204. Cuban CW "cut number" station (M8a), at 0203 and 0303. (Castillo-Panama)

5450.0 Royal Air Force VOLMET, UK, with flight weather, also on 11253, at 0532. (MADX-MD)

5598.0 C-GMND-Canadian military, working Santa Maria at 0558. (MADX-MD)

5628.0 San Francisco-North Pacific air route control, working various aircraft at 1653. (Brookman-AK)

5673.0 Guangzhou VOLMET, China, with Chinese aviation weather at 1540. (Brookman-AK)

5687.0 DHM91-German Air Force Transport Command, Muenster, working GAF 2121, at 0437. (Ron Perron-MD)

5696.0 CAMSLANT Chesapeake-US Coast Guard, working Coast Guard 1720, in a search for a distressed vessel near Key West, FL, at 0200. (Allan Stern-FL)

5717.0 MKL-UK Royal Air Force, Kinloss, calling "V-1-H," no joy, at 0555. (MADX-MD)

6500.9 NMN-US Coast Guard CAMSLANT Chesapeake, with tropical storm Jerry advisory, at 0429. (Sue Wilden-IN)

6586.0 New York Radio, working American 68, American 62, and Speedbird 208. (Wilden-IN)

6604.0 New York VOLMET, with Atlantic coastal flight weather, at 0240. (Wilden-IN)

6676.0 Sydney VOLMET, Australia, with Pacific area flight weather, at 1802. (Brookman-AK)

6697.0 Automatic-US military, with EAM simulcast on 8992 and 11244, at 0556. (Jeff Haverlah-TX)

6745.0 Canforce 80-Canadian Forces aircraft, working Trenton, at 0522. (MADX-MD)

6779.0 DHJ59- German Navy, Wilhelmshaven, calling vessel DRAX (Sailing Training Ship *Gorch Fock*), no joy, at 1742. (Privat-France)

6797.0 Cuban CW "cut number" station (M8a), 10 different times at 1200 or 1300. (Castillo-Panama)

6854.0 Cuban "Atencion," female AM Spanish "numbers" (V2), at 0304. (Castillo-Panama)

6912.0 KPA2-Israeli Intelligence phonetic "numbers" (E10a), in AM at 0220. Same station with VLB2 at 0250, then KPA2 at 0310 and 0315. (MADX-MD)

6933.0 Cuban CW "cut number" station (M8a), 9 different times at 1200 or 1300. (Castillo-Panama)

7527.0 CS4-US Customs Service, sounding in ALE at 0353. (MADX-MD)

7554.0 Cuban "Atencion," female AM Spanish "numbers" (V2), two Sundays at 0303. (Castillo-Panama)

7685.5 NNN0MDC-US Navy-Marine Corps MARS/US Coast Guard ship e-mail system, at 1606. (MADX-MD)

7889.0 Cuban "Atencion," female AM Spanish "numbers" (V2), at 0205. Cuban CW "cut number" station (M8a), twice at 1300. (Castillo-Panama)

7969.0 Unid CW station with 5-letter groups in progress, might be Cuban M8, but just stopped at 0623. (MADX-MD)

8040.0 Unid-Offline encrypted traffic in 3rd-shift Cyrillic RTTY, at 1098. GYA-UK Royal Navy, Northwood, with a blurry weather FAX at 1923. (Watson-UK)

8103.0 4XZ-Israeli Navy, Haifa (M22), with encrypted CW traffic at 1928. (Watson-UK)

8122.0 Canberra Control-Australian Navy, working unknown vessel at 1053. (Perron-MD)

8335.5 DHJ59-German Navy, Wilhelmshaven, working DRAV (frigate FGS *Karlsruhe*) at 0215. (Perron-MD)

8384.0 9HVW5-Vessel *Tasman Spirit*, working Olympia Radio, Greece, in SITOR-A, at 1918. (Watson-UK)

8480.0 HZY-Tannurah Radio, Saudi Arabia, with CW Arabian Gulf weather, then traffic list, at 1630. (Watson-UK)

8658.0 ASK-Karachi Radio, Pakistan, with CW weather at 1633. (Watson-UK)

8806.0 3AC-Monaco Radio, with music marker, then bulletins in French and English, at 0715. (MADX-MD)

8828.0 Auckland VOLMET, New Zealand, weather at 0551. Honolulu VOLMET, HI, weather at 0557. (MADX-MD)
8939.0 Rostov na Donu VOLMET, Russia, with weather in Russian, also on 11297, at 0556. (MADX-MD)
8983.0 CAMSLANT Chesapeake-US Coast Guard, VA, working aircraft 34C on a drug operation, at 2132. (Perron-MD)
8986.5 DHN66-NATO, Geilenkirchen, working aircraft in voice and RTTY, at 1309. (Boender-Netherlands)
8992.0 Sigonella-US Air Force GHFS, with an EAM at 0700. (Haverlah-TX)
9016.0 Golf Club-US military, with a 28-character EAM simulcast on 8992 and 11244, at 1554. (Haverlah-TX)
9031.0 Cyprus Flight Watch-UK Royal Air Force, working an unid aircraft at 1245. Architect-RAF Flight Watch Center, testing at 1341. Croughton-US Air Force, UK, calling Architect, no joy at 1439. (Boender-Netherlands)
9057.0 Pin Ball-US military, with two 28-character EAMs simulcast on 8992 and 11244, at 1642. (Haverlah-TX)
9115.0 Cuban "Atencion," female AM Spanish "numbers" (V2a), in progress at 0804. (MADX-MD)
9122.5 NWO-US Army Corps of Engineers, NE, calling NWOFR in ALE, at 1515. (MADX-MD)
9259.0 RFGW-French MFA, Paris, with encrypted FEC traffic, at 1626. (Watson-UK)
9996.0 RWM-Russian CW standard time station, at 1437. (Brookman-AK)
10204.0 Night Cap-US military, with EAM simulcast on 8992 and 11244, at 2110. (Haverlah-TX)
10315.0 DHN66-NATO, Geilenkirchen, Germany, working US military aircraft Magic 51, 54, 59, and 95, for several hours beginning at 0856. NATO 10, making a radio check with DHN66 at 0909. (Boender-Netherlands)
10720.0 Langtry-US military, setting up secure comms with Shadow Warrior 45, at 2051. (Haverlah-TX)
10922.0 Unknown CW station with formatted "numbers" messages, at 1440. (Geoff Halligey-UK)
11175.0 Diego Garcia-US Air Force GHFS, working Andrews at 0125, and Puerto Rico at 0127. (Haverlah-TX) Reach 707Y-US Air Force C-17, getting weather for Incirlik Air Base, Turkey, at 0315. Reach 364Y, getting weather for Frankfurt, Germany, at 0335. (Perron-MD) Diego Garcia, working aircraft at 1824. (Brookman-AK)
11182.1 "The Singing Chinese"-Two unid males, one at either end, both singing in Chinese to recorded music, at 2250. (LJC-NY) *[New frequency for these bizarre people, who seem to like aero bands. - Hugh]*
11226.0 Reach 746Y-US Air Force, in a possibly ALE-initiated patch via Lajes, at 0100. (Privat-France)
11232.0 Muley 33-Probable US military, working Trenton at 2045. Canforce 3938-Canadian Forces aircraft, working Trenton at 2057. (MADX-MD)
11244.0 Snow Ball-US military, with EAMs at 1655 and 1701. (Haverlah-TX)
11247.0 Cyprus Flight Watch-UK Royal Air Force, with Middle East weather, at 0320. (Perron-MD)
11271.0 Andrews-US Air Force, MD, with an EAM at 0137. (Perron-MD)
11300.0 Tripoli-Air route control with KLM 556, Speedbird 62, Air France 384, and others, at 2337. (Perron-MD)
11318.0 Novosibirsk VOLMET, Russia, with weather in Russian at 0541. Samara VOLMET, also on 8888, at 0546. (MADX-MD)
11440.0 Fox 42-US military aircraft, working Fox 41 at 2323. (Perron-MD)
12138.5 SU1-FBI, Salt Lake City, UT, calling SUP03 in ALE at 0636. (MADX-MD)
12178.0 DRAX-German Navy Sailing Ship *Gorch Fock*, working DHJ59, Wilhelmshaven, in voice and 3-channel VFT, at 1855, calling again at 1915. (MADX-MD)
12750.0 NMF-US Coast Guard, Boston, with FAX weather charts showing hurricane Michelle over Cuba, at 2205. (Watson-UK)
12870.0 UFZ-Vladivostok Radio, Russia, with well-sent Russian CW traffic, at 0631. (MADX-MD)
12970.0 UFZ-Vladivostok Radio, with 3rd-shift Cyrillic RTTY marker, then storm warning, at 0638. (MADX-MD)
13024.5 ASK-Karachi Radio, Pakistan, with CW marker, then weather at 1630. (Watson-UK)
13050.0 UDK2-Murmansk Radio, Russia, giving schedule in 3rd-shift Cyrillic RTTY, at 1000. (Watson-UK)
13270.0 New York VOLMET, weather at 0240. (Wilden-IN)
13285.0 Beijing VOLMET, China, weather at 0049. (Perron-MD) Guangzhou VOLMET, China, weather at 0545. (MADX-MD)
13339.0 Montreal Dispatch-Probably Air Transat, working an aircraft in French, at 2314. (Perron-MD)
13538.0 ZSJ-South African Navy, Cape Town, with a weak FAX surface chart at 2230. (Watson-UK)
13546.0 Polish Embassy, Ankara, Turkey, with ARQ messages at 0747. (Watson-UK)
13907.0 Unid-Possible US Customs aircraft, sounding in ALE at 1945. (MADX-MD)
14418.5 GXQ-UK Royal Navy, London, with 2-channel VFT: Piccolo traffic in channel 1 (14419), and Piccolo idler in channel 2 (14419.4), at 0814. (Watson-UK)
14422.0 RBT-Algerian Embassy, Rabat, calling Algiers in ALE at 0934. (Watson-UK)
14441.5 NNN0TWT-US Navy-Marine Corps MARS, FL, working NNN0OON, at 1636. (MADX-MD)
14441.7 Unid-Egyptian MFA, with Arabic language traffic, in Sitor-A with a tone between the bursts, at 2030. (Watson-UK)
14446.7 Unid-Egyptian MFA, possibly Cairo, with Arabic operator chatter in SITOR-A at 0806. (Watson-UK)
14493.5 KW1-FBI, possibly Key West, FL, calling MM1, Miami, in ALE at 2223. WF1-FBI, Washington, DC, sounding in ALE at 2342. (Watson-UK)
14658.3 MTF-UK Royal Navy, Falklands, with a fleet broadcast in channel 2 of VFT, at 0720. (Watson-UK)
14658.9 MTF- UK Royal Navy, Falklands, with RTTY in channel 1 of VFT, at 0723. (Watson-UK)
14670.0 CHU-Standard time station, Canada, in single-sideband reduced-carrier at 1803. (Wilden-IN)
15034.0 Trenton Military-Canadian Forces VOLMET, with weather at 1630. (Brookman-AK)
16386.7 Unid-Pakistan Embassy, calling Islamabad in SITOR-A at 1553. (Watson-UK)
18176.7 Egyptian MFA, Cairo, with encrypted traffic and Arabic operator chatter, in Sitor-A with the tone between the bursts, at 1313. (Watson-UK)
18239.8 Egyptian Embassy, Algiers, with encrypted traffic and Arabic operator chatter, in Sitor-A at 1500. (Watson-UK)
19064.7 RFVICS-French Navy, Le Port, Martinique, with an ARQ message at 0800. (Bob Hall-RSA)
19131.0 24C-US Coast Guard aircraft, working Atlas (Drug Enforcement Agency, Cedar Rapids, IA) at 1849. (MADX-MD) Atlas, working Flint 453, at 2200. (Perron-MD)
19204.7 RFVICS-French Navy, Le Port, with ARQ message to RFHICS (Noumea, New Caledonia), at 0800. (Hall-RSA)
19498.7 RFHI-French Navy, Noumea, New Caledonia, with an ARQ message at 0651. (Hall-RSA)
20167.0 Wily Fox-US military, with a coded broadcast at 2108. (Haverlah-TX)
20179.7 RFFAAC-French Ministry of Defense, Paris, with an ARQ message in French to AIG2244, at 1525. (Hall-RSA)
20597.0 STFADW-US military SITFAA control station, Andrews AFB, MD, calling TWC1, US National Guard, in ALE, at 1440. (MADX-MD)
22603.5 UIW-Kaliningrad Radio, Russia, with markers, weather, and traffic for UEPC, all in 3rd-shift Cyrillic RTTY, at 1620. (Watson-UK)
23190.0 P6Z-French MFA, Paris, calling C3P (French Embassy, Tokyo) in FEC, at 0855. RFFIC-French Navy, Paris, with FEC message to many callsigns, at 1925. (Hall-RSA)
23872.0 Abundant-US military on frequency Z-315, with an EAM, simulcast on 11244 and maybe 8992, at 1935. (Haverlah-TX)
24370.0 P6Z-French MFA, Paris, with FEC messages at 1100. (Hall-RSA)
26441.7 RFFTD-French Air Force, with ARQ traffic in French to RFVIPP, Le Port, and RFFVA, Paris, at 1636. RFFWBC-French Forces, with ARQ message to many units on RFVIT routing regarding aircraft movements, at 1641. (Hall-RSA)
27870.0 HAW-US Air Force, Ascension Island, working GUA, Guam, in ALE at 1212. PLA-US Air Force, Lajes, working HAW in ALE at 1214. JNR-US Air Force, Salinas, PR, working GUA in ALE at 1221. (Hall-RSA)

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French and Counter-Drug Nets

We have quite a mixed bag this month as we look into developments on the French Diplomatic network, some interesting ALE networks, and welcome news of the return of "Waffa."

French Diplomatic Developments

Long-time readers of this column will know that the system of choice on French Diplomatic frequencies is 192bd FEC-A (with 400 or rarely 850 Hz shift). The 200bd ARQ6-90 system was apparently phased out three or four years ago.

We had unconfirmed reports that a number of frequencies, all occupied by high-speed PacTOR-II modems with a distinctive 0.3kHz offset, many close to old channels, were in fact a new MFA Paris network carrying traffic to mostly African outposts. A number of the frequencies yielded cryptic SELCALs like C35T1L – hardly clarifying matters. However, eagle-eyed monitor Leif Dehio was recently poring over some new screenshots at the Klingenfuss website when he happened upon an excerpt of PacTOR-II traffic attributed to the US email-over-radio provider "MarineNet" but which was clearly on-line encrypted traffic in the usual French style from "RBAT," the French Embassy in Rabat. The logging also showed the same 0.3 kHz offset. It therefore seems likely that the PacTOR-II network is a replacement for the old ARQ6-90 equipment. Here are some of those frequencies:

10403.3, 14432.3, 19983.3, 20141.3, 20708.3, 20743.3, 20801.3, 20906.3, 20980.3kHz

In a separate development, we've known for some time that MFA Paris has been using the Thomson CSF Systeme-3000 high-speed modem on, or close to, a number of its usual FEC-A frequencies. Knowing that Systeme-3000 is based on the STANAG4285 waveform, we tuned to the regularly used frequency of 20558 kHz and captured some of the bursts that we found there.

Unfortunately, Hoka's current STANAG4285 decoder doesn't automatically select speed and interleave like the MIL-188-110A module, so we improvised by manually selecting a number of common speed/interleave combinations and running our captured traffic through the decoder repeatedly. We eventually found a match at 1200bd with a long interleave, revealing the telltale same French traffic we'd seen on the FEC-A transmissions. Here is a sample:

[SOM]
VZCZCSGO000
3GF DE P6Z RE BJR VX TE QAP SUR LA 208 AUG DE 3
QTC 5 INT ZBZ INT QTC A TOI
3GF DE P6Z RE BJR VX TE QAP SUR LA 208 AUG DE 3
QTC 5 INT ZBZ INT QTC A TOI

Paris has been heard working Moscow, Rabat and Cairo with this mode. You can listen to an audio clip of the Systeme-3000 modem (which has both FEC and ARQ modes) by checking the link in the Resources section.

Colombian Counter-Drug Network

This ALE network has now been heard on at least two frequencies, 14775 and 20885 kHz USB, and also triggers MIL-188-110A 2400bd modem traffic in addition to regular USB voice communications. Unfortunately, the frequencies are relatively quiet and we've yet to capture substantial high-speed modem communications, but it would seem unlikely that messages would be passed in plain language on a network of this type. The ALE identifiers spotted so far include:

1JA	UNID Aircraft
BOGCON000	Bogota
FLOCON100	Florencia
FUMIGACIONES	"Weed killer" Spraying Units
GOPCON100	UNID
LETCON100	Leticia
PTACON100	Puerto Asis
TWC1	UNID

Monitor Al W Hussein independently stumbled across another network, probably related to that above, within days of us finding it. Currently found on 6955 and 10489 kHz USB, the following identifiers are used:

TRESESQINT	Tres Esquinas (Intelligence Unit)
TRESESQSIG	Tres Esquinas (Signals Unit)
FACATATIVA	Facatativa
FLORENCIA	Florencia
PUERTOASIS	Puerto Asis
SANATANA	Sanatana

Unidentified Rockwell Collins or US Military Network

A few months back we listed a few frequencies confirmed as belonging to Rockwell Collins. One of those frequencies, 10400 kHz, plus a few others close by, including 10440 and 10444 kHz, sport a whole host of interesting ALE identifiers from about 2200 to 2300UTC each weekday evening:

BRAVO82, ROMEO12, ROMEO13, SKY, UFO, YAO

An Old Friend Returns: Waffa

Around 1996, the WUN mailing list was discussing an unidentified marine network that appeared to be orchestrated by a vessel or base using the callsign "waffa." Intrigued and baffled, Mike took on his first real investigation of this network. It took about three months of concentrated and fascinating monitoring and a whole lot of library research (the Internet then was not nearly as useful for searches as it is today) with ships registers and the like, but eventually pieces of the puzzle came into place.

Waffa turned out to be the code-name for the radio room and operations centre on "PLB648" a pipe-laying barge then moored in the United Arab Emirates port of Mussafah. The exact organization behind Waffa was never quite clear, but the most likely bet was on National Petroleum Construction Company (NPCC) based out of Abu Dhabi.

What Waffa did was to collect reports of the daily activities of a least a dozen flotillas of ships supporting various oil and gas construction and supply operations in the Gulf and India. Each of the flotillas used similar code names – *deena, jawaher, layla,* and *danielle* – with a lead vessel from each providing the daily summary to Waffa. The vessels were mostly registered to local companies in the UAE and based from the ports of Dubai, Sharjah, and Abu Dhabi.

The network operated on at least two frequencies, 8221.5 and 3291.5 kHz, using standard SITOR-A, and sometimes SITOR-B and USB voice. So, fast-forward to today and UK listener Peter Thompson reports hearing the network again, this time on a frequency of 16456.5 kHz. Waffa is still alive and well after all these years. The flotillas have obviously changed, as have the constructions projects, but some of the original vessels are still participating.

If you're looking for an interesting network to monitor and investigate further with modest equipment, here it is! You can see further details on Waffa and a number of other oil and gas exploration and construction networks in the resources section.

Until next month enjoy the digital DX.

Resources

Systeme-3000 Audio Clip
http://rover.vistecprivat.de/~signals/WAV/SYS3000-ARQ.WAV

Systeme-3000 Audio Clip
http://rover.vistecprivat.de/~signals/WAV/SYS3000-FEC.WAV

Waffa Profile
http://www.chace-ortiz.org/umc/oil/Waffa.txt

Oil & Gas Networks
http://www.chace-ortiz.org/umc/oilgas.html

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www.angelfire.com/ok/worldofradio

Reference Sources on the Web

B-01 Comprehensive Shortwave Schedule: **http://www.eibi.de.vu** (Eike Bierwirth, Stary Petergof, Russia, GRDXC) This is all in time order, with lengthy appendices listing languages and transmitter sites, specifically at: **http://wwwstud.uni-leipzig.de/~pge98crf/bc-b01.txt** or **http://wwwstud.uni-leipzig.de/~pge98crf/bc-b01.doc**

B-01 Schedules. The Nagoya DXers Circle has a webpage which is mainly in Japanese, but there is a list of schedules from many international broadcasters, posted in English. Most of the schedules are technical grids, but there are some A01 skeds that remain, and I'm sure they will be updated soon. Go to **http://www2.starcat.ne.jp/~ndxc/** and click the B01 link (Joe Hanlon in Philadelphia, *DX Listening Digest*)

The Open Directory links directly to about 80 international broadcasters: **http://dmoz.org/Arts/Radio/International_Broadcasters/** (John Townes, *swprograms*)

Shortwave Coverage Maps. For an ever-growing file of computed coverage contours of international SW services, standard disclaimer, see **http://www.uwasa.fi/~jpe** (Jari Perkiömäki, Vaasa, Finland)

Selected English Language Dx/Swl/Media Programs On Shortwave, by John Norfolk: **http://www.worldofradio.com/dxpgms.html**

Shortwave Frequency List of 50 years ago is part of the winter 1951 issue of *White's Radio Log*, viewable online thanks to John Ebeling and Mike Bugaj; in that era, almost all stations went by callsigns: **http://members.fortunecity.com/wtfdamem/WRL.html**

AFGHANISTAN [nan] Since Nov. 17 at 1330-1430 on 9950 I have been hearing a station mentioning Afghanistan, I think in Pashto. What is this? (Adolfo Murrieta G., Guanajuato, Mexico, *DX Listening Digest*)

Thus broke a story of immediate worldwide interest to amateur and professional DX listeners. We quickly checked it out Nov 20: after opening Qur'an, a poem declaimed with great drama, *"Watanah Drawn Watanah,"* something about the Fatherland; 1345 switched languages, ID as "Radio Seday-e Afghanistan," Dari, meaning Radio Voice of Afghanistan; another language switch at 1400, and repeated the poem twice more in the final half-hour. Modulation, precision and production were of high standard, as was the signal strength, and I guess this is transmitted from CIS facilities, but studios where? (Glenn Hauser, OK, *DX Listening Digest*)

Very clear ID at 1345 as "Radio Seday-e Afghanistan," and variants at other times. Programming is modernist, with music interludes, short commentary/news segments. Sounds like an RFE/RL format, but from a CIS transmitter (Matt Francis, Canberra, Australia)

Carrier already on at 1310. Interrupted 800 Hz tones between 1324 and 1327, then continuous 1000 Hz tone from 1329, straight into program audio at 1330. Conclusions: This procedure points to a CIS transmitter, probably the feed routed via main control facility at Moscow (Kai Ludwig, Germany)

IDs are: *Da Afghanistan Ghag Radya* (Pashto); *Radyo-i Seda-i Afghanistan* (Dari). 1 kHz test modulation tones precede the transmission for about 5 minutes. Transmitters in the former Soviet Union are known to require these types of tones. On Nov 22, started with the famous song *"Da Zamung Zebah Watan"* by Ustad Awal Mir, said to be the unofficial anthem of Afghanistan. Announcer said that the purpose is to restore culture in Afghanistan; to end the war and promote mutual understanding and unity among the people of Afghanistan (Takuya Hirayama, Japan, *Clandestine Radio Watch*)

I phoned V. of Afghanistan in London, and found out: 9950 is coming from a CIS transmitter. Website is to be **http://www.afghanbroadcasting.net** [still not activated in late Dec] Postal address: Afghan Broadcasting Company, 21 Warship Street, London, UK EC2A 2DW. Plan to expand: 2 hours a day starting Jan. 1, signing on at 1230 instead of 1330. 3 hours a day in Feb. and 4 hours later (Hans Johnson, *Cumbre DX*) Site is Samara, Russia, 200 kW per HFCC (T. Hirayama, Japan, *CRW*)

The man behind the station is Said Jalal Karim. Phone is +44 207 382 9610 or E-mail *afbc9950@hotmail.com* Phone number and address turn out to be a company called Coppernob Business Services **http://www.coppernob.net/** an Internet service company which also runs various Web radio stations. However, when I called they answered as "Voice of Afghanistan." More at **http://www.rnw.nl/realradio/html/afghanistan.html** (Andy Sennitt, Netherlands, *hard-core-dx*)

Radio Voice of Afghanistan: Tests were first reported on 17 November 2001. Official launch was announced at press conference in London 27 November 2001. "The new radio station is the voice of moderate Afghan political opinion and broadcasts news, comment, interviews and music in both Pashto and Farsi. The London-based team of Afghan journalists are producing one hour a day of output to start the service and this will quickly build to four hours a day over the next few weeks."

IDs: "Radio Voice of Afghanistan" 1330-1430 daily on 9950 (© BBC Monitoring Nov 28)

News announcer said "Former Afghanistan President Rabbani" – That means the station's stance is *not* pro-Northern Alliance which regarded Rabbani as current President of the nation. I also have a feeling station is backed by CIA after listening to news. May be pro-Zahir Shah faction is also involved? Then, a statement by Sayed Jalal Afghan [sic], the founder of Radio Voice of Afghanistan: "Our enemies could use our differences like language to separate us. But the good points which make us unite is that we are all Muslims, we have the same culture and history. In this critical situation, we Afghans should avoid revenge and fight against each other. I would like to unite people of Afghanistan. There are Pashtans, Hazaras, Uzbeki and a lot more people living in Afghanistan. They must unite. Women should have their own rights. I would like to bring the voices of people of Afghanistan to Afghan people." 9950 at 1330-1430 is Samara, Russia, 200 kW, 130 degrees per HFCC (T. Hirayama, Japan, *CRW*)

Austria's DX program *Intermedia* is in German, but we heard an interview with founder Mr. Jalal, in English. When Wolf Harranth asked him about transmitter site, Jalal said it doesn't matter whether it is now from "America, Russia, Europe, or Oman," it is a free voice. Would like to operate from Afghanistan itself, when security and non-censorship can be guaranteed. Also has vague plans to add broadcasts in Arabic and English for listeners outside Afghanistan. It took only a sesquimanth to plan the operation and get it on the air (gh) Seemingly changed from Maiac-Grigoriapol', Moldova, eastwards to Samara, Russia site, a few days after it started (Wolfgang Büschel, *BC-DX*) My guess is for Irkutsk as the new site (Olle Alm, Sweden, *BC-DX*) RVOA doubled its output of original programming from a quarter-hour in each language, repeated, to a semi-hour in each language, not repeated (gh)

It is proposed that R. Free Afghanistan relocate three transmitters from Spain (the ones closed down last year at Pals) to Kuwait, costing 10 megadollars (Kai Ludwig).

ANTARCTICA LRA36 was still heard in December, weekdays 1900-2100 on 15475.4 approx. in Spanish (Zeke Russell, Williams AZ) Could only detect a carrier on 15475.6 closing at 2059:25* (gh, OK)

AUSTRIA Radio Africa International (via ORF), 6155 at 2200 with French and nice music // 1476. On SW only Sat (Christer Brunström, Sweden, *SW Bulletin*)

BELARUS' Radio Minsk's external service has started a web site to archive English and German services for on-demand listening. **http://www.tvr.by/Files_eng/General_e.htm** offers current week's Tuesday and Thursday English service and Wednesday and Saturday German. Comments welcomed at: *radio-minsk@tvr.by* Uses just one male announcer in English, with occasional reports by correspondents. Website claims Radio Minsk was one of the most "independent" voices on the airwaves, even during Soviet times, but I doubt listeners to Soviet-era stations would agree. That honor probably first belonged to Radio Vilnius, then Radio Kiev (Phillip Dampier, NY, *DX Listening Digest*)

BOLIVIA R. Mosoj Chaski has expanded time on 3310 with at least one extra hour in the morning and evening, now starting at 0800, ending at 0200 (Rik van Riel, Brazil, *DX Listening Digest*)

Radio Perla del Acre, Cobija, 4600.33, 0102*, reactivated, "Están escuchando Radio Perla del Acre 91.1." Greetings and music. Schedule 1100-0100 (Björn Malm, Quito, Ec-

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

uador, *SW Bulletin*)

BURKINA FASO Ouagadougou on new 5030 ex-4815 at 1945 (Mark Veldhuis, Holland, *SWBC*) "Radio Nationale de Burkina" 2306, address, national anthem at close (Ralph Brandi, NJ, *SWBC*) Still on at 2318 (Marie Lamb, NY, *swl@qth.net*) Clashes with DGS Costa Rica later.

CANADA RCI has another new Director General. Jean Larin stepped up Nov. 20 from Head of News at RCI to replace Denis Doucet who moved back to Radio-Canada, the domestic French-language network. Doucet came in only a few months before to replace Executive Director Robert O'Reilly, who took early retirement shortly after announcing major cuts in RCI's output. The appointment of Larin was low key. RCI's Web site made no immediate reference to it. Larin has publicly stated his belief that RCI performs a vital role in reporting Canada's international involvement. "If we don't cover it, no one will." But his most urgent task will be to restore battered morale amongst the staff (© Radio Netherlands *Media Network*) A lengthy strike in December by technicians disrupted CBC and RCI programming (Ricky Leong, QB)

In late November, RCI frequency changes included English from Sackville at 2100-2159: dropped 5995, replaced with 9770 to Europe, added 12105 to Africa (John Norfolk)

Feeder station on 26142-150; heard many references to Québec and Montréal. Guido Schotmans in Belgium listened to a recording, heard callsign CKTM Télévision. Sheldon Harvey then located that in Trois-Rivières, Québec (David Hodgson, TN) **http://nouvelles.cgotv.ca** E-mail: service technique Mr. Marcel St. Arneault mstarnau@cgotv.ca or ctech@cgotv.ca (Dario Monferini, *PLAY-DX*)

CHILE R. Parinacota is new, on 6010, 1 kW, 24 h from Putre, Region I; relays R. Cooperativa, Santiago by satellite 0400-0800. Reports to: Casilla 82, Arica (Hugo López C., Héctor Frías J., Amigos Radioescuchas de Santiago, via *Conexión Digital*) Don't confuse with new Uruguayan also on 6010v (gh)

CHINA Beautiful Chinese traditional music with no interruptions audible overnight on 9380, 1700-2110 UT, from where? On Sunday night/Monday morning a whole set of ragtime jazz (Des Preston, KB8UYJ, Philippines, *DX Listening Digest*) HFCC shows it's Beijing with Taiwan service 1000-2400 (gh)

Nagoya DX Circle monitoring of the constantly changing CNR scene is found at: **http://www.geocities.co.jp/Technopolis-Mars/6235/b01ch.txt** (Olle Alm, *Cumbre DX*)

New provincial SW station is Yushu PBS, Qinghai, 6075, in Tibetan, 2255-0100 and 1025-1230 including relay of CNR1 1135-1230 (Nagoya DXers Circle)

[non] Falun Dafa [from RUSSIA] +2100-2200 on 9945, same program as 5925, but there is a delay between the two. CNR-1 and CNR-2 jammers mess up both channels (Olle Alm, Sweden, *BC-DX*) On one occasion, 5925 was program-wise 49!! seconds behind 9945, so two separate, independent feeder circuits (Wolfgang Büschel, Germany, *BC-DX*)

COLOMBIA Idea Radio, 7380: E-mail reply from CE Andrea Laudicina said they have 2 kW and omni antenna, looking for clearer frequency (gh) Confirms they are same station previously operating from Genova, Italy in 1992-1993. Now says it's 10 kW, halfwave dipole on tower 50m tall, 25 km from Bogotá. Also plans live internet audio via ISDN (via Roberto Scaglione, Sicily, via Dario Monferini, *Play-DX*)

Ecos del Atrato, Quibdó, 5019.65, ID at 0255 mentions affiliation with RadioNet; used to be with Caracol (Björn Malm, Quito, Ecuador, *SW Bulletin*) R@dionet is owned by Caracol but broadcasts from their own premises – i.e. not from the Caracol-house – in Bogotá. Neat web site (without audio) at **http://www.radionet.com.co** (Henrik Klemetz, Sweden, *SW Bulletin*)

CONGO DR A UN radio station to be known as "Okapi" is scheduled to begin broadcasts in January, the UN's Observer Mission in Congo (MONUC) announced in Kinshasa. The Pan-African News Agency reported the Swiss and British governments had promised to finance its programs. The station will be the biggest to be established during a UN peacekeeping operation. Radio Okapi will broadcast general news on MONUC's activities and humanitarian actions. Okapi is the name of an animal, symbolizing peace (© Xinhua via Mike Cooper) The one previously reported to include SW in the capital (gh)

COSTA RICA RFPI's web streaming direct: **http://www.rfpi.org/webcast.html** is 24 hours on weekends, and weekdays around 2200-1400, i.e. except during local business hours, at 8 kpbs to minimize bandwidth and maximize number of listeners (James Latham and Joe Bernard, RFPI *Mailbag*)

On 5761.10, at 1131-1153, slightly distorted audio on this off-frequency 6th harmonic. IDs as "960 - AM," and "Beepermatic de Costa Rica," evidently the parent company, as well as FM 107.1. US pop hits, "la música Premium Class de todos los tiempos." Fair signal with good peaks (Mark Mohrmann, VT, *DX Listening Digest*)

CROATIA [non] V. of Croatia external service, via Germany has news in English at approx. 0005, 0140, 0205, 0340, 0405, 0540, 0605, 0740, 0805 and 0940 (i.e. 5 minutes into the first hour and 40 into the second hour). Each lasts about six minutes and is followed by Spanish on 9925 0000-0600, 9885 0000-0400, 9470 0600-0800, 13820 0800-1000 (Tony Rogers, BDXC-UK *Communication*)

CUBA R. Rebelde, 710, heard at 1015 on multiple harmonics; first found on 6390 (9x), then matched with deliberate SW 5025 on 2840, 3550, 4260, 4970, 5680, 7100 and the 11th on 7810, which was strongest! Only missing the third, 2130, where my antenna is not resonant (David Hodgson, TN, harmonics yahoogroup)

CYPRUS TURKISH I received the following message from Mr Mustafa Tosun from Bayrak RTV: "We have started tests on our new SW system, 6.150 MHz. We are preparing to test on various neighbouring frequencies in the 48 m band, such as 6.159 MHz at 0430-2200. Reception reports welcome" to *mustafa.tosun@emu.edu.tr* (Caio Fernandes Lopes, *@-tividade DX*, Brazil) After being off some years, heard on 6150 around 1800 with Greek music, ID in English (Costa Constantinides, Cyprus Greekish, *WORLD OF RADIO*) R. Bayrak on 6150.02, news and weather in English around 1730, then Greek; closed at 2200 with Turkish NA (Kunitoshi Hishikawa, Bulgaria, *BC-DX*)

DOMINICAN REPUBLIC Radio Pueblo, 5009.75, at 1117-1150, canned IDs "Radio Pueblo 15-10 AM, dando la hora..." Asking for reception reports, phone 565-1463. Very good signal, even past sunrise (Mark Mohrmann, VT, *DX Listening Digest*) 5009.78, 0045-0234*: classical and religious music, next night to 0247* (Brian Alexander, PA, *DXLD*) see also PERU 5009 last month

ECUADOR HCJB *DX Partyline* is now archived, audio on demand via **http://www.hcjb.org/english** as are 10-minute *Ham Radio Today* segments (gh)

On 3259.94, Stéreo Carrizal, Portoviejo until 0230*, back after four years off, also from 0950; but 1002 ID "Radio Capital R.N.C, Portoviejo." Found out by phone it was test of old 350 watt unit, by relaying another station (Bjorn Malm, Quito, *SW Bulletin*)

CRI, Centro Radiofónico de Imbabura, Ibarra, new on SW from early December, 3380.07, "semi religious" programs, at first mistaken for Guatemala. But later with nonstop cumbia-music in a hot tempo, then ID at 0005: "Escuchan C.R.I., Centro Radiofónico de Imbabura, transmitiendo en 1230 kilociclos desde la ciudad de Ibarra." Jingle: "C.R.I. Radio - la diferencia en radiocomunicación." No SW frequency announced. Religious station, anxious to reach listeners outside Imbabura. Duplicates MW 1230 except at 0200-0400 (Björn Malm, Quito, Ecuador, *SW Bulletin*)

Radio María de Colombia [sic], 3280, strong signal and clear IDs in the +0300-0700* period, whence? (Jari Lehtinen, Finland, *hard-core-dx*) Logged around 0800 UT on 3279.57, the same split frequency as LV del Napo in Ecuador (Gert Nilsson, Sweden, *ibid.*) It's R. María Ecuador, 3280 at 0700, incredibly strong until 0830 (Tore B. Vik, Norway, *SW Bulletin*) It seems La Voz del Napo, 3279.57 has been bought by R. María Ecuador; see: **http://www.radiomariaecuador.org** (Dario Monferini, *DXLD*)

HCJV5 Radio Central, Riobamba, at 1115 on 5850.26, fifth harmonic of 1170.05. Considerably more common on its second harmonic 2340.10 (Björn Malm, Quito, Ecuador, *SW Bulletin*)

ERITREA [non] What is the Arab on 21550 at 1330-1430*? "Sawt-ul Qard" (Dmitri Mezin, Kazan, Russia, hard-core-dx) No chance of it here with Chile blasting in (gh) HFCC shows Woofferton-UK 21550 1330-1530 46SE,47N,48NW WOF 250 140 daily G MNO MER; To zones 46 W. Africa, 47 Central Africa, 48 E. Africa (Wolfgang Büschel, *BC-DX*) Not clear what this has to do with Eritrea, in a non-Eritrean language (gh)

In Arabic *Al Qarn* means either horn, which is wrong in this case, or millennium – 1000 years. So the ID *idha'at Sout al Qarn* means Voice of Millennium Radio as always immediately follows in English. Language is sort of Sudanese Arabic but they are always reading newspapers from the United Arab Emirates! (Tarek Zeidan, Egypt, SU1TZ, *DXW* via *BC-DX*) So maybe the studio and transmitter are in Abu Dhabi? (Wolfgang Büschel, *BC-DX*)

Sawt al Qarn on a Friday was only religious, including 1420-1430 in English about "the beauty of Islam" (P. Robic, Austria, *Clandestine Radio Watch*) Announces local time as UT + 3 (Tarek Zeidan, Egypt, SU1TZ, *BC-DX*)

ETHIOPIA [non] Clandestines via CIS site moved from 12110 to 12120: 1700-1800 Netsanet Le Ethiopia Radio Wed + Sun; 1700-1800 Dejen Radio Sat; 1730-1800 Sagalee Oromiyaa Mon + Thu. Sagalee Oromiyaa is a new station not related to SBO. It is a different organization. SBO has its headquarters in Germany; Sagalee Oromiyaa is based in the USA (Ludo Maes, TDP, *Cumbre DX*)

FRANCE On 25926, lectures in European cultured French about trade routes mentioning the port of La Rochelle, in western France. No more than about 10 seconds of useful audio per hour. Appears to be a recorded tape loop. Might be an exhibit, transmitted to visitors on some sort of wireless system (Alan Roberts, Québec, via Sheldon Harvey) Main museum at La Rochelle knows nothing about this. Received several days as early as 1230, as late as 1715, best in narrow FM mode, 12-15 kHz bandwidth, not in very narrow FM (Alan Roberts, Québec, *DX Listening Digest*)

I am hearing not just one signal on 25926 but a big pile up of many signals in the range of 25925-25928 NFM, between 10 and 20 at one time! Perhaps many automated TIS outlets in France operate over this narrow range, explaining the pileup (David Hodgson, TN) I easily found out via **http://www.csa.fr** – the French *'Journal Officiel'*: these are pre-recorded comments for tourists about spots of historical/ geographical interest. Owner of these frequencies is the 'Comité Departemental du tourisme de la Charente-Maritime' in La Rochelle, broadcast from 37 different sites on 5 different frequencies: 25845, 25880, 25925, 26000 and 26035 kHz. Radiated power of each is (only) 1 Watt. Tourists can listen to these pre-recorded comments, using an especially-made receiver. I believe this system is used only by Charente-Maritime (Stephane Veron, France, *DX Listening Digest*) Stephane, many thanks for solving the mystery! (gh) If it were not for *DXLD* and its large readership, this logging of mine might have always just remained unID. *DXLD* is without a doubt the most comprehensive and timely DX news source available at this time on the www (David Hodgson, TN)

GERMANY In view of changing distribution technologies like the internet we will have to think about a concentration on five or six world languages, suitable for transmitting an idea of the German society... We cannot serve the whole world (Deutsche Welle director Erik Bettermann, *Berliner Zeitung* via *Radio-Kurier* via Kai Ludwig)

DW has a redesigned Web site, new URL: **http://www.dw-world.com** (Kim Elliott, VOA *Communications World* via John Norfolk) DW English to Pacific and Asia via Antigua at 0900-0945 moved from 6160 to 9510 Dec. 20 (Bob Padula, Australia, *EDXP*) Also well-heard in NAm for those awake, so *N.B.* (gh)

GREECE VOG, 7475 to NAm, has severe interference from Norway on the low side (John Babbis, Silver Spring MD) Shifted to 7477 at 2300-0550 (Observer, Bulgaria) VOG relay via Delano 1200-1500 switched in Dec from 11900 to 9590, where it is weaker and fading out (John Babbis)

GUATEMALA Radio Amistad is new, on the air from 1100 to 0200 on 4700 with

500 watts AM, confirmed reception all around the Lake Atitlán (Larry Baysinger, KY, *Cumbre DX*) Actually closer to 4699 at *0021 and 1214 checks (gh) 4698.79, 1100 unmodulated carrier, 1107 music, 1110 opening, brief song, prayer lasting 10 to 15 minutes; 1128 music; 1140 nice full ID. Solid clear signal in Nashville, with S9 peaks using 60 meter quarter-wave groundplane. Good audio fidelity (David Hodgson, TN, *DX Listening Digest*) 4698.77, 1100-1145, interval signal "*Onward Christian Solders,*" ID Radio Amistad. 1130 popular music program mixed with IDs (Chuck Bolland, Lake Worth, FL) 4698.75, poor at 0315, but good from *1100 on 4698.88.

New, religious station with prayers and Tex/Mex-sounding music with religious content. ID often in English in the middle of tunes, announcing 4700 (Björn Malm, Ecuador, *SW Bulletin*)

SIT - Superintendencia de Telecomunicaciones' web site, **http://www.sit.gob.gt/Attachment/inventario.pdf** contains: "4.6975-4.7025 EMILIO ROBERTO DARDON CALDERON 13-01-2012 50 -90 TUF R. 1240 NACIONAL" So the frequency has been licensed for 10 years. (Pentti Lintujärvi, Finland, *DX Listening Digest*)

Radio Amistad, 4699v: QSL manager, reports in English or Spanish: David Daniell, Asesor de Communications, Apartado Postal 25, Bulevares MX, 53140 México. Actually running 350 watts. Also, Radio K'ekchí, 4845, is only 750-800 watts instead of 5 kW (Larry Baysinger, KY, *Cumbre DX*)

IRAN "Voice of Al-Aqsa Intifadah from Tehran" apparently replaces the "Ebri" (Hebrew) service which had actually been in English, registered 1900-1930 from Kamalabad site with 100 kW, 265 degrees on 7105 and 7175. But since the two are not synchronized, one must be from Sirjan site instead. Interval music of VOIRI Tehran before cut off (Wolfgang Büschel, Germany, *BC-DX*)

Voice of the Islamic Republic of Iran (VIRI) is the external service of the Voice and Vision of the Islamic Republic of Iran, which is also known as Islamic Republic of Iran Broadcasting (IRIB).

This schedule, valid until 31 March 2002, is based on information from VIRI and monitoring observations. Broadcasts are NOT generally subject to Summer/Winter time changes. Address: PO Box 19395-6767, Tehran, Iran. Tel: +98 21 2042808. Alt Tel: +98 21 2162953. Fax: +98 21 2051635. E-mail: webmaster@irib.com Web Site: **http://www.irib.com/**

English, daily:
0030-0130 Am 6.065 6.135
1100-1230 MEAsAu 15.375 15.385 15.480 21.470 21.730
1530-1630 As 9.605 11.775 11.870
1930-2030 EuAfAs 6.110 9.890 11.695 15.140
2130-2230 AsAu 9.780 11.740
(© BBC Monitoring)

Note: BBCM has ceased publishing schedules like this (complete, from which we excerpted only one language). Our thanks to them for many years of useful info (gh)

ISRAEL Kol Yisrael announced addition of 7520 for English at 0500 and 2000 (Joel Rubin, NY, *swprograms*) Confirmed at 2000, but still on 9435 instead at 0500 (gh, OK)

ITALY Adventist World Radio officially announces the end of broadcasting from its SW station at Forli, effective Dec, 31, 2001. The low powered 2.5 kW station had been on the air since 1985. Decision to cease became inevitable after AWR began leasing airtime from two more powerful stations: Deutsche Telekom in Jülich, Germany, and ORF in Moosbrunn, Austria, as well as Slovakia, South Africa, Madagascar, and the UAE (Geoff Patterson, Communication Director, AWR via Adrian Peterson) Strange, no mention of Argenta, new Italian site planned to replace Forli; is that no longer necessary either? (gh)

KOREA NORTH VOK is not using bands any higher than 11 MHz this winter; see **http://www2.starcat.ne.jp/~ndxc/nk.htm** (Nagoya DXers Circle)

KURDISTAN [non] Voice of Mesopotamia heard at new time of 0700-1100 on 11530 (Vladimir Kovalenko, Tomsk, Russia, *DX Listening Digest*)

Denge Mezopotamya just expanded from 6 to 12 hours per day, 0500-1700 on 11530, using different sites and power levels depending on time of day. Staying on same frequency was required (Ludo Maes, *BC-DX*)

MEXICO XERTA, Radio Transcontinental de América has been changing frequency every day, ranging from 4760 to 4900 (Héctor Garcia Bojorge, DF, *Conexión Digital*)

NEPAL [non] Everest Radio is on four times a week, Sat, Sun, Mon and Tue at 2100-2200 on 6035 via Austria (**http://www.everestradio.co.uk** via Mike Terry, Dec BDXC-UK *Communication*)

NORWAY NRK is short some 100 megakronor (almost 12 mega$) due to lack of income from license fees, and the external service is in danger of being closed down. The cost of running that alone is 40 million NOK (Stig Hartvig Nielsen, Denmark) Radio Norway International will be completely closed from Jan. 1st. But NRK will have to negotiate with transmitter provider Norkring and also Radio Denmark. Norkring have a contract for running the transmitters and Radio Denmark a 25 megakronor contract for leasing time until the end of 2003.

The staff of seven at RNI have been informed that the station will not exist after Jan. 1, and transferred to a "job-bank" for employment elsewhere. Among the options: keep SW transmitters on with R. Denmark second half of each hour, and fill first half with domestic NRK all-news programming, but not available 24 hours, or sell as much of that time as possible to others, or go silent during first half of hours (Bernt Erfjord, Norway, DX-Listeners' Club)

RNI started in 1948, entirely in Norwegian, but the Sunday English programme *"Norway This Week"* was launched in 1952. That ran for 36 years, until its closure on 1 October 1998 (*Media Network*)

PERU Radio San Antonio, Villa Atalaya: After a lot of work we have a new 1 kW SW transmitter on 4940, formerly on FM only (Gerardo Gerardo Zerdin via Fontenelle, via Ulis Fleming, *Cumbre DX*) Good 0000 until s/on of India 0007. Heard closing at 0315 (Gert Nilsson, Sweden, *Hard-Core-DX*) At 0040* gave OBW8U 95.50 MHz, OAW5A 4940 kHz (*WRTH*: OAW8A). "Radio San Antonio AM y FM se transmite desde la esquina Rioja... teléfono 46 12 40 en Atalaya." The following day until 0300* (Björn Malm, Ecuador, *SW Bulletin*) Answered an e-mail report after exactly one day! The director is Gerardo Zerdin zerdin@terra.com.pe – a Catholic priest from Croatia. He points out that postal services are poor there because of only a few roads, but the Ucayali river may carry a QSL (Michael Schnitzer, Germany, *Hard-Core-DX*)

R Marañón, 4835.5, reactivated, *0940 sign-on, IDs, nice Peruvian folk music (David Hodgson, TN, *DXLD*) See **http://radiomaranon.org.pe/** (Pentti Lintujärvi)

Radiodifusoras Huancabamba, 6559.95, ex-6535.76. Gave name as "La estación de triple frecuencias." Moving 25 kHz is no news so probably a new MW- or FM-transmitter (Björn Malm, Quito, Ecuador, *SW Bulletin*)

POLAND R. Polonia transmitters are doing a very bad job. I tried to listen and the signal was atrocious, certainly not good enough for more than a few seconds to ID the station (Frans Vossen, RVi *Radio World* via John Norfolk) Actually is considering using sites outside Poland for some transmissions instead of Warsaw. Important targets like the Polish diaspora in Kazakhstan can only be reached by SW (Bernd Trutenau, Lithuania, *BC-DX*) In Radio Polonia's *Multimedia Show*, Maryk and Slavic said they did not wish to leave SW but to avoid high costs charged by Polish Telecom. Had numerous complaints about quality of SW signals. They were therefore looking to use relay transmitters in Jülich, Germany and Slovakia which would save them money and provide better service (Mike Barraclough, England, World DX Club *Contact*)

RUSSIA [non] V. of Russia began testing to NAm 2300-0100 on 9835, 0200-0400 7240 via Ukrainian sites Kopani and Krasne, mostly in Russian (Olle Alm, Sweden, *BC-DX*) A revolutionary moment: Ukraine's transmitting agency RRT began leasing the SW transmitters to VOR without notice to RUI and on our main frequencies reserved for N. America (Alexander Yegorov, RUI, via Kraig Krist) VOR very interested in reports on these from NAm, 0200-0400 on 7240, 9385 (Pavel Mikhaylov, *"CLUB DX"* Program, VOR, via Wolfgang Büschel) Back in the USSR, R. Moscow routinely used Ukrainian sites (gh)

TURKEY *Live from Turkey* has been moved earlier to 1930 UT Tuesdays, not to North America, unfortunately (Reshide Morali, Voice of Turkey) That would be only on 7125 to Europe (gh)

U S A Unlike previous winters, WWCR kept 15685 on until 2200, so *WORLD OF RADIO* stayed there instead of 9475, Thu 2130. However, *Mundo Radial*, Fridays at 2215, has been on 3210 instead of 9475 (gh)

Site with lots of photos of WBCQ, and beautiful fall colors is: **http://www.complexvariablesstudio.com/wbcq_tasha_web_2_003.htm** (*Allan Weiner Worldwide*)

Overcomer Ministry newsletter says they are building another 24-hour SW station for blanket coverage of Europe and the US. Another transmitter at WBCQ? (Hans Johnson, *Cumbre DX*)

The ex-wife of Neo-Nazi SW broadcaster Kevin Alfred Strom did a chat after an ABC-TV 20-20 appearance last February, still available at: **http://www.abcnews.go.com/onair/DailyNews/2020_rightwomen_000210_chat.html** (Brian and Kirsten Betsworth, via *DXing.com*)

VOA chief Bob Reilly mandated staff "not to interview any official from nations that sponsor terrorism," in accordance with a clause in VOA's 2002 appropriation bill. Reilly maintained that there is "a clear distinction between giving someone a platform to disseminate their views" and news. "We do the news," he said (James Warren, *Chicago Tribune*)

Harmonic of Radio Martí, heard on 43.35 MHz, lots of fading, while primary 21.675 was rock solid (William Hepburn, Ont., WTFDA) That's Delano site (gh)

I suspect WRNO is running only a few hundred watts. Heard on 7354.37 with Christmas carols 0217; ID as WRNO Worldwide at 0257, then off suddenly (Walt Salmaniw, BC) New owner's site: **http://www.goodnewsworld.org** (Andy Sennitt, *DX Listening Digest*)

FM station relayed is WBSN-FM, 89.1, owned by Providence Educational Foundation, 3939 Gentilly Blvd., New Orleans, LA 70126. Plenty of "89.1 FM" IDs are given, but at the top of the hour, also website as **http://www.lifesongs.com** (John Sgrulletta, NY, *hard-core-dx*)

WLW, 700, Cincinnati, at 1022-1040 heard on a set of dirty harmonics with much distortion: 2100, 2800, 3500, 4200, not on 4900, and perhaps on 5600 (David Hodgson, TN)

URUGUAY 6009.71v to 6010.25v, 1548-1602, "En su receptor, CX42 Emisora Ciudad de Montevideo, Uruguay, transmitiendo en 1370 kilohercios. La frecuencia, que se sintoniza con mayor frecuencia" (Arnaldo Slaen, Argentina) 6010.37 is new frequency, heard at 1353-1415+, talking about a carnival, ads, IDs; nothing heard on ex-9650 (Gabriel Iván Barrera, Argentina, *Conexión Digital*) Sr. Jorge Yizmeyián told me callsign is CXA142, testing at 1300-1800; transmitter built by his brother (and station owner), Aramazd Yizmeyián. Simulcasts MW 1370 and is // to CXA42 on 9650, but only one of the SW channels would be on the air at times (Horacio Nigro, Uruguay, *hard-core-dx*) See also new Chilean on 6010

VANUATU R. Vanuatu has a new jingle based on Abba's *"Dancing Queen,"* usually played right before the *"Yellow Bird"* interval signal. An alternate jingle is based on Abba's song *"SOS"*. 7260 heard in French 0700-0715 (Enzio Gehrig, Spain)

YEMEN Rep. of Yemen R., San'a, seems to alternately use two different transmitters. *WRTH* says they have a 50 kW and a 300 kW, so I think when they use 9780.4 they're going with 50 kW, and when they use 9779.66 (much stronger), it's the 300 (probably at only 200 or 150 kW), switching between the two daily (Roberto Ciappi, Italy, *DXW*)

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

Broadcast Logs

Gayle Van Horn
gayle@webworkz.com

0000 UTC on 15180
NORTH KOREA: Feature on life in North Korea, and current events in Cuba and their relation to activities in North Korea. Poor audio quality with minimal signal flutter. (Lou Rossetti N1PUX, USA; Jerry Brookman, Kenai, AK)

0012 UTC on 5699.7
PERU: Radio Frecuencia San Ignacio.Peruvian music to "muy buenas noches, queridos oyentes."**Radio Huanta** 4751.9, 0017 local time check to ID. **Radio Bolivar** 5460, 0125 with regional music to ID; **La Oroya Peru** 4904.73 at 0432 & 1017 ;**Radio Cultura Amanta** 4955, 1012 religious program in Quechua; **Radio Libertad** 1041 on 5039.2; **Radio Paucartambo** 6520.4 at 1030; **Radio Madre de Dios** 1046 on 4950; **Radio Tawantinsuyo** 6173.9, 1055; **Radio Tarma** 4775, 2355 with IDs. (Arnaldo Slaen, Buenos Aires, Argentina)

0044 UTC on 6145
CANADA: Radio Japan relay. Profile on Japanese photographer's photo show of Afghani women. (Sue Wilden, Noblesville, IN)

0100 UTC on 6165
NETHERLANDS ANTILLES. Radio Netherlands relay. Station ID to time check and report on Afghanistan. Relay station on 13700 at 2005. (William McGuire, Cheverly, MD; Wilden IN) Madagascar relay on 11655 at 1915 with A *Good Life* segment. (Bob Fraser, Cohasset, MA)

0107 UTC on 6973.75
ISRAEL: Galei Zahal. Jazzy instrumental music. Frequency drifting from 6973.3 to 6973.05. SIO=444. Harold Frodge, Midland, MI) Clear from 0045-0230 with music and news format, plus phone calls. (Lee Silvi, Mentor, OH) **Kol Israel** 0510 on 9435 with terrorist update. (Howard Moser, Lincolnshire, IL)

0145 UTC on 9640
GERMANY: Deutsche Welle. Report on Russian republic Georgia to *Inside Europe* program; 0415 on 9710. (William McGuire, Cheverly, MD) 0905 on 7300; 1631 on 6170. (Jerry Brookman, AK) French service 1700-1715 on 15275. (Dexter Anderson, Westerly, RI) 2000 on 9545 report on Taliban. (McGuire, MD)

0150 UTC on 4845
BRASIL Radio Cultura Ondas Tropicais. Portuguese ID, "Radio Cultura 4845 kHz ondas tropicais...Manaus, Amazonas...boa noite amigos da Amazonia legal...boa noite Manaus...," followed by national anthem to sign-off. (Daniel Canonica, Muggio, Switzerland) **Radio Clube Paranaense**, 6040, 0705-0712. Commercials, jingles and regional news. (Enzio Gehrig, Denia, Spain/ *HCDX*)

0200 UTC on 9560
SOUTH KOREA: Radio Korea Int'l. Clear signal of domestic and international news to 0210 station ID. Interview with author of *Mountain Gods* in conjunction with South Korean Tourist Board. (Tony Berry, Burlington, Ontario, Canada)

0205 UTC on 9885
CROATIA: Radio Croatia. Ten minutes of English news. (David M. Weronka, Benson, NC) Additional English news audible 0405 9925; 0005 on 7285 // 9925 with fair signal quality. (Sam Wright, Biloxi, MS)

0220 UTC on 7250
RUSSIA: Voice of. Commonwealth *Update* segment. (Weronka, NC). Report on national tourism 0225 on 9765 (McGuire, MD) *News & Views* 1912 on 9775. (Fraser, MA) 0457 on 7180 // 13665. (Moser, IL)

0300 UTC on 9650
TURKEY: Voice of. Station ID to freq quote and website address, followed by news update on the Taliban. (McGuie, MD) *Daughters of Kybele* segment 9655 at 2316, // 9830. (Fraser, MA)

0440 UTC on 15340
NEW ZEALAND: R NZ Intl. National to world news for excellent signal. Oldies music show at 0159 on 17675. (Moser, IL; Brookman, AK)

0455 UTC on 9455
SAUDI ARABIA: BSKSA. Good signal quality for Arabic service and regional music. (Moser, IL) Station identification to regional Arabic news including text on Israel's continuing strife with Arafat. (McGuire, MD; Zacharias Liangas, Thessoliniki, Greece/*HCDX*)

0800 UTC on 4845
BRAZIL: Radio Ibitinga. Portuguese regional commercials to ID at 0815. International news to ID repeat. Brazilians audible as; **Radio Senado** 5990, 0858-0920 with Braz pops to ID. **Radio** *Tupi* 15325 at 1633 religious programming. (Arnaldo Slaen, Buenos Aires, ARG) **Radio Aparecida** 9630, 2232-2235. Tentative ID for religious segment, // 5035. (Frodge, MI)

1200 UTC on 15200
BULGARIA: Radio Bulgaria. Station identification into Bulgarian service. (Liangas, GRC/*HCDX*) 7500 at 2250. (Fraser, MA)

1300 UTC on 11765
USA: KNLS. Fair signal for Alaskan station, battling against Radio Havana on 11760. Several station IDs. (Silvi, OH) Station should now be on 9615 kHz. - *ed.*
1443 UTC on 17640
UNITED KINGDOM: BBC. Monitoring noted as; 1800 on 21470; 1903 on 17830. (Brookman, AK) 2305 on 5975. (McGuire, MD)

1548 UTC on 6009.71
URUGUAY: Emisora Ciudad de Montevideo. A *Sol Caliente* segment to local ads for electronic store and *Panamericano Restaurante*. Promo for weekend programming to ID as, "en su receptor, CX42 Emisora Ciudad de Montevideo, Uruguay, transmitiendo en 1370 kilohertios. La frecuencia, que se sintoniza con mayor frecuencia." Fair-good signal quality. (Slaen, ARG)

1700 UTC on 15195
SPAIN: Radio Exterior España. Russian service of news and current events to national sports roundup. (Anderson, RI) Spanish service audible 1755 on 21700. (Brookman, AK)

1752 UTC on 13570
USA: WINB. News item on appointment of anti-terrorism czar. Station ID and phone number. Additional USA; **WEWN** 9385 at 2001; **WBCQ** 7415 at 2308. (Wilden, IN) **VOA** 9515 at 2300 Spanish services' report on Afghanistan; *News Now* 2300 on 9770. (McGuire, MD)

1758 UTC on 13630
USA: Radio Martí. Spanish. Jazz piano music to ID and freq quotes. News update on Afghanistan. (Wilden, IN) Additional coverage on Bin Laden 1900 on 11930. (McGuire, MD)

1900 UTC on 5020
SOLOMON ISLANDS: SIBC. English news amid very weak and fading signal. (Gehrig, Spain/*HCDX*) Noted on 5019.9 with religious format to hymn. Station ID "SIBC" to anthem and BBC feature. (Frodge, MI)

2230 UTC on 13700
BELGIUM: Radio Flanders Intl. *Brussels Calling* to national news and features. (Frodge, MI; Weronka, NC)

2233 UTC on 11870
COSTA RICA: University Network. Dr. Gene Scott pontificating. SIO=433 // 11775 signal jammed with bubbler. (Frodge, MI) **RFPI** audible as; 0036 on 15040 // 21815; 0155 on 15040; 1045 on 21815 USB; 2151 on 21815 USB. (Brookman, AK)

2327 UTC on 7380
COLOMBIA; Idea Radio. Colombian music with English ID sounding like, "this is Idea Radio from Colombia, South America, Idea Radio broadcast on 7418 kilohertz." (Though on 7380) Announcer also read a Bogotá P.O. address, plus an email address, audible only partially amid high static. (Canonica, SUI; 2331-2352+ (Frodge, MI)

2338 UTC on 4799.8
GUATEMALA: Radio Buenas Nuevas. Spanish religious text to ID promo at 2345. News and events update with 322 SIO. (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) ***Please note:*** *paper strips and cassette recordings will no longer be accepted. English broadcast unless otherwise noted.*

The QSL Report

Gayle Van Horn
gayle@webworkz.com

February Special Event QSLing

What could be better? For QSLers, this is a triple event month for listening and QSLing.

For football fans, we begin in New Orleans, host city to the Super Bowl XXXVI on February 3, 2002. Monitoring the city's clear channel *WWL 870 AM* will give you an insider's perspective days before the big event, headed by Buddy Diliberto's *Sports Talk*. Send your reports and SASE or mint postage to: 1450 Poydras Street, Suite 440, New Orleans, LA 70112.

Armed Forces Radio plans to broadcast the Super Bowl to our worldwide military forces. Why not show your support by listening and reporting? Reports may be sent via email: *QSL@mediacen.navy.mil*. Time and frequencies may be found within our Shortwave Guide.

The spirit of the Olympics begins February. 8-24 from Salt Lake City, Utah. Clear **Channel-KSL News Radio 1160 AM** is a terrific station to monitor first hand coverage. *Click to Listen* is available their at their website **http://www.ksl.com/radio/** or report to: KSL Broadcasting House, 300 West 55 North, Salt Lake City, UT 84180.

Amid the spirit of the Olympics is Carnival! On the heels of Super Bowl, New Orleans begins a week long celebration of parades and parties. WWL's nightly updates and interviews are not to be missed. Carnival culminates this year on February 12 with Mardi Gras Day (French for Fat Tuesday) as its final crescendo. Follow the fun nightly and in the early morning hours on the 12th with Bob DelGiorno and the gang.

Who could forget Carnival in Rio? Many Brazilian stations throughout this vast country extend their broadcast hours in the days leading up to the 12th, making this a great opportunity to work the extras. If you haven't heard the samba school competitions and parade commentary, do it! *Passport to World Band Radio* and *World Radio TV Handbook* are great references for Brazilian stations, information and addresses. Mint Brazilian postage or IRCs are popular to enclose with your report. Both publications are available through *Grove Enterprises*.

Super Bowl, Olympics and Carnival ... three great reasons to fire up the dials and get those QSLs!

AMATEUR RADIO

3D2AG, Fiji Islands 20 Meter USB. Full data ham logo card initialed by Antoine. Received in 33 days for a nested airmail SASE and one U.S. dollar, plus a N5FPW QSL card. QSL address: P.O. Box 14633, Suva, Fiji Islands. DXCC Country #149. (Larry Van Horn N5FPW, Brasstown, NC)

ES3BR, Estonia 10 Meter PSK31 contact. Full data color ham logo card. Received in one day via **http://www.eQSL.cc**. Electronic QSL country #65. (Van Horn-NC)

BELGIUM

OST-Oostende Radio 12639.5 kHz. Full data verification letter, plus station info sheet. Received in 17 days for a utility report and one U.S. dollar. Station address: Ministerie Van, Landsverdediging, Radio Maritieme, Diensten, Perronstraat 16, 8400 Oostende, Belgium. (George Clement, Powder Springs, GA)

FM/ MEDIUM WAVE

WWCU-FM 90.5 (Power Dot 5) Western Carolina University, Cullowhee, North Carolina. Full data verification on station letterhead signed by Loyd Van Horn-Production Manager/ Underwriting Coordinator, plus coverage map and Rate Card. Received verification by visiting the station. QSL address: WCU-WWCU FM, 123 Stillwell Bldg. Cullowhee, NC 28723. (Justin Byers, Sylva, NC) Guess QSLing runs in the family - JB.

CBR, 1010 AM kHz. Full data letter verification signed by Mike Spear-Senior Producer, plus promo card, hand written thank you message, business card and three styles on four stickers. Received in 21 days for an AM report and one U.S. dollar. Station address: P.O. Box 2640, Calgary T2P 2M7 Canada. (Patrick Griffith, Westminster, CO)

WEUV, 1700 AM kHz. Verification on station letterhead signed by Mark Goodwin, plus WEPU sticker. Noted they are 100% simulcast with WEUP/1600 kHz. Letter mentions that WEUV call letters are only used at top of the hour. Station address: 2609 Jordan Lane NW, Huntsville, AL 35816 USA. (Griffith, CO)

HONDURAS

Radio Litoral, 4830 kHz. Full data *Certificado de Sintonia* letter signed by Jerome Antonio-DJ. Received in six months for a Spanish report. Station address: Station address: Apartado 888, La Ceiba, Atlantida, Honduras C.A. (Daniele Canonica, Muggio, Switzerland)

PHILIPPINES

FEBC Radio Intl, 15095 kHz. Full data *Monkey Eating Eagle* photo QSL card signed by Jay Bayliss, plus sticker and personal letter of apology for response delay. Received in six months for an English report (for Burmese service) one U.S. dollar and souvenir postcard. Station address: P.O. Box 1, Valenzuela, Metro Manila, Philippines 0560.(Lee Silvi, Mentor, OH)

Radio Veritas, 15530 kHz. Full data card signed by Ms Cleofe Labindao-Audience Relations Officer, plus brochures. Station address: P.O. Box 2642, Quezon City 1166, Philippines. (Giampiero Bernardini, Milan, Italy/*HCDX*)

PIRATE RADIO

Radio Neptune, 6950 USB. Full data planets card with personal letter signed by Joe Mack, plys program information and ad for CD *Voices From the Past*. Received in three months for a pirate report, three mint stamps and address label. Station address: P.O. Box 109, Blue Ridge Summit, PA 17214. Postmarked from Las Vegas, NV. (Bill Wilkins, Springfield, MO)

United Patriot Militia Bingo, 6955 kHz. Full data photo montage showing *Montana Militia* at a Radio Bingo listening party, no signature. Received in 73 days for a pirate report and mint Canadian mint stamps. Station address: P.O. Box 293, Merlin, Ontario, Canada N09 1W0. Postmarked Providence, RI. (Wilkins, MO)

USA

NAV-3, Ascension Parish, Louisiana, 13974 kHz USB. Full data prepared card for annual Armed Forces day MARS crossband test signed by B. Owens-Chief Op. Received in six months for utility report, SASE (used for reply), and picture post card. Broadcast was supposed to be from Corpus Christi, Texas, but due to unspecified problems, transmissions were done from alternative site. Station address: NAVMARCORMARS NAV-3, Atten: Benny Owens, 9035 Ocean Dr., Ste. 3A, Corpus Christi, TX 78419-5234. (Bill Wilkins via email)

John Figliozzi
jfiglio1@nycap.rr.com

Don't Touch That Dial!

When listening to domestic broadcasting stations on AM or FM, one is likely to hear this admonishment several times an hour whenever the program pauses for a commercial break or news. "Don't touch that dial," they say, "We'll be right back."

But the shortwave listener is always touching that dial. We have to! The crowded bands, the short programs and transmission periods, the exigencies of propagation – all require us to be very, very attentive to the tuning knob. Even if these factors didn't require it, we would still have a compulsion to do so. After all, we want to use our radios, not just let them sit there like a piece of furniture!

But, for the sake of argument, let's just say we want to listen to our radios the way other, "normal" people listen to theirs. Set it and forget it. Could we do it? What if you have a radio with only a few presets and wanted to enter only frequencies that give the biggest "bang for the buck," so to speak? Could you expect to hear a long progression of programming on shortwave by just tuning to a frequency and then having a spouse or a friend tie your arms behind your back?

Yup, you can do that! In some cases, this will involve being open to hearing multiple stations and languages over time; in others, an individual station may be taking up residency on a particular frequency and not letting go. Let's check out some of shortwave's more exclusive neighborhoods and find out what we can hear there if we just sit still.

9580 kHz

This is one of my personal favorites and my radios all actually have this one as one of their presets. Waking up in the morning, 9580 has *Radio Australia*. RA signs on here at 0800 UT, well before I get up; so it's there waiting for me when the timer switches the radio on. Here on the east coast in winter, the station starts to fade deeply around 1500 UT or so. Since I'm off to work well before then and usually out of the house by then on weekends, that doesn't concern me. RA stays on 9580 until 2130 UT, so more western situated listeners can likely hear it for several more hours than I can. *MT*'s *SWG* regularly carries Radio Australia's program listings, if you want to know what you can hear and when.

When *Radio Australia* isn't on 9580 (and even sometimes when it is), *Afrique Numero Un* (Africa Number One) is there. (Because RA broadcasts to the Pacific and *Afrique Numero Un* broadcasts to Africa, plus the mysteries of propagation, the stations rarely – if ever – interfere with one another. The east coast starts to hear Afrique Numero Un around mid-afternoon (2000 UT) until sign off at 2300 UT and again at sign on (0500 UT) for a couple of hours until the sun is high in the sky over Africa. This is a great station most of the time filled with a wide variety of African popular music.

Don't bother with 9580 between 2300 and 0500 UT; there isn't much of anything there then.

6175 kHz

This was formerly a prominent *BBC* evening frequency for North America originating from Canadian transmitting facilities in Sackville, New Brunswick. With the *BBC* no longer broadcasting to North America, *Radio Canada International* (RCI) has succeeded in repurposing the facility to keep in use for evening broadcasts to North America.

6175 signs on at 2300 UT with two hours of RCI programming in English. Beginning at 0100, the *Voice of Vietnam* is relayed with a half-hour in English, an hour in Vietnamese, another hour-hour in English, a half-hour in Spanish, a final half-hour in English and then more Vietnamese. (See *MT's SWG* for details on the English language programs.)

11620 kHz

This is a channel, wholly occupied by *All India Radio* (AIR) external services, that provides continuous programming audible in North America from 1745 UT until several hours into the early evening, depending on propagation conditions. During no part of this time does AIR intentionally transmit to North America and, in truth, AIR uses 11620 almost around the clock. However, only the broadcasts directed toward Europe are best received here.

At 1745, the General Overseas Service in English opens for a two hour broadcast to the United Kingdom and Ireland. This is followed by an hour in Hindi and a further 105 minutes in English. After a fifteen minute pause to permit a reorientation of the antenna beam, the General Overseas Service in English resumes at 2245 UT, but with a two hour broadcast to Southeast Asia followed by several hours in Hindi and other Asian languages.

AIR broadcasts several newscasts and a fair amount of feature programming, but the most exotic and identifiable feature of AIR programming is the wide variety of subcontinental music presented. It is placed throughout the schedule, so the listener can be assured of regular and copious amounts of film music, karnatak classical music, folk music, vocal and instrumental numbers.

10330 kHz

This is a frequency used by several AIR domestic services almost continuously from 0030 through 1830 UT. None of the programming is in English, but on good nights one can sample what local and regional radio is like in India. Furthermore, this frequency serves as a fine bellwether for propagation circuits to and from that area of the world.

9460 kHz

Twenty four hours a day, this frequency carries the Voice of Turkey in Turkish to Europe, North and Central America. Much of the content is wonderful Turkish music which has both Middle Eastern and European influences, reflecting the location of the country geographically, socially, culturally and politically.

5975, 9410, and 12095 kHz

Looking for the *BBC*? Chances are you can find the World Service on at least one of these frequencies every hour of the day wherever you are in the world. 5975 is the most reliable for North American evenings (2100-0500 UT). 9410 and 12095 are what remain of what was once a troika (with 15070) of frequencies that were "out of band" and consequently mostly in the clear (apart from some radioteletype noise at times).

You must have some favorite parking frequencies as well. Why not share them with us? Write me care of this magazine or by e-mail with yours!

Beware the Ides of March and good listening.

How to Use the Shortwave Guide

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 Standard Time) 5, 6, 7, or 8 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, 7:30 pm Eastern, 6:30 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 À 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 print deadline.

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 for prime listening hours appear following the frequencies – 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.

MT Monitoring Team

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Program Highlights

John Figliozzi

Voice of Russia 1800-1900

We've packed all the information we can into the programming pages, but wanted to give you the last hour's schedule of VOR's morning (1500-1900 UT) broadcast to western North America on 7260 kHz. So, we put it here:

News on hour and half hour. 1811 S Music and Musicians, M/H/A Moscow Mailbag, T/F Newmarket, W Science & Engineering. 1832 M Kaleidoscope, T Yours for the Asking, W Moscow Yesterday & Today, H Russian Musical Portraits, F Folk Box, A Songs from Russia. *1847 T Music at Your Request, H Russia: Personalities and Events, A You Write to Moscow.*

Time to Talk

We've raved in these pages over **Radio Australia**'s excellent educational programs which combine a series of informative and entertaining radio broadcasts with creatively designed and fully interactive Internet web sites. The newest of these is *Time to Talk*, a 13 part series that debuted in December and examines the politics, societies and governments of the Pacific island nations. If you've missed the earlier installments, it's not a problem. Each program stands on its own and, besides, you can catch up by listening and reading the earlier parts via the Internet web site **http://www.abc.net.au/timetotalk/**. *Time to Talk* is broadcast at 1830 F, 0330 A, 2130 S via shortwave and streaming audio. You can access other RA educational series at **http://www.abc.net.au/ra/learn/default.htm**.

A Little Help, Please?

If you've been blessed with the receipt of a recent program guide from **Radio Kuwait**, **All India Radio** or **Radio Cairo**, we'd appreciate it if you'd share it with us. Contact me via my e-mail address *jfiglio1@nycap.rr.com* or via postal mail c/o this magazine.

An Internet Audio Tip

If you want a refreshing departure from what you usually hear on radio, **KCRW** in Santa Monica, California originates a fantastic three-hour music program entitled *Morning Becomes Eclectic* that is broadcast live locally in southern California on FM and worldwide via Internet audio streaming, weekdays from 1700-2000 UT. Here's the site: **http://www.kcrw.com/**.

0000 UTC - 7PM E / 6PM C / 4PM P

0000	0015		Cambodia, National Radio Of	11940as				
0000	0015		Japan, Radio13650as	17810as				
0000	0030		Australia, Radio	9660pa	12080pa	15240as	15415as	17580va
			17750as 17795va	21615as	21740va			
0000	0030		Austria, Christian Voice	17775as	17850as			
0000	0030		Egypt, Radio Cairo	9900na				
0000	0030		Sri Lanka, SLBC	4940do				
0000	0030		Thailand, Radio	9655af	9680af	11905af		
0000	0030		UK, BBC World Service	3915as	5965as	5975am	6195as	7105as
			9410as 9915sa	11945as	11955as	12095sa	15280as	15310as
			15360as 17615as	17790as	17615as	17790as		
0000	0045		India, All India Radio	9705as	9950as	13605as		
0000	0100		Anguilla, Caribbean Beacon		6090am			
0000	0100	vl	Australia, ABC/Alice Springs		4835da			
0000	0100	vl	Australia, ABC/Katherine		5025do			
0000	0100	vl	Australia, ABC/Tennant Creek		4910da			
0000	0100		Bulgaria, Radio	7400na	9400na			
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		Canada, Radio Canada Intl		5960na	6175na	9590na	9750as
			9755na 11895as					
0000	0100		Costa Rica, R for Peace Intl		7455irr	15040va	21815usb	
0000	0100		Costa Rica, University Network		5030am	6150am	7375am	9724sa
			11870am 13749na					
0000	0100		Ecuador, HCJB	11785as				
0000	0100	a/monthly	Finland, Scandv Weekend Radio		5980va	11720va		
0000	0100		Germany, Voice of Hope		6040as			
0000	0100		Guyana, Voice of	3290do	5950do			
0000	0100		Japan, Radio6145na					
0000	0100		Malaysia, Radio	7295do				
0000	0100		Malaysia, RTM Kota Kinabalu		5980do			
0000	0100		Malaysia, RTM Sarawak	7160do				
0000	0100	vl	Namibia, NBC	3270af	3290af	7215irr		
0000	0100		Netherlands, Radio	6165na	9845na			
0000	0100		New Zealand, Radio NZ Intl		17675pa			
0000	0100	vl	Papua New Guinea, NBC		9675do	11880irr		
0000	0100		Russia, University Network		9940as			
0000	0100		Singapore, SBC Radio One		6150do			
0000	0100	vl	Solomon Islands, SIBC	5020do	9545do			
0000	0100		Spain, R Exterior Espana	6055na				
0000	0100		USA, Armed Forces Radio		6458usb	12689usb		
0000	0100		USA, KAIJ Dallas TX	5755va				
0000	0100		USA, KTBN Salt Lk City UT		7510na			
0000	0100		USA, KWHR Naalehu HI	17510as				
0000	0100	twhfa	USA, Voice of America	5995me	6130am	7405am	9455am	9775am
			11695am 13790am					
0000	0100		USA, WBCQ Monticello ME		7415na	9335na	17495na	
0000	0100		USA, WEWN Birmingham AL		5825na	9355na	15745na	
0000	0100		USA, WHRA Greenbush ME		7580af			
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	9955am				
0000	0100		USA, WRNO New Orleans LA		7355am			
0000	0100		USA, WSHB Cyp Creek SC		9430am	15285sa		
0000	0100		USA, WTJC Newport NC		9370na			
0000	0100	sm	USA, WWBS Macon GA	11900na				
0000	0100		USA, WWCR Nashville TN		3215na	5070na	7520na	13845na
0000	0100		USA, WWFV McCaysville GA		6890va	9320va	12172va	
0000	0100		USA, WYFR Okeechobee FL		6085na	9505na		
0000	0100	vl	Vanuatu, Radio	3945do	4960do	7260do		
0000	0100		Zambia, Christian Voice	4965do				
0005	0010		Croatia, Croatian Radio	9925sa				
0030	0100		Australia, Christian Voice Intl		21680as			
0030	0100		Australia, Christian Voice Intl		17775as	17850pa		
0030	0100		Australia, Radio	9660pa	12080pa	15135as	15240as	15415as
			17580va 17750as	17795va	21740va			
0030	0100		Austria, Christian Voice	17775as	17850as	21680pa		
0030	0100		Iran, VO Islamic Rep. of	Iran	6065am	6135na		
0030	0100		Lithuania, R Vilnius	7325am				
0030	0100		Sri Lanka, SLBC	4940do	6005as	9770as	15425as	
0030	0100		Thailand, Radio	9655as	11905as	13695as		
0030	0100		UAE, AWR Africa	6025as	6055as			
0030	0100		UK, BBC World Service	5965as	5975am	6195as	7105as	9410as
			11955as 12095sa	15280as	15310as	15360as	17790as	
0030	0100		USA, VOA Special English		7215as	9890as	11760as	15185as
			15290as 17740as	17820as				
0030	0100		USA, Voice of America	5995me	6015me	6105me	7215as	7265me
			9890as 11760as	15185as	15290as	17740as	17820as	
0030	0100		USA, Voice of America	5995me	6015me	6105me	7265me	
0055	0100		Italy, RAI Intl 9675na	11800na				

0100 UTC - 8PM E/ 7PM C / 5PM P

0100	0115		Italy, RAI Intl 9675na	11800na				
0100	0125		Netherlands, Radio	6165na	9845na			
0100	0127		Czech Rep, Radio Prague Intl		6200na	7345na		
0100	0127		Vietnam, Voice of	6175na				
0100	0130		Australia, Christian Voice Intl		17775as	21550pa	21680pa	
0100	0130		Austria, AWR Europe	6160as				
0100	0130		Austria, Christian Voice	17775as	21550as	21680po		
0100	0130	s	Germany, Universal Life	9435as				
0100	0130		Germany, Voice of Hope		6040as			
0100	0130		Iran, VO Islamic Rep. of Iran		6065am	6135na		
0100	0130		Slovakia, R Slovakia Intl	5930na	7230ca	9440sa		
0100	0130	twhfa	USA, Voice of America	5995am	6130am	7405am	9455am	9775am
			13790am					
0100	0130		Uzbekistan, Radio Tashkent		5955as	5975as	7215as	
0100	0130	mtwhfa	Yugoslavia, Radio	7115am				
0100	0145		Germany, Deutsche Welle		6040na	6145am	9640na	9700am
			9765na 11985na					
0100	0156		China, China Radio Intl	9580na	9790na			
0100	0156		North Korea, Voice of	6195as	6520am	7140as	7580am	9345as
			11735am					
0100	0159		Spain, R Exteriar Espana	6055na				
0100	0200		Anguilla, Caribbean Beacon		6090am			
0100	0200	vl	Australia, ABC/Katherine		5025da			
0100	0200	vl	Australia, ABC/Tennant Creek		4910da			
0100	0200		Australia, Radio	9660pa	12080pa	15240as	15415as	17580va
			17750as 17795va	21725as				
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		Costa Rica, R for Peace Intl		7455irr	15040va	21815usb	
0100	0200		Costa Rica, University Network		5030am	6150am	7375am	9724sa
			11870am 13749na					
0100	0200		Cuba, Radio Havana	6000na	9820na	11705usb		
0100	0200		Ecuador, HCJB	9745na	11840na	21455usb		
0100	0200	a/monthly	Finland, Scandv Weekend Radio		5980va	11720va		
0100	0200		Guyana, Voice of	3290do	5950do			
0100	0200		Indonesia, Voice of	9525pa	11785as	15150as		
0100	0200		Japan, Radio11860pa	11870as	11880va	17810as	15325as	17685pa
			17835as 17845as					
0100	0200		Malaysia, Radio	7295do				
0100	0200		Malaysia, RTM Kota Kinabalu		5980do			
0100	0200		Namibia, NBC	3270af	3290af	7215irr		
0100	0200		New Zealand, Radio NZ Intl		17675pa			
0100	0200	vl	Papua New Guinea, NBC		9675do	11880irr		
0100	0200		Russia, University Network		9940as			
0100	0200		Singapore, SBC Radio One		6150do			
0100	0200	vl	Solomon Islands, SIBC	5020do	9545do			
0100	0200		Sri Lanka, SLBC	6005as	9770as	15425as		
0100	0200		UK, BBC World Service	5965as	5975am	6195as	9410as	9525ca
			9915sa 11955as	12095sa	15280as	15310as	15360as	17790as
0100	0200		Ukraine, R Ukraine Intl	7375eu	7420as	9610as		
0100	0200		USA, Armed Forces Radio		6458usb	12689usb		
0100	0200		USA, KAIJ Dallas TX	5755va				
0100	0200		USA, KTBN Salt Lk City UT		7510na			
0100	0200		USA, KVOH Los Angeles CA		9975na			
0100	0200		USA, KWHR Naalehu HI	17510as				
0100	0200		USA, Voice of America	5995me	6015me	6105me	7115as	7200as
			7255me 9850as	11705as	11820as	15250as	15300as	17740as
			17820as					
0100	0200		USA, WBCQ Monticello ME		7415na	9335na	17495na	
0100	0200		USA, WEWN Birmingham AL		5825na	9355na	15745na	
0100	0200		USA, WHRA Greenbush ME		7580af			
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	9955am				
0100	0200		USA, WRNO New Orleans LA		7355am			
0100	0200		USA, WSHB Cyp Creek SC		9430na	15285sa		
0100	0200		USA, WTJC Newport NC		9370na			
0100	0200		USA, WWCR Nashville TN		3215na	5070na	5935na	7520na
0100	0200		USA, WWFV McCaysville GA		6890va	9320va	12172va	
0100	0200		USA, WYFR Okeechobee FL		6065na	9505na	15060as	
0100	0200	vl	Vanuatu, Radio	3945do	4960do	7260do		
0100	0200		Zambia, Christian Voice	4965do				
0130	0145	vl	Libya, Voice of Africa	15435irr	17725af			
0130	0200		Austria, Christian Voice	21550as	21680pa			
0130	0200		Sweden, Radio	7290al	9495as			
0130	0200		UK, RTE Radio	6155ca				
0130	0200	twhfa	USA, VOA Special English	7405am	9775am	13740am		
0130	0200	twhfa	USA, Voice of America	5995am	6130am	9455am		
0140	0145		Croatia, Croatian Radio	9925sa				
0140	0200		Vatican City, Vatican Radio	7335au	9650au			

0200 UTC - 9PM E / 8PM C / 6PM P

0200	0227		Czech Rep, Radio Prague Intl		6200na	7345na		
0200	0230		Germany, Voice of Hope		11785as			
0200	0230	mtwhfa	Hungary, Radio Budapest		9835na			
0200	0230		Myanmar, Radio	7185do				
0200	0230		Yugoslavia, Radio	7130am				
0200	0245		Germany, Deutsche Welle		7285as	9615as	9765as	11965as
0200	0256		North Korea, Voice of	9325as	11335as			
0200	0259		Canada, Radio Canada Intl		6040am	7235as	9755am	11725am
			11990am 15150as	17860as				
0200	0300		Anguilla, Caribbean Beacon		6090am			
0200	0300	twhfa	Argentina, RAE	6060am	11710am			
0200	0300	vl	Australia, ABC/Alice Springs		4835do			

SELECTED PROGRAMMING BEGINS ON PAGE 55

0200	0300	vl	Australia, ABC/Katherine	5025do				
0200	0300	vl	Australia, ABC/Tennant Creek	4910do				
0200	0300		Australia, Christian Voice Intl	21550as	21680pa			
0200	0300		Australia, Radio 9660pa	12080pa	15415as	15515va	17580va 17750as 21725as	
0200	0300		Austria, Christian Voice	21550as	21680pa			
0200	0300		Canada, CBC Northern Service	9625do				
0200	0300		Canada, CFRX Toronto ON	6070do				
0200	0300		Canada, CFVP Calgary AB	6030do				
0200	0300		Canada, CHNX Halifax, NS	6130do				
0200	0300		Canada, CKZN St John's NF	6160do				
0200	0300		Canada, CKZU Vancouver BC	6160do				
0200	0300		Costa Rica, R for Peace Intl	7455irr	15040va	21815usb		
0200	0300		Costa Rica, University Network 11870am 13749na	5030am	6150am	7375am	9724sa 13749na	
0200	0300		Cuba, Radio Havana 6000na	9820na	11705usb			
0200	0300		Ecuador, HCJB 9745na	11840na	21455usb			
0200	0300		Egypt, Radio Cairo 9475na					
0200	0300	a/monthly	Finland, Scandv Weekend Radio	5990va	11720va			
0200	0300		Guyana, Voice of 3290do	5950do				
0200	0300		Kenya, Kenya BC Corp 4885irr	4915irr				
0200	0300		Malaysia, Radio 7295do					
0200	0300		Malaysia, RTM Kota Kinabalu	5980do				
0200	0300		Namibia, NBC 3270af	3290af	7215irr			
0200	0300		New Zealand, Radio NZ Intl	17675pa				
0200	0300	vl	Papua New Guinea, NBC	9675do	11880irr			
0200	0300		Romania, R Romania Intl 15290as 15370po	9550na	11740na	11830na	11940va	
0200	0300		Russia, University Network	9940as				
0200	0300		Russia, Voice of Russia 7180na 13655na	7250na	7335na	9765na	1202na	
0200	0300		Singapore, SBC Radio One	6150do				
0200	0300	vl	Solomon Islands, SIBC 5020do	9545do				
0200	0300		South Korea, R Korea Intl 15575na	7275na	9560na	11725sa	11810sa	
0200	0300		Sri Lanka, SLBC 6005as	6130do	9770as	15425as		
0200	0300		Taiwan, R Taipei Intl 15320na	15465na				
0200	0300		Taiwan, R Taipei Intl 5950na	9680na	11740ca	15320as	15345as	
0200	0300		UK, BBC World Service 5975am 11955as 12095sa	9410me 15280as	9525ca 15310as	9770af 15360as	9915sa 17790as	
0200	0300		USA, Armed Forces Radio	6458usb	12689usb			
0200	0300		USA, KAIJ Dallas TX 5755va					
0200	0300		USA, KJES Vado NM 7555na					
0200	0300		USA, KTBN Salt Lk City UT	7510na				
0200	0300		USA, KVOH Los Angeles CA	9975na				
0200	0300		USA, KWHR Naalehu HI 17510as					
0200	0300		USA, Voice of America 5995me 7255me 9850as	6015me 11705as	6105me 11820as	7115as 15250as	7200as 15300as	17740as 17820as
0200	0300		USA, WBCQ Monticello ME	7415na	9335na			
0200	0300		USA, WEWN Birmingham AL	5825na	9355na	15745na		
0200	0300		USA, WHRA Greenbush ME	7580af				
0200	0300		USA, WHRI Noblesville IN	5745va	7315am			
0200	0300		USA, WINB, Red Lion PA 12160am					
0200	0300		USA, WJCR Upton KY 7490am	13595as				
0200	0300		USA, WRMI Miami FL 7385am					
0200	0300		USA, WRNO New Orleans LA	7355am				
0200	0300		USA, WSHB Cyp Creek SC	7535am	9430na			
0200	0300		USA, WTJC Newport NC	9370na				
0200	0300		USA, WWCR Nashville TN	3215na	5070na	5935na	7520na	
0200	0300		USA, WWFV McCaysville GA	6890va	12172va			
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				
0205	0210		Croatia, Croatian Radio 9925na					
0215	0220		Nepal, Radio3230as	5005as				
0230	0257		Vietnam, Voice of 6175na					
0230	0300		Austria, Radio Austria Intl	7325na				
0230	0300		Iraq, Radio Iraq Intl 7157irr	9887irr	11787irr			
0230	0300	as	Philippines, Radio Pilipinas	12015me	15120me	15270me		
0230	0300		Slovakia, AWR 7235as					
0230	0300		Sweden, Radio 6020al	9495na				
0245	0300		Albania, Radio Tirana Intl	6110al	6115na	7160na		
0250	0300		Vatican City, Vatican Radio	7305am	9605am			

0300 UTC - 10PM E / 9PM C / 7PM P

0300	0310		Vatican City, Vatican Radio	7305am	9605am			
0300	0330	sm w fa	Belarus, Radio Belarus Intl	5970eu	7210eu			
0300	0330		Egypt, Radio Cairo 9475na					
0300	0330		S Africa, Channel Africa 9525af					
0300	0330		Thailand, Radio 9655am	11905am	15460na			
0300	0330	a	UK, Wales Radio Intl 9795na					
0300	0330		USA, KJES Vado NM 7555na					
0300	0330		USA, KVOH Los Angeles CA	9975na				
0300	0330	mtwhf	USA, Voice of America 4960af					
0300	0345		Germany, Deutsche Welle 9765na 11985na	6020na	6045na	9640am	9700na	
0300	0356		China, China Radio Intl 9690na					
0300	0356		North Korea, Voice of 6195as	7140as	9345as			
0300	0358		New Zealand, Radio NZ Intl	17675pa				
0300	0400		Anguilla, Caribbean Beacon	6090am				
0300	0400	vl	Australia, ABC/Alice Springs	4835da				
0300	0400	vl	Australia, ABC/Katherine	5025do				
0300	0400	vl	Australia, ABC/Tennant Creek	4910do				
0300	0400		Australia, Christian Voice Intl	21550as	21680pa			
0300	0400		Australia, Radio 9660pa	12080pa	15240as	15415as	15515va 17580va 17750as 21725as	
0300	0400		Austria, Christian Voice	21550as	21680pa			
0300	0400	vl	Botswana, Radio 3356do	4820do	7255do			
0300	0400		Bulgaria, Radio 7400na	9400na				
0300	0400		Canada, CBC Northern Service	9625da				
0300	0400		Canada, CFRX Toronto ON	6070do				
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		Costa Rica, R for Peace Intl	7455irr	15040va			
0300	0400		Costa Rica, University Network 11870am 13749na	5030am	6150am	7375am	9724sa 17645as	
0300	0400		Cuba, Radio Havana 6000na	9820na	11705usb			
0300	0400		Ecuador, HCJB 9745na	11840na	21455usb			
0300	0400	a/monthly	Finland, Scandv Weekend Radio	5990va	11720va			
0300	0400	vl	Guatemala, Radio Cultural	3300do	5955do			
0300	0400		Guyana, Voice of 3290do	5950do				
0300	0400		Japan, Radio17825ca					
0300	0400		Kenya, Kenya BC Corp 4885irr	4915irr				
0300	0400	vl	Lesotho, Radio 4800do					
0300	0400		Malaysia, Radio 7295do					
0300	0400		Malaysia, Voice of 6175as	9750as	15295pa			
0300	0400		Namibia, NBC 3270af	3290af	7215irr			
0300	0400		Oman, Radio 15355va					
0300	0400	vl	Papua New Guinea, NBC	9675do	11880irr			
0300	0400	as	Philippines, Radio Pilipinas	12015me	15120me	15270me		
0300	0400		Russia, University Network	17765as				
0300	0400		Russia, Voice of Russia 7180na	7250na	7335na	12020na	13665no	
0300	0400		Singapore, SBC Radio One	6150do				
0300	0400	vl	Solomon Islands, SIBC 5020do	9545do				
0300	0400		Sri Lanka, SLBC 6005as	9770as	15425as			
0300	0400		Taiwan, R Taipei Intl 5950na	9680na	11875as	15320as		
0300	0400		Uganda, Radio 5026do	7196do				
0300	0400		UK, BBC World Service 3255af 7160af 9410eu 15280as 15310as 21830as	5975am 9525ca 15360as	6005af 11730af 15575me	6190af 11765af 17760as	6195eu 12035af 17790as	12095me 21660as
0300	0400		USA, Armed Forces Radio	6458usb	12689usb			
0300	0400		USA, KAIJ Dallas TX 5755va					
0300	0400		USA, KTBN Salt Lk City UT	7510na				
0300	0400		USA, KWHR Naalehu HI 17510as					
0300	0400		USA, Voice of America 6035af 7415af 9575af	6080af 9885af	7105af	7290af	7340af	
0300	0400		USA, WBCQ Monticello ME	7415na	9335na			
0300	0400		USA, WEWN Birmingham AL	5825na	7425na	15745na		
0300	0400		USA, WHRA Greenbush ME	7580af				
0300	0400		USA, WHRI Noblesville IN	5745va	7315am			
0300	0400		USA, WINB, Red Lion PA	12160am				
0300	0400		USA, WJCR Upton KY 7490am	13595as				
0300	0400		USA, WMLK Bethel PA 9465eu					
0300	0400		USA, WRMI Miami FL 7385am					
0300	0400		USA, WRNO New Orleans LA	7395am				
0300	0400		USA, WSHB Cyp Creek SC	7535eu				
0300	0400		USA, WTJC Newport NC	9370na				
0300	0400		USA, WWCR Nashville TN	3215na	5070na	5935na	7520na	
0300	0400		USA, WWFV McCaysville GA	6890va	12172va			
0300	0400		USA, WYFR Okeechobee FL	6065na	9505na			
0300	0400	vl	Vanuatu, Radio 3945do	4960do	7260do			
0300	0400		Zambia, Christian Voice 6065do					
0300	0400	vl	Zimbabwe, Zimbabwe BC Corp	4828do	6045do			
0310	0340		Vatican City, Vatican Radio	9660af				
0330	0345	vl	Libya, Voice of Africa 15435irr	17725af				
0330	0350		UAE, Emirates Radio 12005na	13675no	15400na			
0330	0357		Vietnam, Voice of 6175na					
0330	0400		Albania, Radio Tirana Intl	6110al	6115na	7160na		
0330	0400	mtwhfa	Hungary, Radio Budapest	9835na				
0330	0400		Myanmar, Radio 9730do					
0330	0400		Sweden, Radio 9495na	9755al				
0330	0400		UAE, AWR Africa 11795as					
0340	0345		Croatia , Croatian Radio	9925na				
0345	0400	f	Seychelles, FEBA Radio 11885af					
0345	0400		Tajikistan, Radio 7245as					
0359	0400		New Zealand, Radio NZ Intl	15340pa				

0400 UTC - 11PM E / 10PM C / 8PM P

0400	0425		Belgium, RVI Flanders R Intl	11985na				
0400	0427		Czech Rep, Radio Prague Intl	7345na	7385na	9435na		
0400	0430		Austria, Christian Voice	21550as				
0400	0430		France Radio France Intl	11910af	11995af	13610af		
0400	0430	vl	Guatemala, Radio Cultural	3300do	5955do			
0400	0430	s twhfa	Mexico, Radio Mexico Intl	9705am	11770am			
0400	0430	vl	Nigeria, Radio/Kaduna 6090do	7275do				
0400	0430		S Africa, AWR Africa 9650af					
0400	0430		S Africa, Channel Africa 5955af					
0400	0430		Sri Lanka, SLBC 6005as	9770as	15425as			
0400	0445		Germany, Deutsche Welle	6015af	7195af	9565af	9710af	
0400	0445		USA, WYFR Okeechobee FL	6065na	9505na	9985eu	11550eu	
0400	0450		Turkey, Voice of 6020na	7240va				
0400	0456		China, China Radio Intl 9560na					
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 Intl	21550as				
0400	0500		Australia, Radio 9660pa	12080pa	15240as	15415as	15515va 17580va 17750as 21725as	21780as

0400	0500	vl	Botswana, Radio	3356do	4820do	7255do		
0400	0500	vl	Cameroon, RTV	4850do	6005do			
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	15040va		
0400	0500		Costa Rica, University Network		5030am	6150am	7375am	9724sa
			11870am 13749na	17645as				
0400	0500		Cuba, Radio Havana	6000na	9820na	11705usb		
0400	0500		Ecuador, HCJB	9745na	11840na	21455usb		
0400	0500	a/monthly	Finland, Scandv Weekend Radio		5990va	11720va		
0400	0500		Guyana, Voice of	3290do	5950do			
0400	0500		Kenya, Kenya BC Corp	4885irr	4915irr			
0400	0500	vl	Lesotho, Radio	4800do				
0400	0500		Malaysia, Radio	7295do				
0400	0500		Malaysia, Voice of	6175as	9750as	15295pa		
0400	0500		Myanmar, Radio	9730do				
0400	0500		Namibia, NBC	3270af	3290af	7215irr		
0400	0500		New Zealand, Radio NZ Intl		15340pa			
0400	0500	vl	Nigeria, Radio/Enugu	6025do				
0400	0500	vl	Papua New Guinea, NBC		9675do	11880irr		
0400	0500		Romania, R Romania Intl		9550na	11830na	15335as	17735as
0400	0500		Russia, University Network		17765as			
0400	0500		Russia, Voice of Russia	7125na	7180na	7330na	12010na	12020na
			13665na 15595na	17595na				
0400	0500		Singapore, SBC Radio One		6150do			
0400	0500	vl	Solomon Islands, SIBC	5020do	9545do			
0400	0500		Uganda, Radio	5026do	7196do			
0400	0500		UK, BBC World Service	3255af	5975am	6005af	6135ca	6190af
			6195eu 7160af	9410eu	11765af	12035af	12095me	15280as
			15310as 15420af	15575me	17760as	17790as	21660as	21830as
0400	0500		Ukraine, R Ukraine Intl	7285as	7375as	7420as	9610as	
0400	0500		USA, Armed Forces Radio		6458usb	12689usb		
0400	0500		USA, KAIJ Dallas TX	5755va				
0400	0500		USA, KTBN Salt Lk City UT		7510na			
0400	0500		USA, KWHR Naalehu HI	17780as				
0400	0500		USA, Voice of America	6080af	7170af	7290af	7415af	9575af
			9775af 9885af	15205as				
0400	0500		USA, WBCQ Monticello ME		7415na	9335na		
0400	0500		USA, WEWN Birmingham AL		5825na	7425na	15745na	
0400	0500		USA, WHRA Greenbush ME		7580af			
0400	0500		USA, WHRI Noblesville IN		5745va	7315am		
0400	0500		USA, WINB, Red Lion PA		12160am			
0400	0500		USA, WJCR Upton KY	7490am	13595as			
0400	0500		USA, WMLK Bethel PA	9465eu				
0400	0500		USA, WRMI Miami FL	7385am				
0400	0500		USA, WSHB Cyp Creek SC		7535eu	12020af		
0400	0500		USA, WTJC Newport NC		9370na			
0400	0500		USA, WWCR Nashville TN		3215na	5070na	5935na	7560na
0400	0500		USA, WWFV McCaysville GA		6890va	12172va		
0400	0500		Zambia, Christian Voice	6065do				
0400	0500	vl	Zimbabwe, Zimbabwe BC Corp		4828do	6045do		
0405	0410		Croatia, Croatian Radio	7285na	9925na			
0427	0500	a	Liberia, Voice of Hope	12060af	15320af			
0430	0457		Czech Rep, Radio Prague Intl		9865va	11600va		
0430	0500		Australia, Christian Voice Intl		21680pa			
0430	0500		Austria, Christian Voice	21550as	21680pa			
0430	0500		Italy, IRRS	3980al	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	3326da	4990do			
0430	0500		S Africa, AWR Africa	12080af				
0430	0500	mtwhfa	Swaziland, TWR	4775af	6035af			
0445	0500		Italy, RAI Intl	5965af	7235af			

0500 UTC - 12AM E / 11PM C / 9PM P

0500	0515		Canada, CBC Northern Service		9625do			
0500	0515		Israel, Kol Israel	6280va	7520va	17545va		
0500	0515		Zambia, National BC Corp		6265do			
0500	0525	a	Liberia, Voice of Hope	12060af	15320af			
0500	0530		Austria, Christian Voice	21550as				
0500	0530		France Radio France Intl	13610af	15155af	17800af		
0500	0530	s twhfa	Mexico, Radio Mexico Intl		9705am	11770am		
0500	0530		Netherlands, Radio	6165na	9590na			
0500	0530		S Africa, AWR Africa	5960af	6015af			
0500	0530		S Africa, Channel Africa	15215af				
0500	0530		Vatican City, Vatican Radio		9660af	11625af	15570af	
0500	0530	vl	Zimbabwe, Zimbabwe BC Corp		4828do	6045do		
0500	0545		Germany, Deutsche Welle		5960na	6120na	9670na	11795na
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 Intl		21550as	21680pa		
0500	0600		Australia, Radio	9660pa	12080pa	15240as	15415as	15515va
			17580va 17750as	17865as	21725os			
0500	0600	mtwhf	Bhutan, Bhutan BC Service		5030al	6035do		
0500	0600	vl	Botswana, Radio	3356do	4820do	7255do		
0500	0600	vl	Cameroon, RTV	4850do	6005do			
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	15040va		
0500	0600		Costa Rica, University Network		5030am	6150am	7375am	9724sa
			11870am 13749na	17645as				
0500	0600		Cuba, Radio Havana		9550na	9820nc	9830usb	
0500	0600		Ecuador, HCJB		9745na	11840na	21455usb	
0500	0600	a/monthly	Finland, Scandv Weekend Radio		5990va	11720va		
0500	0600		Guyana, Voice of	3290do	5950dc			
0500	0600		Japan, Radio	5975eu	6110na	7230eu	9835na	11715eu 11760eu
			15195as 17810as	21755pa				
0500	0600		Kenya, Kenya BC Corp	4885irr	4915irr			
0500	0600		Kuwait, Radio	15110as				
0500	0600	vl	Lesotho, Radio	4800do				
0500	0600		Malaysia, Radio	7295do				
0500	0600		Malaysia, RTM Sarawak	7160do				
0500	0600		Malaysia, Voice of	6175as	9750as	15295pa		
0500	0600		Myanmar, Radio	9730do				
0500	0600		Namibia, NBC	3270af	3290af	7215irr		
0500	0600		New Zealand, Radio NZ Intl		15340pa			
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	0600		Nigeria, Voice of	7255af	11770af	15120va		
0500	0600	vl	Papua New Guinea, NBC		9675do	11880irr		
0500	0600		Russia, University Network		17765as			
0500	0600		Russia, Voice of Russia	7125na	7180na	7330na	12010na	12020na
			15595na 17595na					
0500	0600		Singapore, SBC Radio One		6150do			
0500	0600	vl	Solomon Islands, SIBC	5020do	9545do			
0500	0600		Spain, R Exterior Espana	6055na				
0500	0600		Swaziland, TWR	6035af	7205af	9500af		
0500	0600		Uganda, Radio	5026do	7196do			
0500	0600		UK, BBC World Service	6005af	6135ca	6190af	6195eu	7160af
			9410eu 11760me	11765af	11940af	11955as	15280as	15310as
			15360as 15420af	15575as	17640af	17760as	17790as	17885af
			21660as					
0500	0600		USA, Armed Forces Radio		6458usb	12689usb		
0500	0600		USA, KAIJ Dallas TX	5755va				
0500	0600		USA, KTBN Salt Lk City UT		7510na			
0500	0600		USA, KWHR Naalehu HI	17780as				
0500	0600	mtwhf	USA, KWHR Naalehu HI	11565pa				
0500	0600		USA, Voice of America	5970af	6035af	6080af	7170af	7295af
			9700af 11825eu	11835af	13710af	15205as		
0500	0600		USA, WBCQ Monticello ME		7415na	9335na		
0500	0600		USA, WEWN Birmingham AL		5825na	7425na	15745na	
0500	0600		USA, WHRA Greenbush ME		7580af			
0500	0600		USA, WHRI Noblesville IN		5745va	7315am		
0500	0600		USA, WJCR Upton KY	7490am	13595as			
0500	0600		USA, WMLK Bethel PA	9465eu				
0500	0600		USA, WRMI Miami FL	7385am				
0500	0600		USA, WRNO New Orleans LA		7395am			
0500	0600		USA, WSHB Cyp Creek SC		7535eu	12020af		
0500	0600		USA, WTJC Newport NC		9370na			
0500	0600		USA, WWCR Nashville TN		3215na	5070na	5935na	7560na
0500	0600		USA, WWFV McCaysville GA		6890va	12172va		
0500	0600		USA, WYFR Okeechobee FL		5810eu			
0500	0600	vl	Vanuatu, Radio	3945do	4960do	7260do		
0500	0600		Zambia, Christian Voice	6065do				
0525	0600	vl	Ghana, Ghana BC Corp		3366do	4915do		
0530	0550		UAE, Emirates Radio	15435au	17830au	21700au		
0530	0600		Austria, Christian Voice	21550as	21680pa			
0530	0600		S Africa, AWR Africa	15345af				
0530	0600		Thailand, Radio	9655eu	11905eu	13780eu		
0530	0600	mtwhf	UK, BBC World Service	17885af				
0530	0600	vl	Zimbabwe, Zimbabwe BC Corp		5975do	6045do		
0540	0545		Croatia, Croatian Radio	7285na	9925na			

0600 UTC - 1AM E / 12AM C / 10PM P

0600	0620		Vatican City, Vatican Radio		4005eu	5885eu	7250eu	
0600	0630		France Radio France Intl	11710af	15155af	17800af	21620af	
0600	0630		S Africa, AWR Africa	15345af				
0600	0630		S Africa, Channel Africa	15215af				
0600	0630		S Africa, TWR	15345af				
0600	0630		USA, Voice of America	5970af	6035af	6080af	7170af	7295af
			11825eu 11825af	11915me	11930af	11995af	12025af	13710af
			15205as 15335me					
0600	0645		Germany, Deutsche Welle		6140eu	7225af	9565af	11785af
0600	0700		Anguilla, Caribbean Beacon		6090am			
0600	0700	vl	Australia, ABC/Alice Springs		4835do			
0600	0700	v	Australia, ABC/Katherine		5025do			
0600	0700	vl	Australia, ABC/Tennant Creek		4910do			
0600	0700		Australia, Christian Voice Intl		21550os	21680pa		
0600	0700		Australia, Radio	9660pa	12080pa	15240as	15415as	15515va
			17580va 17750as	21725as				
0600	0700		Austria, Christian Voice	21550as	21680pa			
0600	0700	vl	Botswana, Radio	7255do	9600do			
0600	0700	vl	Cameroon, RTV	4850do	6005do			
0600	0700		Canada, CFRX Toronto ON		6070do			
0600	0700		Canada, CFVP Calgary AB		6030do			
0600	0700		Canada, CHNX Halifax, NS		6130do			
0600	0700		Canada, CKZN St John's NF		6160do			
0600	0700		Canada, CKZU Vancouver BC		6160do			
0600	0700		Costa Rica, R for Peace Intl		7455irr	15040va		
0600	0700		Costa Rica, University Network		5030am	6150am	7375am	9724sa
			11870am 13749na	17645as				
0600	0700		Cuba, Radio Havana		9550na	9820na	9830usb	

0600	0700	a/monthly	Finland, Scandv Weekend Radio	5990va	11720va			
0600	0700	vl	Ghana, Ghana BC Corp	3366do	4915do			
0600	0700		Guyana, Voice of	3290do	5950do			
0600	0700	mtwhf/vl	Italy, IRRS 3980al	3985va				
0600	0700		Japan, Radio7230eu	9835na	11740as	15195as	17870pa	21755pa
0600	0700		Kenya, Kenya BC Corp	4885irr	4915irr			
0600	0700		Kuwait, Radio	15110as				
0600	0700	vl	Lesotho, Radio	4800do				
0600	0700		Liberia, ELWA	4760do				
0600	0700		Liberia, R Liberia Intl	6100do				
0600	0700		Malaysia, Radio	7295do				
0600	0700		Malaysia, RTM Sarawak	7160do				
0600	0700		Malaysia, Voice of	6175as	9750as	15295pa		
0600	0700		Myanmar, Radio	9730do				
0600	0700		Namibia, NBC	3270af	3290af	7215irr		
0600	0700		New Zealand, Radio NZ Intl	15340pa				
0600	0700	vl	Nigeria, Radio/Enugu	6025do				
0600	0700	vl	Nigeria, Radio/Ibadan	6050do				
0600	0700	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do	
0600	0700	vl	Nigeria, Radio/Lagos	3326do	4990do			
0600	0700		Nigeria, Voice of	7255af	11770af	15120va		
0600	0700	vl	Papua New Guinea, NBC	9675do	11880irr			
0600	0700		Romania, R Romania Intl	9530na	11830na			
0600	0700		Russia, University Network	17765as				
0600	0700		Russia, Voice of Russia 11770au 21485au 21790au	15275au	15470au	17655au	17665au	
0600	0700		Sierra Leone, SLBS	3316do				
0600	0700		Singapore, SBC Radio One	6150do				
0600	0700	vl	Solomon Islands, SIBC	5020do	9545do			
0600	0700		Swaziland, TWR	6035af	7205af	9500af		
0600	0700		Uganda, Radio	7110	7196do			
0600	0700		UK, BBC World Service 11760me 11765af 15575as 17640af	6055af	6190af	6195eu	7160af	9410eu 11940af 15360as 17760as
				11955as	12095eu	15310as		
				17790as	21660as			
0600	0700	as	UK, BBC World Service	17885af				
0600	0700		USA, Armed Forces Radio	6458usb	12689usb			
0600	0700		USA, KAIJ Dallas TX	5755va				
0600	0700		USA, KTBN Salt Lk City UT	7510na				
0600	0700		USA, KWHR Naalehu HI	17780as				
0600	0700	mtwhf	USA, KWHR Naolehu HI	11565pa				
0600	0700		USA, WBCQ Monticello ME	7415na	9335na			
0600	0700		USA, WEWN Birmingham AL	5825na	7425na	15745na		
0600	0700		USA, WHRA Greenbush ME	7580af				
0600	0700		USA, WHRI Noblesville IN	5745va	7315am			
0600	0700		USA, WJCR Upton KY	7490am	13595as			
0600	0700		USA, WMLK Bethel PA	9465eu				
0600	0700		USA, WRMI Miami FL	7385am				
0600	0700		USA, WRNO New Orleans LA	7395am				
0600	0700		USA, WSHB Cyp Creek SC	7535af				
0600	0700		USA, WTJC Newport NC	9370na				
0600	0700		USA, WWCR Nashville TN	3215na	5070na	5935na	7560na	
0600	0700		USA, WWFV McCaysville GA	6980va	12172va			
0600	0700		USA, WYFR Okeechobee FL	7355eu	11550eu			
0600	0700	vl	Vanuatu, Radio	3945do	4960da	7260do		
0600	0700		Yemen, Rep of Yemen Radio	9780me				
0600	0700		Zambia, Christian Voice	9865do				
0600	0700	vl	Zimbabwe, Zimbabwe BC Corp	5975do	6045do			
0605	0610		Croatia, Croatian Radio	9470pa				
0610	0620	mtwhf	Greece, Voice of	9420eu	11900au	15630eu	17520pa	21530eu
0630	0700		Georgia, Georgian Radio	11805eu				
0630	0700		USA, Voice of America 12025af 15205as 15335me	5995af	7170af	11815eu	11915me	11930af
0630	0700	as	USA, Voice of America 11835af11995af 13710af	5970af	6035af	6080af	7295af	
0630	0700		Vatican City, Vatican Radio	11625af	13765af	15570af		
0632	0700		Austria, Radio Austria Intl	6155eu	13730eu	17870me		
0636	0653		Romania, R Romania Intl 11940eu	7145eu	9510eu	9570eu	11790eu	

0700 UTC - 2AM E / 1AM C / 11PM P

0700	0705		New Zealand, Radio NZ Intl	15340pa				
0700	0705		USA, WWCR Nashville TN	5070na	5935na	7560na		
0700	0705	sm	USA, WWCR Nashville TN	3210na				
0700	0705	twhfa	USA, WWCR Nashville TN	3215na				
0700	0730	vl	Papua New Guinea, NBC	9675do	11880irr			
0700	0730		Slovakia, R Slovakia Intl	15460au	17550au	21705au		
0700	0730		USA, Voice of America 11915me	12025af	15335me			
0700	0730	a	USA, Voice of America	6873af				
0700	0745		USA, WYFR Okeechobee FL	7355eu	9985af	11580af		
0700	0800		Anguilla, Caribbean Beacon	6090am				
0700	0800	vl	Australia, ABC/Alice Springs	4835do				
0700	0800	vl	Australia, ABC/Katherine	5025do				
0700	0800	vl	Australia, ABC/Tennant Creek	4910do				
0700	0800		Australia, Christian Voice Intl	17820as	21680pa			
0700	0800		Australia, Radio 17750as 21725as	9660pa	12080pa	15240va	15415as	17580va
0700	0800		Austria, Christian Voice	17820as	21680po			
0700	0800	vl	Botswana, Radio	7255do	9600do			
0700	0800	vl	Cameroon, RTV	4850do	6005do			
0700	0800		Canada, CFRX Toronto ON	6070do				
0700	0800		Canada, CFVP Calgary AB	6030do				
0700	0800		Canada, CHNX Halifax, NS	6130do				
0700	0800		Canada, CKZN St John's NF	6160do				
0700	0800		Canada, CKZU Vancouver BC	6160do				
0700	0800		Costa Rica, R for Peace Intl	7455irr	15040va			
0700	0800		Costa Rica, University Network 11870am 13749na 17645as	5030am	6150am	7375am	9724sa	
0700	0800		Ecuador, HCJB	9780eu	11755pa	21455usb		
0700	0800	mtwhf	Eqt Guinea, Radio Africa		15185af			
0700	0800	as/vl	Eqt Guinea, Radio East Africa		15185af			
0700	0800	a/monthly	Finland, Scandv Weekend Radio	5990va	11720va			
0700	0800		France Radio France Intl	15605af				
0700	0800		Germany, Voice of Hope	5975eu	21590me			
0700	0800		Germnay, Deutsche Welle	6140eu				
0700	0800	vl	Ghana, Ghana BC Corp	3366do	4915do			
0700	0800		Guyana, Voice of	3290do	5950do			
0700	0800	as/vl	Italy, IRRS 7120va	7125al				
0700	0800		Kenya, Kenya BC Corp	4885irr	4915irr			
0700	0800		Kuwait, Radio	15110as				
0700	0800	vl	Lesotho, Radio	4800do				
0700	0800		Liberia, ELWA	4760do				
0700	0800		Liberia, R Liberia Intl	6100do				
0700	0800		Malaysia, Radio	7295do				
0700	0800		Malaysia, RTM Sarawak	7160do				
0700	0800		Malaysia, Voice of	6175as	9750as	15295pa		
0700	0800		Myanmar, Radio	9730do				
0700	0800		Namibia, NBC	3270af	3290af	7215irr		
0700	0800	vl	Nigeria, Radio/Enugu	6025do				
0700	0800	vl	Nigeria, Radio/Ibadan	6050do				
0700	0800	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do	
0700	0800	vl	Nigeria, Radio/Lagos	3326do	4990do			
0700	0800		Nigeria, Voice of	7255af	11770af	15120va		
0700	0800		Romania, R Romania Intl		15335af	17720af		
0700	0800		Russia, University Network		17765as			
0700	0800		Russia, Voice of Russia 17665au 21485au	11770au	11820au	15275au	15470au	17655au
				21790au				
0700	0800		Sierra Leone, SLBS	3316do				
0700	0800		Singapore, SBC Radio One	6150do				
0700	0800	vl	Solomon Islands, SIBC	5020do	9545do			
0700	0800		Swaziland, TWR	6035af	7205af	9500af		
0700	0800		Taiwan, R Taipei Intl	5950na				
0700	0800		Uganda, Radio	5026do	7110do	7196do		
0700	0800		UK, BBC World Service 11955as 12095eu 15575as 17640eu	6190af	9410eu	11760me	11765af	11940af
				15310as	15360as	15400af	15485eu	15565eu
				17760as	17790as	17830af	21660as	
0700	0800	as	UK, BBC World Service	15575as	17885af			
0700	0800		USA, Armed Forces Radio		6458usb	12689usb		
0700	0800		USA, KAIJ Dallas TX	5755va				
0700	0800		USA, KTBN Salt Lk City UT		7510na			
0700	0800		USA, KWHR Naalehu HI	11565pa	17780as			
0700	0800		USA, WBCQ Monticello ME		7415na			
0700	0800		USA, WEWN Birmingham AL	5825na	7425na	15745na		
0700	0800		USA, WHRA Greenbush ME		7580af			
0700	0800		USA, WHRI Noblesville IN	5745va	7315am			
0700	0800		USA, WJCR Upton KY	7490am	13595as			
0700	0800		USA, WMLK Bethel PA	9465eu				
0700	0800		USA, WRNO New Orleans LA		7395am			
0700	0800		USA, WSHB Cyp Creek SC		7535af			
0700	0800		USA, WTJC Newport NC		9370na			
0700	0800	vl	Vanuatu, Radio	3945do	4960do	7260do		
0700	0800		Zambia, Christian Voice	9865do				
0700	0800	vl	Zimbabwe, Zimbabwe BC Corp	5975do	6045do			
0705	0800		USA, WWCR Nashville TN	3210na	5070na	5935na	7560na	
0706	0800		New Zealand, Radio NZ Intl	11675pa				
0710	0715	mtwhf	Vatican City, Vatican Radio 9645eu 11740eu 15595va	4005eu	5885eu	6185eu	7250eu	
0720	0735	mtwhf	Swaziland, TWR	6035af	7205af	9500af		
0730	0758		Finland, YLE/Radio Finland	9510va	21670va			
0730	0800	t h	Georgia, Georgian Radio	6080me				
0730	0800		Guam. KTWR/ TWR	15200as				
0730	0800	vl	Papua New Guinea, NBC	4890do	9675irr			
0730	0800		Switzerland, Swiss R Intl	9885af	13635af	17665af		
0740	0745		Croatia, Croatian Radio	9470pa				
0745	0755	as	Armenia, TWR	12070eu				
0745	0755	as	Monaco, TWR	9870eu				
0745	0800	as	Albania, TWR	12070eu				
0750	0800	mtwhf	Greece, Voice of	9420eu	11900au	15630eu	17520af	21530as
0755	0800		Albania, TWR	12070eu				
0755	0800		Armenia, TWR	12070eu				
0755	0800	mtwhf	Monaco, TWR	9870eu				

0800 UTC - 3AM E / 2AM C / 12AM P

0800	0804		Pakiston, Radio	17510eu	21465eu			
0800	0825		Belgium, RVI Flanders R Intl	5985eu				
0800	0825		Malaysia, Voice of	6175as	9750as	15295pa		
0800	0827		Czech Rep, Radio Prague Intl	11600eu	15255eu			
0800	0830	vl	Australia, ABC/Alice Springs	4835do				
0800	0830	vl	Australia, ABC/Katherine	5025do				
0800	0830	vl	Australia, ABC/Tennant Creek	4910do				
0800	0830		Myanmar, Radio	9730do				
0800	0830		Sierra Leone, SLBS	3316do				
0800	0830		USA, Voice of America	11995as	13615as	15150as		
0800	0900	mtwhf	Albania, TWR	12070eu				
0800	0900		Anguilla, Caribbean Beacon	6090am				
0800	0900		Armenia, TWR	12070eu				
0800	0900		Australia, Christian Voice Intl	17820as	21680pa			
0800	0900		Australia, Radio 15240va 15415as	5995pa	9580va	9710as	12080pa	13605va
				17750as	21725as			
0800	0900		Austria, Christian Voice	17820as	21680pa			
0800	0900	mtwhf	Bhutan, Bhutan BC Service	5030al	6035do			
0800	0900	vl	Botswana, Radio	7255do	9600do			
0800	0900	vl	Cameroon, RTV	4850do	6005do			
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	15040va			
0800	0900		Costa Rica, University Network 11870am 13749na 17645as	5030am	6150am	7375am	9724sa	
0800	0900		Ecuador, HCJB	9780eu	11755pa	21455usb		
0800	0900	mtwhf	Eqt Guinea, Radio Africa		15185af			
0800	0900	as/vl	Eqt. Guinea, Radio East Africa		15185af			
0800	0900	a/monthly	Finland, Scandv Weekend Radio	6170va	11720va			
0800	0900		Germany, Deutsche Welle	6140eu				
0800	0900		Germany, Voice of Hope	5975eu	21590me			
0800	0900	vl	Ghana, Ghana BC Corp	3366do	4915do			
0800	0900		Guam, KTWR/TWR	15200as				
0800	0900		Guyana, Voice of	3290do	5950do			
0800	0900		Indonesia, Voice of	9525pa	11735as	15150as		
0800	0900	as/vl	Italy, IRRS	7120va	7125al			
0800	0900		Kenya, Kenya BC Corp	4885irr	4915irr			
0800	0900	vl	Lesotho, Radio	4800do				
0800	0900		Liberia, ELWA	4760do				
0800	0900		Liberia, R Liberia Intl	6100do				
0800	0900		Malaysia, Radio	7295do				
0800	0900	mtwhf	Monaco, TWR	9870eu				
0800	0900		Namibia, NBC	7165af	7215af			
0800	0900		New Zealand, Radio NZ Intl	11675pa				
0800	0900	vl	Nigeria, Radio/Enugu	6025do				
0800	0900	vl	Nigeria, Radio/Ibadan	6050do				
0800	0900	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do	
0800	0900	vl	Nigeria, Radio/Lagos	3326do	4990do			
0800	0900		Nigeria, Voice of	7255af	11770af	15120va		
0800	0900	vl	Papua New Guinea, NBC	4890do	9675irr			
0800	0900		Russia, University Network	17765as				
0800	0900		Russia, Voice of Russia 17525au 17665au 21810au	11770au	11820au	15275au	15470au	17495au
0800	0900		Singapore, SBC Radio One	6150do				
0800	0900	vl	Solomon Islands, SIBC	5020do				
0800	0900		South Korea, R Korea Intl	9570cm	13670eu			
0800	0900		UK, BBC World Service 15310as 15360as 15400af 17830af 17885af	6190af	9410eu	11940af	11955as	12095eu 15485eu 15565eu 17640eu 17760as 21470af 21660as 21830as
0800	0900	as	UK, BBC World Service	15575as				
0800	0900		USA, Armed Forces Radio	6458usb	12689usb			
0800	0900		USA, KAIJ Dallas TX	5755va				
0800	0900		USA, KNLS Anchor Point AK	9615as				
0800	0900		USA, KTBN Salt Lk City UT	7510na				
0800	0900		USA, KWHR Naalehu HI	9930as	11565pa			
0800	0900		USA, WBCQ Monticello ME	7415na				
0800	0900		USA, WEWN Birmingham AL	5825na	7425na	15745na		
0800	0900		USA, WHRI Noblesville IN	5745va	7315am			
0800	0900		USA, WJCR Upton KY	7490am	13595as			
0800	0900		USA, WMLK Bethel PA	9465eu				
0800	0900		USA, WRMI Miami FL	7385am				
0800	0900		USA, WRNO New Orleans LA	7395am				
0800	0900		USA, WSHB Cyp Creek SC	7535eu	9845au			
0800	0900		USA, WTJC Newport NC	9370na				
0800	0900		USA, WWCR Nashville TN	3210na	5070na	5935na	7560na	
0800	0900	vl	Vanuatu, Radio	3945do	4960do	7260do		
0800	0900		Zambia, Christian Voice	9865do				
0800	0900	vl	Zimbabwe, Zimbabwe BC Corp	5975do	6045do			
0805	0810		Croatia, Croatian Radio	13820au				
0815	0900		Guam, KTWR/TWR	15200as	15330as			
0830	0845	i	Seychelles, FEBA Radio	15460as				
0830	0900	vl	Australia, ABC/Alice Springs	2310do				
0830	0900	vl	Australia, ABC/Katherine	2485do				
0830	0900	vl	Australia, ABC/Tennant Creek	2325do				
0830	0900		Austria, AWR Europe	9660eu	17820af			
0830	0900		Austria, Radio Austria Intl		17820eu			
0830	0900		Georgia, Georgian Radio		11910eu			
0830	0900		Italy, AWR Europe	9765eu				
0830	0900		Switzerland, Swiss R Intl	21770af				
0830	0900		USA, Voice of America 17875af	11995as	13615as	15150as	15165me	15235me
0840	0900	s	Armenia, Voice of	4810eu	15270eu			

0900 UTC - 4AM E / 3AM C / 1AM P

0900	0915	vl	Ghana, Ghana BC Corp	3366do	4915do			
0900	0920	mtwhf	Albania, TWR	12070eu				
0900	0920		Armenia, TWR	12070eu				
0900	0920	mtwhf	Monaco, TWR	9870eu				
0900	0930		Austria, AWR Europe	11670af				
0900	0930		Austria, Radio Austria Intl		11670eu			
0900	0930	as	Guam, KTWR/TWR	15330as				
0900	0945		Germany, Deutsche Welle 17800af 17820pa 17845pa	6160pa	7300as	11785af	15410af 17860af 21560af	
0900	0956		China, China Radio Intl	11730pa	15210pa			
0900	1000		Anguilla, Caribbean Beacon	6090am				
0900	1000	vl	Australia, ABC/Alice Springs	2310do				
0900	1000	vl	Australia, ABC/Katherine	2485do				
0900	1000	vl	Australia, ABC/Tennant Creek	2325do				
0900	1000		Australia, Christian Voice Intl	13775pa	17725pa			
0900	1000		Australia, Radio 12080pa 13605va 15400as	5995pa	6020pa	9580va	9710as	11550as 17750as 21820va
0900	1000		Austria, Christian Voice	13775as	17725as			
0900	1000	vl	Botswana, Radio	7255do	9600do			
0900	1000	vl	Cameroon, RTV	4850do	6005do			
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		Costa Rica, R for Peace Intl	7455irr	15040va			
0900	1000		Costa Rica, University Network 11870am 13749na 17645as	5030am	6150am	7375am	9724sa	
0900	1000		Ecuador, HCJB	11775pa	21455usb			
0900	1000	mtwhf	Eqt Guinea, Radio Africa		15185af			
0900	1000	as/vl	Eqt. Guinea, Radio East Africa		15185af			
0900	1000	a/monthly	Finland, Scandv Weekend Radio	6170va	11720va			
0900	1000		Germany, Deutsche Welle	6140eu				
0900	1000		Germany, Voice of Hope		21590me			
0900	1000		Guyana, Voice of	3290do	5950do			
0900	1000	as/vl	Italy, IRRS	7120va	7125al			
0900	1000		Kenya, Kenya BC Corp	4885irr	4915irr			
0900	1000	vl	Lesotho, Radio	4800do				
0900	1000		Liberia, ELWA	4760do				
0900	1000		Liberia, R Liberia Intl	6100do				
0900	1000		Malaysia, Radio	7295do				
0900	1000	s	Malta, VO Mediterranean		9840eu			
0900	1000		Namibia, NBC	7165af	7215af			
0900	1000		New Zealand, Radio NZ Intl	11675pa				
0900	1000	vl	Nigeria, Radio/Enugu	6025do				
0900	1000	vl	Nigeria, Radio/Ibadan	6050do				
0900	1000	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do	
0900	1000	vl	Nigeria, Radio/Lagos	3326do	4990do			
0900	1000		Nigeria, Voice of	7255af	11770af	15120va		
0900	1000		Palau, KHBN/ VO Hope	15725as				
0900	1000	vl	Papua New Guinea, NBC		4890do	9675irr		
0900	1000		Russia, University Network		17765as			
0900	1000		Russia, Voice of Russia 17525au 17665au 21810au	11770au	11820au	15275au	15470au	17495au
0900	1000		Singapore, SBC Radio One		6150do			
0900	1000	vl	Solomon Islands, SIBC	5020do				
0900	1000		UK, BBC World Service 11940af 11945as 15485eu 15565eu 17885af 21470af	6190af	6195as	9605as	9740as	11760me 12095eu 15190sa 15310as 15360as 15400af 15575as 17640eu 17760as 17790as 17830af 21660as
0900	1000		USA, Armed Forces Radio		6458usb	12689usb		
0900	1000		USA, KAIJ Dallas TX	5755va				
0900	1000		USA, KTBN Salt Lk City UT		7510na			
0900	1000		USA, KWHR Naalehu HI	9930as	11565pa			
0900	1000		USA, Voice of America 17875af	11995as	13615as	15150as	15165me	15235me
0900	1000		USA, WBCQ Monticello ME		7415na			
0900	1000		USA, WEWN Birmingham AL		5825na	7425na	15745na	
0900	1000		USA, WHRA Greenbush ME		7580af			
0900	1000		USA, WHRI Noblesville IN		5745va	7315am		
0900	1000		USA, WJCR Upton KY		7490am	13595as		
0900	1000		USA, WRMI Miami FL		7385am			
0900	1000		USA, WSHB Cyp Creek SC		7535eu	9455sa		
0900	1000		USA, WTJC Newport NC		9370na			
0900	1000		USA, WWCR Nashville TN		3210na	5070na	5935na	7560na
0900	1000	vl	Vanuatu, Radio		3945do	4960do	7260do	
0900	1000		Zambia, Christian Voice		9865do			
0900	1000	vl	Zimbabwe, Zimbabwe BC Corp		5975do	6045do		
0915	1000	vl	Ghana, Ghana BC Corp		6130do	4915do		
0915	1000	vl/as	Ghana, Ghana BC Corp		4915do			
0930	1000		Georgia, Georgian Radio		11910me			
0930	1000		Greece, Voice of	9420eu	15630eu			
0930	1000		Lithuania, R Vilnius	9710eu				
0930	1000		Netherlands, Radio	7260va	9790va	12065va		
0940	0945		Croatia, Croatian Radio	13820au				

1000 UTC - 5AM E / 4AM C / 2AM P

1000	1005		New Zealand, Radio NZ Intl	11675pa				
1000	1027		Czech Rep, Radio Prague Intl	21745va				
1000	1027		Vietnam, Voice of	9840au	12019au			
1000	1030		Guam, KSDA/ AWR	11705as	11900as			
1000	1030		Palau, KHBN/ VO Hope	15725as				
1000	1030		UK, RTE Radio	11685au	15540au			
1000	1045		USA, KWHR Naalehu HI	9930as	11565pa			
1000	1056		China, China Radio Intl	11730pa	15210pa			
1000	1056		North Korea, Voice of	9335am	9850as	11710am	11735as	
1000	1100		Anguilla, Caribbean Beacon		6090am			
1000	1100	vl	Australia, ABC/Alice Springs		2310do			
1000	1100	vl	Australia, ABC/Katherine		2485do			
1000	1100	vl	Australia, ABC/Tennant Creek		2325do			
1000	1100		Australia, Christian Voice Intl		12775pa	17655pa	17725pa	
1000	1100		Australia, Radio 13605va 15400as		5995pa	6020pa	9580va	9710as 12080pa 17750va 21820va
1000	1100		Austria, Christian Voice		13775as	17655as	17725as	
1000	1100	as	Bhutan, Bhutan BC Service		5030al	6035do		
1000	1100	vl	Botswana, Radio		7255do	9600do		
1000	1100		Canada, CFRX Toronto ON		6070do			
1000	1100		Canada, CFVP Calgary AB		6030do			
1000	1100		Canada, CHNX Halifax, NS		6130do			
1000	1100		Canada, CKZN St John's NF		6160do			
1000	1100		Canada, CKZU Vancouver BC		6160do			
1000	1100		Costa Rica, R for Peace Intl		7455irr	15040va		
1000	1100		Costa Rica, University Network 11870am 13749na 17645as		5030am	6150am	7375am	9724sa
1000	1100		Ecuador, HCJB		11755pa	21455usb		
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		6170va	11720va		
1000	1100		Germany, Voice of Hope			21590me		

1000	1100		Germnay, Deutsche Welle	6140eu				
1000	1100	vl	Ghana, Ghana BC Corp	6130do				
1000	1100	vl/as	Ghana, Ghana BC Corp	4915do				
1000	1100		Guyana, Voice of	5950do				
1000	1100		India, All India Radio	11585as	13700au	15020as	15260as	17510as
			17800au 17895au					
1000	1100	as/vl	Italy, IRRS	7120va	7125al			
1000	1100		Japan, Radio9695as	15590as	21755pa			
1000	1100		Kenya, Kenya BC Corp	4885irr	4915irr			
1000	1100	vl	Lesotho, Radio	4800do				
1000	1100		Liberia, ELWA	4760do				
1000	1100		Liberia, R Liberia Intl	6100do				
1000	1100		Malaysia, Radio	7295do				
1000	1100		Namibia, NBC	7165af	7215af			
1000	1100		Netherlands, Radio	7260va	9790va	12065va		
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	7285da			
1000	1100	vl	Papua New Guinea, NBC		4890do	9675irr		
1000	1100		Russia, University Network		17765as			
1000	1100		Singapore, SBC Radio One		6150do			
1000	1100	vl	Solomon Islands, SIBC	5020do				
1000	1100		UK, BBC World Service	6190af	6195va	9605as	9740as	11760me
			11940af 11945as	12095eu	15310as	15360as	15485eu	15565eu
			15575as 17640eu	17760as	17790as	21470af	21660as	
1000	1100	as	UK, BBC World Service	15190sa	15400af	17830af		
1000	1100		USA, Armed Forces Radio		6458usb	12689usb		
1000	1100		USA, KAIJ Dallas TX	5755va				
1000	1100		USA, KTBN Salt Lk City UT		7510na			
1000	1100		USA, Voice of America	5745am	5985pa	7370am	9590am	11720as
			15165me 15235me	15250as	15425as	17895me		
1000	1100		USA, WBCQ Monticello ME		7415na			
1000	1100		USA, WEWN Birmingham AL		5825na	7425na	15395na	15745eu
1000	1100		USA, WHRI Noblesville IN		6040na	9495am		
1000	1100		USA, WJCR Upton KY	7490am	13595as			
1000	1100		USA, WRMI Miami FL	9955am				
1000	1100		USA, WRNO New Orleans LA		7395am			
1000	1100		USA, WSHB Cyp Creek SC		6095am	9455sa	11780as	
1000	1100		USA, WTJC Newport NC		9370na			
1000	1100		USA, WWCR Nashville TN		3210na	5070na	5935na	7560na
1000	1100		USA, WYFR Okeechobee FL		5950na			
1000	1100	vl	Vanuatu, Radio	3945do	4960do	7260do		
1000	1100	mt hfa	Vatican City, Vatican Radio		5885eu			
1000	1100		Zambia, Christian Voice	9865do				
1000	1100	vl	Zimbabwe, Zimbabwe BC Corp		5975do	6045do		
1006	1100		New Zealand, Radio NZ Intl		15175pa			
1030	1045	mtwhf	Ethiopia, Radio	5990do	7110do	9704do		
1030	1100		Guam, KSDA/ AWR	11900as				
1030	1100		Malaysia, RTM Sarawak	7160do				
1030	1100		Mongolia, Voice of	12085as				
1030	1100		Palau, KHBN/ VO Hope	9965as	15725as			
1030	1100		UAE, Emirates Radio	13675eu	15370eu	15395eu	21605eu	
1045	1100		USA, KWHR Naalehu HI	9930as				
1045	1100	as	USA, KWHR Naalehu HI	11565pa				

1100 UTC - 6AM E / 5AM C / 3AM P

1100	1104		Pakistan, Radio	17520eu	21465eu			
1100	1127		Vietnam, Voice of	7285as				
1100	1130	as	Bhutan, Bhutan BC Service		5030al	6035do		
1100	1130		Netherlands, Radio	7260va	9790va	12065va		
1100	1130	mtwhf	UK, BBC Caribbean Report		6195am	15190am		
1100	1130	as	UK, BBC World Service	6195am	15190am			
1100	1145		Germany, Deutsche Welle		15410af	17800af	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 Intl		13775pa	15530as	17655pa	17725pa
1100	1200		Australia, Radio	5995pa	6020va	9580va	11880as	12080pa
			13605va 15400as	21820va				
1100	1200		Austria, Christian Voice	13765as	17655as	17725as		
1100	1200	vl	Austria, Radio Africa Intl	17815eu				
1100	1200	vl	Botswana, Radio	7255do	9600do			
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	15040va		
1100	1200		Costa Rica, University Network		5030am	6150am	7375am	9724sa
			11870am 13749na	17645as				
1100	1200		Ecuador, HCJB	12005am	15115am	21455usb		
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		6170va	11720va		
1100	1200		Germany, Deutsche Welle		6140eu			
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	5950do				
1100	1200		Iran, VO Islamic Rep. of Iran		15185as	15375as	15385as	15480as
			21470as 21730as					
1100	1200	as/vl	Italy, IRRS	7120va	7125al			
1100	1200		Japan, Radio6120na	9695as	15590as	21755as		
1100	1200		Jordan, Radio	11690eu				
1100	1200		Kenya, Kenya BC Corp	4885irr	4915irr			
1100	1200	vl	Lesotho, Radio	4800do				
1100	1200		Liberia, ELWA	4760do				
1100	1200		Liberia, R Liberia Intl	6100do				
1100	1200		Malaysia, Radio	7295do				
1100	1200		Malaysia, TRM Sarawak	7160do				
1100	1200		Namibia, NBC	7165af	7215af			
1100	1200		New Zealand, Radio NZ Intl		15175pa			
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		Palau, KHBN/ VO Hope	9965as				
1100	1200	vl	Papua New Guinea, NBC		4890do	9675irr		
1100	1200		Russia, University Network		17765as			
1100	1200		Singapore, R Singapore Intl		6150as	9600as		
1100	1200		Taiwan, R Taipei Intl	7445as	11985as			
1100	1200		Taiwan, Voice of Asia	7445as				
1100	1200		UK, BBC World Service	6190af	6195as	9740as	11760me	11940af
			12095eu 15310as	15360as	15400af	15485eu	15565eu	15575as
			17640eu 17700as	17790sa	17830af	17885af	21470af	
1100	1200		USA, Armed Forces Radio		6458usb	12689usb		
1100	1200		USA, KAIJ Dallas TX	5755va				
1100	1200		USA, KTBN Salt Lk City UT		7510na			
1100	1200		USA, KWHR Naalehu HI	9930as				
1100	1200	as	USA, KWHR Naalehu HI	11565pa				
1100	1200		USA, Voice of America	5985pa	6110as	9645as	9760as	11705as
			11720as 15250as	15425as				
1100	1200		USA, WEWN Birmingham AL		5825na	7425na	15395na	15745eu
1100	1200		USA, WHRI Noblesville IN		6040na	9495am		
1100	1200		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 Cyp Creek SC		6095am	11660am		
1100	1200		USA, WTJC Newport NC		9370na			
1100	1200		USA, WWCR Nashville TN		5070na	5935na	7560na	15685na
1100	1200		USA, WYFR Okeechobee FL		5950na	11830na		
1100	1200	vl/s	Vanuatu, Radio	3945do	4960do	7260do		
1100	1200		Zambia, Christian Voice	9865do				
1100	1200	vl	Zimbabwe, Zimbabwe BC Corp		5975do	6045do		
1115	1127		Zambia, National BC Corp		6265do			
1115	1145		Nepal, Radio3230as	5005as				
1130	1135		Israel, Kol Israel	15640va	17545va			
1130	1145	vl	Libya, Voice of Africa	15435irr	17725af			
1130	1155		Belgium, RVI Flanders R Intl		9865as			
1130	1157		Czech Rep. Radio Prague Intl		11640eu	21745va		
1130	1200		Italy, AWR Europe	12020eu				
1130	1200		Netherlands, Radio	5965na	6045eu	9860eu		
1130	1200		South Korea, R Korea Intl		9650na			
1130	1200	a	UK, Wales Radio Intl	17625au				
1130	1200	f	Vatican City, Vatican Radio		15595va	17515va		

1200 UTC - 7AM E / 6AM C / 4AM P

1200	1205		New Zealand, Radio NZ Intl		15175pa			
1200	1220	fa	Kazakhstan, R Almaty	9620eu	11840eu			
1200	1220	mtwhf	UK, BBC Caribbean Report		6195am	15190am		
1200	1220	as	UK, BBC World Service	6195am	15190am			
1200	1230		France Radio France Intl	15540af	25820af			
1200	1230		Iran, VO Islamic Rep of Iran		15185as	15385as	15375as	15385as
			15480as 21470as	21730as				
1200	1230		South Korea, R Korea Intl		9650na			
1200	1230		Uzbekistan, Radio Tashkent		5060as	5955as	5975as	6025as
			9715as					
1200	1245		USA, WYFR Okeechobee FL		5950na	11830na	11970na	13695na
1200	1256		China, China Radio Intl	9705as	9730as	9760pa	11760pa	11980as
			15415pa					
1200	1259		Canada, Radio Canada Intl		9660as	11730as		
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 Intl		13775pa	15530as	17725pa	
1200	1300		Australia, Radio	5995pa	6020va	9580va	11650pa	11880as
			15400as 21820va					
1200	1300		Austria, Christian Voice	13775as	17725as			
1200	1300		Bangladesh, Bangla Betar		7185as	9550as		
1200	1300	vl	Botswana, Radio	7255do	9600do			
1200	1300		Bulgaria, Radio	15700eu	17500eu			
1200	1300		Canada, CBC Northern Service		9625do			
1200	1300		Canada, CFRX Toronto ON		6070do			
1200	1300		Canada, CFVP 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		6160da			
1200	1300		China, Voice of Hope	7460as				
1200	1300		Costa Rica, R for Peace Intl		15040va	21815usb		
1200	1300		Costa Rica, University Network		5030am	6150am	7375am	9724sa
			11870am 13749na	17645as				
1200	1300		Ecuador, HCJB	12005am	15115am	21455usb		
1200	1300	as/vl	Eqt. Guinea, Radio East Africa		15185af			
1200	1300	a/monthly	Finland, Scandv Weekend Radio		6170va	11720va		
1200	1300		Germany, Deutsche Welle		6140eu			
1200	1300		Germany, Voice of Hope		15715me			
1200	1300	vl	Ghana, Ghana BC Corp		4915do	6130do		
1200	1300		Guyana, Voice of	5950do				
1200	1300	os/vl	Italy, IRRS	7120va	7125al			
1200	1300		Kenya, Kenya BC Corp	4885irr	4915irr			

1200	1300	vl	Lesotho, Radio	4B00da				
1200	1300		Liberia, R Liberia Intl	6100do				
1200	1300		Malaysia, Radio	7295do				
1200	1300		Namibia, NBC	7165af	7215af			
1200	1300		Netherlands, Radio	5965na	6045eu	9860eu		
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	7285da			
1200	1300		Palau, KHBN/ VO Hope	9965as				
1200	1300	vl	Papua New Guinea, NBC		4B90da	9675irr		
1200	1300		Russia, University Network		17765as			
1200	1300		Singapore, R Singapore Intl		6150as	9600as		
1200	1300		Taiwan, R Taipei Intl	7130pa	9610pa			
1200	1300		UK, BBC World Service	6190af	6195as	9740as	11760me	11940af
			12095eu	15310as	15360as	15485eu	15565eu	15575me	17640eu
			17700as	17B30af	17B85af	21470af			
1200	1300		Ukraine, R Ukraine Intl	11720eu	11825na	15520na		
1200	1300		USA, Armed Forces Radio		6458usb	12689usb		
1200	1300		USA, KAIJ Dallas TX	5755va				
1200	1300		USA, KTBN Salt Lk City UT		7510na			
1200	1300		USA, KWHR Naalehu HI	9930as				
1200	1300	as	USA, KWHR Naalehu HI	11565pa				
1200	1300		USA, Voice of America	6110as	9645as	9760as	11705as	11715as
			15170me	15250as	15260me	15425as	17630af		
1200	1300		USA, WEWN Birmingham AL		5825na	7425na	15375na	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		USA, WRMI Miami FL	9955am				
1200	1300		USA, WRNO New Orleans LA		7395am			
1200	1300		USA, WSHB Cyp Creek SC		5915as	6095am	9980as	11660am
1200	1300		USA, WTJC Newport NC		9370na			
1200	1300		USA, WWCR Nashville TN		5070na	5935na	7560na	15685na
1200	1300		USA, WWFV McCaysville GA		6890va	12172va		
1200	1300	vl/s	Vanuatu, Radio	3945do	4960do	7260do		
1200	1300		Zambia, Christian Voice	9B65do				
1200	1300	vl	Zimbabwe, Zimbabwe BC Corp		5975do	6045do		
1206	1300	occsnal	New Zealand, Radio NZ Intl		6095pa			
1215	1300		Egypt, Radio Cairo	17595as				
1220	1240	w	Kazakhstan, R Almaty	9620eu	11840eu			
1225	1300		Sri Lanka, SLBC	6005as	9770as	15425as		
1230	1257		Vietnam, Voice of	9840as	12019as			
1230	1300		Austria, Radio Austria Intl		6155eu	13730eu		
1230	1300		Sweden, Radio	18960na				
1230	1300		Thailand, Radio	9655as	9B10as	11905as		
1240	1300	t	Kazakhstan, R Almaty	9620eu	11840eu			
1245	1300	a	Seychelles, FEBA Radio	15535me				
1245	1300		USA, WYFR Okeechobee FL		11830na	11970na	13695na	

1300 UTC - 8AM E / 7AM C / 5AM P

1300	1310		Turkmenistan, Turkmen Radio		5015as			
1300	1325		Netherlands, Radio	5965na	6045eu	9860eu		
1300	1330		Australia, Radio	5995pa	6020va	9580va	11650pa	11880as
			15400as	21820va				
1300	1330		Egypt, Radio Cairo	17595as				
1300	1330		Germnay, Voice of Hope		15715me			
1300	1330		Guam, KSDA/ AWR	15660as				
1300	1330		UAE, AWR Africa	17630as				
1300	1356		China, China Radio Intl	9750na	11760pa	11900pa	11980as	13650va
			15180as					
1300	1356		North Korea, Voice of	7505eu	9335na	11335eu	11710na	
1300	1359		Poland, Radio Polania	6095eu	7270eu	9525eu	11820eu	
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 Intl		13660pa	13775pa	15155as	
1300	1400		Austria, Christian Voice	13660as	13775es			
1300	1400	vl	Botswana, Radio	7255do	9600do			
1300	1400		Canada, CBC Northern Service		9625do			
1300	1400		Canada, CFRX Toronto ON		6070do			
1300	1400		Canada, CFVP 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, Radio Canada Intl		9515na	13655na	17710na	
1300	1400		China, Voice of Hope	7460as				
1300	1400		Costa Rica, R for Peace Intl		15040va	21815usb		
1300	1400		Costa Rica, University Network		5030am	6150am	7375am	9724sa
			11870am	13749na	17645as			
1300	1400		Ecuador, HCJB	12005am	15115am	21455usb		
1300	1400	as/vl	Eqt. Guinea, Radio East Africa		15185af			
1300	1400	a/monthly	Finland, Scandv Weekend Radio		6170va	11720va		
1300	1400		Germany, Deutsche Welle		6140eu			
1300	1400	vl	Ghana, Ghana BC Corp		4915do	6130do		
1300	1400		Guyana, Voice of	5950do				
1300	1400	as/vl	Italy, IRRS	7120va	7125al			
1300	1400		Jordan, Radio	11690eu	17680al			
1300	1400		Kenya, Kenya BC Corp	4885irr	4915irr			
1300	1400	vl	Lesotho, Radio	4800do				
1300	1400		Liberia, R Liberia Intl	6100do				
1300	1400		Malaysia, Radio	7295do				
1300	1400		Namibia, NBC	7165af	7215af			
1300	1400	occsnal	New Zealand, Radio NZ Intl		6095pa			
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		Palau, KHBN/ VO Hope	9965as				
1300	1400	vl	Papua New Guinea, NBC		4890do	9675irr		
1300	1400		Russia, University Network		17765as			
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	13670orn		
1300	1400		Sri Lanka, SLBC	6005as	9770as	15425as		
1300	1400		Uganda, Radio	5026do	7196do			
1300	1400		UK, BBC World Service	6190af	6195va	9740as	11760me	11940af
			12095eu	15190am	15310as	15360as	15420af	15485eu	15565eu
			15575me	17640eu	17700as	17830af	17B85af	21470af	
1300	1400		USA, Armed Forces Radio		6458usb	12689usb		
1300	1400		USA, KAIJ Dallas TX	5755va				
1300	1400		USA, KNLS Anchor Point AK		9615as			
1300	1400		USA, KTBN Salt Lk City UT		7510na			
1300	1400		USA, KWHR Naalehu HI	9930as				
1300	1400	as	USA, KWHR Naalehu HI	11565pa				
1300	1400		USA, Voice of America	6110as	9645as	9760as	11705as	15170me
			15260me	15425as	17630af			
1300	1400		USA, WBCQ Monticello ME		17495na			
1300	1400		USA, WEWN Birmingham AL		11875na	11530na	11550na	15375na
			15745eu					
1300	1400		USA, WHRI Noblesville IN		6040na	15105am		
1300	1400		USA, WINB Red Lion PA	13570am				
1300	1400		USA, WJCR Upton KY	7490am	13595as			
1300	1400		USA, WRMI Miami FL	15725am				
1300	1400		USA, WRNO New Orleans LA		7395am			
1300	1400		USA, WSHB Cyp Creek SC		6095na	7485as	9455am	
1300	1400		USA, WTJC Newport NC		9370na			
1300	1400		USA, WWCR Nashville TN		9475na	13845na	12160na	15685na
1300	1400		USA, WWFV McCaysville GA		9400va	12172va		
1300	1400		USA, WYFR Okeechobee FL		11550as	11740na	11830na	11970na
			17510sa	17575sa				
1300	1400		Zambia, Christian Voice	9865do				
1300	1400	vl	Zimbabwe, Zimbabwe BC Corp		5975do	6045do		
1325	1400		Germany, Overcomer Ministries		6110eu			
1330	1350		UAE, Emirates Radio	13630eu	13675eu	15395eu	21605eu	
1330	1357		Vietnam, Voice of	7145eu	9730eu			
1330	1359		Finland, YLE/Radio Finland		15400na	17660na		
1330	1400		Australia, Radio	5995pa	6020va	9475as	9580va	11650pa
			11660as	21820va				
1330	1400		Austria, Radio Austria Intl		17855as			
1330	1400		Germany, Voice of Hope		15675as	15715me	15775as	
1330	1400		Guam, KSDA/ AWR	11755as	11980as			
1330	1400		India, All India Radio	11620as	13710as			
1330	1400		Laos, Lao National Radio		7145as			
1330	1400		Sweden, Radio	9430va	17505va	18960na		
1330	1400		Turkey, Voice of	17690as	17B15eu			
1330	1400		UAE, AWR Africa	15385as				
1330	1400		Uzbekistan, Radio Tashkent		5060as	5955as	5975as	6025as
			9715as					
1330	1400		Yugoslavia, Radio	11835au				

1400 UTC - 9AM E / 8AM C / 6AM P

1400	1425		Turkey, Voice of	17690as	17815eu			
1400	1427		Czech Rep, Radio Prague Intl		21745va			
1400	1430		Ecuador, HCJB	12005am	15115am	21455usb		
1400	1430		Thailand, Radio	9530as	9655as	11905as		
1400	1430	s	USA, Voice of America	18275as				
1400	1455	as	S Africa, Channel Africa	11720af	17780af	21725af		
1400	1456		China, China Radio Intl	7405na	9700as	11675as	11765va	13650va
			13685af	15125af	17720na			
1400	1500		Anguilla, Caribbean Beacon		11775am			
1400	1500	vl	Australia, ABC/Alice Springs		2310do			
1400	1500	vl	Australia, ABC/Katherine		2485do			
1400	1500	vl	Australia, ABC/Tennant Creek		2325do			
1400	1500		Australia, Christian Voice Intl		13660pa	13775pa	15155as	
1400	1500		Australia, Radio	5995va	6080pa	9475as	9580va	11650pa
			11660as	15435as				
1400	1500		Austria, Christian Voice	13660as	13775as			
1400	1500	vl	Botswana, Radio	7255do	9600do			
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, Radio Canada Intl		9515na	13655na	17710na	
1400	1500		China, Voice of Hope	7460as				
1400	1500		Costa Rica, R for Peace Intl		15040va	21815usb		
1400	1500		Costa Rica, University Network		5030am	6150am	7375am	9724sa
			11870am	13749na	17645as			
1400	1500	as/vl	Eqt. Guinea, Radio East Africa		15185af			
1400	1500	a/monthly	Finland, Scandv Weekend Radio		5990va	11720va		
1400	1500		France Radio France Intl	9580as	11600me	17620me		
1400	1500		Germany, Deutsche Welle		6140eu			
1400	1500		Germany, Overcomer Ministries		6110eu	13810af		
1400	1500	vl	Ghana, Ghana BC Corp		4915do	6130do		
1400	1500		Guyana, Voice of	5950da				
1400	1500		India, All India Radio	11620as	13710as			
1400	1500	as/vl	Italy, IRRS	7120va	7125al			
1400	1500		Japan, Radio	7200as	9505na	9845as	17755va	
1400	1500		Jordan, Radio	11690eu	17680al			
1400	1500		Kenya, Kenya BC Corp	4885irr	4915irr			

1400	1500	vl	Lesatho, Radio	4800da				
1400	1500		Liberia, R Liberia Intl	6100da				
1400	1500		Malaysia, Radio	7295do				
1400	1500		Malaysia, RTM Sarawak	7160do				
1400	1500		Namibia, NBC	7165af	7215af			
1400	1500	occsnal	New Zealand, Radio NZ Intl	6095pa				
1400	1500	vl	Nigeria, Radio/Enugu	6025do				
1400	1500	vl	Nigeria, Radio/Ibadan	6050do				
1400	1500	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570da	
1400	1500	vl	Nigeria, Radio/Lagos	4990do	7285do			
1400	1500		Oman, Radio	15140va				
1400	1500		Palau, KHBN/ VO Hope	9965as				
1400	1500		Romania, R Romania Intl		11940eu	15365eu	17790eu	
1400	1500		Russia, University Network		17765as			
1400	1500		Singapore, SBC Radio One		6150do			
1400	1500		Sri Lanka, SLBC	6005as	9770as	15425as		
1400	1500		Taiwan, R Taipei Intl	15265as				
1400	1500		Uganda, Radio	5026do	7196do			
1400	1500		UK, BBC World Service	6135as	6190af	6195as	9740as	11940af
			12095eu 15190am	15310as	15485eu	15565eu	15575me	17640eu
			17700as 17830af	21470af	21660af			
1400	1500		USA, Armed Forces Radio		6458usb	12689usb		
1400	1500		USA, KAIJ Dallas TX	13815va				
1400	1500		USA, KJES Vado NM	11715na				
1400	1500		USA, KTBN Salt Lk City UT		7510na			
1400	1500		USA, KWHR Naalehu HI	9930as				
1400	1500	as	USA, KWHR Naalehu HI	11565pa				
1400	1500		USA, Voice of America	6110as	7125as	9645as	9760as	11705as
			15205as 15395as	15425as				
1400	1500		USA, WBCQ Monticello ME		17495na			
1400	1500		USA, WEWN Birmingham AL		11875na	11530na	11550na	15375na
			15745eu					
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	15725am				
1400	1500		USA, WRNO New Orleans LA		7395am			
1400	1500		USA, WTJC Newport NC		9370na			
1400	1500		USA, WWCR Nashville TN		9475na	12160na	13845na	15685na
1400	1500		USA, WWFV McCaysville GA		9400va	12172va		
1400	1500		USA, WYFR Okeechobee FL		11550as	11740na	11830na	17510sa
			17575sa 17760na					
1400	1500		Zambia, Christian Voice	9865do				
1400	1500	vl	Zimbabwe, Zimbabwe BC Corp		5975do	6045do		
1415	1420		Nepal, Radio3230as	5005as				
1430	1500		Austria, Radio Austria Intl		6155eu	13730eu		
1430	1500		Germany, Voice of Hope		15715me	15775as		
1430	1500		Guam, KSDA/ AWR	15660as				
1430	1500		Guam KTWR/ TWR	15330as				
1430	1500		Malaysia, RTM Kota Kinabalu		5980do			
1430	1500		Myanmar, Radio	5985do				
1430	1500		Netherlands, Radio	12070as	12080as	15220na	15595as	
1430	1500		Sweden, Radio	9430al	17505va	18960na		
1445	1500	f	Seychelles, FEBA Radio	11600as				

1500 UTC - 10AM E / 9AM C / 7AM P

1500	1530		Mexico, Radio Mexico Intl		9705am	11770am		
1500	1530		Mongolia, Voice of	12015as				
1500	1530		S Africa, Channel Africa	17770af				
1500	1530	h	Seychelles, FEBA Radio	11600as				
1500	1530		USA, Voice of America	7125as	9645as	15205as	15395as	
1500	1535		Germany, Voice of Hope		15715me	15775as		
1500	1556		China, China Radio Intl	7160as	7405na	9785as	13685af	15125af
			17720na					
1500	1556		North Korea, Voice of	7505eu	9335na	11335eu	11710na	
1500	1600		Anguilla, Caribbean Beacon		11775am			
1500	1600	vl	Australia, ABC/Alice Springs		2310do			
1500	1600	vl	Australia, ABC/Katherine		2485do			
1500	1600	vl	Australia, ABC/Tennant Creek		2325do			
1500	1600		Australia, Christian Voice Intl		13660pa	13775pa	15155as	
1500	1600		Australia, Radio	5995va	6080pa	9475as	9580va	11650pa
			11660va 15435as					
1500	1600		Austria, Christian Voice	13660as	13775as			
1500	1600	vl	Austria, Radio Africa Intl	'7895eu				
1500	1600	vl	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		Canada, Radio Canada Intl		9515na	13655na	15360as	17710na
			17820as					
1500	1600		China, Voice of Hope	7460as				
1500	1600		Costa Rica, R for Peace Intl		15040va	21815usb		
1500	1600		Costa Rica, University Network		5030am	6150am	7375am	9724sa
			11870am 13749na	17645as				
1500	1600	as/vl	Eqt. Guinea, Radio East Africa		15185af			
1500	1600	a/monthly	Finland, Scandv Weekend Radio		5990va	11720va		
1500	1600		Germany, Deutsche Welle		6140eu			
1500	1600		Germany, Overcomer Ministries		6110eu	13810af		
1500	1600	vl	Ghana, Ghana BC Corp		4915do	6130do		
1500	1600		Guam, KTWR/ TWR	15330as				
1500	1600		Guyana, Voice of	5950do				
1500	1600		Italy, IRRS 7120va	7125al				
1500	1600		Japan, Radio7200as	9505na	9750as	9845as	17755va	
1500	1600		Jordan, Radio	11690eu	17680al			
1500	1600		Kenya, Kenya BC Corp	4885irr	4915irr			
1500	1600	vl	Lesotho, Radio	4800do				
1500	1600		Liberia, R Liberia Intl	6100do				
1500	1600		Malaysia, Radio	7295da				
1500	1600		Malaysia, RTM Kota Kinabalu		5980do			
1500	1600		Malaysia, RTM Sarawak	7160do				
1500	1600		Myanmar, Radio	5985do				
1500	1600		Namibia, NBC	7165af	7215af			
1500	1600		Netherlands, Radio	12070as	12080as	15220na	15595as	
1500	1600	occsnal	New Zealand, Radio NZ Intl	6095pa				
1500	1600	vl	Nigeria, Radio/Enugu	6025do				
1500	1600	vl	Nigeria, Radio/Ibadan	6050do				
1500	1600	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do	
1500	1600	vl	Nigeria, Radio/Lagos	4990do	7285do			
1500	1600		Russia, University Network		17765as			
1500	1600		Russia, Voice of Russia	6205as	7260na	7315as	7350as	11500as
			15735am					
1500	1600		Russia, World Beacon	15340eu				
1500	1600		Singapore, SBC Radio One		6150do			
1500	1600		Sri Lanka, SLBC	6005as	9770as	15425as		
1500	1600		Uganda, Radio	5026do	7196do			
1500	1600		UK, BBC World Service	5975as	6135as	6190af	6195as	9410eu
			9740as 11860af	11940af	12095eu	15190am	15400af	15420af
			15485eu 15565eu	17700as	17830af	21470af	21490af	21660af
1500	1600		UK, World Beacon	15340eu				
1500	1600		USA, Armed Forces Radio		6458usb	12689usb		
1500	1600		USA, KAIJ Dallas TX	13815va				
1500	1600		USA, KJES Vado NM	11715na				
1500	1600		USA, KTBN Salt Lk City UT		7510na			
1500	1600		USA, KWHR Naalehu HI	9930as				
1500	1600	as	USA, KWHR Naalehu HI	11565pa				
1500	1600		USA, VOA Special English		6110as	9760as	12040as	15460as
1500	1600		USA, WBCQ Monticello ME		9335na	17495na		
1500	1600		USA, WEWN Birmingham AL		11875na	11530na	11550na	15375no
			15745eu					
1500	1600		USA, WHRI Noblesville IN		6040na	15105am		
1500	1600		USA, WINB Red Lion PA	13570am				
1500	1600		USA, WJCR Upton KY	7490am	13595as			
1500	1600		USA, WRMI Miami FL	15725am				
1500	1600		USA, WRNO New Orleans LA		7395am			
1500	1600		USA, WTJC Newport NC		9370na			
1500	1600		USA, WWCR Nashville TN		9475na	12160na	13845na	15685na
1500	1600		USA, WWFV McCaysville GA		9400va	12172va		
1500	1600		USA, WYFR Okeechobee FL		6280as	11830na	15525as	17760na
1500	1600		Zambia, Christian Voice	4965do				
1500	1600	vl	Zimbabwe, Zimbabwe BC Corp		5975do	6045do		
1515	1545	twf	Seychelles, FEBA Radio	11600as				
1515	1600	m	Seychelles, FEBA Radio	11600as				
1530	1600	vl	Botswana, Radio	3356do	4820do	7255do		
1530	1600		Iran, VO Islamic Rep of Iran		9605as	11640eu	11870as	
1530	1600	as	Seychelles, FEBA Radio	11600as				
1530	1600		USA, Voice of America	7125as	9575as	9645as	11955me	13735me
			15120me 15205as	15265me	15395as			
1535	1600		Germany, Voice of Hope		15715me			
1550	1600		Vatican City, Vatican Radio		9865au	13765au	15235au	

1600 UTC - 11AM E / 10AM C / 8AM P

1600	1610		Vatican City, Vatican Radio		9865au	13765au	15235au	
1600	1615		Pakistan, Radio	11570me	15100me	15725af	17750af	
1600	1625		Netherlands, Radio	12070as	12080as	15220na	15595as	
1600	1627		Vietnam, Voice of	7145eu	9730eu			
1600	1630		Iran, VO Islamic Rep. of Iran		9605as	11640eu	11870as	
1600	1630		Mexico, Radio Mexico Intl		9705am	11770am		
1600	1630		S Africa, Channel Africa	9525af				
1600	1630	vl	Zimbabwe, Zimbabwe BC Corp		5975do	6045do		
1600	1635		UAE, Emirates Radio	13630eu	13675eu	15395eu	21597af	21605eu
1600	1645	a/monthly	Finland, Scandv Weekend Radio		5990va	11720va		
1600	1645		Germany, Deutsche Welle		6170as	7225as	9735af	11695as
			13605as 15455af	21840af				
1600	1650	occsnal	New Zealand, Radio NZ Intl		6095pa			
1600	1656		China, China Radio Intl	7190af	13650af			
1600	1656		North Korea, Voice of	9975af	11735af			
1600	1659	as	Canada, Radio Canada Intl		9515na	13655na	17710na	
1600	1700		Algeria, Radio Algiers Intl		11715eu	15160eu		
1600	1700		Anguilla, Caribbean Beacon		11775am			
1600	1700	vl	Australia, ABC/Alice Springs		2310do			
1600	1700	vl	Australia, ABC/Katherine		2485do			
1600	1700	vl	Australia, ABC/Tennant Creek		2325do			
1600	1700		Australia, Christian Voice Intl		7170pa	13660pa	15115as	
1600	1700		Australia, Radio	5995va	6080pa	9580va	9655va	11650pa
			11660va					
1600	1700		Austria, Christian Voice	7170as	13660as			
1600	1700	vl	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		Costa Rica, R for Peace Intl		15040va	21815usb		
1600	1700		Costa Rica, University Network		5030am	6150am	7375am	9724sa
			11870am 13749na					
1600	1700		Ethiopia, Radio	5990do	7110af	7165af	9560af	9704af
			11800af					
1600	1700		France Radio France Intl	11615af	11995af	12015af	15605af	17605af
			17850af					
1600	1700		Germany, Deutsche Welle		6140eu			

Shortwave Guide

1600	1700		Germany, Overcomer Ministries	6110eu				
1600	1700		Germany, Voice of Hope	15715af				
1600	1700	vl	Ghana, Ghana BC Corp	4915do	6130do			
1600	1700		Guyana, Voice of	5950do				
1600	1700		Jordan, Radio	11690na				
1600	1700		Kenya, Kenya BC Corp	4885irr	4915irr			
1600	1700	vl	Lesotho, Radio	4800do				
1600	1700		Liberia, R Liberia Intl	6100do				
1600	1700		Malaysia, Radio	7295do				
1600	1700		Namibia, NBC	7165af	7215af			
1600	1700	vl	Nigeria, Radio/Enugu	6025do				
1600	1700	vl	Nigeria, Radio/Ibadan	6050do				
1600	1700	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do	
1600	1700	vl	Nigeria, Radio/Lagos	3326do	4990do			
1600	1700		Russia, University Network	17765as				
1600	1700		Russia, Voice of Russia	4940as	4965as	4975as	6005me	7260na
			7305as 9830me	15735am				
1600	1700		Russia, World Beacon	15340eu				
1600	1700		South Korea, R Korea Intl	5975om	9515af	9870af		
1600	1700		Taiwan, R Taipei Intl	11550as				
1600	1700		Uganda, Radio	5026do	7196do			
1600	1700		UK, BBC World Service	3915as	5975as	6190af	6195as	7160as
			9410eu 9740as	11940af	12095eu	15190am	15310as	15400af
			15565eu 17700as	17830af	21470af	21660af		
1600	1700		UK, World Beacon	15340eu				
1600	1700		USA, Armed Forces Radio	6458usb	12689usb			
1600	1700		USA, KAIJ Dallas TX	13815va				
1600	1700		USA, KJES Vado NM	11715na				
1600	1700		USA, KTBN Salt Lk City UT	15590na				
1600	1700		USA, KWHR Naalehu HI	9930as				
1600	1700		USA, VOA Special English	13600af	15445af	17640af		
1600	1700		USA, Voice of America	6035af	6110as	7125as	9575as	9645as
			9760as 11950me	13710af	13735me	15120me	15205as	15240af
			15395as 15485af	17715af	17895af			
1600	1700		USA, WBCQ Monticello ME	9335na	17495na			
1600	1700		USA, WEWN Birmingham AL	11530na	11550na	13615na	15375na	
			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, WRMI Miami FL	15725am				
1600	1700		USA, WRNO New Orleans LA	7395om	15420am			
1600	1700		USA, WSHB Cyp Creek SC	18910af				
1600	1700		USA, WTJC Newport NC	9370na				
1600	1700		USA, WWCR Nashville TN	9475na	12160na	13845na	15685na	
1600	1700		USA, WWFV McCaysville GA	9400va	12172va			
1600	1700		USA, WYFR Okeechobee FL	11830na	13855af	15525as	17760na	
			18980eu 21455eu	21525af				
1600	1700		Zambia, Christian Voice	4965do				
1615	1700	as	UK, BBC World Service	11860af	15420af	21490af		
1630	1700		Austria, Radio Austria Intl	17865na				
1630	1700		Egypt, Radio Cairo	15255af				
1630	1700		Georgia, Georgian Radio	6180me				
1630	1700		Guam, KSDA/ AWR	11980as				
1630	1700		UAE, AWR Africa	9890eu				
1630	1700	as	UK, BBC World Service	11860af	21490af			
1630	1700	vl	Zimbabwe, Zimbabwe BC Corp	4828do	6045do			
1645	1700	a/monthly	Finland, Scandv Weekend Radio	6170va	11720va			
1645	1700		Tajikistan, Radio	7245as				
1650	1700		New Zealand, Radio NZ Intl	11725pa				

1700 UTC - 12PM E / 11AM C / 9AM P

1700	1725		Germany, Overcomer Ministries	6110eu				
1700	1727		Czech Rep, Radio Prague Intl	5930eu	17485eu			
1700	1727		Vietnam, Voice of	12070eu				
1700	1730	a/monthly	Finland, Scandv Weekend Radio	6170va	11720va			
1700	1730		France Radio France Intl	11615af	15605af	17605af		
1700	1730		Israel, Kol Israel	11605va	17545va			
1700	1730		Jordan, Radio	11690na	17680al			
1700	1730	mtwhfa	Malta, VO Mediterranean	6110eu	9840eu			
1700	1730		S Africa, Channel Africa	17870af				
1700	1750		New Zealand, Radio NZ Intl	11725pa				
1700	1756		China, China Radio Intl	7150af	9570af	9670va	9695af	11910af
1700	1800		Anguilla, Caribbean Beacon	11775am				
1700	1800	vl	Australia, ABC/Alice Springs	2310do				
1700	1800	vl	Australia, ABC/Katherine	2485do				
1700	1800	vl	Australia, ABC/Tennant Creek	2325do				
1700	1800		Australia, Christian Voice Intl	7170pa	13660pa	15115as		
1700	1800		Australia, Radio	5995va	6080pa	9580va	9655va	9815as
			11880va					
1700	1800		Austria, Christian Voice	7170as	13660as			
1700	1800	vl	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		Costa Rica, R for Peace Intl	15040va	21815usb			
1700	1800		Costa Rica, University Network	5030am	6150am	7375am	9724sa	
			11870am 13749na	17645as				
1700	1800		Egypt, Radio Cairo	15255af				
1700	1800	mtwhf	Eqt Guinea, Radio Africa	15185af				
1700	1800		Germany, Deutsche Welle	6140eu				
1700	1800		Germany, Unt. Methodist Church	11735af	13820af			
1700	1800		Germany, Voice of Hope	9815eu				
1700	1800	vl	Ghana, Ghana BC Corp	3366do	4915do			
1700	1800	a	Greece, Voice of	9420eu	11640eu	15630eu	17705na	
1700	1800		Guyana, Voice of	5950do				
1700	1800		Japan, Radio9505na	11970eu	15355af			
1700	1800		Kenya, Kenya BC Corp	4885irr	4915irr			
1700	1800	vl	Lesotho, Radio	4800do				
1700	1800		Liberia, R Liberia Intl	6100do				
1700	1800		Namibia, NBC	3270af	3290af	7215irr		
1700	1800	vl	Nigeria, Radio/Enugu	6025do				
1700	1800	vl	Nigeria, Radio/Ibadan	6050do				
1700	1800	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do	
1700	1800	vl	Nigeria, Radio/Lagos	3326do	4990do			
1700	1800		Romania, R Romania Intl	9625af	11830eu	11940eu	15245eu	
1700	1800		Russia, University Network	17765as				
1700	1800		Russia, Voice of Russia	5890me	7260na	9470me	9830me	15735am
1700	1800		Russia, World Beacon	9575eu				
1700	1800		Sierra Leone, SLBS	3316do				
1700	1800		Taiwan, R Taipei Intl	11550as				
1700	1800		Uganda, Radio	5026do	7196do			
1700	1800		UK, BBC World Service	3255af	3915as	5975as	6005af	6190af
			6195eu 7160as	9410eu	9510as	9630af	9740as	15400af
			15420af 15565as	17830af	21470af			
1700	1800		UK, World Beacon	9575eu				
1700	1800		USA, Armed Forces Radio	6458usb	12689usb			
1700	1800		USA, KAIJ Dallas TX	13815va				
1700	1800		USA, KTBN Salt Lk City UT	15590na				
1700	1800		USA, KWHR Naalehu HI	9930as				
1700	1800		USA, Voice of America	6040af	6110as	7125as	9645as	9760as
			13710af 15205as	15240af	15395as	15445af	17895af	
1700	1800	mtwhf	USA, Voice of America	5990as	6045as	9525as	9670as	9795as
			11955as 12005as	15255as				
1700	1800		USA, WBCQ Monticello ME	9335na	17495na			
1700	1800		USA, WEWN Birmingham AL	11530na	11550na	13615na	15745na	
			17595eu					
1700	1800		USA, WHRA Greenbush ME	17650af				
1700	1800		USA, WHRI Noblesville IN	13760va	15105am			
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		USA, WRMI Miami FL	15725am				
1700	1800		USA, WRNO New Orleans LA	7395am	15420am			
1700	1800		USA, WSHB Cyp Creek SC	18910at				
1700	1800		USA, WTJC Newport NC	9370na				
1700	1800		USA, WWCR Nashville TN	9475na	12160na	13845na	15685na	
1700	1800		USA, WWFV McCaysville GA	9400va	12172va			
1700	1800		USA, WYFR Okeechobee FL	13855af	18980eu	21455eu		
1700	1800		Zambia, Christian Voice	4965do				
1700	1800	vl	Zimbabwe, Zimbabwe BC Corp	4828do	6045do			
1710	1725		Armenia, TWR	5855eu				
1715	1730		Vatican City, Vatican Radio	4005eu	5885eu	7250eu	9645eu	
			15595eu					
1725	1745	mtwhf/vl	UK, United Nations Radio	6125af	15495me	17580af		
1730	1745	vl	Libya, Voice of Africa	15435irr	17725af			
1730	1745		Swaziland, TWR	9500af				
1730	1745	mtwhf	Swaziland, TWR	3200af				
1730	1800	a/monthly	Finland, Scandv Weekend Radio	6170va	11690va			
1730	1800		Guam, KSDA/ AWR	7455as	9385me	11560me		
1730	1800		Liberia, ELWA	4760do				
1730	1800		Netherlands, Radio	6020af	11655as			
1730	1800		Philippines, Radio Pilipinas	11730me	11890me	15190me		
1730	1800		S Africa, AWR Africa	12130af				
1730	1800		Slovakia, R Slovakia Intl	5915eu	6055eu	7345eu		
1730	1800		Switzerland, Swiss R Intl	9605af	13790va	15555va		
1730	1800		Vatican City, Vatican Radio	13765af	15570af	17515af		
1735	1745	vl/th	Paraguay, Radio Nacional	9739sa				
1745	1800		Bangladesh, Bangla Betar	7185eu	9550eu	15520eu		
1745	1800		India, All India Radio	7410eu	11620eu	11935va	13605af	15155af
			17670af					
1745	1800	smtwhf	Swaziland, TWR	3200af				
1751	1800		New Zealand, Radio NZ Intl	15160pa				

1800 UTC - 1PM E / 12PM C / 10AM P

1800	1810		Zambia, National BC Corp	6265do		
1800	1815		Bangladesh, Bangla Betar	7185eu	9550eu	15520eu
1800	1827		Vietnam, Voice of	5955eu	7145eu	9730eu
1800	1830		Azerbaijan, Voice of	6110eu	9155eu	
1800	1830		Egypt, Radio Cairo	15255af		
1800	1830		Germany, Deutsche Welle	3995eu		
1800	1830	s	Germany, Universal Life	11840af		
1800	1830		S Africa, AWR Africa	5960af	6100af	
1800	1830		S Africa, Channel Africa	17870af		
1800	1830		UK, RTE Radio	9895me		
1800	1857		Czech Rep. Radio Prague Intl	5930eu	7315va	
1800	1858		Yemen, Rep of Yemen Radio	9780me		
1800	1859		Poland, Radio Polonia	5995eu	7285eu	
1800	1900		Anguilla, Caribbean Beacon	11775am		
1800	1900	vl	Australia, ABC/Alice Springs	2310do		
1800	1900	vl	Australia, ABC/Katherine	2485do		
1800	1900	vl	Australia, ABC/Tennant Creek	2325do		
1800	1900		Australia, Christian Voice Intl	7170pa	9795po	
1800	1900		Australia, Radio	6080as	7240pa	9580va	9655va	9815as
			11880va					
1800	1900		Austria, Christian Voice	7170as	9795as			
1800	1900	vl	Botswana, Radio	3356do	4820do			
1800	1900	vl	Cameroon, RTV	4850do	6005do			
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	15040va	21815usb			
1800	1900		Costa Rica, University Network 11870am 13749na 17645as	5030am	6150am	7375am	9724sa	
1800	1900	mtwhf	Eqt Guinea, Radio Africa	15185af				
1800	1900	a/monthly	Finland, Scandv Weekend Radio	6170va	11690va			
1800	1900		Germany, Deutsche Welle	6140eu				
1800	1900		Germany, Unt. Methodist Church	11735af	13820af			
1800	1900		Germnay, Voice of Hope	9815eu				
1800	1900	vl	Ghana, Ghana BC Corp	3366do	4915do			
1800	1900		Guyana, Voice of 5950do					
1800	1900		India, All India Radio 7410as 17670af	11620eu	11935va	13605af	15155af	
1800	1900	vl	Italy, IRRS 3980al	3985va				
1800	1900		Kenya, Kenya BC Corp 4885irr	4915irr				
1800	1900		Kuwait, Radio 11990va					
1800	1900	vl	Lesotho, Radio 4800do					
1800	1900		Liberia, ELWA 4760do					
1800	1900		Liberia, R Liberia Intl 5100do					
1800	1900		Namibia, NBC 3270af	3290af	7215irr			
1800	1900		Netherlands, Radio 6020af	11655af				
1800	1900		New Zealand, Radio NZ Intl	15160pa				
1800	1900	vl	Nigeria, Radio/Enugu 6025do					
1800	1900	vl	Nigeria, Radio/Ibadan 6050do					
1800	1900	vl	Nigeria, Radio/Kaduna 4770do	6090do	7275do	9570do		
1800	1900	vl	Nigeria, Radio/Lagos 3326do	4990do				
1800	1900		Philippines, Radio Pilipinas	11730me	11890me	15190me		
1800	1900		Russia, University Network	17765as				
1800	1900		Russia, Voice of Russia 7260na 11510af 15735am	7335af	7340eu	9775eu	9830af	
1800	1900	as	Russia, Voice of Russia 5940eu	6175eu				
1800	1900		Russia, World Beacon 3230af	9575eu	17850af			
1800	1900		S Africa, African Beacon 3230af					
1800	1900		Sierra Leone, SLBS 3316do					
1800	1900		Swaziland, TWR 3200af	9500af				
1800	1900		Taiwan, R Taipei Intl 3955eu					
1800	1900		Uganda, Radio 5026do	7196do				
1800	1900		UK, BBC World Service 3255af 9510as 9740me	5975as 15400af	6190af 15420af	6195eu 17830af	9410eu 21470af	
1800	1900		UK, World Beacon 3230af	9575eu	17850af			
1800	1900		USA, Armed Forces Radio	6458usb	12689usb			
1800	1900		USA, KAIJ Dallas TX 13815va					
1800	1900		USA, KTBN Salt Lk City UT	15590na				
1800	1900		USA, KWHR Naalehu HI9930as					
1800	1900		USA, Voice of America 6035af 13710af 15240af	6040af 15580af	9760as 17895af	9840as	11975af	
1800	1900		USA, WBCQ Monticello ME	9335na	17495na			
1800	1900		USA, WEWN Birmingham AL 17595eu	11530na	11550na	13615na	15745na	
1800	1900		USA, WHRA Greenbush 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		USA, WRMI Miami FL 15725am					
1800	1900		USA, WRNO New Orleans LA	7395am	15420am			
1800	1900		USA, WSHB Cyp Creek SC	15665eu	18910af			
1800	1900		USA, WTJC Newport NC	9370na				
1800	1900		USA, WWCR Nashville TN	9475na	12160na	13845na	15685na	
1800	1900		USA, WWFV McCaysville GA	9400va	12172va			
1800	1900		USA, WYFR Okeechobee FL	18980eu				
1800	1900		Zambia, Christian Voice 4965do					
1800	1900	vl	Zimbabwe, Zimbabwe BC Corp	4828do	6045do			
1815	1900		Bangladesh, Bangla Betar	7185eu	9550eu	15520eu		
1830	1855		Belgium, RVI Flanders R Intl	9925eu	13685eu	13710va		
1830	1900	mtwhf	Georgia, Georgian Radio	6230eu				
1830	1900	as	Georgia, Georgian Radio	6080as				
1830	1900		Netherlands, Radio 9895af	17605af				
1830	1900		Sweden, Radio 6065eu					
1830	1900	s	Sweden, Radio 5840eu					
1830	1900		UK, RTE Radio	13640na	21630af			
1830	1900	as	USA, Voice of America	13675af	15160af	17640af		
1845	1900		Congo, RTV Congolaise 4765af	5985af				

1900 UTC - 2PM E / 1PM C / 11AM P

1900	1915		Congo, RTV Congolaise 4765do	5985af				
1900	1927		Vietnam, Voice of 7145eu	9730eu				
1900	1930		Germany, Deutsche Welle	3995eu				
1900	1930		Philippines, Radio Pilipinas	11730me	11890me	15190me		
1900	1930		USA, VOA Special English	9785me	12015me	13640me		
1900	1945		Germany, Deutsche Welle 15390af 17810af	11765af	11810af	13780af	15275af	
1900	1945		India, All India Radio 7410as 17670af	11620eu	11935va	13605af	15155af	
1900	1956		China, China Radio Intl 9440af	9585af	13790af			
1900	1956		North Korea, Voice of 7505eu	11334eu				
1900	2000		Anguilla, Caribbean Beacon	11775am				
1900	2000	mtwhf	Argentina, RAE 9690va	15345va				
1900	2000	vl	Australia, ABC/Katherine	2485do				
1900	2000	vl	Australia, ABC/Tennant Creek	2325do				
1900	2000		Australia, Christian Voice Intl	7170pa	9795pa			
1900	2000		Australia, Radio 6080as 11880va	7240pa	9500as	9580va	9815as	
1900	2000		Austria, Christian Voice 7170as	9795as				
1900	2000	vl	Botswana, Radio 3356do	4820do				
1900	2000	vl	Cameroon, RTV 4850do	6005do				
1900	2000		Canada, CFRX Toronto ON	6070do				
1900	2000		Canada, CFVP Calgary AB	6030do				
1900	2000		Canada, CHNX Halifax, NS	6130do				
1900	2000		Canada, CKZN St John's NF	6160do				
1900	2000		Canada, CKZU Vancouver BC	6160do				
1900	2000		Canada, CBC Northern Service	9625do				
1900	2000		Costa Rica, R for Peace Intl	15040va	21815usb			
1900	2000		Costa Rica, University Network 11870am 13749na 17645as	5030am	6150am	7375am	9724sa	
1900	2000	mtwhf	Eqt Guinea, Radio Africa	15185af				
1900	2000	a/monthly	Finland, Scandv Weekend Radio	6170va	11690va			
1900	2000	vl	Ghana, Ghana BC Corp	3366do	4915do			
1900	2000		Guyana, Voice of 5950do					
1900	2000	vl	Italy, IRRS 3980al	3985va				
1900	2000		Kenya, Kenya BC Corp 4885irr	4915irr				
1900	2000		Kuwait, Radio 11990va					
1900	2000	vl	Lesotho, Radio 4800do					
1900	2000		Liberia, ELWA 4760do					
1900	2000		Liberia, R Liberia Intl 5100do					
1900	2000		Namibia, NBC 3270af	3290af	7215irr			
1900	2000		Netherlands, Radio 6020af	9895af	11655af	17605af		
1900	2000		New Zealand, Radio NZ Intl	15160pa				
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	15120va			
1900	2000		Russia, University Network	17765as				
1900	2000		Russia, Voice of Russia 5940eu 7360eu 7440eu	5950eu 9775af	6175eu 9875af	7335af 11510af	7340eu	
1900	2000		Russia, World Beacon 3230af	17850af				
1900	2000		S Africa, African Beacon 3230af					
1900	2000		Sierra Leone, SLBS 3316do					
1900	2000	vl	Solomon Islands, SIBC 5020do					
1900	2000		South Korea, R Korea Intl	5975am	7275eu			
1900	2000		Swaziland, TWR 3200af					
1900	2000		Thailand, Radio 9535eu	9655eu	11905eu			
1900	2000		Uganda, Radio 5026do	7196do				
1900	2000		UK, BBC World Service 3255af 9630af 12095af	6005af 15400af	6190af 17830af	6195eu	9410eu	
1900	2000		UK, World Beacon 3230af	17850af				
1900	2000		USA, Armed Forces Radio	6458usb	12689usb			
1900	2000		USA, KAIJ Dallas TX 13815va					
1900	2000		USA, KJES Vada NM 15385au					
1900	2000		USA, KTBN Salt Lk City UT	15590na				
1900	2000		USA, KWHR Naalehu HI9930as					
1900	2000		USA, Voice of America 4950af 9760as 11870pa 17895af 15580af	6035af 11975af	7415af 13710af	9525pa 15180pa	9690as 15240af	15580af
1900	2000	mtwhf	USA, Voice of America 5965me 15205me 15410as	9840as	11720as	11970as	13725af	
1900	2000		USA, WBCQ Monticello ME	9335na	17495na			
1900	2000		USA, WEWN Birmingham AL 17595eu	11550na	11530na	13615na	15745na	
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	13595as				
1900	2000		USA, WMLK Bethel PA 15265eu					
1900	2000		USA, WRMI Miami FL 15725am					
1900	2000		USA, WRNO New Orleans LA	7395am	15420am			
1900	2000		USA, WSHB Cyp Creek SC	15665eu	18910af			
1900	2000		USA, WTJC Newport NC	9370na				
1900	2000		USA, WWCR Nashville TN	9475na	12160na	13845na	15685na	
1900	2000		USA, WWFV McCaysville GA	9400va	12172va			
1900	2000		USA, WYFR Okeechobee FL	13855af	15565eu	18980eu		
1900	2000		Zambia, Christian Voice 4965do					
1900	2000	vl	Zimbabwe, Zimbabwe BC Corp	4828do	6045do			
1904	1930	s	Greece, Voice of 5865eu	7475eu	17705na			
1930	2000		Austria, Radio Austria Intl	5945eu	6155eu			
1930	2000		Georgia, Georgian Radio	11760eu				
1930	2000		Greece, Voice of 11645eu					
1930	2000	s	Greece, Voice of 5865eu	7475eu	11645na	17705na		
1930	2000		Iran, VO Islamic Rep. of Iran	6110eu	9890eu	11695af	15140af	
1930	2000	vl	Papua New Guinea, NBC	4890do				
1930	2000		Slovakia, R Slovakia Intl 5915eu	6055eu	7345eu			
1930	2000		Switzerland, Swiss R Intl 9605af	13660af	15485af	17660me		
1930	2000		Turkey, Voice of 7125eu					
1930	2000		Yugoslavia, Radio 6100eu					
1935	1955		Italy, RAI Intl 5970eu	9760eu				
1945	2000		Albania, Radio Tirana Intl	7210eu	9510eu			

2000 UTC - 3PM E / 2PM C / 12PM P

2000	2015		Swaziland, TWR 3200af					
2000	2020		Turkey, Voice of 7125eu					
2000	2025		Netherlands, Radio 6020af	9895af	11655af	17605af		
2000	2030		Austria, Christian Voice 7170as	9795as				
2000	2030	mtwhfa	Hungary, Radio Budapest	6025eu	7135eu			
2000	2030		Iran, VO Islamic Rep. of Iran	6110eu	9890eu	11695af	15140af	
2000	2030		Israel, Kol Israel	6280va	7520va	15640af	15650va	
2000	2030		Mongolia, Voice of 12015as					
2000	2030		S Africa, AWR Africa	17695af				
2000	2030		Switzerland, Swiss R Intl	9605af	13660af	15485af	17660me	
2000	2030		USA, Voice of America 4950af 9760as 11855af	6035af 11975af	6095af 13710af	7415af 15240af	9690as 15580af	17885af

			17895af					
2000	2030		Vatican City, Vatican Radio	9660af	11625af	13765af		
2000	2045		Germany, Deutsche Welle	6180eu				
2000	2056		China, China Radio Intl 5965eu	9440af	9840eu	13640af	15125af	
2000	2100		Algeria, Radio Algiers Intl	11715eu	15160eu	15160va		
2000	2100		Anguilla, Caribbean Beacon	11775am				
2000	2100	vl	Australia, ABC/Alice Springs	2310do				
2000	2100	vl	Australia, ABC/Katherine	2485do				
2000	2100	vl	Australia, ABC/Tennant Creek	2325do				
2000	2100		Australia, Christian Voice Intl	7170pa	9795pa			
2000	2100		Australia, Radio 6080as	7240pa	9500as	9580va	9815as	
			11880va 12080pa					
2000	2100	vl	Botswana, Radio 3356do	4820do				
2000	2100		Bulgaria, Radio 5800eu	7500eu				
2000	2100	vl	Cameroon, RTV 4850do	6005do				
2000	2100		Canada, CBC Northern Service	9625do				
2000	2100		Canada, CFRX Toronto ON	6070do				
2000	2100		Canada, CFVP Calgary AB	6030do				
2000	2100		Canada, CHNX Halifax, NS	6130do				
2000	2100		Canada, CKZN St John's NF	6160do				
2000	2100		Canada, CKZU Vancouver BC	6160do				
2000	2100		Costa Rica, R for Peace Intl	15040va	21815usb			
2000	2100		Costa Rica, University Network 5030am		6150am	7375am	9724sa	
			11870am 13749na 17645as					
2000	2100		Ecuador, HCJB 11890eu					
2000	2100	mtwhf	Eqt Guinea, Radio Africa	15185af				
2000	2100	a/monthly	Finland, Scandv Weekend Radio	6170va	11690va			
2000	2100	vl	Ghana, Ghana BC Corp	3366do	4915do			
2000	2100		Guyama, Voice of 5950do					
2000	2100		Indonesia, Voice of 9525pa	11785as	15150as			
2000	2100	vl	Italy, IRRS 3980al	3985va				
2000	2100		Kenya, Kenya BC Corp 4885irr	4915irr				
2000	2100		Kuwait, Radio 11990va					
2000	2100	vl	Lesotho, Radio 4800do					
2000	2100		Liberia, ELWA 4760do					
2000	2100		Liberia, R Liberia Intl 5100do					
2000	2100	mtwha	Malta, VO Mediterranean	7440eu				
2000	2100		Namibia, NBC 3270af	3290af	7215irr			
2000	2100		New Zealand, Radio NZ Intl	15160pa				
2000	2100	vl	Nigeria, Radio/Enugu 6025do					
2000	2100	vl	Nigeria, Radio/Ibadan 6050do					
2000	2100	vl	Nigeria, Radio/Kaduna 4770do	6090do	7275do	9570do		
2000	2100	vl	Nigeria, Radio/Lagos 3326do	4990do				
2000	2100		Nigeria, Voice of 7255af	11770af	15120va			
2000	2100	vl	Papua New Guinea, NBC	4890do				
2000	2100		Russia, University Network	17765as				
2000	2100		Russia, Voice of Russia 5940eu	5950eu	6175eu	7340eu	7390eu	
			9775eu 15735eu					
2000	2100		Russia, World Beacon 3230af	17850af				
2000	2100		S Africa, African Beacon 3230af					
2000	2100	vl	Solomon Islands, SIBC 5020do					
2000	2100	mtwhf	Spain, R Exterior Espana 9595af	9680eu				
2000	2100		Uganda, Radio 5026do	7196do				
2000	2100		UK, BBC World Service 3255af	6005af	6190af	6195eu	9410eu	
			9630af 11835af 12095af	15400af	17830af			
2000	2100		UK, World Beacon 3230af	17850af				
2000	2100		USA, Armed Forces Radio	6458usb	12689usb			
2000	2100		USA, KAIJ Dallas TX 13815va					
2000	2100		USA, KJES Vado NM 15385na					
2000	2100		USA, KTBN Salt Lk City UT	15590na				
2000	2100		USA, KWHR Naalehu HI 9930as					
2000	2100		USA, WBCQ Monticello ME	9335na	17495na			
2000	2100		USA, WEWN Birmingham AL	11530na	13615na	15745na	17595eu	
2000	2100		USA, WHRA Greenbush ME	17650af				
2000	2100		USA, WHRI Noblesville IN	5745va	9495am			
2000	2100		USA, WINB Red Lion PA 13570am					
2000	2100		USA, WJCR Upton KY 7490am	13595as				
2000	2100		USA, WMLK Bethel PA 15265eu					
2000	2100		USA, WRMI Miami FL 15725am					
2000	2100		USA, WRNO New Orleans LA	7395am	15420am			
2000	2100		USA, WTJC Newport NC	9370na				
2000	2100		USA, WWCR Nashville TN	9475na	12160na	13845na	15685na	
2000	2100		USA, WWFV McCaysville GA	9400va	12172va			
2000	2100		USA, WYFR Okeechobee FL	7580eu	13820af	13855af	15565af	
			17575sa					
2000	2100	vl	Vanuatu, Radio 3945do	4960do	7260do			
2000	2100		Zambia, Christian Voice 4965do					
2000	2100	vl	Zimbabwe, Zimbabwe BC Corp	4828do	6045do			
2000	2100		USA, WSHB Cyp Creek SC	11550eu	15665af			
2005	2100	vl	Syria, Radio Damascus 12085eu	13610eu				
2025	2045		Italy, RAI Intl 7220af	9710af	11880af			
2030	2045	vl	Libya, Voice of Africa 15435irr	17725af				
2030	2045		Thailand, Radio 9535eu	9655eu	11905eu			
2030	2055		Belgium, RVI Flanders R Intl	9925eu				
2030	2057		Vietnam, Voice of 7145eu	9730eu				
2030	2100		Austria, AWR Europe	5955eu				
2030	2100		Austria, Christian Voice 7170as	9795as	11935pa			
2030	2100	t h	Belarus, Radio Belarus Intl	7105eu	7210eu			
2030	2100		Cuba, Radio Havana 13660usb	13750eu				
2030	2100		Egypt, Radio Cairo 15375af					
2030	2100		Poland, Radio Polonia 5995eu	7165eu	7290eu	9540eu		
2030	2100		S Africa, AWR Africa 15295af					
2030	2100		Sweden, Radio 6065eu	9445au				
2030	2100		USA, Voice of America 6035af	6095as	7415af	9690as	9760as	
			11975af 13710af 15240af	15580af	17885af	17895af		
2030	2100	as	USA, Voice of America 4950af					
2030	2100		Uzbekistan, Radio Tashkent	5025eu	7105eu	11905eu		
2030	2130		Australia, Christian Voice Intl	11935pa				
2040	2100	mtwhfa	Armenia, Voice of 4810eu	9960eu				
2045	2100		India, All India Radio 7150va	7410eu	9650au	9910au	11620eu	
			11715au					
2050	2100		Vatican City, Vatican Radio	4005eu	5885eu	7250eu	9645eu	

2100 UTC - 7AM E / 6AM C / 4AM P

2100	2110		Kenya, Kenya BC Corp 4885irr	4915irr				
2100	2110		Vatican City, Vatican Radio	4005eu	5885eu	7250eu		
2100	2129		Poland, Radio Polonia 5995eu	7165eu	7290eu	9540eu		
2100	2130	vl	Australia, ABC/Alice Springs	2310do				
2100	2130	vl	Australia, ABC/Katherine	2485do				
2100	2130	vl	Australia, ABC/Tennant Creek	2325do				
2100	2130		Australia, Christian Voice Intl	11935pa				
2100	2130		Australia, Radio 7240pa	9500as	9580va	9660pa	11880va	
			12080pa 17715va 21740va					
2100	2130		Austria, Christian Voice 7170as	11935pa				
2100	2130		China, China Radio Intl 5965eu	9840eu	9845eu	13640af	15125af	
2100	2130		Cuba, Radio Havana 13660usb	13750eu				
2100	2145		Germany, Deutsche Welle	9615af	9690af	9765as	15275pa	
			15410af 17560pa 17835af					
2100	2145		Iraq, Radio Iraq Intl 7157irr	9887irr	11787irr			
2100	2145		USA, WYFR Okeechobee FL	7580eu	13820af	15565af	17575sa	
			21525af					
2100	2156		North Korea, Voice of 7505eu	11335eu				
2100	2157		Czech Rep, Radio Prague Intl	5930va	9430va			
2100	2159		Canada, Radio Canada Intl	7235va	7425va	9770va	9805va	
			11600va 12015va 13650va					
2100	2200		Anguilla, Caribbean Beacon	11775cm				
2100	2200		Australia, Christian Voice Intl	7170pa				
2100	2200		Austria, AWR Europe 9660af					
2100	2200	vl	Botswana, Radio 3356do	4820do				
2100	2200	vl	Cameroon, RTV 4850do	6005do				
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	15040va	21815usb			
2100	2200		Costa Rica, University Network	5030am	6150am	7375am	9724sa	
			11870am 13749na 17645as					
2100	2200		Ecuador, HCJB 11890eu					
2100	2200		Egypt, Radio Cairo 15375af					
2100	2200	mtwhf	Eqt Guinea, Radio Africa	15185af				
2100	2200	f/monthly	Finland, Scandv Weekend Radio	6170va	11720va			
2100	2200	vl	Ghana, Ghana BC Corp	3366do	4915do			
2100	2200		Guyana, Voice of 5950do					
2100	2200		India, All India Radio 7150va	7410eu	9650au	9910au	11620eu	
			11715au					
2100	2200	vl	Italy, IRRS 3980al	3985va				
2100	2200		Japan, Radio 6115eu	6180eu	11850as	11855af	11920as	17825pa
			21670pa					
2100	2200	vl	Lesotho, Radio 4800do					
2100	2200		Liberia, ELWA 4760do					
2100	2200		Liberia, R Liberia Intl 5100do					
2100	2200		Namibia, NBC 3270af	3290af	7215irr			
2100	2200		New Zealand, Radio NZ Intl	15160pa				
2100	2200	vl	Nigeria, Radio/Enugu 6025do					
2100	2200	vl	Nigeria, Radio/Ibadan 6050do					
2100	2200	vl	Nigeria, Radio/Kaduna 4770do	6090do	7275do	9570do		
2100	2200	vl	Nigeria, Radio/Lagos 3326do	4990do				
2100	2200		Nigeria, Voice of 7255af	11770af	15120va			
2100	2200	vl	Papua New Guinea, NBC	4890do				
2100	2200		Romania, R Romania Intl	5955eu	7105eu	7215eu	9690eu	
2100	2200		Russia, University Network	17765as				
2100	2200		Russia, Voice of Russia 5940eu	5950eu	6175eu	7300eu	7340eu	
			7390eu 15735eu					
2100	2200		Russia, World Beacon 3230af	17850af				
2100	2200		S Africa, African Beacon 3230af					
2100	2200	vl	Solomon Islands, SIBC 5020do	9545do				
2100	2200		South Korea, R Korea Intl	15575eu				
2100	2200	vl	Syria, Radio Damascus 12085eu	13610eu				
2100	2200		UK, BBC World Service 3255af	3915as	5965as	6005af	6110as	
			6190af 6195va 9410eu	11835af	12095sa	15400af		
2100	2200		UK, World Beacon 3230af	17850af				
2100	2200		USA, Armed Forces Radio	6458usb	12689usb			
2100	2200		USA, KAIJ Dallas TX 13815va					
2100	2200		USA, KTBN Salt Lk City UT	15590na				
2100	2200		USA, KWHR Naalehu HI 9930as					
2100	2200		USA, Voice of America 6035af	6040me	6095as	6160as	7140me	
			7415af 9530me 9595as	9670as	9760me	11870pa	11975af	
			13710af 15185pa 15240af	15580af	17735as	17820as	17895af	
2100	2200		USA, WBCQ Monticello ME	7415no	9335na	17495na		
2100	2200		USA, WEWN Birmingham AL	11530na	13615na	15745na	17595eu	
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 15725am					
2100	2200		USA, WRNO New Orleans LA	7395am	15420am			
2100	2200		USA, WSHB Cyp Creek SC	11550eu	15665af			
2100	2200		USA, WTJC Newport NC	9370na				
2100	2200		USA, WWCR Nashville TN	9475na	12160na	13845na	15685na	
2100	2200		USA, WWFV McCaysville GA	9400va	12172va			
2100	2200	vl	Vanuatu, Radio 3945do	4960do	7260do			
2100	2200		Zambia, Christian Voice 4965do					
2100	2200	vl	Zimbabwe, Zimbabwe BC Corp	4828do	6045do			
2115	2130	mtwhf	UK, BBC Caribbean Report	5975am	11675am	15190am		
2115	2130	as	UK, BBC World Service 5975am					

2115	2200		Egypt, Radio Cairo	9990eu				
2118	2200	s	Greece, Voice of	9420pa	15650pa			
2130	2145	tf	UK, BBC Calling Falklands		11680sa			
2130	2156		China, China Radio Intl	5965eu	9840eu			
2130	2200	vl	Australia, ABC/Alice Springs		4835do			
2130	2200	vl	Australia, ABC/Katherine		5025do			
2130	2200	vl	Australia, ABC/Tennant Creek		4910do			
2130	2200		Australia, Radio	7240pa	9660pa	11550as	11695as	11880va
			12080pa	15415pa	17715va	21740va		
2130	2200		Austria, Christian Voice	7170as				
2130	2200	th	Belarus, Radio Belarus Intl		7105eu	7210eu		
2130	2200		Guam, KSDA/ AWR	11960as	11980as			
2130	2200		Iran, VO Islamic Rep of Iran		9780au	11740au		
2130	2200		Turkey, Voice of	9525as				
2130	2200	f	UK, Wales Radio Intl	6010eu				
2130	2200		Uzbekistan, Radio Tashkent		5025eu	7105eu	11905eu	
2145	2200		USA, WYFR Okeechobee FL		7580eu	15565af		

2200 UTC - 5PM E / 4PM C / 2PM P

2200	2205	vl	Syria, Radio Damascus	12085eu	13610eu			
2200	2215		New Zealand, Radio NZ Intl		15160pa			
2200	2218	s	Greece, Voice of	9420pa	15650pa			
2200	2230		Canada, Radio Canada Intl		6045va	9770va	9805va	11600va
2200	2230		India, All India Radio	7150va	7410eu	9650au	9910au	11620eu
			11715au					
2200	2230		Iran, VO Islamic Rep. of Iran		9780au	11740au		
2200	2230		Mexico, Radio Mexico Intl		9705am	11770am		
2200	2230	vl	Papua New Guinea, NBC		4890do			
2200	2230		South Korea, R Korea Intl		3955eu			
2200	2230		Turkey, Voice of	9525as				
2200	2230		USA, KWHR Naalehu HI	9930as				
2200	2230	mtwhf	USA, Voice of America	6035af	7415af	11655af	11975af	13710af
2200	2230		Yugoslavia, Radio	6100eu				
2200	2245		Egypt, Radio Cairo	9990eu				
2200	2245		USA, WYFR Okeechobee FL		7580eu	11740na	15565af	
2200	2256		China, China Radio Intl	7170eu				
2200	2259	as	Spain, R Exterior Espana	9595va	9680eu			
2200	2300		Anguilla, Caribbean Beacon		6090am			
2200	2300	vl	Australia, ABC/Alice Springs		4835do			
2200	2300	vl	Australia, ABC/Katherine		5025do			
2200	2300	vl	Australia, ABC/Tennant Creek		4910do			
2200	2300		Australia, Christian Voice Intl		13620pa	17850pa		
2200	2300		Australia, Radio	11550as	11695as	15240as	15415pa	17715va
			17795va 21740va					
2200	2300		Austria, Christian Voice	13620as	17850os			
2200	2300		Bulgaria, Radio	5800eu	7500eu			
2200	2300	vl	Cameroon, RTV	4850do	6005do			
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		Costa Rica, R for Peace Intl		15040va	21815usb		
2200	2300		Costa Rica, University Network		5030am	6150am	7375am	9724sa
			11870am 13749na	17645as				
2200	2300	mtwhf	Eqt Guinea, Radio Africa		15185af			
2200	2300	f/monthly	Finland, Scandv Weekend Radio		6170va	11720va		
2200	2300	vl	Ghana, Ghana BC Corp		3366do	4915do		
2200	2300		Guyana, Voice of	3290do	5950do			
2200	2300		Italy, IRRS	3980al	3985va			
2200	2300		Malaysia, Radio	7295do				
2200	2300		Namibia, NBC	3270af	3290af	7215irr		
2200	2300	vl	Nigeria, Radio/Enugu	6025do				
2200	2300	vl	Nigeria, Radio/Ibadan	6050do				
2200	2300	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do	
2200	2300	vl	Nigeria, Radio/Lagos	3326do	4990do			
2200	2300		Nigeria, Voice of	7255af	11770af	15120va		
2200	2300		Russia, University Network		17765as			
2200	2300	vl	Solomon Islands, SIBC	5020do	9545do			
2200	2300		Taiwan, R Taipei Intl	5810eu	9335eu			
2200	2300		UK, BBC World Service	5965as	5975am	6195va	7105as	9660as
			11685as 11835af	12080pa	15400af			
2200	2300		Ukraine, R Ukraine Intl	5905eu	7240eu	9560eu		
2200	2300		USA, Armed Forces Radio		6458usb	12689usb		
2200	2300		USA, KAIJ Dallas TX	13815va				
2200	2300		USA, KTBN Salt Lk City UT		15590na			
2200	2300		USA, Voice of America	6160as	7215as	7290me	9530me	9770as
			9880as 9890as	11760as	15185as	15290as	15305as	17735as
			17820as					
2200	2300		USA, WBCQ Monticello ME		7415na	9335na	17495na	
2200	2300		USA, WEWN Birmingham AL		9975eu	11530na	15745na	17595eu
2200	2300		USA, WHRA Greenbush ME		17650af			
2200	2300		USA, WHRI Noblesville IN		5745va	9495am		
2200	2300		USA, WINB Red Lion PA	13570am				
2200	2300		USA, WJCR Upton KY	7490am	13595as			
2200	2300		USA, WRMI Miami FL	15725am				
2200	2300		USA, WRNO New Orleans LA		7395am			
2200	2300		USA, WSHB Cyp Creek SC		7510eu	15285sa		
2200	2300		USA, WTJC Newport NC		9370na			
2200	2300		USA, WWCR Nashville TN		3215na	7520na	12160na	13845na
2200	2300		USA, WWFV McCaysville GA		9400va	12172va		
2200	2300	vl	Vanuatu, Radio	3945do	4960do	7260do		
2200	2300		Zambia, Christian Voice	4965do				
2200	2359		Liberia, R Liberia Intl	5100do				
2205	2230		Italy, RAI Intl	9675as	11900as			
2216	2300		New Zealand, Radio NZ Intl		17675pa			
2230	2255		Belgium, RVI Flanders R Intl		13700na			
2230	2257		Czech Rep, Radio Prague Intl		7345na	9435af		
2230	2300	smtwhf	Austria, Radio Austria Intl		5945eu	6155eu		
2230	2300		Cuba, Radio Havana	9550am				
2230	2300	mtwhfa	Hungary, Radio Budapest		3975eu	7135eu		
2230	2300	vl	Papua New Guinea, NBC		4890do	11880irr		
2230	2300		Sweden, Radio	6065eu	9435eu			
2245	2300		India, All India Radio	9705as	9950as	13605as		
2245	2300		USA, WYFR Okeechobee FL		11740na			

2300 UTC - 6PM E / 5PM C / 3PM P

2300	0000		Anguilla, Caribbean Beacon		6090am			
2300	0000	vl	Australia, ABC/Alice Springs		4835do			
2300	0000	vl	Australia, ABC/Katherine		5025do			
2300	0000	vl	Australia, ABC/Tennant Creek		4910do			
2300	0000	vl	Cameroon, RTV	4850do	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		Costa Rica, R for Peace Intl		15040va	21815usb		
2300	0000		Costa Rica, University Network		5030am	6150am	7375am	9925sa
			11870am 13749na	17645as				
2300	0000		Ecuador, HCJB	11785as				
2300	0000		Egypt, Radio Cairo	9900na				
2300	0000	f/monthly	Finland, Scandv Weekend Radio		6170va	11690va		
2300	0000	vl	Ghana, Ghana BC Corp		3366do	4915do		
2300	0000		Guyana, Voice of	3290do	5950do			
2300	0000		India, All India Radio	9705as	9950as	13605as		
2300	0000	tas	Italy, IRRS	7120va	7125al			
2300	0000		Liberia, R Liberia Intl	5100do				
2300	0000		Malaysia, Radio	7295do				
2300	0000		Malaysia, RTM Kota Kinabalu		5980do			
2300	0000		Namibia, NBC	3270af	3290af	7215irr		
2300	0000		New Zealand, Radio NZ Intl		17675pa			
2300	0000	vl	Papua New Guinea, NBC		4890do	11880irr		
2300	0000		Romania, R Romania Intl		7195eu	9510na	9570eu	11940na
2300	0000		Russia, University Network		17765as			
2300	0000		Singapore, SBC Radio One		6150do			
2300	0000	vl	Solomon Islands, SIBC	5020do	9545do			
2300	0000		UK, BBC World Service	3915as	5875eu	5965as	5975am	6035as
			7105as 11685as	11945as	12095sa	15280as		
2300	0000		USA, Armed Forces Radio		6458usb	12689usb		
2300	0000		USA, KAIJ Dallas TX	13815va				
2300	0000		USA, KTBN Salt Lk City UT		15590na			
2300	0000		USA, Voice of America	6160as	7215as	7290me	9530me	9770me
			9880as 9890as	11760as	15185as	15290as	15305as	17735as
			17820as					
2300	0000		USA, WBCQ Monticello ME		7415na	9335na	17495na	
2300	0000		USA, WEWN Birmingham AL		9355na	9975eu	11530na	17595eu
2300	0000		USA, WHRA Greenbush ME		7580eu			
2300	0000		USA, WHRI Noblesville IN		5745va	9495am		
2300	0000		USA, WINB Red Lion PA	12160am				
2300	0000		USA, WJCR Upton KY	7490am	13595as			
2300	0000		USA, WRMI Miami FL	15725am				
2300	0000		USA, WRNO New Orleans LA		7355am			
2300	0000		USA, WSHB Cyp Creek SC		7510va	15285sa		
2300	0000		USA, WTJC Newport NC		9370na			
2300	0000	as	USA, WWBS Macon GA	11900na				
2300	0000		USA, WWCR Nashville TN		3215na	5070na	7520na	13845na
2300	0000		USA, WWFV McCaysville GA		6890va	9400va		
2300	0000	vl	Vanuatu, Radio	3945do	4960do	7260do		
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	9730as	11550as	11695as	12080pa
			15240as 15415pa	17715va	17795va	21740va		
2300	2330		Austria, Christian Voice	13620as	17850as			
2300	2330		Canada, Radio Canada Intl		5960am	6040am	6175am	9590am
			9755am 11865am	13730am				
2300	2330		Cuba, Radio Havana	9550am				
2300	2330	mtwhf	Mexico, Radio Mexico Intl		9705am	11770am		
2300	2330		USA, VOA Special English		6045as	7140as	9545as	11925as
			15395as					
2300	2345		Germany, Deutsche Welle		9470as	9815as	13690as	21790as
2300	2345		USA, WYFR Okeechobee FL		11740na	15170sa	15400sa	
2300	2350		Turkey, Voice of	9655na	9830va			
2300	2356		China, China Radio Intl	5990na	13680na			
2330	0000		Albania, Radio Tirana Intl		7130eu	9540eu		
2330	0000		Australia, Christian Voice Intl		11935pa	13620pa	17850pa	
2330	0000		Australia, Radio	9660pa	11695as	12080pa	15135as	15240as
			15415pa 17715va	17795va	21740va			
2330	0000		Austria, Christian Voice	11935pa	13620as	17850as		
2330	0000		Canada, Radio Canada Intl		5960na	6175na	9590na	9755na
2330	0000		Malaysia, RTM Sarawak	7160do				
2330	0000		Netherlandsss, Radio	6165na	9845na			
2330	0000		USA, VOA Special English		6045as	7130as	7140as	9545as
			9620as 11805as	11925as	13745as	15205as	15395as	
2330	2345	vl	Libya, Voice of Africa	15435irr	17725af			
2330	2357		Czech Rep, Radio Prague Intl		7345na	9435na		
2330	2357		Vietnam, Voice of	9840as	12019as			
2330	2359		Lithuania, R Vilnius	9875na				
2330	2359		Switzerland, Swiss R Intl	9885sa	11660sa			

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

0000 UTC/ 7pm E/4pm P - Page 43 Freqs

NEWSCASTS (*extended)

0000	BBCWS(am)	S News Summary
		M World Briefing*
		T-A News
	BBCWS(eas)(sas)	D World Briefing*
	R. Australia	D World News
	R. Canada Int.	O News
	R. Japan	D World News
	R. New Zealand Int.	D News
	Spanish Foreign R.	T-A Ibero-American News*
	VOA News Now	T-A World News
0010	VOA News Now	T-A Regional News
0014	VOA News Now	T-A USA News
0030	BBCWS(am)	M The World Today*
	BBCWS(sas)	M-F The World Today*
	VOA News Now	T-A World News

CURRENT AFFAIRS MAGAZINES/FEATURES

0005	BBCWS(am)	T-A Outlook
	R. Canada Int.	T-A As It Happens (from 2330)
0010	R. Australia	W The National Interest
		H Background Briefing (documentaries)
0015	R. Japan	T-A 44 Minutes
0030	BBCWS(eas)(sas)	S Agenda (trends)
	BBCWS(eas)	T/W/F/A Analysis
		H From Our Own Correspondent
0032	Spanish Foreign R.	T-A Press Review
0033	VOA News Now	T Encounter
		F Best of 'Talk to America'
		A Press Conference USA

BUSINESS/ECONOMICS (also in NEWSCASTS & Current Affairs)

0000	R. Netherlands	A A Good Life (development issues)
0030	BBCWS(eas)	M-A World Business Report
	R. Netherlands	W A Good Life (development issues)
0049	VOA News Now	T-F Business News

SCIENCE/TECHNOLOGY (incl. Health & Environment)

0000	R. Netherlands	T The Research File
0005	R. Canada Int.	S Quirks and Quarks
0010	R. Australia	T The Science Show
0030	BBCWS(sas)	A Science in Action
	R. Netherlands	F The Research File
0045	VOA News Now	T-F Science News
	BBCWS(am)	A Body and Mind

ARTS & CULTURE

0010	R. Australia	M Awaye! (Aboriginal culture)
0030	R. Netherlands	S Roughly Speaking (youth culture)
		M Aural Tapestry
	R. New Zealand Int	S Bookmarks
0033	VOA News Now	H Kaleidoscope

LOCAL LIVES AND VIEWS

0000	R. Netherlands	M Dutch Horizons
0010	R. Australia	F Hindsight (social history)
	R. Japan	M Weekend Square
0030	R. Australia	A Country Breakfast (rural Australia)
	R. Netherlands	T Euroquest (Europe in context)
		H Dutch Horizons
0045	BBCWS(eas)	M Letter from America

INFORMATIONAL FEATURES

0000	R. Netherlands	H Documentary
		F Sound Fountain (soundscapes)
0005	R. Australia	S The Europeans
0022	VOA News Now	T-A Feature story
0045	BBCWS(am)	T Patterns of Faith
		H Heart and Soul (religion)
		F What's the Problem? (advice)
0047	Spanish Foreign R.	T-A Spanish Language Course

MUSIC

0000	R. Netherlands	W Music 52-15 (world/folk)
	WBCQ(7415kHz)	A Lost Discs Radio Show
0005	R. Canada Int.	M Global Village (world/folk)
	R. New Zealand Int.	M-F Cadenza (light classics)
		A Home Grown (NZ music)
0030	R. New Zealand Int.	A Musical Chairs (featured artist)
0053	VOA News Now	T-F Music feature

ENTERTAINMENT/VARIETY, Magazine Shows

0000	WBCQ	M Le Show
0001	BBCWS(am)	S Play of the Week (radio theatre)

SWL, MEDIA, COMMUNICATIONS

0000	WBCQ	S The Real Amateur Radio Show
	WHRI(5745 kHz.)	A Dxing with Cumbre
0030	WHRI(5745 kHz.)	S Dxing with Cumbre
	R. Australia	H The Media Report
	WBCQ	H World of Radio
0047	Spanish Foreign R.	A Radio Waves

LISTENER CONTACT/INTERACTIVE

0005	R. Australia	A Feedback
0010	R. Japan	S Hello from Tokyo
0030	R. Australia	A Feedback
0035	Spanish Foreign R.	A Radio Club
0047	Spanish Foreign R.	M Radio Club (rpt.)

SPORT

0018	VOA News Now	T-A Sports
0020	BBCWS(am)	M Sports Roundup
	BBCWS(eas)(sas)	D Sports Roundup

0100 UTC/ 8pm E/5pm P - Page 43 Freqs

NEWSCASTS (*extended)

0100	BBCWS(am)	S/M The World Today*
		T-A News
	BBCWS(eas)	S The World Today*
		M-A News
	BBCWS(sas)	D The World Today*
	China R. Int.	D News
	Deutsche Welle	D News
	HCJB	T-A Latin American & World News
	R. Australia	D News
	R. Habana Cuba	T-S 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
	Voice of Vietnam	D News
0110	R. Habana Cuba	T-S National News
	VOA News Now	T-A Regional News
0114	VOA News Now	T-A USA News
0130	R. Habana Cuba	T-S News Bulletin
	RTE, Ireland	T-S The News at Six*
	VOA News Now	T-A World News
	VOA Spec. Eng.	T-A News

CURRENT AFFAIRS MAGAZINES/FEATURES

0100	R. Netherlands	T-A Newsline
0105	BBCWS(eas)	T-A Outlook (topical magazine)
	Deutsche Welle	M Talking Point (journalists)
		T-A Newslink
	R. Australia	S Correspondents' Report
		A Asia Pacific
	R. Netherlands	M Wide Angle (week in review)
0110	China R. Int.	S Report on Developing Countries
		M-F Current Affairs
		A Global Review
	R. Australia	M-F Asia Pacific
	R. Habana Cuba	M Weekly Review
0115	R. Habana Cuba	T-S Viewpoint
0130	BBCWS(sas)	S Assignment
	Deutsche Welle	T Insight
0136	VOA News Now	T-F Dateline
0140	R. Habana Cuba	A Weekly Review
	VOA Spec. Eng.	A In the News
0145	BBCWS(am)	S Letter from America

BUSINESS/ECONOMICS (also in NEWSCASTS & Current Affairs)

0115	Voice of Vietnam	F Vietnam Economy
0120	R. Prague	F Economic Report
0130	China R. Int.	W China Horizons
0149	VOA News Now	T-F Business News

SCIENCE/TECHNOLOGY (incl. Health & Environment)

0105	R. New Zealand Int.	S Eureka!
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 & CULTURE

0105	BBCWS(am)	T Meridian-Masterpiece (ideas)
		W Meridian-Screen (cinema)
		F Meridian-Writing (books)
	R. Prague	S Readings from Czech Literature
0110	R. Prague	M The Arts
0115	Deutsche Welle	M Arts on the Air
	Voice of Vietnam	W Culture and Society
0120	China R. Int.	S In the Spotlight
	Voice of Vietnam	A Literature and Arts
0130	R. Australia	A Arts Talk
0145	VOA Spec. Eng.	A American Stories
		H The Making of a Nation

LOCAL LIVES AND VIEWS

0105	R. Netherlands	S Europe Unzipped
	R. New Zealand Int.	M-F In Touch with New Zealand
	R. Prague	M Letter from Prague
		T-A Current Affairs
	Voice of Vietnam	D Current Affairs
0110	HCJB	T-A Studio 9 (Latin America)
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 (biweekly)
	Voice of Vietnam	T Vietnam: Land and People
		A Rural Vietnam
0120	R. Prague	W Talking Point
		A From the Weeklies
0130	BBCWS(sas)	A People and Politics (Parliament)
	China R. Int.	M People in the Know
		F Life in China
	Deutsche Welle	H Living in Germany
0140	R. Habana Cuba	T/H/F Caribbean Outlook
0145	VOA Spec Eng.	F American Mosaic

(*1st wk.)

INFORMATIONAL FEATURES

0105	BBCWS(am)	A Omnibus (documentary)
	Deutsche Welle	M Religion and Society
0115	Deutsche Welle	A German by Radio
	Spanish Foreign R.	S American Chronicles
0122	VOA News Now	T-A Feature report
0130	BBCWS(am)	S Reporting Religion
	BBCWS(eas)	S In Praise of God (worship service)
	China R. Int.	H Voices from Other Lands
	R. Australia	S Educational series
		T The Law Report
		W The Religion Report
	R. New Zealand Int.	A Changing feature or series
0147	Spanish Foreign R.	T-A Spanish Language Course
0154	VOA News Now	T-F Feature report

MUSIC

0100	WBCQ(7415 kHz.)	A A Different Kind of Oldies Show
0105	BBCWS(am)	H Meridian-Music
	R. New Zealand Int.	A Home Grown (from 0005)
0110	HCJB	A Musica del Ecuador [within 'Studio9']
	R. Prague	S Saturday Music (classical/folk/jazz)
0120	Voice of Vietnam	S Music
0130	BBCWS(am)	T Music Mix (popular)
		W UK Top 20
		F Charlie Gillett (world)
	R. Australia	S Oz Sounds
0145	BBCWS(am)	H UK Album Chart
		A Music X-Press

ENTERTAINMENT/VARIETY, Magazine Shows

0100	WBCQ(7415 kHz.)	M Radio NY International
		A Allan Weiner Worldwide
0110	Voice of Vietnam	S Sunday Show
0130	BBCWS(am)	H/A Westway (drama serial)
0145	BBCWS(eas)	M-F Off the Shelf (readings)

SWL, MEDIA, COMMUNICATIONS

0100	HCJB	S DX Partyline
	WWCR(3215 kHz.)	M World of Radio
0110	HCJB	H Ham Radio Today [within 'Studio 9']
0130	R. Australia	H The Media Report
	WWCR(3215 kHz.)	A World of Radio
0133	VOA News Now	S Communications World
0140	R. Habana Cuba	S/W DXers Unlimited
0147	Spanish Foreign R.	S Radio Waves

LISTENER CONTACT/INTERACTIVE

0100	HCJB	M Musical Mailbag
0105	BBCWS(eas)	M Talking Point (global call-in)
0110	R. Prague	A Mailbox
0115	Voice of Vietnam	H Letterbox
0120	China R. Int.	A Listeners' Garden
0130	HCJB	S Saludos Amigos
0135	Spanish Foreign R.	A Radio Club
0140	R. Habana Cuba	M Mailbag Show
0145	BBCWS(eas)	A Write On
0147	Spanish Foreign R.	M Radio Club (rpt)

SPORT

0105	R. Australia	S/A Grandstand (live sport)*
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

Shortwave Guide

	RTE Ireland	S/M Sportsnews
0135	R. Habana Cuba	T-A Time Out
0135	R. New Zealand Int.	S/A Live Sport (in season)

*special service on 9660, 12080, 17580, 21725 kHz.

0200 UTC/ 9pm E/6pm P - Page 43 Freqs

NEWSCASTS (*extended)

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

CURRENT AFFAIRS MAGAZINES/FEATURES

0210	R. Australia	M-F The World Today
0211	Voice of Russia	S News and Views
		M Sunday Panorama
		T-A Commonwealth Update
0215	R. Korea Int.	T-A Seoul Calling
0230	BBCWS(am)(me)	S From Our Own Correspondent
	R. Austria Int.	O Report from Austria
	R. Sweden	T-A 60 Degrees North
0235	R Canada Int.	S/A Canada in the World
		T Media Zone

BUSINESS/ECONOMICS (also in NEWSCASTS & Current Affairs)

0205	R. Canada Int.	S Business Sense
0210	R. Budapest	M Europe Unlimited (trade-monthly)
0220	R. Prague	F Economic Report
0230	R. Korea Int.	H Economic Radar
0235	R Canada Int.	F Business Sense
0245	R. Sweden	H Money Matters
	Voice of Vietnam	F Vietnam Economy

SCIENCE/TECHNOLOGY (incl Health & Environment)

0205	BBCWS(am)(me)	T Health Matters
		W Go Digital
		F One Planet (ecology)
		A Discovery (research)
	R. Australia	A Ockham's Razor (issues)
0230	R. Australia	A Earthbeat (environment)
0245	R. Sweden	F Greenscan (ecology-2nd wk.); Heartbeat (health-3rd wk.)

ARTS & CULTURE

0205	R. Prague	S Readings from Czech Literature
		M The Arts
0210	R. Budapest	M Spotlight (monthly)
0215	R. Taipei Int	H Journey into Chinese Culture
0230	R. Korea Int.	W Cultural Promenade
	R. Sweden	S Spectrum (3rd wk.)
0235	R. Canada Int.	M/H Spotlight
0245	Voice of Vietnam	W Culture and Society
0250	Voice of Vietnam	F Literature and Arts

LOCAL LIVES AND VIEWS

0205	R. Budapest	M Heading for Hungary (monthly)
		T-A Hungary Today
	R. Canada Int.	T-A Canada Today
	R. New Zealand Int.	M-F In Touch with New Zealand
	R. Prague	M Letter from Prague
		T-A Current Affairs
0210	R. Korea Int.	S Seoul Report
0215	R. Prague	T Spotlight (Czech current events) or One on One (interview)
		H Czechs in History or Central Europe Today
	R Taipei Int.	T People
		W Taiwan Today
		F Taipei Magazine
		A Kaleidoscope (life in Taiwan)
0220	R. Prague	W Talking Point
		A From the Weeklies
0224	Voice of Russia	M Russia in Personalities
0230	R. Korea Int.	F Korea and Its Splendars
	R. Sweden	S Weekend (Europe magazine-1st wk.); Sweden Today (2nd wk); Studio 49 (topical discussion-4th wk.)
	Voice of Vienam	D Current Affairs
0232	Voice of Russia	S Moscow Yesterday and Today
0240	R. Austria Int.	S Radio E (on Europe)
	Voice of Vietnam	S Weekly Review
		T/W/F/A Press Review
		H Talk of the Week
0245	R. Sweden	F Nordic Report (1st wk.); The S-Files (things Swedish-4th wk)
		A Review of the Newsweek
	Voice of Vietnam	T Vietnam: Land & People
		A Rural Vietnam
0254	Voice of Russia	H Russia: People and Events

INFORMATIONAL FEATURES

0215	R. Taipei Int.	S Great Wall Forum (mainland issues)
0230	BBCWS(am)(me)	T Everywoman (magazine)
		W Focus on Faith
		F People and Places (global views)
		A Essential Guide (global affairs)
	R. Korea Int.	T Exploring the New Millennium
0232	Voice of Russia	A Christian Message from Moscow
0235	R. Habana Cuba	S The World of Stamps
0245	R. Taipei Int.	M-A Let's Learn Chinese

MUSIC

0200	WBCQ	A Tasha Takes Control
	HCJB	S Rock Solid (Christian rock)
0205	R. New Zealand Int.	S/A Music feature or series
0210	R. Habana Cuba	M From Habana
	R. Korea Int.	M Korean Pop Interactive (requests)
	R. Prague	S Saturday Music (classical/folk/jazz)
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	T Folk Box
		W Jazz Show
		H Russian Musical Highlights (history)
		F Yours for the Asking
0246	Voice of Russia	F Music At Your Request
0250	Voice of Vietnam	S Music (Vietnamese)

ENTERTAINMENT/VARIETY, Magazine Shows

0200	WBCQ	S Marion's Attic (vintage recordings)
0205	BBCWS(am)(me)	M Wright Around the World (pop requests)
	R. Australia	S Margaret Throsby Interview
0230	BBCWS(am)(me)	H Pick of the World (BBC's best)
0232	Voice of Russia	M Timelines
0240	Voice of Vietnam	M Sunday Show

SWL, MEDIA, COMMUNICATIONS

0205	R. Canada Int.	M CIDX Report (biweekly)
0210	R Budapest	S DX Blockbuster
0230	R. Korea Int.	M Multiwave Feedback
0235	R. Canada Int.	M CIOX Report (biweekly)

LISTENER CONTACT/INTERACTIVE

0205	R. Canada Int.	M Maple Leaf Mailbag
0210	R. Budapest	M And the Gatepost (monthly)
0215	R. Prague	A Mailbox
0230	R. Korea Int.	S From Us to You
	R. Sweden	M In Touch with Stockholm (1st wk.)
0235	R. Canada Int.	W Maple Leaf Mailbag
0245	R. Taipei Int.	S Mailbag Time
	Voice of Vietnam	H Letterbox
	WWCR(5070 kHz.)	S Ask WWCR

SPORT

0200	R. New Zealand Int.	S/A Live Sport (in season)
0205	BBCWS(am)(me)	H Sports International (magazine)
	R. Australia	S/A Grandstand (live sports action*)
0245	R. Sweden	T Sportscan

(*special on 9660, 12080, 17580, 17715, 17750, 21725 kHz. only.)

0300 UTC/ 10pm E/7pm P - Page 44 Freqs

NEWSCASTS (*extended)

0300	BBCWS(am)	D World Briefing*
	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	T-S International News
	R. New Zealand Int.	S/A News
		M-F Pacific Regional News
	R Taipei Int.	D News
	Voice of Russia	D News
0310	R. Habana Cuba	T-S National News
0330	R. Budapest	D News
	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
0315	R. Habana Cuba	T-S Viewpoint
0330	BBCWS(am)	M Assignment
	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	M/F Caribbean Outlook
		A Weekly Review
0345	BBCWS(am)(me) TWFA	News Analysis
		H From Our Own Correspondent

BUSINESS/ECONOMICS (also in NEWSCASTS & Current Affairs)

0311	Voice of Russia	W/A Newmarket
0315	R. Taipei Int	M Taiwan Economic Journal
0330	BBCWS(am)(me)	T-A World Business Report
	BBCWS(me)	M World Business Review
	China R. Int.	W China Horizons
	R New Zealand Int.	W Tradewinds
0340	R. Budapest	M Europe Unlimited (trade-monthly)
0345	R. Sweden	H Money Matters
	Voice of Vietnam	F Vietnam Economy

SCIENCE/TECHNOLOGY (incl. Health & Environment)

0311	Voice of Russia	T/F Science and Engineering
0315	Deutsche Welle	S Spectrum
0330	BBCWS(am)	S Science in Action
	Deutsche Welle	W Man and Environment
0345	R. Sweden	F Greenscan (ecology-2nd wk.); Heartbeat (health-3rd wk.)
0350	R. Habana Cuba	M Breakthrough

ARTS AND CULTURE

0305	R. New Zealand Int.	M Tagata o te Moana (Pacific culture)
0315	Deutsche Welle	M Arts on the Air
0320	China R. Int.	S In the Spotlight
0330	HCJB	F The Book & the Spade (archaeology)
	R. Sweden	S Spectrum (3rd wk.)
0340	R. Budapest	M Spotlight (monthly)
0345	Voice of Vietnam	W Culture and Society
		A Literature and Arts

LOCAL LIVES AND VIEWS

0305	R Australia	A Rural Reporter (outback)
0330	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),
0332	Voice of Russia	M This is Russia
		T Kaleidoscope (events)
		H Moscow Yesterday and Today
0335	R Budapest	M Heading for Hungary (monthly)
		T-A Hungary Today
	Voice of Vietnam	D Current Affairs
0345	R. Sweden	F Nordic Report (1st wk.); The S-Files (things Swedish-4th wk)
		A Review of the Newsweek
	Voice of Vietnam	T Vietnam: Land and People
		A Rural Vietnam
0354	Voice of Russia	W Russia: People and Events

INFORMATIONAL FEATURES

0320	China R. Int.	H Voices from Other Lands
0330	Deutsche Welle	A German by Radio
0332	R. Australia	A Educational series
	Voice of Russia	F Russian by Radio

MUSIC

0300	HCJB	S Inspirational Classics
0305	R. New Zealand Int.	T Top 5 (pop/rock)
		A Musical feature or series
0315	HCJB	T-A Rendezvous (inspirational)
0330	HCJB	A Walkin' in the Sunshine (country)
	R. New Zealand Int.	T New Releases
	R. Sweden	M Sounds Nordic (rock-exc. 1st wk.)
0332	Voice of Russia	S Songs from Russia
		W Russian Musical Highlights (history)
0340	R. Australia	M Australian Music Show (modern rock)
		T Music Oeli (international)
		W Blacktracker (Aboriginal)
		H Country Style
		F Jazz Notes
0345	HCJB	W Wonderful Words of Life (hymns)
0350	Voice of Vietnam	S Music (Vietnamese)

ENTERTAINMENT/VARIETY, Magazine Shows

0305	R New Zealand Int.	S Playhouse (radio theatre)
0310	R. Australia	M-F Margaret Throsby Interview
0330	HCJB	M Unshackled (radio's oldest drama series)
0332	Voice of Russia	A Audio Book Club
0340	Voice of Vietnam	M Sunday Show

Shortwave Guide

SWL, MEDIA, COMMUNICATIONS
0300 WWCR(5070 kHz.) S Communications World
0305 R. New Zealand Int. H Pacific Dxers Report (biweekly); RNZI Talk (meet the staff-biweekly)
0330 WWCR(5070 kHz.) S World of Radio
0340 R. Budapest S DX Blockbuster
R. Habana Cuba S/W Dxers Unlimited

LISTENER CONTACT/INTERACTIVE
0305 BBCWS(sas) M Talking Point (global phone-in)
R. Australia S Feedback
R. New Zealand Int. H Mailbox (biweekly)
0311 Voice of Russia S/M/H Moscow Mailbag
0320 China R Int. A Listeners' Garden
0330 R. Sweden M In Touch with Stockholm (1st wk.)
0340 R. Budapest M And the Gatepost (monthly)
R. Habana Cuba H Mailbag Show
0345 Voice of Vietnam H Letterbox
0346 Voice of Russia S You Write to Moscow

SPORT
0300 R. Australia S/A Grandstand (live action)*
R. New Zealand Int. S/A Live Sport (in season)
0320 BBCWS(am)(me)(af) D 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 Sportscan
(*special on 9660, 12080, 17580, 17715, 17750, 21725 kHz. only)

0400 UTC/ 11pm E/8pm P - Page 44 Freqs

NEWSCASTS (*extended)
0400 BBCWS(am) S/M The World Today*
T-A News
BBCWS(eu)(me)(af) D The World Today*
BBCWS(sas) S/A The World Today*
M-F News
China R. Int. D News
HCJB T-A Latin American & World News
R. Australia D News
R. Habana Cuba T-S International News
R. New Zealand Int. D News
R. Prague 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 D News in Brief

CURRENT AFFAIRS MAGAZINES/FEATURES
0405 R. New Zealand Int. M-F Checkpoint
0410 China R. Int. S Report on Developing Countries
M-F Current Affairs
A Global Review
HCJB T-A Studio 9 (on Latin America)
R. Habana Cuba T-A Spotlight on the Americas
0411 Voice of Russia M Sunday Panorama
T-A News & Views
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 (also in NEWSCASTS & Current Affairs)
0413 R. Vlaanderen Int. F Economics
0420 R. Prague F Economic Report
0430 BBCWS(am)(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
0413 R. Vlaanderen Int. W Green Society (ecology)

ARTS AND CULTURE
0405 BBCWS(sas) T Meridian-Screen (cinema)
H Meridian-Writing (books)
R. Prague S Readings from Czech Literature
M The Arts
0413 R. Vlaanderen Int. H/A Around the Arts
0420 China R. Int. S In the Spotlight
0430 R. Australia S Arts Talk
Voice of Russia W/F Russian history/culture program

LOCAL LIVES AND VIEWS
0404 R. Vlaanderen Int. T-A Belgium Today
0405 R. Prague M Letter from Prague
T-A Current Affairs
0408 R. Vlaanderen Int. M Tourism in Flanders
T-A Press Review
0410 R. New Zealand Int. A Best of Kim Hill (interviews)
R Prague F From the Weeklies
0413 R. Vlaanderen Int. T Focus on Europe
0415 R. Prague T Spotlight (Czech current events) or One on One (interview)
H Czechs in History or Central Europe Today
0418 R. Vlaanderen Int. H Around Town
A Tourism in Flanders
0420 R. Prague W Talking Point
0424 Voice of Russia M Russia: People and Events
0430 BBCWS(me)(sas) S In Praise of God (worship 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
0432 Voice of Russia S Kaleidoscope (Russian events)
0435 R. Netherlands S Europe Unzipped

INFORMATIONAL FEATURES
0418 R. Vlaanderen Int. F International Report
0420 China R. Int. H Voices from Other Lands
0430 BBCWS(am) W Patterns of Faith
F Heart and Soul (spiritual matters)
0432 Voice of Russia T/H/S 20th Century
0435 R. Habana Cuba S The World of Stamps

MUSIC
0400 R. Vlaanderen Int. S Music from Flanders
WBCQ(7415 kHz.) S Zomba's Mondo Record Party
0405 BBCWS(am) W John Peel (alternative)
H The Greenfield Collection (classical requests)
F Jazzmatazz
A Composer of the Month
BBCWS(sas) M Meridian-Masterpiece*
W Meridian-Music
0410 HCJB A Musica del Ecuador [within 'Studio 9']
R. Habana Cuba M From Habana
R. Prague S Saturday Music (classical/folk/jazz)
0424 R. Vlaanderen Int. M-A Soundbox (Flemish rock)
0430 BBCWS(sas) M Music Mix*
T UK Top 20
H World of Music
R. Australia A Jazz Notes
0445 BBCWS(sas) W UK Album Chart
F Music X-Press

ENTERTAINMENT/VARIETY, Magazine Shows
0405 BBCWS(am) T Panel game or quiz show
0410 R. Australia M-F Margaret Throsby Interview
0430 BBCWS(am) M Westway Omnibus
BBCWS(sas) W/F Westway (drama serial)
0432 Voice of Russia M Audio Book Club
0445 BBCWS(am) T-A Off the Shelf (book readings)

SWL, MEDIA, COMMUNICATIONS
0400 HCJB S DX Partyline
R. Vlaanderen Int. M Radio World
WWCR(5070 kHz.) S Spectrum
0410 HCJB H Ham Radio Today [within 'Studio 9']
0430 WHRI(5745 kHz.) S Dxing with Cumbre

LISTENER CONTACT/INTERACTIVE
0400 HCJB M Musical Mailbag
0414 R. Vlaanderen Int. M Brussels 1043
0415 R. Prague A Mailbox
0420 China R. Int. A Listeners' Garden
0430 BBCWS(am) A Write On
HCJB S Saludos Amigos
R. Habana Cuba M The Mailbag Show
0435 R. Netherlands M Sincerely Yours

SPORT
0400 R. Australia S/A Grandstand (live action)*
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, 17715, 17750, 21725 kHz. only.)

0500 UTC/ 12am E/9pm P - Page 45 Freqs

NEWSCASTS (*extended)
0500 BBCWS(am) S News
M-A The World Today*
BBCWS(eu)(me)(af)(eas) D 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 T-A International News
R. Japan D News
R. New Zealand Int D News
Spanish Foreign R T-A Ibero-American News*
Voice of Russia D News
0510 R. Habana Cuba T-A National News
0530 R. Habana Cuba T-A News Bulletin
Voice of Russia D News in Brief

CURRENT AFFAIRS MAGAZINES/FEATURES
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
0515 R. Habana Cuba T-S Viewpoint
R. Japan M-F 44 Minutes
0530 BBCWS(af) M-F Network Africa
Deutsche Welle T Insight (international affairs)
R. New Zealand Int. M Letter from America
F The Pacific Report
0540 R. Habana Cuba T/F Caribbean Outlook
A Weekly Review

BUSINESS/ECONOMICS (also in NEWSCASTS & Current Affairs)
0500 R. Netherlands A A Good Life (development)
0505 R. Australia A Pacific Focus-Business
0511 Voice of Russia H Newsmarket
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
0511 Voice of Russia W/A Science and Engineering
0530 Deutsche Welle W Man and Environment

ARTS AND CULTURE
0505 R. New Zealand Int. M-F What's Going On?
0520 China R. Int. S In the Spotlight
0530 BBCWS(am)(eu)(me)(eas) A Arts in Action
BBCWS(af) S Artbeat (arts in Africa)

LOCAL LIVES AND VIEWS
0500 R. Netherlands S Roughly Speaking
M Dutch Horizons
0505 R. New Zealand Int. S Whenua (Maori magazine)
A Focus on Politics
0530 BBCWS(esaf) A Africa Quiz or This Week and Africa
BBCWS(wcaf) 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
R. Australia S In Conversation
R. New Zealand Int. T-H Today in Parliament
F Pacific Report
0532 Voice of Russia S Moscow Yesterday and Today
0546 Voice of Russia W Russia: People and Events

INFORMATIONAL FEATURES
0500 R. Netherlands H Documentary
0505 Deutsche Welle M Religion and Society
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
HCJB W The Book & the Spade (archaeology)
R. Australia A Lingua Franca (about language)
0547 Spanish Foreign R. T-A Spanish Language Course

MUSIC
0500 HCJB S Inspirational Classics
R. Netherlands W Music 52-15 (world/folk)
0510 R. Japan S Pop Goes Asia
0511 Voice of Russia S/M Russian Musical Highlights (history)
0525 R. New Zealand Int. A In a Mellow Tone (soft jazz)
0530 HCJB A Walkin' in the Sunshine (country)
R. Australia S Fine Music Australia (classical)
R. Habana Cuba M The Jazz Show
0532 Voice of Russia M Jazz Show
T Yours for the Asking
W Russian Musical Highlights (history)
H Folk Box
0545 HCJB W Wonderful Words of Life (hymns)
0546 Voice of Russia T Music At Your Request

ENTERTAINMENT/VARIETY, Magazine Shows
0500 HCJB H Adventures in Odyssey (stories)

	WBCQ(7415 kHz.)	M-A Amos 'n Andy (classic comedy)
0505	BBCWS(am)	S Wright Around the World (music requests)
0532	Voice of Russia	F Audio Book Club
		A Timelines
0545	R. Australia	A Short Story

SWL, MEDIA, COMMUNICATIONS

0500	WBCQ(7415kHz)	S Tom and Darryl
0540	R. Habana Cuba	S/W Dxers Unlimited
0547	Spanish Foreign R.	S Radio Waves

LISTENER CONTACT/INTERACTIVE

0510	R. Japan	A Hello from Tokyo
0511	Voice of Russia	T/F Moscow Mailbag
0520	China R. Int.	A Listeners' Garden
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	R. Australia	A Pacific Focus-Sport
0530	China R. Int.	T Sports World
	Deutsche Welle	F Hard to Beat: The World of Sport
0535	R. Habana Cuba	T-A Time Out

(*special on 9660, 12080, 17580, 17715, 17750, 21725 kHz. only.)

0600 UTC/ 1am E/10pm P - Page 45 Freqs

NEWSCASTS (*extended)

0600	BBCWS(eu)(wcaf)	O World Briefing*
	BBCWS(me)(esaf)	S World Briefing*
		M-A News
	BBCWS(eas)	S/A World Briefing*
		M-F News
	R. Australia	O News
	R. Habana Cuba	T-S International News
	R. Japan	D News
	R. New Zealand Int.	O 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 (also in NEWSCASTS & Current Affairs)

0630	BBCWS(eu)	M-F World Business Report

SCIENCE/TECHNOLOGY (incl. Health & Environment)

0605	R. New Zealand Int.	M Eureka!
0630	R. New Zealand Int.	M Health [or] Environment Matters

ARTS AND CULTURE

0605	BBCWS(eas)	H Meridian-Screen (film/cinema)
		A Meridian-Writing (books)
	R Australia	S Pacific Focus-Arts
0630	R. New Zealand Int.	H Bookmarks

LOCAL LIVES AND VIEWS

0605	R. New Zealand Int.	F Country Life
0610	R. Japan	S Weekend Square (Japanese life)
0620	R. Australia	M-F Pacific Focus
0630	BBCWS(eu)(eas)	A People and Politics
	BBCWS(wcaf)	M-F Network Africa
		A African Quiz or This Week and Africa
		F Dateline Pacific
0635	R. New Zealand Int.	S This Week 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)	F Omnibus (documentary)
	R. Australia	S The Europeans
	R. New Zealand Int.	S Future Indicative (for disabled)
0625	R. Japan	T Let's Try Japanese
		H Brush Up Your Japanese
0635	R. Habana Cuba	S The World of Stamps

MUSIC

0605	BBCWS(eas)	T Meridian-Masterpiece*
		H Meridian-Music
	R. New Zealand Int.	W Musical Chairs (artist feature)
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)
0630	BBCWS(eas)	M Composer of the Month
		T Music Mix*
		W UK Top 20
		F World of Music
	R. Australia	A Oz Sounds
0640	R Australia	M Australian Music Show (modern rock)
		T Music Deli (international)
		W Blacktracker (Aboriginal)
		H Country Style
		F Jazz Notes

ENTERTAINMENT/VARIETY, Magazine Shows

0605	R. New Zealand Int.	A Saturday Night
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)

SWL, MEDIA, COMMUNICATIONS

0600	WHRI	A Dxing with Cumbre
	WWCR(3210 kHz.)	M World of Radio
0630	WWCR(3210 kHz)	M Communications World

LISTENER CONTACT/INTERACTIVE

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)(wcaf)	D Sports Roundup
	BBCWS(me)(wcaf)	S Sports Roundup
	BBCWS(eas)	S/A Sports Roundup
0630	R. New Zealand Int.	F Sports Story
0635	R. New Zealand Int.	S/A Live Sport (in season)

(*special on 9660, 12080, 17580, 17715, 17750, 21725 kHz. only.)

1000 UTC/ 5am E/2am P - Page 47 Freqs

NEWSCASTS (*extended)

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

CURRENT AFFAIRS MAGAZINES/FEATURES

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

BUSINESS/ECONOMICS (also in NEWSCASTS & Current Affairs)

1030	BBCWS(eu)(eas)	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
		A In Conversation
1045	VOA News Now	M-F Science, Medicine, Environment

LOCAL LIVES AND VIEWS

1005	R. Australia	A Pacific Review
	R. New Zealand Int.	M-H Kim Hill (interviews)
1030	BBCWS(eu)	S Weekend
	BBCWS(esaf)	M Letter from America
	R. Australia	S Rural Reporter
1045	R. New Zealand Int.	A Dateline Pacific

INFORMATIONAL FEATURES

1001	BBCWS(wcaf)	S Heart and Soul (religion)
1005	R. Australia	S Lingua Franca (about language)
1030	BBCWS(me)	M-F World Learning
	R. Australia	T Law Report
		W Religion Report
1033	VOA News Now	S On the Line (US foreign policy)
1045	BBCWS(wcaf)	S A Radio History of the World

MUSIC

1001	BBCWS(eas)	S Concert Hall (classical)
1005	BBCWS(esaf)	S The Alternative (eclectic)
	BBCWS(eas)	A Jazzmatazz
1020	BBCWS(wcaf)	S The Alternative (eclectic)
1030	BBCWS(wcaf)	S Composer of the Month
	BBCWS(eas)	A Greenfield Collection (classical requests)

SWL, MEDIA, COMMUNICATIONS

1030	R. Australia	H Media Report

SPORT

1005	R. New Zealand Int.	S Sportsworld
		F Sports Story
		A The World in Sport
1020	BBCWS(am)(eu)(me)	S/A Sports Roundup
	BBCWS(wcaf)	S Sports Roundup
1030	R. Australia	F Sports Factor
1045	BBCWS(eu)(esaf)(eas)	M-F Sports Roundup

1100 UTC/ 6am E/3am P - Page 48 Freqs

NEWSCASTS (*extended)

1100	BBCWS(am)(eu)	D World Briefing*
	BBCWS(me)	S World Briefing*
		M-A News
	BBCWS(esaf)	S-F World Briefing*
		A News
	BBCWS(eas)	S/A World Briefing*
		M-F News
	R. Australia	O News
	R. Japan	O News
	R. New Zealand Int	O News
1105	R. New Zealand Int.	M-F Late Edition*
1120	BBCWS(am)(eu)(wcaf)	D British News
	BBCWS(me)	S British News
	BBCWS(esaf)	S-F British News
	BBCWS(eas)	S/A British News
1130	R. Korea Int.	D News
	R. Netherlands	S/A News

CURRENT AFFAIRS MAGAZINES/FEATURES

1105	BBCWS(am)	M-F Caribbean Morning Report
	R. Australia	M-F Asia Pacific
1115	R. Japan	M-F Asian Top News (region's radio)
1130	BBCWS(eu)	TWFA News Analysis
		H From Our Own Correspondent
	R. Netherlands	M-F Newsline
1135	R. Netherlands	S Wide Angle (week in review)
1140	R. Korea Int	M-F News Commentary

BUSINESS/ECONOMICS (also in NEWSCASTS & Current Affairs)

1128	HCJB	M-F Money Minute
1130	BBCWS(am)(af)	M-F World Business Report
	BBCWS(am)	A World Business Review
1145	R. Korea Int.	W Economic Radar

SCIENCE/TECHNOLOGY (incl. Health & Environment)

1105	BBCWS(eas)	M Health Matters
		T Science View
		H One Planet (ecology)
		F Discovery
1130	BBCWS(eas)	A Science in Action

ARTS AND CULTURE

1105	BBCWS(me)	W Meridian-Screen (film/cinema)
		F Meridian-Writing (books)
1130	BBCWS(am)(eu)(me)(esaf)	S Arts in Action
1145	R. Korea Int.	T Cultural Promenade

LOCAL LIVES AND VIEWS

1115	BBCWS(am)	M-F Caribbean Magazine
1130	BBCWS(am)(eu)	M Letter from America
	BBCWS(wcaf)	S Postmark Africa
	R. Australia	S Country Breakfast
	R. New Zealand Int.	S Sunday Supplement (NZ opinions)
1135	R. Australia	M-F Life Matters (social issues)
	R Netherlands	A Europe Unzipped
1145	R. Korea Int.	H Korea and Its Splendors
1155	R. Netherlands	A Insight (commentary)

INFORMATIONAL FEATURES

1105	BBCWS(me)	M Omnibus (documentary)
1125	R. Japan	T Let's Learn Japanese
		H Brush Up Your Japanese
1130	BBCWS(eas)	M Everywoman
		T Focus on Faith
		W Pick of the World (BBC's best)
		H People and Places
		F Essential Guide
1145	R. Korea Int.	M Exploring the New Millennium

MUSIC

1105	BBCWS(me)	T Meridian-Masterpiece
		H Meridian-Music
	R. New Zealand Int.	A Deep Purple (relaxing)
1125	R. Japan	M Unforgettable Masterpieces
		W Japan Music Log
		F Music Beat (pop)

1130 BBCWS(me) M Composer of the Month
T Music Mix*
W UK Top 20
F World of Music
BBCWS(esaf) A Greenfield Collection (classical requests)
R. Australia A Find Music Australia (classical)
1145 R. Korea Int. F Notes of Nostalgia

ENTERTAINMENT/VARIETY, Magazine Shows
1105 BBCWS(me) A Wright Around the World (pop requests)
BBCWS(esaf) A Westway Omnibus (drama serial)
1130 BBCWS(me) H Panel game or Quiz
BBCWS(eas) S Play of the Week (radio theatre)
1130 HCJB M-F Morning in the Mountains

SWL, MEDIA, COMMUNICATIONS
1105 R New Zealand Int. S Mediawatch
1140 R Korea Int. S Multiwave Feedback

LISTENER CONTACT/INTERACTIVE
1110 R Japan S Hello From Tokyo
1140 R Korea Int. A From Us to You

SPORT
1110 BBCWS(am) M-F Caribbean Sport
1130 BBCWS(wcaf) F Fast Track
BBCWS(eas) W Sports International
R Australia M-F Sports Report
1145 BBCWS(am)(eu) M-H/A Sports Roundup
BBCWS(am)(eu)(af) F Football Extra
BBCWS(af) M-H Sports Roundup

1200 UTC/ 7am E/4am P - Page 48 Freqs

NEWSCASTS (*extended)
1200 BBCWS(am)(me)(wcaf) D Newshour*
BBCWS(eu) D News
BBCWS(esaf) S/A Newshour*
M-F News
BBCWS(eas) M-A News
HCJB M-F Latin American & World News
R Australia D News
R New Zealand Int. M-F Late Edition*
1210 BBCWS(am) M-F Caribbean Morning Report
1230 HCJB M-F Latin American & World News
R New Zealand Int. S New Zealand News

CURRENT AFFAIRS MAGAZINES/FEATURES
1205 BBCWS(eu)(esaf)(eas) M-F Outlook (magazine)
1230 BBCWS(eas) S Agenda (trends)
A Assignment
R. Sweden M-F 60 Degrees North

BUSINESS/ECONOMICS (also in NEWSCASTS & Current Affairs)
1200 R. Netherlands T A Good Life (development issues)
1205 BBCWS(am) M-F Caribbean Business
1230 BBCWS(eu) A Global Business
R. Netherlands F A Good Life (development issues)
1245 R. Sweden W Money Matters

SCIENCE/TECHNOLOGY (incl. Health & Environment)
1200 R. Netherlands H Research File
1230 BBCWS(eu)(esaf) H Body and Mind (health)
R. Netherlands M Research File
1245 BBCWS(esaf) F Body and Mind (health)
R Sweden H Greenscan (ecology-2nd wk.); Heartbeat (3rd wk.)

ARTS AND CULTURE
1230 R Sweden A Spectrum (3rd wk.)

LOCAL LIVES AND VIEWS
1200 R Netherlands M EuroQuest
W Dutch Horizons
A Roughly Speaking
1205 R. Australia M-H Late Night Live (discussion)
1230 R. Netherlands S Dutch Horizons
R Sweden A Weekend (Europe magazine-1st wk.)
Sweden Today (2nd)
Studio 49 (discussion-3rd)
1245 R. Sweden H Nordic Report (1st)
The S-Files (things Swedish-4th)
F Review of the Newsweek

INFORMATIONAL FEATURES
1200 R Netherlands S The Sound Fountain
F Documentary
1205 R. Australia A The Spirit of Things (spiritual matters)
1224 HCJB M-F Mission Network News
1230 R Netherlands W Documentary
A The Sound Fountain
1245 BBCWS(eu)(esaf) M A Radio History of the World
T Heart and Soul (religion)
F Patterns of Faith
BBCWS(eas) M Patterns of Faith
T A Radio History of the World
W Heart and Soul (religion)

MUSIC
1205 BBCWS(eu) S The Alternative (eclectic)
R. Australia S Country Club
F Sound Quality (innovative)
1230 R. Netherlands T Music 52-15 (international)
R. Sweden S Sounds Nordic (rock-exc. 1st wk.)

ENTERTAINMENT/VARIETY, Magazine Shows
1200 BBCWS(eas) S Play of the Week (from 1130)
HCJB M-F Morning in the Mountains (from 1130)
A Adventures in Odyssey (children's stories)
1205 BBCWS(eu)(esaf) W Best of "The Edge" (youth culture)
BBCWS(eu) A Wright Around the World (pop requests)
BBCWS(eas) A Panel game or Quiz
1245 BBCWS(eas) H Best of "The Edge" (youth culture)

SWL, MEDIA, COMMUNICATIONS
1200 WWCR(15685kHz.)T World of Radio
W Communications World
1230 WHRI(9495 kHz.) A Dxing with Cumbre
WWCR(15685kHz.)A World of Radio

LISTENER CONTACT/INTERACTIVE
1215 WWCR(15685kHz.)S/M Ask WWCR
1230 R. Sweden S In Touch with Stockholm (1st wk.)

SPORT
1205 HCJB M-F Sports News
R. New Zealand Int. S The World in Sport
A Sports Story
1245 R. Sweden M Sportscan

1300 UTC/ 8am E/5am P - Page 49 Freqs

NEWSCASTS
1300 BBCWS(am)(me)(af) D News
BBCWS(eu) S/A Newshour*
M-F News
BBCWS(eas) D Newshour*
China R. Int. D News
R. Australia D News
R. Canada Int. D News
R. Netherlands S/A News

CURRENT AFFAIRS MAGAZINES/FEATURES
1300 R. Netherlands M-F Newsline
1305 BBCWS(am) M-F Outlook
1310 China R. Int. S Report on Developing Countries
M-F Current Affairs
A Global Review
1330 R. Sweden M-F 60 Degrees North

BUSINESS/ECONOMICS (also in NEWSCASTS & Current Affairs)
1305 BBCWS(am) A Global Business
1320 China R. Int. W China Horizons
1330 BBCWS(me) S Global Business
1345 R. Sweden W Money Matters
1350 BBCWS(eas) M-F World Business Report

SCIENCE/TECHNOLOGY (incl. Health & Environment)
1305 BBCWS(me) M Discovery
T Health Matters
W Science View
F One Planet (ecology)
R. Australia A The Science Show
1345 R Sweden H Greenscan (ecology-2nd wk.)
Heartbeat (health-3rd wk.)

ARTS/CULTURE
1305 BBCWS(eu)(af) W Meridian-Screen (film/cinema)
F Meridian-Writing (books)
1320 China R. Int. S In the Spotlight
1330 R. Sweden A Spectrum (3rd Sat.)

LOCAL LIVES AND VIEWS
1305 R. Netherlands A Europe Unzipped
1310 R. Canada Int. M-F This Morning (magazine)
A The House (Canadian politics)
1330 BBCWS(esaf) A People & Politics (Parliament)
China R. Int. M People in the Know
F Life in China
YLE R. Finland S/F Capital Cafe (conversations)
M-H Finland This Morning
A Finland This Week
R. Sweden A Weekend (Europe magazine-1st wk); Sweden Today (2nd wk.); Studio 49 (discussion-4th wk.)
1345 R. Sweden H Nordic Report (1st wk.); The S-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 (religious service)
A Chill Out (young adult opinion)
BBCWS(me) M Essential Guide
T Everywoman
W Focus on Faith
F People and Places
HCJB M-F Family Life Today
1345 YLE R. Finland A Starting Finnish

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)
WWCR(5070 kHz.) A Rock the Universe (Christian rock)
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
HCJB S Rock Solid (Christian rock)
R. Sweden S Sounds Nordic (rock/pop-exc. 1st wk.)

ENTERTAINMENT/VARIETY, Magazine Shows
1300 Channel Africa S/A Channel Africa Extra (weekend variety)
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
1305 R. Netherlands S Sincerely Yours
1320 China R. Int. A Listeners' Garden
1330 R. Sweden S In Touch with Stockholm (1st wk.)

SPORT
1305 BBCWS(am) A World Football (magazine)
1310 R. Australia M-F Sport (daily report)
1330 China R. Int. T Sports World
1345 R. Sweden M Sportscan

1400 UTC/ 9am E/6am P - Page 49 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
R. Prague D News
1430 BBCWS(me,esaf,eas) M-F British News
R. Netherlands S/A News

CURRENT AFFAIRS MAGAZINES/FEATURES
1400 BBCWS(eas) M-F East Asia Today
1405 R. Canada Int. S The Sunday Edition
1410 China R. Int. S Report on Developing Countries
M-F Current Affairs
A Global Review
R. Japan S Roundup Asia
1415 R. Japan M-F 44 Minutes
1430 R. Netherlands M-F Newsline
R. Sweden M-F 60 Degrees North
1435 R. Netherlands S Wide Angle (week in review)

BUSINESS/ECONOMICS (also in NEWSCASTS & Current Affairs)
1420 China R Int. W China Horizons
R. Prague H Economic Report
1445 R. Sweden W Money Matters

SCIENCE/TECHNOLOGY (incl. Health & Environment)
1405 BBCWS(eu)(wcaf) M Discovery
T Health Matters
W Science View
F One Planet (ecology)
1445 R. Sweden H Greenscan (ecology-2nd wk.)
Heartbeat (health-3rd wk.)

ARTS AND CULTURE
1405 BBCWS(am) M Meridian-Masterpiece (ideas)
T Meridian-Screen (cinema)
H Meridian-Writing (books)
R. Australia S Books and Writing
R. Prague S The Arts

		A Readings from Czech Literature
1420	China R Int.	S In the Spotlight
1430	R Sweden	S Spectrum (3rd wk.)

LOCAL LIVES AND VIEWS

1405	R. Canada Int.	M-F This Morning (from 1310)
		A The House (Parliament)
	R. Prague	S Letter from Prague
		M-F Current Affairs
1410	R. Japan	S Weekend Square
	R Prague	H From the Weeklies
1415	R Prague	M Spotlight (Czech events) or One on One (interview)
		W Czechs in History or Central Europe Today
1420	R Prague	T Talking Point
1430	China R Int.	M People in the Know
		F Life in China
	R Sweden	A Weekend (Europe magazine-1st wk.); Sweden Today (2nd wk.); Studio 49 (discussion-4th wk.)
1435	R. Netherlands	A Europe Unzipped
1445	R Sweden	H Nordic Report (1st wk.); The S-Files (things Swedish-4th wk.)
		F Review of the Newsweek
1455	R. Netherlands	A Insight (commentary)

INFORMATIONAL FEATURES

1405	BBCWS(am)	F Omnibus (documentary)
	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

1400	R. Sweden	S Sounds Nordic (rock/pop-exc.1st wk.)
1405	BBCWS(am)	W Meridian-Music
	R Australia	M-F The Planet (from 1315)
	R. Japan	S Pop Goes Asia
1410	R. Prague	A Saturday Music (classical/folk/jazz)
1430	BBCWS(am)	M Music Mix (popular)
		T UK Top 20
		H Charlie Gillett (world)
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)
1430	BBCWS(am)	W/F Westway (drama serial)

LISTENER CONTACT/INTERACTIVE

1405	BBCWS(am)	S Talking Point (current events call-in)
1415	R. Prague	F Mailbox
	WWCR(15685kHz.)	A Ask WWCR
1420	China R. Int	A Listeners' Garden
1430	R. Sweden	S In Touch with Stockholm (1st wk.)

SPORT

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

1500 UTC/ 10am E/7am P - Page 50 Freqs

NEWSCASTS

1500	BBC(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.	D News
	Voice of Russia	D News
1530	Voice of Russia	D News in Brief

CURRENT AFFAIRS MAGAZINES/FEATURES

1505	BBCWS(am)	S Assignment
	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 1410)
1510	China R. Int.	S Report on Developing Countries
		M-F Current Affairs
		A Global Review
1511	Voice of Russia	S Sunday Panorama
		M-A News and Views
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 (also Newscasts & Current Affairs)

1500	R. Netherlands	F A Good Life (development issues)
1530	China R. Int.	W China Horizons
	R. Netherlands	T A Good Life (development issues)

SCIENCE/TECHNOLOGY (incl. Health & Environment)

1500	R. Netherlands	M Research File
1505	BBCWS(am)	M One Planet (ecology)
		T Discovery (research)
		W Health Matters
		H Go Digital
1530	R. Australia	M The Health Report
	R. Netherlands	H Research File
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

1500	R. Netherlands	S Dutch Horizons
1505	R Canada Int.	M-F This Morning (from 1310)
1530	BBCWS(am)	S People and Politics (Parliament)
	China R. Int.	M People in the Know
		F Life in China
	R. Australia	T The Law Report
		W The Religion Report
	R Canada Int.	F C'est La Vie (life in Quebec)
	R. Netherlands	M EuroQuest
		W Dutch Horizons
		A Roughly Speaking
1532	Voice of Russia	S Kaleidoscope (Russian events)
		F Moscow Yesterday and Today
1540	R. Austria Int.	A Radio E (on Europe)
1545	BBCWS(eu)	F The New Europe (last wk.)
	R Canada Int.	M-H Out Front (experimental radio)

INFORMATIONAL FEATURES

1500	R. Netherlands	W Documentary
		H/A The Sound Fountain
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 Essential Guide (global ideas)
		W Everywoman
		H Focus on Faith
		F Pick of the World (BBC's best)
	BBCWS(af)	M-F World Learning
	R. Netherlands	S The Sound Fountain
		F Documentary
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

1500	R Netherlands	T Music 52-15 (international)
1505	R Australia	A Melisma (innovative)
1532	Voice of Russia	M Folk Box
		T/H Yours for the Asking
		W Jazz Show
1546	Voice of Russia	T/H Music at Your Request

ENTERTAINMENT/VARIETY, Magazine Shows

1505	BBCWS(af)	S Play of the Week (radio theatre)
	R. Canada Int.	A Vinyl Cafe
1530	BBCWS(eas)	W/F Westway (drama serial)
1532	Voice of Russia	A Timelines

SWL, MEDIA, COMMUNICATIONS

1530	R. Australia	H The Media Report
	WHRI(6040 kHz.)	S/A Dxing with Cumbre

LISTENER CONTACT/INTERACTIVE

1520	China R. Int.	A Listeners' Garden

SPORT

1505	BBCWS(am)	F Sports International
		A Sportsworld (from 1405)
1530	China R. Int.	T Sports World
		F The Sports Factor
	R. Australia	F The Sports Factor

1600 UTC/ 11am E/8am P - Page 50 Freqs

NEWSCASTS (*extended)

1600	BBCWS(am)(eu)(eas)	S News Summary
		M-F World Briefing*
		A News
	R. Australia	O News
	R. Netherlands	S/A News
	Voice of Russia	D News
1620	BBCWS(am)	M-F British News

CURRENT AFFAIRS MAGAZINES/FEATURES

1600	R. Netherlands	M-F Newsline
1611	Voice of Russia	M-F Focus on Asia & the Pacific
1630	BBCWS(am)	M/T/H/F News Analysis
		W From Our Own Correspondent
	R Austria Int.	D Report from Austria

BUSINESS/FINANCE (also in NEWSCASTS & Current Affairs)

1611	Voice of Russia	A Newmarket

SCIENCE/TECHNOLOGY (incl. Health & Environment)

1605	R. Canada Int.	A Quirks and Quarks

LOCAL LIVES AND VIEWS

1605	R. Australia	S The National Interest
		T The Comfort Zone (homes/gardens/food)
		W Verbatim (oral histories)
		H Hindsight (history)
		F Awaye! (Aboriginal culture)
	R. Canada Int.	S The Sunday Edition (from 1405)
	R. Netherlands	A Europe Unzipped
1630	BBCWS(af)	W Talkabout Africa
	R. Australia	W Earshot (Australian voices)
1632	Voice of Russia	M This is Russia
		T Moscow Yesterday & Today
		A Kaleidoscope
1640	R. Austria Int	A Radio E (on Europe)

INFORMATIONAL FEATURES

1605	BBCWS(me)(af)	F Omnibus (documentary)
1630	BBCWS(af)	T The Story of Africa

MUSIC

1601	BBCWS(am)	S Concert Hall (classical)
1605	BBCWS(me)	M Meridian-Masterpiece
		W Meridian-Music
	R. Australia	M Music Deli
		A Melisma (from 1505)
1630	BBCWS(me)(af)	M Music Mix
		T UK Top 20
		H World of Music
1632	Voice of Russia	H Folk Box
		F Songs from Russia
1645	BBCWS(me)(af)	W UK Album Chart
		F Music X-Press

ENTERTAINMENT/VARIETY, Magazine Shows

1632	Voice of Russia	W Audio Book Club

LISTENER CONTACT/INTERACTIVE

1605	R. Netherlands	S Sincerely Yours
1611	Voice of Russia	S Moscow Mailbag
1647	Voice of Russia	F You Write to Moscow

SPORT

1605	BBCWS(am)	A Sportsworld (from 1405)
1645	BBCWS(am)	M-F Sports Roundup

1700 UTC/ 12pm E/9am P - Page 51 Freqs

NEWSCASTS (*extended)

1700	BBCWS(eu)	S News
	BBCWS(eu)(me)	A World Briefing*
	BBCWS(me)	S-F News
	BBCWS(af)	D News
	R. Australia	D News
	R. Japan	D News
	Voice of Russia	D News
1720	BBCWS(eu)(me)	A British News

CURRENT AFFAIRS MAGAZINES/FEATURES

1700	BBCWS(eu)	M-F Europe Today
1705	BBCWS(af)	D Focus on Africa
1715	R. Japan	M-F 44 Minutes

BUSINESS/FINANCE (also in NEWSCASTS & Current Affairs)

1711	Voice of Russia	M/H Newmarket
1730	BBCWS(eu)	M-F World Business Report

SCIENCE/TECHNOLOGY (incl. Health & Environment)

1711	Voice of Russia	S/T Science and Engineering

Arts and Culture

1705	BBCWS(me)	M Meridian-Masterpiece (ideas)
		T Meridian-Screen (film)
		H Meridian-Writing
1732	Voice of Russia	T/H Cultural programs

LOCAL LIVES AND VIEWS

1705	R. Australia	M-F Bush Telegraph (rural life)

1732 Voice of Russia S Timelines

INFORMATIONAL FEATURES
1705 BBCWS(me) F Omnibus (documentary)
R. Australia S The Spirit of Things
A New Dimensions
1732 Voice of Russia M/W/F 20th Century

MUSIC
1705 BBCWS(me) W Meridian-Music
1710 R. Japan A Pop! Goes Asia
1711 Voice of Russia A Music and Musicians
1730 BBCWS(me) M Music Mix
T UK Top 20
H World of Music
VOA Africa S Music Time in Africa
1745 BBCWS(me) W UK Album Chart
F Music X-Press

LISTENER CONTACT/INTERACTIVE
1710 R. Japan S Hello from Tokyo
1711 Voice of Russia W/F Moscow Mailbag

SPORT
1705 BBCWS(eu)(me) S Sportsworld
1745 BBCWS(eu)(af) M-F Sports Roundup
BBCWS(af) S/A Sportsworld

2100 UTC/ 4pm E/1pm P - Page 53 Freqs

NEWSCASTS (*extended)
2100 BBCWS(am) S/A Newshour*
M-F News
BBCWS(eu)(wcaf) D News
R. Australia D News
2120 BBCWS(am)(eu) M-A British News

CURRENT AFFAIRS MAGAZINES/FEATURES
2110 R. Australia S-H AM (morning news magazine)

BUSINESS/FINANCE (also in NEWSCASTS & Current Affairs)
2105 BBCWS(eu) M-F World Business Report

SCIENCE/TECHNOLOGY (incl. Health & Environment)
2105 BBCWS(am) M Discovery (research)
T Health Matters
W Go Digital
F One Planet (ecology)
2130 R. Australia M Health Report
T Innovations

LOCAL LIVES AND VIEWS
2105 BBCWS(am) M-F Caribbean Report*
R. Australia A Australia All Over
2130 BBCWS(am) T/F Calling the Falklands ^
BBCWS(wcaf) A People and Politics
R. Australia H Rural Reporter
(*special service on 5975, 11675, 15190 kHz. only.)
(^ special service on 11680 kHz)

INFORMATIONAL FEATURES
2130 BBCWS(am) M Essential Guide (global views)
T Everywoman
W Focus on Faith
F People and Places
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
2100 WBCQ(7415kHz) H-S Radio Caroline
2105 BBCWS(wcaf) S Wright Around the World (pop requests)
2130 BBCWS(eu) S Panel game or Quiz
BBCWS(am) H 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(am) H Sports International
2130 BBCWS(eu) M-F Sports Roundup

2200 UTC/ 5pm E/2pm P - Page 54 Freqs

NEWSCASTS (*extended)
2200 BBCWS(am) S/A The World Today*
M-F News
BBCWS(wcaf) D News
R. Australia D News
2220 BBCWS(am) M-F British News
2230 R Vlaanderen Int. M-F News

CURRENT AFFAIRS MAGAZINES/FEATURES
2205 BBCWS(wcaf) M-F Outlook (topical magazine)
2210 R. Australia S-H AM (morning news magazine)
F Asia Pacific
A Correspondents' Report
2230 BBCWS(am) S Agenda (trends)
BBCWS(am)(wcaf) A From Our Own Correspondent
2243 R. Vlaanderen Int. M Focus on Europe
2245 BBCWS(am) M/T/H/F Analysis
W From Our Own Correspondent
2248 R. Vlaanderen Int. H International Report

BUSINESS/FINANCE (also in NEWSCASTS & Current Affairs)
2205 BBCWS(am) M-F World Business Report
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) M Patterns of Faith
T A Radio History of the World
W Heart and Soul (religion)

MUSIC
2200 WBCQ(7415kHz) A HarvZower
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
2200 WBCQ(7415kHz) M Jean Shepherd
F Juliet's Wild Kingdom
2205 BBCWS(wcaf) S Panel game or Quiz
2230 WBCQ(7415kHz) A The Pab Sungenis Project
2245 BBCWS(wcaf) H Best of "The Edge" (youth culture)

SWL, MEDIA, COMMUNICATIONS
2200 WBCQ(7415kHz) S Communications World
2230 R. Vlaanderen Int S Radio World

LISTENER CONTACT/INTERACTIVE
2244 R Vlaanderen Int. S Brussels 1043

SPORT
2230 BBCWS(am) M-F Sports Roundup
R. Canada Int. S Inside Track (anthologies)
2248 R. Vlaanderen Int. M Sports

2300 UTC/ 6pm E/3pm P - Page 54 Freqs

NEWSCASTS (*extended)
2300 BBCWS(am)(eas) D The World Today*
China R. Int. D News
R. Australia D News
R. Canada Int. M-F The World at Six*
R. New Zealand Int. S-H Midday Report*
F/A News
2330 R. Netherlands S/A News
R. Prague D News

CURRENT AFFAIRS MAGAZINES/FEATURES
2300 R. Canada Int. S/A The World This Weekend
2310 China R. Int. S-H Current Affairs
F Global Review
A Report on Developing Countries
R. Australia S-H Asia Pacific
2330 R. Canada Int. M-F As It Happens
R. Netherlands M-F Newsline

BUSINESS/ECONOMICS (also in NEWSCASTS & Current Affairs)
2330 BBCWS(am) F Global Business
China R. Int. T China Horizons
R. Australia M Innovations
2350 R. Prague H Economic Report

SCIENCE/TECHNOLOGY (incl. Health & Environment)
2305 R. Australia A Ockham's Razor (opinion)
2330 R. Australia S Earthbeat (ecology)
F In Conversation-Science

ARTS AND CULTURE
2320 China R Int. A In the Spotlight
2330 BBCWS(am) A Arts in Action
R. Australia T Arts Talk
2335 R. Prague S The Arts
R. Prague A Readings from Czech Literature

LOCAL LIVES AND VIEWS
2310 R. New Zealand Int. F Focus on Politics
A This Week in Parliament
2330 China R. Int S People in the Know
H Life in China
R Australia W Rural Reporter (outback)
R. New Zealand Int. S Spectrum (life in NZ)
2335 R. Netherlands A Europe Unzipped
R Prague S Letter from Prague
M-F Current Affairs
2340 R. Prague H From the Weeklies
2345 R. Prague M Spotlight (current events) or One on One (interview)
W Czechs in History or Central Europe Today
2350 R. Prague T Talking Point
2355 R. Netherlands F Insight (commentary)

INFORMATIONAL FEATURES
2315 R. Australia F Lingua Franca (about language)
2330 China R. Int. W Voices from Other Lands

MUSIC
2300 WBCQ(9335kHz) S Uncle Ed's Musical Memories
2330 BBCWS(am) S Greenfield Collection (classical requests)
R. New Zealand Int. F The Sampler (latest CDs)
WBCQ(7415kHz) A International World Beat Music
2340 R. Prague A Saturday Music (classical/folk/jazz)

ENTERTAINMENT/VARIETY, Magazine Shows
2305 R. Australia F Book Reading
2330 R. Canada Int. A Madly Off in All Directions (comedy/satire)

SWL, MEDIA, COMMUNICATIONS
2330 R. Australia H The Media Report

LISTENER CONTACT/INTERACTIVE
2320 China R. Int. F Listeners' Garden
2335 R. Netherlands S Sincerely Yours
2345 R. Prague F Mailbox

SPORT
2330 China R. Int. M Sports World
R. Canada Int. S The Inside Track

Thank You ...

Additional Contributors to This Month's Shortwave Guide:

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GOES-Supported Research

If you recently started receiving APT – the low resolution, easily decoded transmissions from polar-orbiting weather satellites – you could be feeling annoyed that two of the regular WXSATs, NOAA-14 and Resurs have effectively failed. However, NOAAs 12 and 15, together with the geostationary GOES WXSATs still provide an excellent service.

Monitors with systems capable of receiving high resolution picture telemetry (HRPT) from the NOAA WXSATs are rather better served because NOAA-16 is providing excellent HRPT – especially the early afternoon passes. It is a pity that NOAA-16's APT system failed, apparently due to a faulty r.f. switch. Even so, I do believe that we are well catered for with the remaining NOAA WXSATs.

❖ Seasonal darkness

For several weeks on either side of the winter equinox, we see the worst of the year's visible-light imagery. The sun barely illuminates the upper latitudes, leaving us with washed-out images that almost defy enhancement. Throughout this period, however, the infrared (thermal) image formats provide nearly all we want to know.

Figures 1 and 2 illustrate the high level of detail available from GOES WXSATs.

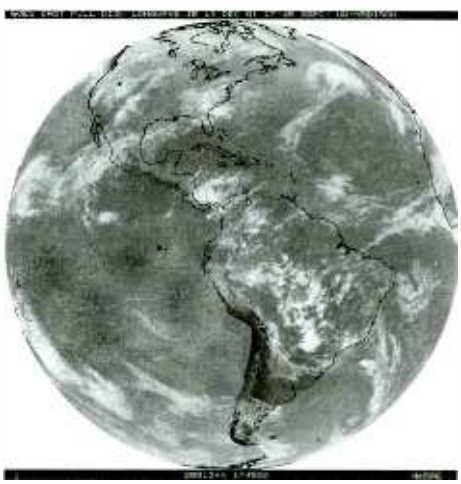

Fig 1: GOES-east full disc channel 4 (infrared) image December 10, 2001 at 1745UTC

❖ NOAA launch slips

The launch of NOAA-M has been further delayed, a follow-on effect caused by higher priority missions due to be launched by the Titan-2. The latest date is June 26.

Fig 2: GOES-west full disc channel 4 image December 10, 2001 at 1800UTC

❖ GOES research

Although I confess to merely enjoying the ability to receive images from GOES-east and GOES-west (via Meteosat-7), as with Meteosat and the other geostationary WXSATs that provide a constant flow of cheap-to-access near-real-time data, I am aware that behind the scenes are thousands of researchers at universities and government institutions that analyze almost every pixel transmitted from orbit. Two of these organizations are the *Cooperative Institute for Meteorological Satellite Studies (CIMSS)* and the *Space Science and Engineering Center (SSEC).*

❖ CIMSS

CIMSS works with the University of Wisconsin-Madison Department of Atmospheric and Oceanic Sciences providing graduate student research support. This education and research center link provides a path for scientists entering geophysical fields. They implement techniques for using geostationary weather satellite thermal radiation observations to improve forecasts of severe storms, including tornadoes and hurricanes. CIMSS also plays a major role in instrument design and testing, and related software development to improve space-based measurements of the earth's atmosphere.
http://cimss.ssec.wisc.edu/goes/goes.html

❖ SSEC

SSEC dates back to 1965, and is a multidisciplinary research and development center in the University of Wisconsin-Madison's Graduate School. The Center is based on the pioneering work of its founders, Professors Verner E. Suomi (Meteorology) and Robert J. Parent (Electrical Engineering). It was Suomi's spin-scan camera that was used on geostationary satellites worldwide from the 1960s through 1994, and this was the impetus for the Center's research in atmospheric and space sciences. SSEC continues to contribute to current-generation geostationary and polar orbiting weather satellites through software development and simulation analysis.
http://www.ssec.wisc.edu/data/index.html

❖ Correspondence

I am pleased to have received some e-mails during the last month from readers making general enquiries. *Monitoring Times* is providing its contributors with a standardized address, so I welcome any correspondence directed to the new address.

Harris Yarbrough, Jr. (W5IPC) described how he still uses his YU3UMV scan converter – the unit that I mentioned a few editions ago – that was originally designed by Marjaz Vidmar to decode both APT and Wefax. This unit took considerable skills to construct, and had limited expansion possibilities, so I was impressed to hear that he has added some 256K DRAMS to enhance the decoder's memory capability. I suspect that this is possibly the only working unit now in operation! My own unit suffered a memory chip failure, and I could not find replacements, so I reluctantly disposed of the unit a few months ago.

Frequencies

NOAA-14 transmits (faulty) APT on 137.62 MHz
Reports from NOAA indicate that this WXSAT is unlikely to be fixed, although investigations are continuing and a daily synchronization pulse is commanded in order to try to resynchronize the imager.

NOAA-12 and -15 transmit APT on 137.50 MHz
Both WXSATs are providing good imagery. NOAA-15 receives a synchronizing pulse every day at 0730 UTC, and this has maintained good image quality.

Meteor 3-5 may transmit APT on 137.30 MHz when in sunlight
The orbit of this Russian WXSAT is not sun-synchronous, so periodically crosses the day-night boundary (twilight zone). During these times it is usually powered off to conserve power.

Meteor 2-21 may transmit APT on 137.85 MHz when Meteor 3-5 is off.
The APT antenna is not properly aligned, so reception is normally poor on most amateur antennas.

Okean-O, Okean-4 and Sich-1 sometimes transmit APT briefly on 137.40 MHz
These Russian/Ukrainian resources satellites rarely transmit telemetry outside of Russia, although they often record data during their orbits for retransmission later.

GOES-8 and GOES-10 use 1691 MHz for WEFAX
These provide continuous WEFAX and high resolution images over continental USA.

Satellite Service Guide

Robert Smathers
roberts@nmia.com
www.grove-ent.com/mtssg.html

All Frequencies MHz

Loral Skynet Telstar 5 - Ku-Band

97 degrees West longitude

1(V) 11728.5 Bob Jones University Homesat (digital)
2(H) 11735.0 Data Transmissions
3(V) 11789.5 FOX SNG feeds (digital)
4(H) 11796.0 Data Transmissions
5(V) 11836.0 Occasional video
6(H) 11842.5 Data Transmissions
7(V) 11867.0 Data Transmissions
8(H) 11873.5 **Globecast World Television** (digital)
- Arab Network of America/MBC TV
- ANA Radio
- 102.5 Hit Channel
- Radio Dimensione Suono
- SPT-1 and SPT-2
- Al Jamahirya Satellite Channel
- Iraq TV
- Irib 2/Jame-Jam Network
- Futbol DP radio

9(V) 11898.0 **International television** (digital)
- Nile Variety/Culture Channel
- Palenstine Satellite Channel
- Emiratates Dubai Television (EDTV)
- Dubai Sports Channel
- Saudi Channel One
- Dubai Business Channel
- Arabic radio

10(H) 11904.5 Data Transmissions
11(V) 11929.0 **Globecast World Television** (digital)
- Euronews
- Syria Satellite Channel
- Al Manar TV
- German TV (DW, ARD, ZDF)
- DW Radio

12(H) 11935.5 **Globecast World Television** (digital)
- Business TV 1 and 2
- HIC (Hrvatski Informativni Centar) TV
- HIC Radio
- HRT (Hrvatska Televizija)
- DFH-1,2,3 (Turkey)
- KISB 1 and 2 (Korea)
- DFH-FM 1 and 2 (Turkey)
- Euronews - several languages available

13(V) 11960.0 Data Transmissions
14(H) 11966.5 Data Transmissions
15(V) 11991.0 **Williams PAC Network** (digital)
- Bloomberg TV
- Remax Satellite Network

16(H) 11997.5 Data Transmissions
17(V) 12022.0 Data Transmissions
18(H) 12028.5 Data Transmissions
19(V) 12053.0 Occasional video
20(H) 12059.5 Data Transmissions
21(V) 12084.0 **Taipei International Satellite Television** (digital)
- CTV
- TTV
- CTS
- Taipei International Channel
- Super Value Channel
- KMRB-AM 1430 San Gabriel, CA - radio
- Radio 2
- BCC-News - radio
- BCC-Pop - radio
- BCC-Taiwan - radio
- TAN - The Asian Network
- Koreon Radio
- Iran Radio
- Macroview TV
- CCTV-4 China
- ACTV (Chinese)

22(H) 12090.5 **ABS-CBN International** (digital)
- The Filipino Channel
- ABS-CBN News Channel
- Pinoy Blockbuster Channel (Cinema One)
- DZMM Radio Patrol
- DWRR Radio Romance
- American Farsi Network - radio
- National Iranian TV
- PPV
- Zhong
- Tzu Chi Da'I
- Melli TV

23(V) 12115.0 **C Sky Net** (digital)
- ETTV International
- TSI - radio
- Sanlih Entertainment TV
- Buddhism TV
- Best News Entertainment Network
- Unique Satellite TV
- Japanese Entertainment TV
- USA-Info - radio
- Tzu Chi Da'I
- NATV

24(H) 12121.5 **Globecast World Television** (digital)
- Business TV 1, 2 and 3
- DFH 1, 2, and 3 (Turkey)
- KISB 1 and 2 (Korea)
- DFH-FM 1 and 2 (Turkey)
- HIC Radio
- Euronews - several languages available

25(V) 12146.0 Occasional video
26(H) 12152.5 **Globecast World Television** (digital)
- Abu Dhabi TV
- Emirate FM1 and FM 2 - radio
- Syria Satellite Channel
- Voice of the People - Arabic radio
- Iran TV Network
- Al Manar TV
- American Farsi Network - radio
- PARS TV
- Tapesh TV
- Ajara
- Appadana International
- Radio Sedaye Iran - radio
- Radio Seoul

27(V) 12177.0 **Pittsburgh International Telecommunications** (digital)
- World Radio Network 1, 2 and 3
- Kurdsat
- KSMI Radio - "National voice of Iran"
- Maharishi Open University
- Thai TV 5
- American Farsi Network - radio
- TRT TV - Turkey
- Samanyolu TV World
- International Tamil Broadcasting Corp. TV and Radio
- Kuwait Radio Network
- Kuwait Space Channel
- Back-to-Health TV
- Israeli TV
- Business TV

28(H) 12183.5 Spacecom FM Squared/Hypercube Services Data Transmissions .046, .08, .15, .19, .23, .30, .35, .38 .50, .65, .89, .93, .96, 1.05, 1.12, 1.22, 1.35 MHz

Panamsat Galaxy 4R - C-Band

99 degrees West longitude

1(H) 3720 SCPC Services
- **1443.80 56.20** Chinese audio service
- **1443.60 56.40** KBLA-AM, Santa Monica, CA - "Radio Korea"
- **1438.30 61.70** WWRV, 1300 AM, Patterson, NJ - spanish language religious
- **1431.00 69.00** Occasional Audio

2(V) 3740 Galaxy 3D (Digital)
3(H) 3760 SCPC Services
- **1404.40 55.60** Occasional audio
- **1403.10 56.90** Michigan News Network
- **1402.90 57.10** Agrinet/USA Radio Network
- **1402.00 58.00** Andy Thomas Radio Network
- **1401.50 58.50** Occasional Audio
- **1399.00 61.00** Sports Byline USA/Sports Byline Weekend
- **1397.50 62.50** Minnesota Talking Book net
- **1397.30 62.70** Accent Radio Network
- **1397.10 62.90** Wisconsin Radio Network
- **1396.00 64.00** Kansas Audio Reader Network
- **1395.80 64.20** WTMJ-AM, Milwaukee, WI - news and talk
- **1395.00 65.00** Occasional Audio
- **1394.70 65.30** WJR-AM, Detroit, MI - talk radio
- **1390.95 69.05** Occasional Audio
- **1383.10 76.90** KIRO-AM Seattle, WA - news and talk
- **1382.90 77.10** Michigan News Network
- **1382.60 77.40** Soldiers Radio Network
- **1382.30 77.70** Motor Racing Network
- **1382.00 78.00** Occasional Audio
- **1381.60 78.40** Radio Northwest Network
- **1381.20 78.80** Occasional Audio
- **1380.90 79.10** KJR-AM 950, Seattle, WA - sports talk
- **1380.90 79.10** Occasional Audio
- **1377.10 82.90** In-Touch reading service

4(V) 3780 WB Network/WB Domestic TV Distribution/ WB International TV Distribution (digital)
5(H) 3800 Christian Television Network (digital) / KCHF-TV Albuquerque, NM -religious (digital)
6(V) 3820 WB Domestic TV Distribution (digital)
7(H) 3840 Data Transmissions
8(V) 3860 Data Transmissions
9(H) 3880 XEW-TV 2 / XHGC-TV 5 / XEQ-TV 9, Mexico City (digital)
10(V) 3900 Occasional video
11(H) 3920 Mexican television occasional feeds (digital)
12(V) 3940 Occasional video
13(H) 3960 (none)
14(V) 3980 Waterfront Communications (digital)
15(H) 4000 World Harvest Television - religious
- **6.48, 7.30** WHPZ-FM 96.9 Bremen, IN / WGTC-FM 102.3 Carlisle, IN, contemporary Christian "Pulse FM"
- **7.46** WHRI Americas - World Harvest Radio
- **7.55** WHRI Europe - World Harvest Radio
- **7.64** KWHR Asia - World Harvest Radio
- **7.73** KWHR South Pacific - World Harvest Radio
- **7.82** WHRA Africa/Middle East - World Harvest Radio

16(V) 4020 Shepherd's Chapel Network (Dr. Pastor Murray) - religious
- **7.30** KNEA-AM 970 Jonesboro, AR - sports talk

17(H) 4040 Buena Vista Syndication / Carsey-Werner Syndication / Bueno Vista International Syndication
18(V) 4060 Occasional video
19(H) 4080 Occasional video
20(V) 4100 Occasional video
21(H) 4120 Occasional video
22(V) 4140 Occasional video
23(H) 4160 Occasional video
24(V) 4180 Occasional video / Bueno Vista Syndication (occasional)

Panamsat Galaxy 4R - Ku-Band

99 degrees West longitude

1(H) 11720 Occasional video
2(V) 11740 Occasional video
3(H) 11760 Occasional video
4(V) 11780 AT&T HITS 5 (digital)
5(H) 11800 AT&T HITS 6 (digital)
6(V) 11820 AT&T HITS 11 (digital)
7(H) 11840 AT&T HITS 4 (digital)
8(V) 11860 Occasional video
9(H) 11880 AT&T HITS 3 (digital)
10(V) 11900 AT&T HITS 2 (digital)
11(H) 11920 AT&T HITS 1 (digital)
12(V) 11940 AT&T HITS 8 (digital)
13(H) 11960 Data Transmissions
14(V) 11980 Occasional video
15(H) 12000 Occasional video
16(V) 12020 Occasional video
17(H) 12040 AT&T HITS 9 (digital)
18(V) 12060 AT&T HITS 10 (digital)
19(H) 12080 USPS-TV (digital)
20(V) 12100 Occasional video
21(H) 12120 Occasional video
22(V) 12140 AT&T HITS 7 (digital)
23(H) 12160 AT&T HITS 13 (digital)
24(V) 12180 Spacecom Systems Data Transmissions

SES Americom Americom-4 - C-Band

101 degrees West longitude

1(V) 3720 Data Transmissions / Cornerstone TV (digital)
2(H) 3740 (none)
3(V) 3760 Data Transmissions / Daystar TV (digital)
4(H) 3780 Data Transmissions
5(V) 3800 (none)
6(H) 3820 (none)
7(V) 3840 Data Transmissions
8(H) 3860 (none)
9(V) 3880 Golden Eagle Broadcasting - religious
- **5.80** KMUS-AM 1380 Muskogee, OK - religious

10(H) 3900 (none)
11(V) 3920 (none)
12(H) 3940 (none)
13(V) 3960 Data Transmissions
14(H) 3980 NPS Fox Sports (digital)
15(V) 4000 Data Transmissions
16(H) 4020 NPS Fox Sports (digital)
17(V) 4040 (none)
18(H) 4060 WNBC-TV New York City - Primetime 24 NBC (VC2+)
19(V) 4080 (none)
20(H) 4100 Data Transmissions
21(V) 4120 Data Transmissions
22(H) 4140 WKRN-TV Nashville, TN - Primetime 24 ABC (VC2+)
23(V) 4160 Data Transmissions
24(H) 4180 WSEE-TV Erie, PA - Primetime 24 CBS (VC2+)

SES Americom Americom-4 - Ku-Band

101 degrees West longitude

1(V) 11720 Data Transmissions
2(H) 11740 Data Transmissions
3(V) 11760 Data Transmissions
4(H) 11780 Data Transmissions
5(V) 11800 Data Transmissions
6(H) 11820 Data Transmissions / 3 Angels Broadcasting TV and Radio (digital)
7(V) 11840 Data Transmissions
8(H) 11860 **TVB** (digital)
- TVB Jade Channel
- Jade World Movie
- TVB Xing He
- TVBS-News
- TVB8
- CCTV-4 China
- MacTV

9(V) 11880 Data Transmissions
10(H) 11900 Data Transmissions
11(V) 11920 Data Transmissions
12(H) 11940 Data Transmissions
13(V) 11960 Data Transmissions
14(H) 11980 Data Transmissions
15(V) 12000 Data Transmissions
16(H) 12020 Data Transmissions
17(V) 12040 Data Transmissions
18(H) 12060 Data Transmissions
19(V) 12080 Data Transmissions
20(H) 12100 Data Transmissions
21(V) 12120 **German Channel 0** (digital)
- Channel 0 Television
- Channel 0 Radio
- MagicStar

22(H) 12140 Data Transmissions
23(V) 12160 Data Transmissions
24(H) 12180 Data Transmissions
25(V) 11535 South-American beamed transponder
26(H) 11535 South-American beamed transponder
27(V) 11655 South-American beamed transponder
28(H) 11655 South-American beamed transponder

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Federal Communications Commission

The Federal Communications Commission (FCC) is an independent United States government agency, directly responsible to Congress. The FCC was established by the Communications Act of 1934 and is charged with regulating interstate and international communications by radio, television, wire, satellite and cable. The FCC's jurisdiction covers the 50 states, the District of Columbia, and U.S. possessions.

This agency has an extensive High Frequency (HF) radio network (below). In 1996 the FCC reorganized its field office structure closing down its nine monitoring stations around the country.

❖ Field Office Structure

The FCC has now has three Regional Offices, 16 District Offices, and nine Resident Agent Offices located across the United States.

The Northeast Region covers the states of Connecticut, Delaware, Illinois, Indiana, Kentucky, Maine, Maryland, Massachusetts, Michigan, Minnesota, New Hampshire, New Jersey, New York, North Dakota, Ohio, Pennsylvania, Rhode Island, South Dakota (east of the Missouri River), Vermont, Virginia (Northern Virginia portion of the Washington, DC metropolitan area only), Washington, DC, West Virginia, and Wisconsin.

The Northeast Region consists of six District Offices located in Boston, MA; Chicago, IL; Columbia, MD; Detroit, MI; New York, NY; and Philadelphia, PA; and two Resident Agent Offices located in Buffalo, NY and Saint Paul, MN.

The South Central Region covers the states of Alabama, Arkansas, Florida, Georgia, Iowa, Kansas, Louisiana, Mississippi, Missouri, Nebraska, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia (excluding northern part included in the Washington, DC. metropolitan area), and Puerto Rico.

The South Central Region consists of five District Offices located in Atlanta, GA; Dallas, TX; Kansas City, MO; New Orleans, LA; and Tampa, FL; and four Resident Agent Offices located in Houston, TX; Miami, FL; Norfolk, VA; and San Juan, PR

The Western Region covers Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, South Dakota (west of Missouri River), Utah, Washington, and Wyoming.

The Western Region consists of five District Offices located in Denver, CO; Los Angeles, CA; San Diego, CA: San Francisco, CA; and Seattle, WA; and three Resident Agent offices located in Anchorage, AK, Honolulu, HI; and Portland, OR. The only ALE identification I have confirmed for the FCC is KGD32FCC on 9106.0 kHz.

Table 1: FCC Callsign/Station List

Callsign	Location	Notes
KAN 38	Kansas City, MO	South Central Regional Office/District Office
KAN 39	Denver, CO	District Office
KAN 40	Saint Paul, MN	Resident Agent Office
KAN 41	Quincy, MA	District Office (Boston)
KCE 57	Buffalo, NY	Resident Agent Office
KCE 58	New York City, NY	District Office
KEG 24	Baltimore, MD	District Office
KEG 25	Philadelphia, PA	District Office
KGA 91	Laurel, MD	Monitoring Station
KGA 93	Washington, DC	FCC Headquarters
KGJ 38	Atlanta, GA	District Office
KGJ 39	Miami, FL	Resident Agent Office
KGJ 40	Norfolk, VA	Resident Agent Office
KIP 68	Dallas, TX	District Office
KIP 69	Houston, TX	Resident Agent Office
KIP 70	New Orleans, LA	District Office
KIP 71	Long Beach, CA	District Office (Los Angeles)
KKW 36	Hayward, CA	Western Regional Office/District Office (San Francisco)
KKW 37	Portlond, OR	Resident Agent Office
KKW 38	Seattle, WA	District Office
KMP 29	Detroit, MI	District Office
KMP 30	Chicago, IL	Northeast Regional Office/District Office
KMP 31	Honolulu, HI	Resident Agent Office
KOA 55	Seattle, WA	District Office
KOT 72	San Diego, CA	District Office
KQG 98	Tampa, FL	District Office
KSH 43	Anchorage, AK	Resident Agent Office
KWC 41	Anchorage, AK	Resident Agent Office
WWQ 21	San Juan, PR	Resident Agent Office

HF Radio Network Frequencies

2110.0 2295.0 4483.0 4483.5 5133.0 5372.5 7603.5 7790.0 10655.0 10902.0 11035.0 13830.0 13942.5 13990.0 13992.0 14971.0 18050.0 19230.0 22964.0 23035.0 27575.0 kHz

FCC to FEMA HF Links

5211.0 10493.0 kHz

VHF Frequencies

41.060 MHz Simplex
167.050 MHz Simplex
167.050/172.800 MHz Repeater

❖ Public Safety in Military Band

For some time now I have seen reports that the State of Wisconsin is setting up a trunking system in the 138-144 MHz military land mobile service band. After considerable research here is what we now know about this system.

The Wisconsin State Patrol is owner and operator of this Motorola trunk system. The Department of Defense is not a partner, even though they have their own assigned talk group on this system and they have relinquished 20 VHF pairs to the state. The state has 90 radios on system, which includes mobiles and portables, but their Mobile Data Terminals (MDT) operate on VHF in a separate environment. According to some sources they do run a parallel system for interoperability and their radios can scan both trunk and conventional systems.

This system reportedly covers from the Illinois border to Eau Claire along one of the Interstates and is used by Monroe County plus various state and federal units. Reportedly, the system cannot be expanded statewide because the 20 pairs they got from DoD are insufficient to handle such a system.

Table 2: Wisconsin Centralized Digital Trunk Relay Interconnect

Motorola Smortzone Astro APCO-25 technology 3.6 control.
(System ID 7924)
System: Four sites using the 20 VHF military pairs
Base/Offset Frequencies: 138.000 MHz/12.5 kHz
Callsign: KQO228

Trunk System Outputs:

Baraboo, Sauk County (Site 2)
139.0125 139.1875 139.3625 139.7375 139.9125*
Black River Falls, Jackson County (Site 4)
139.0875 139.2125 139.4125 139.7625 139.9625*
Milton Junction, Rock County (Site 1)
139.1125 139.2625 139.6125 139.8125 140.3625*
Ridgeville, Monroe County (Site 3)
139.1625 139.3125 139.6625 139.8625 140.4125*

System Mobile Input Frequencies:

141.5125 141.6125 141.6875 141.8125 141.9125 142.1125 142.1875 142.2125 142.2375 142.3125 142.3375 142.3875 142.4125 142.4375 142.4625 142.4875 142.8875 142.9125 142.9375 142.9875
* indicates trunk system control channel

❖ Who is the AUSC?

Recently, while flipping through the pages of my well-worn copy of Tom Kneitel's *Top Se-*

cret Registry of U.S. Government Radio Frequencies, I stumbled on one of those little government agencies I didn't know a whole lot about – the AUSC or the Administration Office of the United States Courts. As you can see below, their radio net isn't nationwide. In fact, the bulk of their communications is right here in my backyard (see 164.200).

162.025/165.4125	Phoenix, Arizona
164.200 Simplex	Asheville, Bryson City, Charlotte, Shelby, and Statesville, North Carolina
170.575/166.100	Atlanta, Georgia

If you live in the Phoenix, Atlanta or Western North Carolina area, I would appreciate any reports on activity you have observed on the frequencies above. While these are the only locations I have noted with any sort of activity for this agency, you might want to plug the frequencies above into your scanner and see if there is any other activity in your area; please report your results to the email address in the masthead.

❖ Army MARS Frequencies

Our final treat this month is the latest list of U.S. Army Military Affiliate Radio System (MARS) frequencies and designators. The Army MARS frequency designators consist of three alpha characters. The first character is a "K" for high frequency assignments (for kilohertz). It is a "M" for VHF and UHF assignments (for Megahertz).

For HF designators, the second character is an alpha equivalent of the MHz band used, and the third character is an alpha equivalent of the kHz assignment within the MHz band. For VHF and UHF designators, the second and third alpha characters reflect the wider range of frequency assignments.

And that does it for this month, Until next time, 73 and good hunting.

Table 3: U.S. Army Military Affiliate Radio System

Location	Legend
CONUS	Continental United States
E/SWA	Europe/Southwest Asia
PAC	Pacific

HF	MARS	Frequencies
KAA	2001.5	CONUS
KAB	2218.5	CONUS
KAC	2221.5	CONUS
KAD	2256.5	CONUS
KAE	2259.5	CONUS
KAF	2306.5	CONUS
KAG	2309.5	CONUS
KAH	2358.5	CONUS
KAI	2813.5	CONUS
KBA	3235.5	CONUS
KBC	3238.5	CONUS
KBD	3243.5	CONUS
KBE	3257.0	CONUS
KBF	3273.5	CONUS
KBG	3276.5	CONUS
KBH	3287.5	CONUS
KBJ	3290.5	CONUS
KBL	3348.5	CONUS
KBM	3243.5	CONUS
KBN	3227.0	CONUS
KBO	3233.0	CONUS
KBP	3230.0	CONUS
KBQ	3876.5	E/SWA
KBR	3885.0	E/SWA
KBS	3802.5	PAC
KCA	4001.5	CONUS
KCC	4012.0	CONUS
KCD	4018.5	CONUS
KCE	4021.5	CONUS
KCF	4024.5	CONUS
KCG	4027.5	CONUS
KCI	4030.5	CONUS
KCJ	4033.5	CONUS
KCK	4036.5	CONUS
KCL	4446.5	CONUS
KCN	4440.0	CONUS
KCO	4920.0	CONUS
KCP	4791.0	CONUS
KCQ	4930.0	CONUS
KCR	4518.5	CONUS
KCS	4015.0	E/SWA
KDA	5113.5	CONUS
KDB	5116.5	CONUS
KDC	5203.5	CONUS
KDD	5206.5	CONUS
KDE	5218.5	CONUS
KDF	5396.0	CONUS
KDG	5401.0	CONUS, E/SWA
KDH	5758.5	CONUS
KDI	5761.5	CONUS
KDJ	5258.5	CONUS
KEA	6824.5	CONUS, E/SWA
KEB	6908.5	CONUS
KEC	6911.5	CONUS
KED	6988.0	CONUS
KEE	6997.5	CONUS, E/SWA, PAC
KEG	6905.0	CONUS
KEH	6906.5	CONUS, PAC
KFA	7309.5	CONUS
KFB	7312.5	CONUS
KFC	7315.5	CONUS
KFD	7358.5	CONUS
KFE	7361.5	CONUS
KFF	7405.0	CONUS
KFG	7590.0	CONUS
KFH	7720.0	CONUS
KFI	7849.5	CONUS, PAC
KFJ	7313.5	CONUS
KFL	7433.0	CONUS
KFM	7954.5	CONUS
KFN	7410.0	CONUS
KFO	7422.5	CONUS
KFP	7754.5	CONUS
KFQ	7475.0	E/SWA
KFR	7411.5	PAC
KFS	7315.0	PAC
KFT	7316.5	PAC
KGA	8067.5	CONUS, PAC
KGB	8038.5	CONUS
KHA	9182.0	CONUS
KHB	9305.0	CONUS
KHC	9419.0	CONUS
KHD	9421.0	CONUS
KHE	9810.0	CONUS
KHF	9990.0	CONUS
KHG	9260.0	CONUS
KHH	9261.5	CONUS, PAC
KHJ	9948.5	CONUS, PAC
KHK	9865.5	PAC
KIA	10151.5	CONUS
KIB	10165.0	CONUS
KIC	10180.0	CONUS, E/SWA
KID	10815.0	CONUS
KIE	10534.5	CONUS, PAC
KIF	10327.0	E/SWA
KJA	11990.0	CONUS
KJB	11455.5	CONUS
KJC	11105.0	CONUS
KJD	11106.5	CONUS, PAC
KJE	11455.0	E/SWA
KKA	12072.0	CONUS
KKB	12148.5	CONUS, PAC
KKC	12075.0	CONUS
KKE	12188.5	CONUS
KLA	13912.0	CONUS
KLB	13479.5	CONUS, PAC
KLC	13505.0	CONUS
KLD	13508.0	CONUS
KLE	13511.0	CONUS
KLF	13514.0	CONUS
KLG	13743.0	CONUS
KLH	13965.0	CONUS, PAC
KLI	13994.5	CONUS, E/SWA
KLK	13997.5	CONUS
KLL	13996.5	PAC
KLM	13451.5	PAC
KLN	13811.5	PAC
KLO	13843.5	PAC
KLP	13995.0	PAC
KMA	14403.5	CONUS, E/SWA
KMB	14440.0	CONUS
KMC	14485.5	CONUS, PAC
KMD	14489.5	CONUS, E/SWA
KME	14488.5	CONUS, E/SWA, PAC
KMF	14511.5	CONUS, E/SWA, PAC
KMH	14514.0	CONUS
KMI	14580.5	CONUS, PAC
KMJ	14665.0	CONUS, E/SWA, PAC
KMK	14847.5	CONUS
KML	14855.5	CONUS, PAC
KMM	14877.5	CONUS
KMN	14930.0	CONUS
KMO	14936.5	CONUS
KMQ	14939.5	CONUS
KMR	14511.0	CONUS
KMS	14405.0	E/SWA
KMT	14406.5	E/SWA
KMU	14403.0	PAC
KMV	14440.5	PAC
KNA	15779.0	CONUS
KNB	15782.0	CONUS
KNC	15872.0	CONUS
KND	15551.0	E/SWA
KNE	15805.5	PAC
KOA	16041.0	CONUS, E/SWA
KOB	16093.0	CONUS
KOC	16049.5	CONUS
KOD	16292.0	PAC
KPA	17497.5	PAC
KPB	17444.5	CONUS
KPC	17459.0	CONUS, E/SWA
KPD	17498.5	CONUS
KPE	17501.5	CONUS, E/SWA, PAC
KPF	17520.0	CONUS
KPG	17546.5	CONUS, PAC
KPH	17594.0	CONUS
KPJ	17403.5	PAC
KPK	17487.5	PAC
KQA	18212.5	CONUS
KQB	18294.5	CONUS
KQC	18640.5	CONUS
KQD	18745.0	PAC
KQE	18129.5	PAC
KQF	18291.5	PAC
KRA	19004.5	CONUS
KRB	19007.5	CONUS, PAC
KRC	19010.5	CONUS
KRD	19013.5	CONUS
KRE	19024.0	CONUS, E/SWA
KRF	19029.0	CONUS
KRG	19531.0	CONUS
KRH	19534.0	CONUS
KRI	19840.0	CONUS
KRK	19011.5	PAC
KRL	19534.5	PAC
KRM	19837.0	PAC
KSA	20078.5	CONUS, PAC
KSB	20105.5	CONUS
KSC	20221.0	CONUS
KSD	20520.0	CONUS
KSE	20560.0	CONUS
KSF	20650.5	CONUS
KSG	20655.0	CONUS
KSH	20812.0	CONUS
KSI	20921.5	CONUS
KSJ	20941.5	CONUS
KSK	20975.0	CONUS, E/SWA
KSL	20978.0	CONUS
KSM	20995.5	CONUS, E/SWA, PAC
KSN	20992.5	E/SWA, PAC
KSO	20994.0	E/SWA, PAC
KSP	20873.0	PAC
KSQ	20908.5	PAC
KTA	21825.5	CONUS, PAC
KWA	24012.5	CONUS
KWB	24050.0	CONUS
KWC	24197.5	CONUS, PAC
KWD	24560.0	CONUS
KWE	24761.5	CONUS
KWF	24860.0	CONUS
KWG	24007.5	PAC
KWH	24012.0	PAC
KZA	27565.0	CONUS
KZB	27780.0	CONUS
KZC	27790.0	CONUS
KZD	27810.0	CONUS
KZE	27820.0	CONUS
KZF	27992.5	CONUS, PAC
KZG	27994.0	E/SWA, PAC
KZH	27995.5	PAC

MARS VHF/UHF Frequencies

MBA	40.950
MBB	49.800
MBC	46.790
MBD	49.790
MBE	49.930
MBF	72.975
MCA	138.075
MDA	141.525
MEA	142.325
MEB	142.400
MEC	142.425
MFA	143.000
MFB	143.025
MFC	143.315
MFD	143.350
MFF	143.400
MFG	143.415
MFH	143.975
MFI	143.9875
MFJ	143.990
MGB	148.010
MGC	148.0125
MGD	148.025
MGE	148.075
MGF	148.600
MGG	148.625
MGH	148.650
MGI	148.750
MGJ	148.800
MIA	150.625
MJA	226.100
MJB	226.350
MJC	226.400
MJD	226.450
MJE	226.550
MLA	229.400
MLB	229.450
MLC	229.650
MOA	407.250
MOB	407.450
MRA	413.125
MRC	413.250
MRD	413.575
MVA	419.150

Dan Veeneman
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Nextel Proposes Restructuring 800 MHz

Public Safety radio systems are experiencing increasing levels of interference from commercial mobile radio systems (CMRS) such as cellular and specialized mobile radio (SMR). More than 20 cities have reported significant interference from Nextel, the largest SMR operator, or a local cellular provider.

Public safety and commercial users both use frequencies in 800 MHz band, an arrangement that began in the 1970s when the Federal Communications Commission (FCC) did away with UHF television stations 70 through 83 and reallocated much of that space to land mobile radio (LMR) users. These users include public safety, cellular telephone and SMR operators.

Cellular telephone service started in 1983 and has grown dramatically since then. SMR service in the 800 MHz band has also increased, although not to the same degree. To accommodate all of this growth, operators have built thousands of towers across the country with the goal of serving as many users as possible. Meanwhile, public safety agencies have also moved into the 800 MHz band, building their towers to maximize coverage area while attempting to minimize cost.

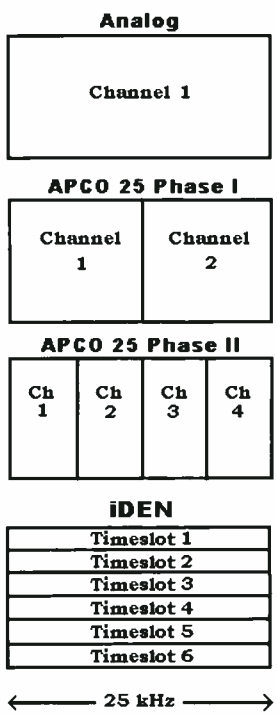
So today we have commercial and public safety users in the 800 MHz band, each operating with conflicting goals on adjacent, intermixed radio frequencies. The end result is interference and poor performance for public safety radios when they are near commercial towers.

Several organizations and manufacturers have been working to reduce this interference, including APCO (Association of Public Safety Communications Officials) with their Project 39 effort. Some measures being tried by commercial operators include reducing transmitter power, limiting use of certain frequencies at certain times of the day, and reorienting tower antennas. This is a slow and tedious process, and is not always successful.

❖ Nextel Proposal

Most public safety radio activity in the 800 MHz band currently takes place in two blocks of spectrum, one running from 806 MHz to 824 MHz and the other from 851 MHz to 869 MHz. Each of these blocks is split into 25 kHz wide channels, where one channel from the lower block is paired with a channel from the upper block. The channel from the lower block is used by mobile radios to transmit to a base station and the channel from the other block, exactly 45 MHz higher, is used by the base station to transmit out to the mobile radios. (Because transmissions from the base station are so much stronger than from mobiles, most scanner listeners monitor frequencies in the higher block.)

This past November, Nextel submitted a white paper to the FCC proposing a significant restructuring of the 800 MHz band. The stated purpose of the proposal is to reduce the interference currently experienced by public safety users from Nextel and cellular telephone operators, and to provide somewhat more spectrum to the public safety community.



The core of the Nextel proposal is for the FCC to scrap the current arrangement and create two separate blocks of channels in the 800 MHz band, one for public safety and one for commercial operations. The public safety block would run from 806 MHz to 816 MHz and from 851 MHz to 861 MHz (20 MHz of spectrum) and have a total of 400 paired channels. Commercial operators would have 16 MHz of continuous spectrum just above that, from 816 MHz to 824 MHz and from 861 MHz to 869 MHz, comprising a total of 320 channels.

Nextel would surrender 16 MHz of their existing licensed frequencies (they are currently allocated a total of 18 MHz in the 800 MHz band), and in exchange would receive two new allocations: 6 MHz at 821 to 824 MHz and 866 to 869 MHz, and a 10 MHz block up in the Mobile Satellite Service (MSS) band at 2.1 GHz.

Nextel's pitch is that by splitting up the users into their own contiguous bands, the interference problems would be greatly reduced. The proposal also highlights the fact that public safety is currently allocated less than 10 MHz in the 800 MHz band; their proposal would more than double public safety's allocation. Nextel also offers to relocate their licenses to other frequencies at their own expense and promises to contribute a significant amount of money to help other users relocate if their requests are granted.

Some of these relocation efforts may be easier than others. For instance, there are 50 channels set aside for business and industrial users between 809 MHz and 816 MHz (with their corresponding base station frequencies between 854 MHz and 861 MHz) that Nextel suggests be allowed to operate on a secondary, non-interfering basis until they eventually move on their own.

More problematic are the NPSPAC (National Public Safety Planning Advisory Committee) channels between 821 MHz and 824 MHz and between 866 MHz and 869 MHz. Nextel suggests moving these channels into the proposed public safety block at 806 MHz, and acknowledges that this will be expensive.

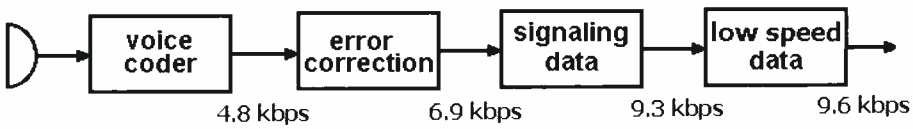
NPSPAC, with the blessing of the FCC, has specified several nationwide frequencies to be set aside for mutual aid, in order to allow multiple agencies to communicate with each other in time of disaster or other emergency. The channels currently in place are:

ICALL	Calling	866.0125
ITAC-1	Mutual Aid #1	866.5125
ITAC-2	Mutual Aid #2	867.0125
ITAC-3	Mutual Aid #3	867.5125
ITAC-4	Mutual Aid #4	868.0125
STAC-5	Portable/Mobile	868.7875 (low power)

The standard for transmissions on these frequencies includes a CTCSS tone squelch of 156.7 Hz.

The request for spectrum up in the 2 GHz

iDEN Voice and Data



is more of a regulatory challenge for the FCC. Although the slice of spectrum Nextel is asking for isn't currently being used by any primary license holder, it sits in a band that is designated for Mobile Satellite Service (MSS). The FCC would have to reallocate at least the 10 MHz of spectrum Nextel wants (2020 MHz to 2025 MHz and 2170 MHz to 2175 MHz) away from MSS and dedicate it to terrestrial mobile services. Secondary users in these frequencies, such as Broadcast Auxiliary Service and Fixed Point-to-Point Microwave, would have to be relocated sooner than the FCC currently requires.

Other parts of the proposal include Nextel relinquishing licenses for spectrum in the 700 MHz and 900 MHz bands.

A number of organizations support the Nextel proposal, at least in principal, and are urging the FCC to begin a rule-making process for the 800 MHz band. These organizations include the Association of Public Safety Communication Officials, the International Association of Fire Chiefs, the International Association of Chiefs of Police, Major Cities Chiefs Association, National Sheriff's Association, Major County Sheriff's Association and the National Public Safety Telecommunications Council.

❖ Nextel Technology

Nextel is the fifth largest cellular mobile carrier in the United States with more than 8 million subscribers. Nextel is unique among cellular providers because they grew out of the two-way dispatch business rather than the telephone industry. One of the most popular features of their radios is the "walkie-talkie" capability where one Nextel subscriber can immediately communicate with another just by using a push-to-talk button. Nextel is also different because they use frequencies set aside for Specialized Mobile Radio (SMR) rather than cellular mobile telephone or personal communications services (PCS).

Nextel uses a technology developed by Motorola called integrated Digital Enhanced Network (iDEN). iDEN was formerly known as Motorola Integrated Radio System (MIRS) and provides digital voice and data services including enhanced dispatch (two-way talk group communications, similar to walkie-talkies), telephone interconnect (place and receive regular telephone calls) and messaging (alphanumeric messages similar to paging) .

iDEN uses time division multiple access (TDMA) to fit six conversations into a single radio channel. This channel is divided up into timeslots, each slot lasting 15 milliseconds. This means each iDEN user can transmit for 15 milliseconds in each 90-millisecond period. By taking turns in this way, six users can share one radio channel.

Voice traffic on an iDEN is digital. A voice codec (encoder/decoder) takes the analog input from the microphone and produces a digital representation according to a VSELP (Vector Sum Excited Linear Prediction) algorithm. This representation is protected by error correction information, which allows the receiver to repair bit errors that the representation may have experienced during transmission. Signaling information is added, along with any low-speed data the user may wish to send. This whole package is transmitted when the next timeslot comes around, and the process is repeated every 90 milliseconds for as long as the user holds down the push-to-talk button.

The iDEN transmitter uses Quadrature Amplitude Modulation (QAM), which is a fairly complicated modulation scheme but provides for an overall data rate of 64 kilobits per second (kbps) in a 25 kHz radio channel. QAM was chosen, in part, because it doesn't require adaptive equalization or other relatively expensive methods to correct for transmission path delays and rapidly changing signal strength that are common in mobile radio environments.

So far there are no commercially available scanners that can follow iDEN transmissions.

❖ Pro-92 Channel Lock Out

On my Pro 92 scanner when I turn it on it says all channels locked out. It will not pick up any channels when this feature is on and I want to turn it off. The Owner's Manual has not helped much so I was wondering if you could help me.
– Bob

The "All Channels Locked Out" message appears on the PRO-92 and PRO-2067 scanners when there is an active control channel programmed into the radio but no available voice channels. This is a confusing message because it may appear even if you don't actually have any channels locked out!

What is happening is that the control channel is reporting activity on a voice channel, but the scanner either doesn't have that proper voice channel programmed into it or all of the voice channels are locked out.

First be sure that you really don't have voice channels locked out. You can do this using the instructions on page 50 of the Owner's Manual, which describes how to review and clear locked out frequencies. To review, press [SEARCH] then [FUNC] then [L/OUT]. Use [FUNC] and an arrow key to move through the banks. To clear all locked-out frequencies in a bank, press [SEARCH] and then turn on the bank you want to clear. Press [FUNC] then [4]. The scanner will ask you to confirm the operation.

If you don't have any locked out frequencies, go back through all of the programmed frequencies in the bank and see if there is a control channel with missing or incorrect voice frequencies. Either add the appropriate voice frequencies or remove the entry for that control channel and you should no longer see the "All Channels Locked Out" message.

Keep in mind this isn't really a bug – the scanner is doing the right thing by informing you that it cannot find a programmed voice channel to use with an active control channel.

That's all for this month. Take some time out to watch the Winter Olympics, if you can, and let me know what you're monitoring via electronic mail at *dan @ signalharbor.com*. As always, my website at **http://www.signalharbor.com** has additional information and links. Until next month, happy monitoring!

NOTICE: It is unlawful to buy cellular-capable scanners in the United States made after 1993, or modified for cellular coverage, unless you are an authorized government agency, cellular service provider, or engineering/service company engaged in cellular technology.

PLANE TALK

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Flying with Concorde

Welcome aboard and fasten your seatbelts. For a special treat today we are going to take a look at Concorde, now that she is flying again. We also offer up some ARTCC frequencies.

❖ Performance

Concorde measures 204 ft in length – but that stretches by almost 10 inches in-flight due to heating of the airframe. The characteristic droop nose is lowered to improve pilots' visibility on landing . The four engines – specially modified Rolls-Royce/SNECMA Olympus 593s – give more than 38,000 lbs of thrust each, with "reheat." This adds fuel to the final stage of the engine to produce the extra power required for take-off and the transition to supersonic flight.

Concorde takes off at 220 knots, compared with 165 knots for most subsonic aircraft and landing speeds are higher. In other respects, she performs as other aircraft.

Seating capacity is for 100 passengers: 40 seats in the front cabin, 60 in the rear, both offering a single class "R," or supersonic, brand of service. It can accommodate 0.59 ton of cargo. Flight range is about 4,053 miles. Take-off speed is 250 mph (402 kph), with a cruising speed of 1,350 mph, (2,150 kph/Mach Two), at 55,000 ft. (16,765 m)! The plane is listed as Category 3 (decision height 15 ft, landing runway visual range 200 metres, and take-off runway visual range 150 metre; see below).

The flight crew is comprised of two pilots and one flight engineer, and six cabin crew. The Concorde flies an average of 940 hours per aircraft per year.

❖ History

Great Britain and France started working separately towards a supersonic aircraft in 1956. They were working along such similar lines that in 1962 they decided to develop one jointly. This partnership between the British Aircraft Corporation (now British Aerospace) and Aerospatiale, led to 20 Concordes being built. Each country manufactured one prototype, one pre-production and eight production aircraft. Concorde was the most tested aircraft in aviation history.

Of the 16 production aircraft, 14 were made available for sale. British Airways was the world's first supersonic airline, ordering five. The first flight of the French prototype aircraft 001, took place from Toulouse on March 2, 1969. Concorde 002 landed at Dallas/Ft. Worth on September 20, 1973.

British Airways accepted its first supersonic passenger reservation in 1960, but the commercial supersonic era wasn't inaugurated until January 21, 1976, with British Airways flying from London Heathrow to Bahrain and Air France from Paris to Rio. The first transatlantic service, London to Washington, followed on May 24 that year. New York flights began November 22, 1977.

The first round the world flight by a British Airways Concorde covered 28,238 miles in 29 hours and 59 minutes on November 8, 1986. Concorde's fastest transatlantic crossing was on April 14, 1993, when it completed the New York to London flight in 2 hours, 54 minutes and 20 seconds.

Thanks to Bob Hubbard who furnished this material from a British Airway Publication! They sent him quite a package in response to a reception report he forwarded to them.

Aeronautical Frequencies

Louisville International Standford Field
Class C Airspace
ATIS: 118.725
Ground: 121.700/348.600
UniCom: 122.950
Approach/Departure: 123.675/327.000 - West
132.075/327.000 - East
Tower: 124.300/257.800
Clearance Delivery: 126.100/275.800
Air National Guard Ops: 268.100
Flight Service Station (FSS) - Louisville: SDF RDO (Standiford Radio): 122.200, 122.450, 255.400, 114.800 (Talk)/122.100 (Receive)

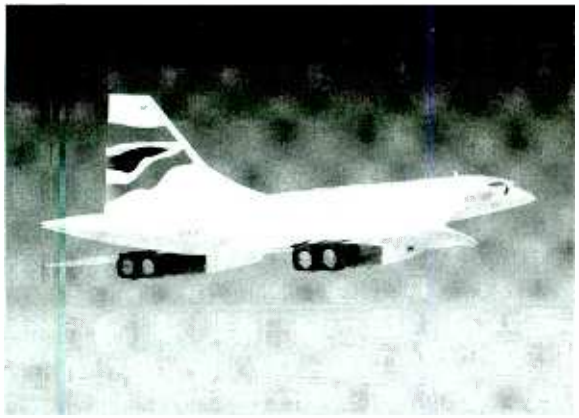
New York Center ARTCC
KZNY:
Barnegat: 132.150, 354.000
Barnstable (Oceanic): 135.800, 125.925, 381.700
Big Flat: 133.475, 132.200, 270.300, 322.400
Colts Neck: 118.975, 381.600
Dougloston: 133.050, 134.375
Elk Mountain: 134.450, 128.500, 132.175, 290.400, 298.900, 363.200
Flint Hill: 135.750, 132.100, 134.600, 290.200, 278.300, 339.800
Huguenot: 132.600, 285.500
Joliet: 133.675, 132.500, 322.500, 239.050
Matawan: 125.325, 127.175, 282.300, 350.300
Millville: 134.325, 381.450,
Modena: 135.450, 335.600
Nantucket: 121.125
North Mountain: 133.500, 118.450, 121.325, 128.575, 269.100, 273.600, 279.550, 282.350
Philipsburg: 134.800, 132.875, 306.200, 388.300
Sayre: 133.350, 372.000
Ship Bottom: 134.550, 133.050, 307.800, 353.500

Toronto Center
CZYZ: 124.925, 125.775, 127.000, 132.475, 132.800, 134.575, 134.925, 236.800, 294.500, 344.300, 354.300, 374.500
Coehill: 124.675
Elliot Lake: 135.400, 260.900
Hamilton: 133.300, 135.625, 290.800
Kitchener Waterloo Rgnl: 128.275, 135.825, 268.750
London: 135.300, 266.300
Moosonee: 133.725, 225.075
North Bay: 127.250, 132.375, 132.375, 233.400, 356.300
Peterborough: 134.250
Sarnia: 134.375, 254.900
Sault Ste. Marie: 132.650, 134.425, 227.300, 344.500
Sudbury: 135.500, 285.700
Timmins: 128.300, 133.975, 226.300, 381.400
Wawa: 124.075, 298.600
Wiarton: 132.575, 290.600

❖ Airport Instrument Landing Systems

We've had some queries from readers about instrument landing systems and how they work. The purpose of an Instrument Landing System (ILS) is to provide an approach path of exact alignment and rate of descent of an aircraft on its final approach to a runway.

A **precision landing approach** is a standard instrument approach procedure in which an electronic glide slope is provided, utilizing ILS or precision approach radar (PAR). A nonprecision approach is a standard instrument approach procedure



in which no electronic glide slope is provided. That would include VHF omni range (VOR), tactical air navigation nondirectional beacon (TACAN NDB), localizer (LOC), airport surveillance radar (ASR), localizer directional aid (LDA), or simplified directional facility (SDF) approaches.

Precision approaches have lower minimums and can be used under lower visibility conditions than nonprecision approaches.

Minimums consist of weather condition requirements which must be met before an aircraft can land. The minimums will vary with the type of approach procedure available. The two terms used to describe ILS minimums are "decision height" and "runway visual range."

Decision Height: A specified height at which a missed approach must be initiated by a pilot if the required visual reference to continue the approach to land has not been established; or, the height at which a decision must be made during an ILS or PAR instrument approach to either continue the approach or to execute a missed approach.

Runway Visual Range (RVR): An instrumentally derived value, based on standard calibrations that represent the horizontal distance a pilot will see down the runway from the approach end.

The lowest authorized ILS minimums in the United States, with all required ground and airborne systems components operative, are:

ILS Category I: Decision height not less than 200 feet and runway visual range of not less than 1800 feet.

ILS Category II: An ILS approach which provides for approach to a height above touchdown of not less than 100 feet and with RVR of not less than 1200 feet.

ILS Category IIIA: An ILS approach which provides for approach without a decision height minimum and with RVR of not less than 700 feet.

ILS Category IIIB: An ILS approach procedure which provides for approach with a decision height minimum and with RVR of not less than 150 feet.

ILS Category IIIC: An ILS approach procedure which provides for approach without a decision height minimum and without RVR minimum.

The approach course of the localizer is called the front course. The course line along the extended centerline of a runway, in the opposition direction of the front course, is called the back course.

The back course is normally not a precision approach, as there is normally no glide slope available for the back course, although some locations have a complete ILS system installed on each end of a runway. For example, on the approach end of a runway numbered 04, the other end would be the approach end of runway 22. When such is the case, the ILS systems are not in service simultaneously. If the localizer fails, an ILS approach is not authorized.

Aboard an aircraft, the ILS localizer frequency is selected by the VHF radio navigation selector, which automatically tunes in the paired glide slope frequency. The VHF selector is the same that is used for the VOR, and carries the full range of VOR/ILS localizer frequencies.

The localizer transmitter operates on one of the 40 ILS channels within the VHF frequency range of 108.100 MHz to 111.950 MHz, on the odd tenths. Glide slope frequencies utilize the UHF band from 329.300 to 334.000 MHz. Each localizer frequency is paired with a glide slope frequency, e.g., localizer at 108.500 MHz and glide slope at 334.000 MHz.

Actually, the term "glide slope" is a misnomer, as the aircraft is certainly not gliding. Power is required to maintain the aircraft on the correct descent path with gear and flaps lowered. The glide slope transmitter provides the pilot with vertical guidance. Should the glide slope fail, the system reverts to a non-precision localizer approach.

Glide slope transmitters are located between 740 and 1,250 feet from the approach end of the runway and offset 250 to 650 feet from the runway centerline. Signals are radiated primarily in the direction of the localizer front course to provide vertical guidance along a correct descent angle. It is normally usable to the distance of 10 nautical miles; however, at some locations, the glide slope has been certified for an extended service volume which exceeds that distance.

We'll have more about ILS systems in a future column.

❖ Farewell to the B727

The Boeing Company's 727 – its best-selling jetliner after the 737 and the savior of many airlines during the economic crisis of the 1970s – is fast disappearing from commercial service in the United States. Most of the remaining 727 passenger jets in the U.S. fleet are being sent to California's Mojave Desert for storage as airlines, struggling to survive financially since Sept. 11, discard their older and less efficient jets.

Given their age, it is unlikely the 727s will be returned to commercial service once the current downturn ends. Most will end up as scrap. Last week, United Airlines retired its remaining fleet of 75 Boeing 727s. They averaged 22 years in age, said airline spokesman Joe Hopkins. Another 727 customer, American Airlines, plans to retire its fifty 727s in a few months. Trans World Airlines (since taken over by American) and US Airways retired their 727s last year. Delta is accelerating retirement of more than sixty 727s. The 727 will continue to be used as a freighter by some operators such as FedEx.

The passing of the 727 as a commercial transport will end a remarkable era for a plane that was not supposed to do all that well. Boeing's initial market forecast was that it would sell about 250 planes. Boeing ended up delivering 1, 831. All were built at Boeing's Renton plant. Most of those were a stretched version known as the 727-200. Ironically, many airlines bought the then fuel-efficient 727 to save money during the oil crisis of the 1970s.

Although the 727 had the same-width fuselage as Boeing's 707, it was designed to land and take off on much shorter runways, which opened up many more airports to jet service. The secret was an ingenious flap system for low-speed approaches to short runways.

The engineers designed the 727 with three engines – two in the side of the aft fuselage and one in the tail cone. It became the only Boeing-built commercial jetliner in which the engines were not hung under the wings.

Although the jet became a pilot favorite, there were a series of crashes on final approach in 1965 that prompted calls by some in Congress for the 727 to be grounded. Investigators found that the pilots were at fault because they exceeded sink-rate limits. "The real culprit was a jet transport that handled like a fighter but still had to be flown strictly by the book," wrote Robert Serling in his book *Legend and Legacy* which details Boeing's colorful history.

Story from the *Seattle Post*. A big thank-you to Bruce Ames for forwarding it to us.

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Digital TV on the air

As you may or may not be aware, a great transformation is in progress which will change the way over-the-air television works. In theory, four years from now regular analog television will end in the United States and be replaced by new digital transmissions. (In practice, almost nobody believes this deadline will be met.) I've now had an opportunity to experiment with the new digital broadcasts and have seen their quirks.

Earlier this year, I purchased a Hauppauge WinTV-D card. Hauppauge is one of the larger manufacturers of TV tuner cards – expansion cards you install in a computer, which allow you to watch TV on the computer monitor. Unlike most of these tuner cards, the WinTV-D receives not only traditional analog broadcasts, but the new digital ones as well. The problem was that at the time of my purchase there were no digital TV stations within 120 miles of my location.

So, I did what any good radio fanatic would do. I stuffed my computer in the trunk of my car and traveled to Milwaukee, where two digital stations are operating. Ironically, just two weeks later a digital TV station began operation here in the Nashville area. I have now had an opportunity to see this new system in operation in both cities.

When I first set up my computer in Milwaukee, I was able to receive WMVS-DT just long enough to get a freeze-frame of Barney on the screen. After looking at WMVS's analog signal, it was obvious I had far too much interference from the computer to receive any digital signals. It was necessary to hook 10 feet of cable to the antenna, and get the antenna further from the computer. Once this was done, it was still necessary to carefully orient the antenna, but once I did, WMVS-DT came in perfectly.

And I do mean *perfectly*. The colors were strikingly clear and vivid. The sharpness of the picture was amazing. Digital TV looks *very* good, even on a standard resolution monitor like the one I was using. Unfortunately, I was using small computer speakers, so I was unable to evaluate the audio.

Later that evening, after some fiddling, I was able to receive Milwaukee's other DTV station, WTMJ-DT. Digital TV is more sensitive to noise and "ghosts" than analog. An antenna location that delivers an ugly, noise-ridden, but stable, analog picture, will probably deliver only a blank screen from digital stations.

About a week after I got home, I received an email reporting that WTVF-DT here in Nashville had signed on the air. My observations with this station are similar to my observations in Milwaukee – critical antenna aiming, little tolerance for noise. And a *beautiful* picture.

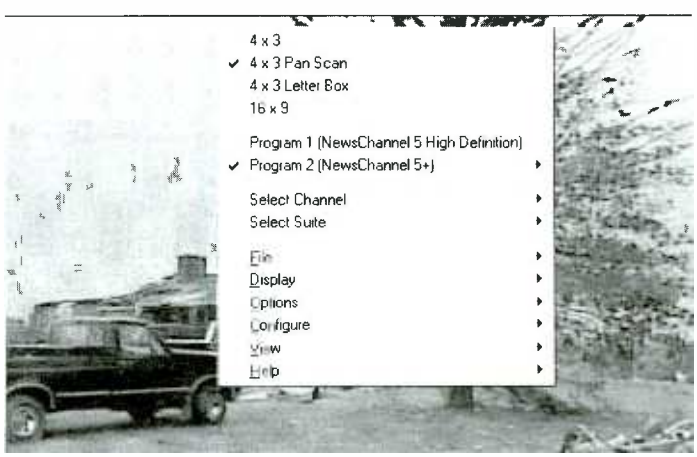
One feature of digital TV that many may not be aware of is the capability for "multicasting." Through digital compression technology, it is possible for a single DTV station to transmit more than one program over the same transmitter, on the same channel. In Milwaukee, WMVS-DT was transmitting two channels of PBS children's programming, one of cultural material, and a fourth that seemed to have a variety of programs. Here in Nashville, WTVF-DT has one channel that carries the same program as its traditional analog signal, and another which simulcasts their "Newschannel 5+" from cable channel 50. The picture in this month's column shows the subchannel selection menu on WTVF-DT, with their two programs "Newschannel 5 High Definition" and "Newschannel 5+".

I have yet to log any digital DX, but others have had more luck. DXer Jeff Kadet of western Illinois has received DTV stations from as far as 500 miles. There are photos of Jeff's reception on **http://pages.cthome.net/fmdx/hdtv.html.** At least three other people are known to be DXing the digital TV dials.

❖ Bits & Pieces

- Peter Leong recently purchased a Radio Shack DX-398 with the RBDS decoder. He found three stations in his area carrying the RBDS signal, but they don't seem to be triggering the radio's autoclock properly. Have any other readers had success with the autoclock in this set, or the similar Sangean ATS-909? (I fear the stations in his area simply are not transmitting the clock signal. I've found relatively few RBDS stations doing so.)
- The GE Superradio series have been popular with DXers for quite awhile. Many of the early Superradio IIIs have been reported with rather poor alignment. A webpage has appeared explaining where the alignment adjustments on this radio are, and how to do it. This is not a project for someone without electronics experience. But, if you know your way around a signal generator, **http://users.netonecom.net/~swordman/Radio/GEsrIIIAlign.htm** might be of interest. The older Superradio II still has a lot of fans; **http://www1.shore.net/~dmoisan/faqs/superradio/gesr_app_A.html** has valuable information about both the II and the III.
- Martin Schoech in Germany has started something called the "QSL Information Pages." His site contains names and addresses of those who've provided reception verification for AM broadcasting stations over the years. While the site is in Germany, it has plenty of information on North American stations. You can see this information on **http://listen.to/qip**.
- Another new reference source is also out. The International Radio Club of America (IRCA) prints a *Mexican Log*, a list of Mexican AM stations by frequency including call letters, location, power, slogan, and format, among other information. Like the National Radio Club's *AM Log* for the U.S. and Canada, the IRCA's Mexican publication is a number of 8-1/2x11" sheets punched for a 3-ring binder. It's $11.50 in the U.S. ($2.50 off if you're an IRCA or NRC member) payable to Phil Bytheway, mailed to the IRCA Bookstore, 9705 Mary NW, Seattle WA 98117-2334. The IRCA offers other publications; send a SASE to the same address for a list.

It's time to start thinking about those spring antenna projects. What are you planning? Write me at Box 98, Brasstown NC 28902-0098, or by email to *w9wi@w9wi.com*. Good DX!



Subchannel selection menu for WTVF-DT, Nashville

OUTER LIMITS

THE CLANDESTINE, THE UNUSUAL, THE UNLICENSED

George Zeller
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Pirates a Focus Again at Winter SWL Festival

Time has flown, and it's time for the 15th annual Winter SWL Fest in Kulpsville (suburban Philadelphia), Pennsylvania, on March 8 and 9. The world's largest gathering of shortwave listeners is always an enjoyable family reunion. Last year it also featured the biggest gathering of shortwave pirate experts ever assembled.

The organizers, *MT*'s own John Figliozzi and Richard Cuff, promise more fun this year. Full registration information is available for an SASE to SWL Winterfest, PO Box 4153, Clifton Park, NY 12065. Or, try the Fest web site at **http://www.swlfest.com/** for full details.

❖ What We Are Hearing

MT readers again heard a deluge of North American pirates. These stations all operate near 6955 kHz, but frequencies vary about 5 or 10 kHz depending on interference and band conditions.

Amiga Computer Generated Radio- Old pirate stations have been making nostalgia comebacks, including this one with computer generated music and jokes. (Announced maildrop defunct)

Blind Faith Radio- Dr. Napalm says he's not as active as he used to be, but his classic rock music still is heard on the pirate band. (Merlin)

Crunch Radio- Jazz and decades old popular music have shown up here. (Still none)

Freedom 40- The old pirate shortwave liberation broadcast has returned, featuring their late host Nemesis, better known as Kirk Trummell. (Stoneham)

Ground Zero Radio- Sketches, quizzes, and other comedy are mixed with the rock music on this one. (Blue Ridge Summit)

He Man Radio- Still in upper sideband, "the manliest of all modes," this parody of anti-feminism is now a classic station. (Blue Ridge Summit)

Indira Calling- Nehru's parody of All India Radio is still with us. You know that when they have George Zeller playing with the Beach Boys, it must be a parody. (Providence)

KIPM- When not producing the most elaborate drama shows on shortwave radio today, Alan took the time to correct our misspelling of his Elkhorn maildrop. (Elkhorn)

KTVI- Emanuel Goldstein's coverage of the pirate radio scene is insightful, but recent relays have been old programs. (Announced maildrop defunct)

Midi Radio- Their hit tunes are all played by a computer. (Uses midiradio@yahoo.com e-mail)

Old Turkey Radio- Another old standby, concentrating on Thanksgiving, is representative of holiday-related pirate programming. (Uses oldturkeyradio@hotmail.com e-mail)

Paragon Radio- Blues and poetry are not heard on many stations, but that's the format here. (None)

Psyco Radio- They have added a crowd of people chanting "We Want Psyco" to their station ID's. (Uses psycoradiohd@yahoo.com e-mail)

Quantum State Laboratory- As we see here this month, some real old timers have returned to the air. The pictured QSL is from 1994. (Stoneham)

Radio Azteca- Bram Stoker is back with elaborately produced hilarious parodies of DXers and DXing. (Belfast)

Radio Doomsday- The late Kirk Trummell's pirate stations are generating a nostalgia revival. (None)

Radio Nonsense- Here's another old timer who has come back after a long layoff. (Belfast)

Radio USA- Mr. Blue Sky, the oldest active pirate, is sending out QSL's for his latest efforts. (Belfast)

Radio 3- Using a "3 Rock" slogan, Sal Amoniac plays varied rock music, from insipid oldies to current favorites. (Providence)

Radio 8- Here's another example of the pirates who use numbers in their ID's. The format on this one has been anti-Taliban parodies. (None)

Radio 43- Owlsley reminds us that this is among the replays we are hearing of the late Kirk Trumell's stations. (Announced Free Radio Network, but not valid for this)

Spam Radio- This Kirk Trummell production generated the most controversial QSL in the history of shortwave radio, a nude woman defecating on her partner. It's no longer available, and maybe that's not all bad. (None)

Ultra Shortwave- Rock music, especially Pink Floyd, is their programming focus. (None)

United Patriot Militia Bingo- This parody is all that remains of Steve Anderson's clandestine. At press time, Steve remains at large. (Merlin)

Up Against the Wall Radio- Owlsely's well produced protest rock station has returned to the airwaves, this time with one of his holiday specials. (Providence)

WACK- They are an extremely slick rock oldies station, featuring live call-ins to a toll free number. (listen on the air; the number can change)

WHYP- James Brownyard was probably the most active North American pirate in 2001, and he's back for another year. (Providence)

WJFK- This one usually emerges in November on the anniversary of the John F. Kennedy assassination. Mark your calendar for next year. (Sometimes QSL's logs in *The ACE*)

WLIS- Jack Boggan's format of actual shortwave broadcast interval signals treated as hit songs remains unique. (Blue Ridge Summit)

WMFQ- They always ask where their QSL's are, but if they would write in, they would find out. (Providence)

Z-100- They remain the best produced replica of commercial FM rock on the pirate bands. (Uses biz100fm@yahoo.com e-mail)

❖ QSLing Pirates

Reception reports to pirate stations require three first class stamps for USA maildrops or $2 US to foreign locations. They don't make money; the funds cover postage for mail forwarding and a souvenir QSL to your mailbox. Letters go 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 146, Stoneham, MA, 02190; PO Box 69, Elkhorn, NE 68022; and PO Box 293, Merlin, Ontario N0P 1W0, Canada. 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 **niel@ican.net** e-mail. Sample copies of *The ACE* bulletin 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 all of our contributors: Jerry Berg, Lexington, MA; Jerry Coatsworth, Merlin, Ontario; Jerry Ervine, Hidalgo, TX; Harold Frodge, Midland, MI; Martin Gallas, Jacksonville, IL; Peter Greene, Eastlake, OH; William Hassig, Mount Prospect, IL; Vince Havrilko, Beale AFB, CA; Ed Kusalik, Coaldale, Alberta; Harald Kuhl, Germany; Chris Lobdell, Stoneham, MA; Greg Majewski, Oakdale, CT; Alan Maxwell, Elkhorn, NE; Bill McClintock, Minneapolis, MN; Dr. Napalm, Merlin, Ontario; Charles Pratt, Cincinnati, OH; Mike Prindle, New Suffolk, NY; Lee Reynolds, Lempster, NH; Robert Ross, London, Ontario; Zeke Russell, Williams, AZ; Martin Schoech, Merseburg, Germany; Tom Sevart, Frontenac, KS; Lee Silvi, Mentor, OH; Joey Smith, Denham Springs, LA; DJ Stevie, Basel, Switzerland; Jerry Strawman, Des Moints, IA; Robert E. Thomas, Bridgeport, CT; and Niel Wolfish, Toronto, Ontario.

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Lowfer Roundup

Each winter we present an updated listing of low power stations known as Lowfers – short for Low Frequency Experimental Radio Stations. February is a great time to try for these stations since natural static (QRN) levels are almost nil in most parts of North America. These stations are usually very weak, so the absence of noise is a crucial element to listening success.

For those unfamiliar with Lowfer stations, they operate under the authority of the FCC rules, Part 15.217 which permits license-free operation of a transmitter from 160 to 190 kHz (1750 meters) under the restrictions listed below. (Similar rules exist in Canada – see RSS-210 regulations):

- Total input power to the final RF stage does not exceed one watt.
- Total length of the transmission line, antenna, and ground lead (if used) does not exceed 15 meters (49.21 feet).
- All emissions below 160 kHz and above 190 kHz are suppressed at least 20 decibels below the level of the fundamental carrier.

Although these restrictions may sound harsh, Lowfers are getting out surprisingly well in many cases, with contacts of over 300 miles becoming almost commonplace. Table 1 is a list of stations believed to be active at this writing. This information comes from the LWCA, publishers of the *Lowdown* journal. For subscription information, check out their website at **http://www.lwca.org**, or write to club headquarters at: 45 Wildflower Road, Levittown, PA 19057-3209.

Until recently, most Lowfer stations ran standard keyed-carrier CW, but today, a number of new digital modes have appeared. Among them are QRSS (super-slow CW), BPSK, and WOLF – all of which require a computer (with a soundcard) and the appropriate software to properly view. Having said this, quite a few stations still run standard CW at least part of the time. (AM and SSB voice are sometimes used, but to a much lesser extent.) For more information on Lowfer modes, including some links to free decoding software, check out the LWCA's website mentioned above.

Table 1. Lowfer Listings—Winter '02

FREQ.	ID	CITY
160.000	HTTP	ALDEN, NY
164.900	KLFB	SUNNYVALE, CA
165.000	VMY	MIDWEST CITY, OK
170.000	GSD	GARY, SD
170.000	LAB	DAYTONA BEACH, FL
172.418	NF	NEW FREEDOM, PA
174.600	8TXT	SANDUSKY, OH
175.000	D	DES MOINES, IA
177.777	NC	STANFIELD, NC
178.600	ZWI	BALDWINSVILLE, NY
180.000	K3DI	ARNOLD, MD
180.000	AZK	KINGMAN, AZ
181.167	IZJ	SAN GABRIEL, CA
182.200	BRO	DULUTH, MN
182.500	UD	WAKEFIELD, QC
182.500	T	BATAVIA, IL
182.516	NR	RIVERSIDE, CA
182.700	TFQ	CENTERTOWN, KY
182.900	A3O	MONROEVILLE, PA
183.140	IHX	OLEAN, NY
183.160	PRK	SARATOGA, CA
183.333	3ZIM	N. TORONTO, ON
183.500	ELU	SIMI VALLEY, CA
183.500	PLI	BURBANK, CA
183.544	MEL	SAN JOSE, CA
184.300	A3P	CATAWISSA, PA
184.318	RI	RIFTON, NY
184.324	LEA	SALEM, OR
184.500	JDH	BONAIRE, GA
184.700	LEK	AITKIN, MN
184.722	JJX	GARDEN CITY, NY
184.877	R	DURANT, OK
184.899	XMGR	HELENA, AL
185.000	WMT	WESTFIELD, MA
185.185	FAW	RIVERTON, UT
185.300	WA	ANDOVER, MA
185.500	RED	WAUSA, FL
185.555	RLD	STANFIELD, NC
185.900	3SCO	SCARBOROUGH, ON
185.970	YK	EVANSVILLE, IN
186.000	GW	ATHENS, OH
186.375	BA	LANCASTER, IL
186.713	1A	MARSHFIELD, MA
186.800	MS	SCOTTSBURG, IN
186.920	RB	FREEPORT, IL
186.986	BOB	MAHOMET, IL
187.088	M	BRAWLEY, CA
187.302	BZS	AVONDALE, AZ
187.352	DCH	BERLIN, MD
187.460	BK	SHELL LAKE, WI
187.500	YD	WHITE CITY, FL
187.500	K	OAK RIDGE, TN
187.500	COV	S. COFFEYVILLE, OK
187.600	RAD	RADFORD, VA
187.800	VA	SMITH MTN. LAKE, VA
188.000	PHR	SAN ANTONIO, TX
188.150	YHO	MASON, OH
188.295	LP	PASADENA, MD
188.570	QYV	DONORA, PA
189.200	GIR	NEW EAGLE, PA
189.300	ARK	LESLIE, AR
189.370	TH	COLTS NECK, NJ
189.520	LIP	AGRICOLA, MS
189.700	TEXAS	HASLET, TX
189.800	RM	DULUTH, MN

DXpedition Loggings

In December, Jacques d'Avignon, (ON) attended a weekend DXpedition with several others at Coe Hill, Ontario. Although the participants listened to many parts of the spectrum, Jacques focused his efforts squarely on longwave, and he offered the loggings shown in Table 2. During this event, Jacques heard several new-to-him beacons in the US (especially in Florida and Alabama) and his first Cuban and Mexican beacons. Congratulations, Jacques! For these loggings, Jacques used an AOR 7030+ receiver and a Wellbrook Large Aperture Loop 20 meters in circumference pointing true South.

Table 2. DXpedition Logs, Coe Hill, ON

FREQ	CALL	ST/PR	LOCATION
203	KL	QC	SCHEFFERVILLE
204	YFY	NU	IQALUIT/FROBAY
208	YSK	NU	SANIKILUAQ
211	K7	QC	STE ANNE DES MONTS
221	YAS	QC	KANGIRSUK
223	YYW	ON	ARMSTRONG
236	RZT	OH	CHILICOTHE
239	5Q	QC	FONTANGES
242	SY	NY	SYRACUSE
245	ALP	NY	ELMIRA
248	FRT	NC	SPARTANBURG
254	LLW	NC	ELIZABETH CITY
255	PNU	PA	WASHINGTON
257	SQT	FL	MELBOURNE
263	BFA	MI	BOYNE FALLS
265	SXD	VT	SPRINGFIELD
265	YKO	QC	AKULIVIK
269	CAD	MI	CADILLAC
272	PFH	NY	HUDSON
274	YPM	ON	PIKANGIKUM
279	OZ	NY	ONEONTA
280	QX	NF	GANDER
281	HP	NY	WHITE PLAINS
284	RT	NU	RANKIN INLET
291	9Q	QC	AMOS
329	AAA	IL	LINCOLN
329	AMN	MI	ALMA
330	CZM	MEX	COZUMEL
338	YPX	QC	PUVIRNITUQ
348	BUP	ME	PITTSFIELD
359	2I	NB	FLORENCEVILLE
362	LYL	OH	LIMA
363	RNB	NF	MILLVILLE
364	TZ	VA	WINCHESTER
365	TV	MI	TRAVERSE CITY
365	JN	IN	MUNCIE
373	JF	NY	NEW YORK
375	BO	MA	BOSTON
375	LQ	IL	SPRINGFIELD
379	BRA	NC	ASHEVILLE
380	UCY	CUB	CAYOCABO
382	VCY	ND	VALLEY CITY
382	BHU	PA	LA TROBE
382	BT	VT	BURLINGTON
385	HYX	MI	SAGINAW
385	LY	VA	LYNCHBURG
388	UN	PA	STATE COLLEGE
388	NXX	PA	WILLOW GROVE
391	DDP	PR	SAN JUAN
392	VEP	FL	VERO BEACH
395	XEN	OH	XENIA
399	HFY	IN	INDIANPOLIS
400	AB	PA	ALLENTOWN
400	RO	NY	ROCHESTER
404	BPO	TN	ONEIDA
408	HBD	OH	HUBBARD
416	BKL	OH	CLEVELAND
420	TU	MI	TUPELO
420	CFY	SC	LAKE CITY
423	AU	AL	AUBURN
424	RVJ	GA	REIDSVILLE
426	FTP	AL	FORT PAYNE
521	GM	SC	GREENVILLE
521	TVX	IN	GREENCASTLE
524	HEH	OH	NEWARK
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DRAKE RECEIVERS		
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External Speaker	SPK 2	$48.95
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MISCELLANEOUS		
Scancat Gold for Windows	SFT 2W	$99.95
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Surface Mount Solutions

The times, as Bob Dylan said, are a'changing. Amateur radio kit builders, experimenters and "home brewers" have had to put up with increasingly miniaturized electronic components. When I started out in this hobby I was building projects with 1- and 2-watt resistors connected to solder lug busses and secured using a soldering iron practically big enough to rest on my shoulder. With transistors came 1/2-watt resistors on printed circuit boards soldered with a 25 watt "pencil" iron. I had to put my glasses on to get my work done.

Next came integrated circuits, 1/4 watt resistors, smaller, grounded tip irons and a need to adjust my bifocals to see straight. Now we have entered into the world of *Surface Mount Technology* (SMT). I maneuver the components on teeny circuit boards with tweezers and I need a large magnifying lens to even find the job. The sum of this circuitous route through electronics experimentation has led me to develop the theory that the quality of my eyesight and component miniaturization are clearly inversely proportional.

So just what is SMT? If you were to look at a common electronic component hanging in a bubble pack at your local electronics parts store, you will see that the various devices – be they resistors, capacitors, transistors or ICs – all have leads. The components are added to a circuit by putting these leads into their appropriate holes in a printed circuit or breadboard to make up the electronic device of one's desire. In the "ugly" construction method, the leads themselves become the structure of the circuit on top of a ground plane made of PC board material. In any case, you don't get many electrons to flow around in an organized way without those component leads. Or do you?

Surface mount componentry are "leadless" by design. These components sit on top of a circuit board, and instead of having leads that extend through holes to be soldered from below, these leadless SMT parts are soldered on the same side. The commercial advantages to this are obvious. Robotic devices can simultaneously place and solder such devices with high precision and speed. SMT is the way things are going, and for good reason: Time is, after all, money.

Then there is the clear advantage of smaller physical size for a given electronic device. SMT devices are classed by their physical size measured in *thousandths* of an inch. How big do you think a cell phone would be if it used traditional "thorough the hole" components? Finally, the components themselves can be manufactured more efficiently and are therefore exponentially cheaper than traditional devices performing the same task.

❖ Draggin' and kickin'

But where does all this leave the hobbyist? Anyone who is involved in home brewing and experimentation can tell you that the supply of some traditional "through the hole" parts has pretty much dried up. You may have heard me talk in the past about the venerable NE/SA602 and SA612 Double Balanced Mixer ICs. These little jewels are the mainstay of homebrew receiver design. They are no longer produced in leaded packages – only as surface mount devices. (I think I bought the last 50 units in the whole state of New Jersey last summer).

Since commercial manufacturing has moved on to surface mount technology, there is less and less call for through-the-hole parts. Can you honestly expect Phillips to keep their assembly line running by making leaded NE602s for guys like me who buy them in lots of 10 and 20?

The situation for the ham who likes to build his or her own gear is not without precedent. Many of us can remember the adjustment as we moved away from tubes to transistors or transistors to ICs. The first time I tried to solder a DIP IC using my then-standard 25 watt soldering pencil led to more solder bridges than successes. With a smaller iron and a bit of technique development, I now scarcely think about the task. Getting along with SMT is not really that different. You just have to be a bit resourceful – a basic ham quality.

Speaking of resourcefulness, there have already been a couple of forays into SMT kits. Both of these deigns were developed specifically to get hams to begin to experiment in this new SMT medium. They also turned out to be dandy little transceivers as well. Neither kit is in current production, but I'll reference them as a point of departure to indicate what we can see coming around the bend.

❖ The KnightSMiTe 80 Meter Transceiver

Pssst...Hey Buddy...How would you like a great deal on a brand new amateur radio transceiver? How about $10?

The QRP Club known as The Knightlites developed a surface mount version of the classic "Pixie II" transceiver design. The circuit board for the entire rig is only 1 in. x 1-3/4 inches! The design included a direct conversion receiver and variable crystal oscillator transmitter using a 3.6864 MHz crystal. Output is in the neighborhood of 250 mW so we're talking serious QRP here. The $10 cost indicates the amazingly low cost of common SMT components.

A lot of folks bought the kit just to have their first run at SMT construction. The kit came with all of the components taped to an oversized drawing of the diminutive PC board. I remember showing this to a friend who promptly told me "DON'T SNEEZE!" These parts were truly tiny. The kit included a number of extra "chip" capacitors to allow for a bit of placement and soldering practice before getting down to business.

The circuit was a lot of fun to assemble: quite challenging, but it still took less than an evening. This even included the time to set the board up in an "Altoids" mint tin with the

Uncle Skip's KnightSMiTe Transceiver

needed key and antenna jacks. Not very much work at all!

I got done just about the time of evening when 80 begins to open up around these parts and actually worked a couple of stations right off the bat. All with a rig that I could fit in my shirt pocket, including the 9 volt battery to power the thing. I was amazed at the performance of such a simple circuit.

The Pixie and Pixie II designs have floated around the QRP community for quite some time. Using this design as a "proof of concept" for experimenting with surface mount construction was a great idea. The KnightSMiTe kit was a sellout for the Knightlites group. I hope we see more kits from them which take advantage of SMT. The group's Web site is:
http://www.knightlites.org/

❖ The Norcal SMK-1 40 Meter Transceiver

Well, once the Knightlite group got things going it was only a matter of time until The Norcal QRP Club came up with a surface mount project of their own. The Norcal club has been one of the leading providers of excellent kit rigs over the last few years. Several have gone on to commercial production. Their SMK-1 rig recently sold out of its production run and it is my hope that it also goes on to future commercial release.

The SMK-1 circuit, like the KnightSMiTe, drew on proven circuits for its transposition to SMT. In this case the basis was the famous Doug Demaw Tuna Tin II transmitter married to the very practical MRX receiver design. One unique feature this design allowed was separate VXO tuning for both the transmitter and receiver. This allowed both RIT and XIT operation: essential features when dealing with limited frequency coverage. The receiver section makes use of the leadless SMT version of the NE602 chip I mentioned earlier in this article.

The basic SMT rig put out about 360 mW, but simple modifications have cropped up to take the rig to either 1 or 5 watts. If you hang with the QRP crowd you know that that is more power than you need.

Again, the purpose of this kit was to expose the home building community to the wonders of SMT and to prove once and for all that it could be managed in the home shop with basic tools and techniques. The Norcal Group came up with an innovative "shrink wrap" packaging that put each needed part in its own little square of plastic. By doing this, you only had to manage one part at a time – a critical factor when parts look almost identical.

My SMT-1 has become sort of a "test mule" on my workbench. I keep tweaking it and changing it, just to see what can be done with the technology. The ongoing soldering and desoldering have taught me a great deal about managing these itsy bitsy parts.

The SMK-1 made for a great first SMT kit for many folks because it used 1206 size parts. In the SMT world these are referred to as the "big ones." 1206 means that the component's cases are .12 x .06 inches in size. (You should see what it's like to use the *really* small parts!) You may want to keep an eye on Norcal's Web site **http://www.fix.net/~jparker/norcal/norcal.html**, because the SMK-1 is rumored to be the first of many SMT kits coming down the road.

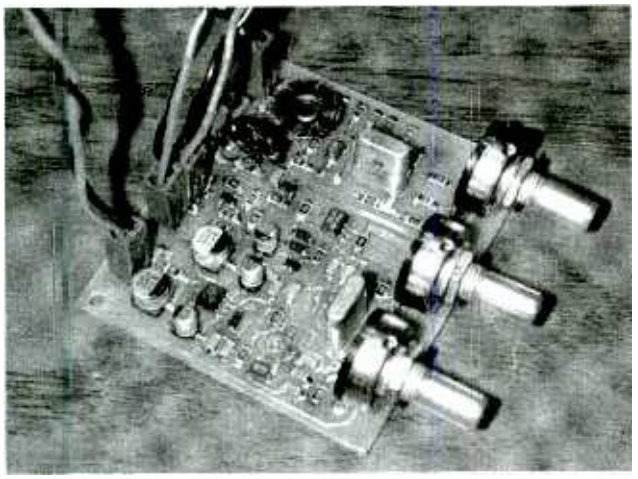
❖ Sizing it Down

So how do you go about working with devices made to be assembled by machines and not humans? The process is actually quite simple. While these parts are designed to live in a manufacturing environment using robots, repair and maintenance is largely still done the old-fashioned way – by people.

Fine tipped soldering irons, thin gauge solder, pinpoint desoldering tools are all off the shelf items. Instead of using them exclusively for repair purposes, the ham has adapted these tools to extend the home brewing challenge into this latest electronics development. The only new tool most people need to bring into the equation is some level of magnification to help them see the small parts and work area. I use a magnifying light unit that I picked up at a yard sale.

Most standard soldering stations are up to the job of working with SMT, provided you can get nice fine tips to deal with the small surface areas of the components and pads. With SMT you will also want to use 2 percent silver *Low Melting Point* solder. SMT parts are a bit more sensitive to heat than traditional through-the-hole components. You will also want to get a jar of liquid solder flux designed for use with electronic work. This is useful because the fine solder used to work with SMT cannot carry enough flux in its core to normally get the job done. Extra flux keeps things clean and it serves to improve heat transfer as well.

SMT is the future of electronics and it will be a growing force in the amateur radio hobby as well. Even for those of us that like to build our own equipment.



The Norcal SMK-1 board

UNCLE SKIP'S CONTEST CORNER

February 2
Vermont QSO Party: 0000 - 2400 UTC Feb 3
New Hampshire QSO Party: 0000 - 2400 UTC Feb 3
Delaware QSO Party: 1700 - 0500 UTC Feb 3
1300 UTC Feb 3- 0100 UTC Feb 4

February 9
Utah QSO Party: 0000 - 2400 UTC Feb 10
FISTS Winter Sprint: 1700 UTC - 2100 UTC

February 10
QRP ARCI Winter Fireside SSB Sprint: 2000 - 2400 UTC

February 16-17
ARRL Int'l DX Contest, CW: 0000 - 2400 UTC Feb 17

February 22-24
CQ 160-Meter Contest, SSB: 2200 - 1600 UTC Feb 24

Marc Ellis
mfellis@enteract.com

The BC-453 Comes to Life

In the December issue we completed a general overview of the command set receiver series, then opened the enclosures of the two 190-550 kHz examples we plan to restore: an Army BC-453 and a Navy R-23A. (The two sets are almost identical, but have some little differences that are worth discussing.)

As with almost any vintage radio restoration project, my next move would be to completely recap the sets. However, in the last issue, I played hooky from the command set project, bringing you instead a review of reference books useful to the antique radio hobbyist. This month I'm back on track, and have put in enough bench time so that I can report some progress.

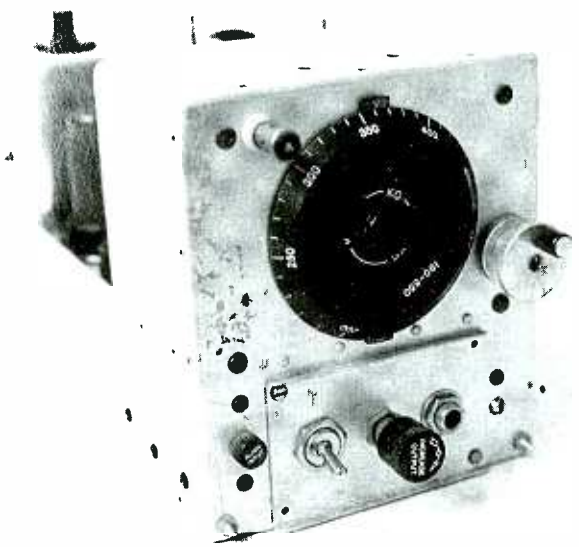
❖ Recapping: Tough but Necessary

I had expected to recap both of the radios in one work session, but after the first half-hour on the project I realized I would have to settle for finishing just the BC-453. Working on this diminutive, tightly packed, military miracle was a lot more demanding and detailed than probing the innards of a roomy old Philco or Zenith! At first I was quite frustrated because I was not only impatient with all the extra work, I could also see that it was going to make me late with my column. But after changing my attitude to a more accepting one (and receiving a gracious dispensation from our editor) I actually began to enjoy the job.

The closest thing I can compare this job to is rehabbing an auto carburetor back in the days when cars still had them. You waited for a nice warm pleasant morning and got out your kit of replacement gaskets, jets, springs and other small parts, your can of cleaning solvent and your tiny tools. Then you sat in the sun and, bit by bit as the morning wore on, dismantled that little devil and put the parts to soak in solvent.

There was some tension because you knew that if you lost or damaged a part the job would be botched, and you might not even realize it until you finished reassembly and bolted the unit back on the car. But there was also a kind of peace that came from the fact that you would have to shut the rest of the world out so that you could focus all of your attention on this tricky, but not really difficult, task.

Once I got in the carburetor rebuilding mood, turned on the radio, and relaxed, I was good to go! If you can refer back to the December issue and look at the underchassis shot at the bottom of P. 77, you'll get an idea of the problem. The set's capacitors are located in little cylindrical canisters, sometimes as many as three to a canister. These are the four "rightmost" canisters in the top row and the three at the right of the bottom row. There's also one at behind the front panel (at the bottom of the picture).

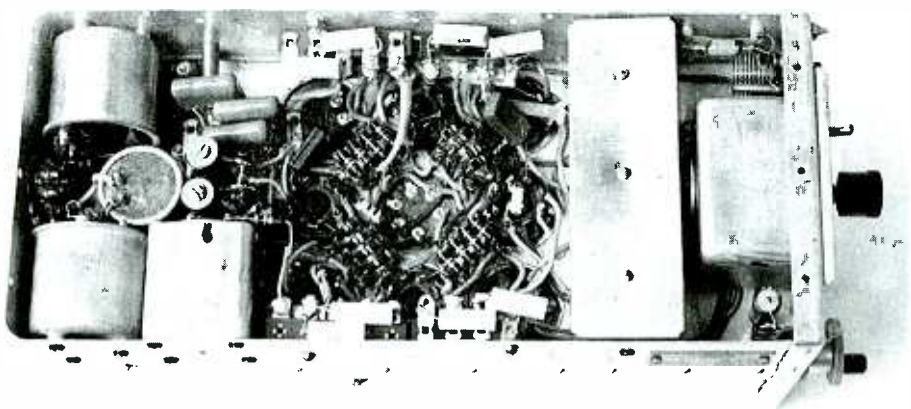


Local control panel (below tuning dial) installed temporarily for testing. Tuning crank is rare original government issue.

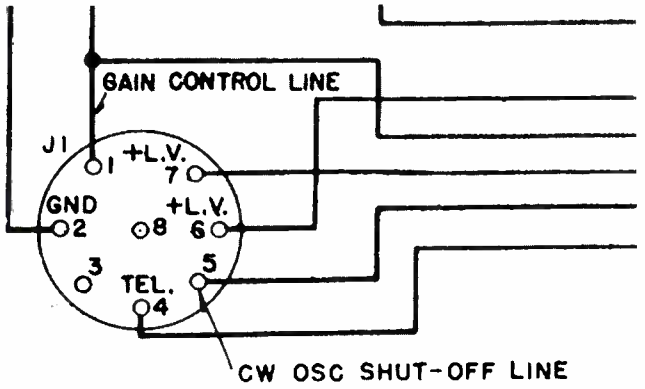
These canisters look to be as permanent as Gibraltar but they are, in fact, the command set's Achilles heel. The capacitors in them held fine sixty years ago when they were new and the B-plus voltages applied to them came from the original aircraft dynamotors – and thus rose only slowly as the armatures were turned on and picked up speed. Later, when radio hams first got their hands on the sets and powered them up, the caps still hadn't aged much. Moreover, the hams were using d.c. power supplies with vacuum tube rectifiers, which didn't deliver full voltage until their filaments warmed up.

As the years passed and semiconductors replaced tube rectifiers, command set capacitors began to pop. They were not only older now, but the rectifiers delivered full B plus instantly, before the filaments of the tubes in the set had a chance to heat up. While the tubes were cold, they didn't present the proper load to the power supply. During this start-up period the B-plus voltage was abnormally high, which caused capacitors to fail.

When capacitors fail, they often take



Comparing this shot with the similar view in the December issue, you can see that the capacitor canisters have now been replaced by individual capacitors mounted on terminal strips.



Front view of plug recessed behind control panel. Gain control, headphone output jack and cw oscillator control are wired between ground and terminals 1, 4 and 5 respectively. Terminals 6 and 7, provided to control input power to dynamotor, are wired together in this application.

other, more difficult to replace components along with them. Because of this set's densely packed construction (the wiring was apparently done in layers, with successive layers of wiring sometimes covering parts of previous ones), troubleshooting can be quite daunting. So it's well worth starting your command set off with a full complement of new capacitors before applying power.

❖ Supplies and Techniques

To do this work, I supplied myself with a handful of new poly caps of at least 450-volt ratings (mostly .05s and a few .22s), a couple of 4.7 mFd electrolytics (same voltage), and one low voltage job (25 mFd @ 25 volts works ok) to replace the 15-mFd audio output tube cathode bypass. The original capacities (but not the working voltages) are marked on the canisters.

I also used four- or five-terminal strips (each with three or four terminals in addition to the ground terminal).

I removed and disconnected the canister units one at a time, replacing each with a set of appropriate capacitors mounted on a terminal strip before going onto the next unit. The strips were mounted, by the angle hardware on their ground lugs, in holes that had been used to mount the original canisters. There were plenty of holes to choose from because each canister had been held with two screws.

Each terminal strip was mounted with a 6-32 screw and nut. Even though the screw holes were sized for 4-40 hardware, the 6-32 replacements threaded easily through the soft aluminum of the chassis. A star washer was installed between the mounting angle and the chassis to ensure a good ground connection. The terminal lug thus grounded was used to ground one lead of each of the replacement capacitors. In the original canisters, one lead of each capacitor was internally connected to the can and was therefore grounded automatically via the mounting screws.

A special challenge was presented by the fact that the wires connecting to the capacitor cans were usually only as long as they had to be, with very little slack. Furthermore, they had to be clipped from their original terminals rather than removed intact. The fine wires were tightly wrapped around the terminals, and the much higher melting point of the vintage solder made it difficult to free them up. The removed wires were now not only shorter, but were also difficult to strip.

I used a pliers-type stripper that captures the wire in an appropriately-sized hole. But the wires were often so short that I couldn't hold them by hand, resorting to a pair of needle-nose pliers to apply back pressure to the wires as I pulled on the stripper. The woven insulation didn't strip cleanly, but tended to shred – sometimes getting in the way during resoldering. Occasionally, two or more wires were connected to a single terminal, creating an identification problem as I moved the wires around for stripping and resoldering.

I probably could have made things a bit easier for myself had I mounted the terminal strips on spacers to place their terminals as far out into the chassis as the terminals of the original canisters had been. However, I got along by replacing an occasional too-short wire with a longer one, if its origination point was accessible, and splicing to it if it were not. I did use a 1" spacer on the terminal strip replacing the three .22 mFd capacitors (in the large can fourth from the right, top row, in the photograph in the December issue). Those leads were fiendishly short and I needed every advantage I could get!

❖ The Smoke Test

I've just done a lot of whining about the difficulties of recapping, but after I settled down I really did enjoy the process and I'm pleased with the reasonably neat appearance I managed to achieve through careful attention to detail. With that process completed, I turned my attention to the control panel. As you may remember from the December issue, the original owner of this BC-453 had not bothered to provide a complete local control panel. He had supplied a gain control but little else. There was no phone jack or BFO switch. I supplied and mounted the jack and the switch and properly wired the whole works into the local control plug recessed behind the control panel.

At this point I had intended to stop work, saving power supply construction and testing for next time. And I do intend to recommend, at that time, a power supply that can be constructed using back-to-back low-voltage Radio Shack transformers. But I was very anxious to know, right now, if my rehabbed set was going to work or if a wiring error or a hitherto unnoticed problem was going to require some aggravating trouble shooting.

I hooked up the low-voltage (filament) circuit to a 24-volt transformer I had on hand. And I lashed up a 250-volt B-plus supply using a conventional high-voltage transformer, diode rectifiers, and a filter capacitor, choke and bleeder resistor from the junk box. With the tubes warmed up I plugged in a set of headphones and switched on the B plus.

To my delight the set came to life, and the static crashes and buzzes so typical of low-frequency reception were music to my ears. (Things got a lot quieter after I switched off the fluorescent light above my bench.) I had only a three-foot antenna stretched out in my basement workshop, and no ground. But I could hear signals all over the band. Most of these were steady carriers: no voice or code. Maybe one of LF experts can tell me what these are all about – perhaps utility company telemetering? However, I did pick up a couple of AM stations at the bottom end of the broadcast band.

I'm also pleased to report that I received two actual aircraft beacons: IUL at 355 kHz and ME at 3500 kHz. Thanks to Kevin Carey's "beacon identifier" (advertised in most issues of *MT*), I know that these are at Chicago IL (O'hare Airport) and LaPorte Indiana. Not exactly DX from my Evanston, IL, location – but when you consider the circumstances it's really not too bad!

Not to worry. We'll give the set a better test before we're through.

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Antenna Primer Part I: Definition, History, and Build Your Own

This month's column and the next two *Antenna Topics* columns will be three parts of a primer on antennas and their applications. If you already have some ideas about what antennas are and how they work, this primer may help you organize and clarify those ideas. If you haven't yet been introduced to antennas, then this primer will start you on your way to working with, and even building, your own antennas.

❖ What is an Antenna?

An antenna is a device which either transmits radio (electromagnetic) waves into the space around it, or receives radio waves from that space. It is possible to make a simple, working antenna from a simple piece of wire. On the other hand, some antenna designs are very complex devices with multiple, precisely dimensioned conductors which are spaced at precise distances from one another. There is a large number of different antenna designs available, and the selection and utilization of an appropriate design is an interesting and exciting part of radio communications.

❖ A Bit of History

It is interesting that when radio waves were first demonstrated convincingly to the scientific world, some of the basic antenna designs we utilize today were already developed. Henrik Hertz was the first scientist to convincingly show that radio waves did in fact exist. And his early work reported such basic antenna designs as the halfwave dipole, and the parabolic reflector antenna, (figs. 1A, 1B). He also demonstrated the principle of the dielectric-lens antenna.

Using the discoveries of Hertz and others, Guglielmo Marconi developed a working radio communication system. At one point in his work, Marconi took a Hertzian dipole antenna and removed half of it. This left a quarter wavelength piece which Marconi mounted upright on the ground. He left one feedline connected to the bottom of the upright half of the dipole, and grounded the feedline connection which had formerly been connected to the half which he had removed. The antenna worked quite well, and in his honor it is called the "Marconi, grounded, quarterwave, vertical antenna." Today it is utilized in many AM broadcast station installations and many shortwave stations.

Marconi and his engineers developed other antennas also, most notably the L-antenna and the Imperial Beam. Whereas the Marconi grounded quarterwave antenna transmitted and received equally well in all compass directions, the L and Imperial antennas were directional antennas, or "beams." This means that they could focus their transmitted energy or reception responsiveness in particular directions.

In addition, Marconi's engineer Franklin developed a phase-based design for antenna elements which causes an antenna to focus its waves somewhat perpendicular to the antenna. Various versions of the Franklin design remain quite useful today for both to-the-horizon coverage with very high frequencies (VHF) and higher frequencies, and in beam antennas for high frequency (HF) operation.

To support the growing utilization of trans-oceanic radio communication, a number of very large directional beam antennas were developed from circuits used in the early days of radio. One class of these beams was derived from an antenna known as a "long wire" antenna. These include the V-beam, and the rhombic beam, and were known as "wire beams." "Curtain beams" were gigantic beam antennas with a large number of elements forming something like a hanging curtain. They often utilized a second antenna behind the main antenna (driven element) to reflect RF energy such that the beam's radiation-pattern was primarily unidirectional.

George Brown discovered that beams could be improved by spacing their elements closer than the quarter wavelength that had formerly been utilized between driven element and reflector. Another important development was the Yagi-Uda beam antenna, in which both a reflector and director element were used in addition to the main (driven) element to give greater directivity and higher gain than was previously available. The relatively small size of the Yagi-Uda beam meant that at frequencies above 10 MHz one could have an antenna which was both highly directive and able to be rotated by remote control. Remote control greatly facilitated pointing the antenna for maximum performance in any compass direction.

As radio technology developed, operation became practical on higher and higher frequencies. In the VHF, and particularly the UHF and microwave bands, the small size of the wavelengths involved led to the development of many antenna designs which would have been too large to be practical at lower frequencies with their longer wavelengths. Antennas such as the helical, corner reflector, dish

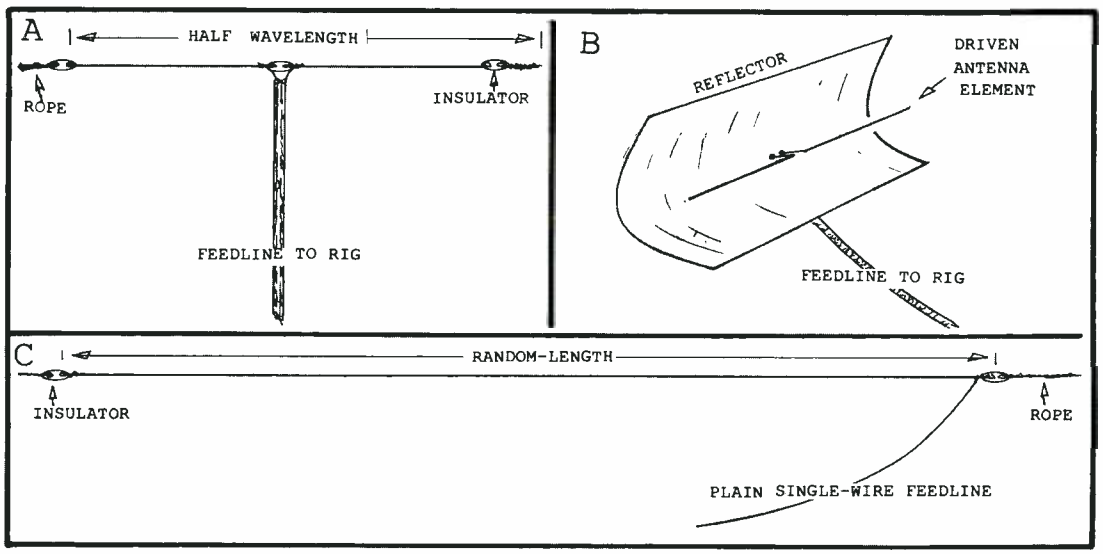

Fig. 1.A Hertzian Dipole Antenna (A), A Hertzian Parabolic Reflector (B), and a Random-Length Antenna (C).

This Month's Interesting Antenna-Related Web site:

Here is an interesting site with lots of tips for beginners:
http://my.integritynet.com.au/purdic/antennas-rules.htm

reflector, waveguide, horn, slot and patch antennas are examples of designs more practical at the shorter wavelengths. Many of these designs have been utilized in radar, cross-country repeaters, and for space, satellite and aircraft communications. Various reflector-type antennas have been important in the development of radio astronomy.

Many other types of antenna designs have been of considerable importance in the development in various areas of radio communications. Wide band, multi-band and the so-called "frequency-independent" antennas have facilitated ease of switching between multiple frequencies. As early as the pioneering days of wireless some radio direction-finding antenna designs were put to use for general radio-location, location of enemy transmitters in wartime, and for search and rescue operations at sea.

Some of the areas where today's engineers are looking for new antenna designs, as well as adapting existing designs, include space and satellite communication, and putting antennas inside cell phones, pagers, and digital-computer accessories such as wireless mice, and wireless modems.

❖ And So:

This historical sketch is necessarily abbreviated, but it is easy to see that antenna technology has a long and important list of contributions to the advancement of radio technology. Next month we'll continue with a discussion of some of the important concepts you'll need to appropriately select and utilize antennas for your own use. We'll also talk about building your own dipole antenna.

❖ Let's Make an Antenna:

For the beginner wanting an antenna to use for general monitoring on high frequency, medium frequency, or even lower in frequency, one of the easiest to make is the random-length wire antenna. Start by finding a good place to string the wire as high, long, and in-the-clear as possible. Get enough metal wire of any kind and size that is strong enough to hold together for the distance you intend to span. Put the antenna up with insulators at each end as shown in fig. 1C, and run the end into your radio room. Don't string it near power lines. Connect the end of the antenna to your receiver's antenna input terminal, and start monitoring.

Don't forget lightning-induced damage protection: the minimum is to disconnect and ground the antenna when it is not in use, and never use it when weather is likely to produce lightning.

RADIO RIDDLES

Last Month:

I said: "In this article I've hopefully kept things relatively simple by concentrating mainly on receiving antennas. But did you know that most antenna measurements, such as reception pattern, gain, resonant frequency, and feedpoint impedance, are the same when the antenna is transmitting as when the antenna is receiving? What is this commonality between reception and transmission with antennas called?"

Well, this reciprocal antenna function between receiving and transmitting is called "antenna reciprocity." And it certainly makes it handy that one antenna can provide identical transmitting and receiving functions for a communications application.

This Month:

Antennas certainly are useful devices, but what would you say if I told you that antennas in space could also be used to measure the temperature of the Amazon Rain Forest on earth? Is this a joke? Am I kidding or not?

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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MFJ-886 Frequency Counter

I built my first frequency counters from kits about 25 years ago. Back then, frequency counters were used mainly for radio servicing and not transmitter hunting. They were handy for aligning Plectron and Motorola Alert Monitor receivers as well as 2 meter transceivers and other ham gear. Some of the Japanese-made crystal scanners, like the Craig 4530, employed a trimmer capacitor for each channel which required adjustment and the frequency counter permitted accurate measurement when lightly coupled to the oscillator or multiplier output.

An RF signal generator is required for receiver alignment, but affordable RF signal generators, e.g., the military surplus AN/URM26A and later models made by Measurements Corporation and Edison Electric, provided only coarse frequency calibration. Therefore, I used a counter to measure the signal generator's frequency more accurately.

Figure 1: MFJ-886 frequency counter shown in Hold mode

My first use of a counter for transmitter snooping came about unexpectedly. I noticed my Heath counter displaying "146.820" MHz while it sat in on a shelf. A ham had installed a new 2 meter repeater inside his garden apartment located across the courtyard!

Today, my lab is equipped with high quality Hewlett-Packard and Tektronix frequency counters. Each employs a highly stable oven time base, has adjustable triggering levels, and is capable of performing several "tricks." While they are appropriate for lab use, they are not battery powered and ill suited for transmitter hunting. That's a task better suited to the new MFJ-886 frequency counter.

MFJ-886 Frequency Counter

College kids in Mississippi do not make the MFJ-886. Instead, Aceco Electronics Corporation (**http://www.aceco.com.tw**) builds it in Taiwan for MFJ. Aceco Electronics specializes in manufacturing handheld frequency counters that wear other brand names around the world, e.g., Elenco and GW.

The MFJ-886 is capable of counting radio frequency signals between 1 and 3000 MHz. A top mounted BNC jack conducts RF signals to the counting circuitry. An internal prescaler circuit serves as a frequency range "extender" and a 2-position slide switch sets the frequency range. The lower frequency range is applied directly to the low frequency counting circuitry and the higher frequency range applies the RF signal to the prescaler, which divides the frequency by a fixed amount for measurement by the low frequency circuitry.

A Gate key lets you choose among four gate times. The longer the gate time, the longer you must wait before the 10 digit LCD display is updated with the current frequency. A red LED located near the upper right corner of the display blinks each time the gate closes. Longer gate times permit the frequency to be displayed with higher resolution, i.e., more digits (see specifications table). You don't need much precision, perhaps 1 kHz, for transmitter hunting. The higher precision capability is suitable for other applications, such as radio alignment.

A Hold key freezes the frequency display reading when pressed. The hold operation is strictly a manual operation, so you must keep your gaze on the display and watch for signals because the counter doesn't have a signal-activated latch.

What You Get

I prefer MFJ's conventional power switch over the "soft" power key arrangement used in the Optoelectronics DS-1000 (see September 2001 *MT*). The MFJ counter is powered by an internal NiCd battery pack (fig. 2). The included 9 VDC 300 mA wall wart power supply plugs into a jack atop the counter and can recharge the batteries in 12 to 16 hours.

The LCD display shows the frequency using digits 5/16-inch tall. It is easy to read in daylight but is not illuminated for night viewing. A bar graph portrays relative signal strength.

I was impressed with the 24-inch black telescoping antenna included with the counter. A rubber ring around the BNC plug makes it easy to grip. The collapsed antenna fits handily in my shirt pocket, and incorporates a pocket clip similar to a ballpoint pen.

The MFJ-886 doesn't look or feel like an inexpensive accessory. The cabinet is a 2-piece anodized aluminum affair thick enough to resist flexing when pressed. A rubber pad along the bottom prevents the counter from scratching a table when sitting upright.

Internal construction is neat and modern (fig. 3). The circuit board markings indicate that the same board is stuffed with additional components when used in other Aceco models.

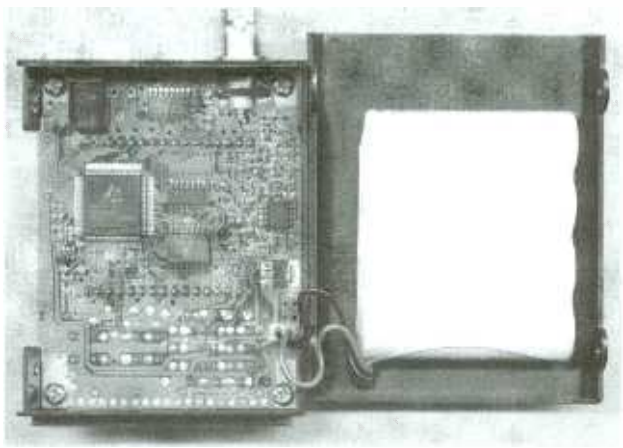


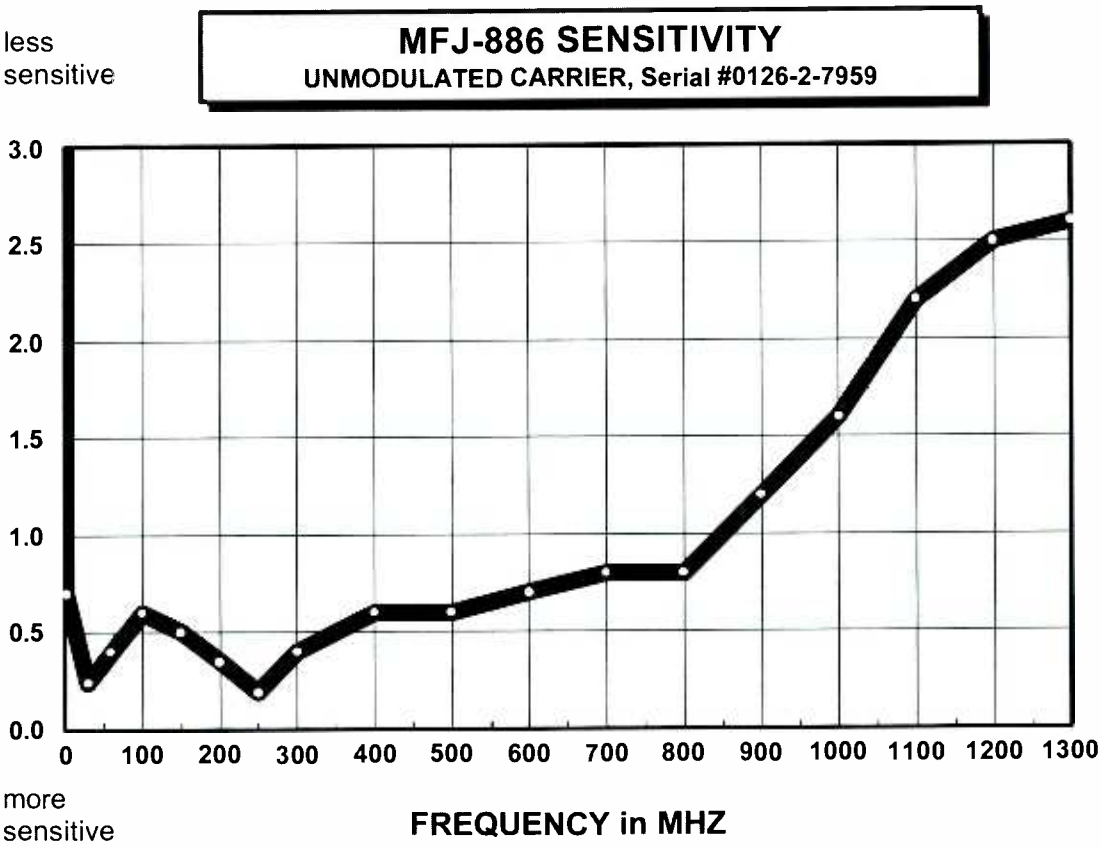
Figure 2: Internal view of circuit board back and NiCd battery pack.

The instruction sheet contains basic guidelines, cautions, and limited specifications but provides no schematic.

Performance

The MFJ-866 (s/n 0126-2-7959) performed very well in both quantitative lab tests and during field testing. It was more sensitive than the feature rich Optoelectronics DS1000.

I measured the MFJ-886's sensitivity from 500 kHz to 1300 MHz using a signal generator and found the counter to be as "hot as a pistol." The sensitivity was less than 1 millivolt between 2 and 800 MHz. At frequencies above 100 MHz, the counter was more sensitive with the Range switch in the 3 GHz position instead of the 300 MHz position, and I made use of that information when plotting the sensitivity chart.



The MFJ-886 displayed the frequency of a 146 MHz walkie-talkie up to 261 feet away when testing in a flat, open field. It captured a 446 MHz walkie-talkie up to 145 feet under the same conditions.

My wife and I took the MFJ-866 mobile. For safety reasons, she drove while I tested. The MFJ-866 snagged several signals while connected to a 19 inch magnetic mount whip antenna atop the truck, including a 477 MHz land mobile user, a 442 MHz ham repeater, and a 95.9 MHz commercial FM broadcaster. I used separate receivers to verify signals.

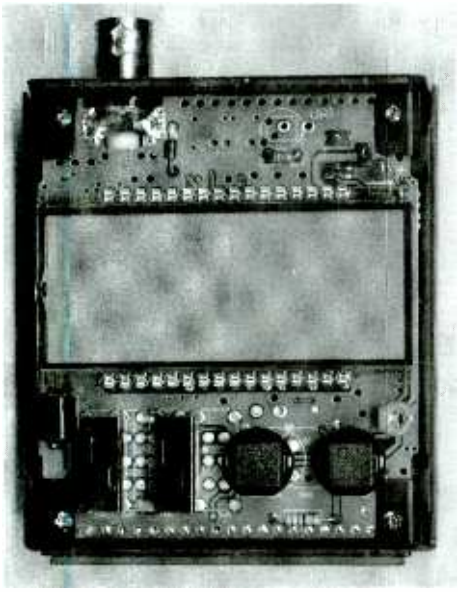


Figure 3: MFJ-886 with front panel removed.

I had to place the counter's antenna one inch from a low power 49 MHz baby monitor transmitter to obtain an accurate frequency reading.

A front panel hole provides access to the timebase alignment adjustment, though you shouldn't need to realign the MFJ-886 for a long time. The factory alignment was excellent. It agreed with my lab signal generator to within 500 Hz at 1000 MHz.

The MFJ-866 displays random readings until it detects a signal. More expensive counters include display blanking circuitry.

Conclusions

The MFJ-886 performed flawlessly during testing. It is well built and extremely sensitive. This is one accessory I can recommend without hesitation.

The MFJ-886 is available for $119.95 from Grove Enterprises (800-438-8155; 7540 Hwy 64 West, Brasstown, NC 28902; http://www.grove-ent.com) or from MFJ Enterprises (see sidebar for contact info).

MFJ-886 Frequency Counter Published Specifications

MFJ Enterprises, Inc.
300 Industrial Park Rd.
Starkville, MS 39759
http://www.mfjenterprises.com

Range: 1 - 3000 MHz
Input impedance: 50 ohms
VSWR: less than 2:1
Maximum input: 15 dBm

Display Resolution:

Range (MHz)	GateTime (sec.)	Resolution (Hz)
300	0.0625	10
300	0.25	1
300	1	1
300	4	0.1
3000	0.0625	1000
3000	0.25	100
3000	1	10
3000	4	10

Size: 3.15"H x 2.6"W x 1.22"D
Weight: 210g
Battery: Internal 4 AA 600 mAH NiCd pack
Timebase stability: < 1 PPM typical at room temperature

John Catalano, PhD
j_catalano@conknet.com

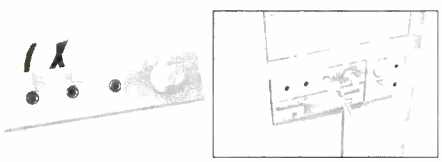
Gizmos and Gadgets

Sometimes very simple products can make our lives so much easier. This month we will look at a number of computer accessories which do just that. Some are simple in concept and others are simple in their use. In either case, I think you will find at least one that you will want to own.

Let's Start Simple

I'm always plugging and unplugging new devices into my sound card. This includes digital mode decoders, audio from computer-controlled receivers, and inputs to Digital Signal Processor (DSP) filters, just to name a few. This usually requires me to get into contorted positions over my computer while trying to reach the plugs on the back of the computer. My back hurts just thinking of it! But now there are two products that make this torture a thing of the past.

The first product's name says it all: **Soundcard Extender**. As you can see from Figure 1, this device fits into the front panel of a computer in a 3.5 inch floppy disk panel bay. Then installation is as easy as plugging its three wires into your sound card. Now speaker, microphone and line connections, as well as the volume control, are easily accessible on the front panel. Simple, convenient and easy on my back. At $13.95 it is a must-have for all *computer & radio* users.



A Bit More, for a Bit More

The **Up Front Panel Adapter**, model ACE112D, does everything that the Soundcard Extender does, plus it includes USB, joystick and IEEE 1394 ports. It's slightly larger, fitting into a CD ROM or 5.25 inch floppy drive front panel spot. Up Front Panel's cable harness is well made and uses parallel port type connectors for easy installation. This product will set you back a bit more at $19.95, but it's not a budget buster.

You can't go wrong with either of these products, especially if you do a lot of I/O work.

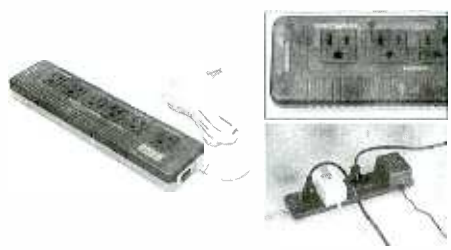
Get a Grip

For those of you that need to move computer gear from place to place, it can be tough. Getting your arms around a large monitor can make alligator wrestling seem pleasurable. And carrying computer towers around contributed to my shoulder ailments. A company called Case Ace makes a line of products called **GearGrip** which make the computer moving process a whole lot less painful.

Again the concept is simple, see Figure 2. Nylon/plastic netting has been fashioned with Velcro fasteners to provide a computer carrier. The computer can then be carried like a suitcase from the GearGrip handle or shoulder strap. GearGrip Pro came in two models: one for computer towers and another for monitors up to 21 inches in size. The computer model will set you back around $35, while the monitor version costs around $26, much less than a physical therapy visit!

Get the Power

A product that we looked at a few months ago is the **@Power** strip. However, this is not a simple surge-protected power strip. One socket on the @Power strip is a sense socket. See Figure 3. When the strip senses that the device plugged into the sense socket (a computer, for example) is turned on, it supplies power to the devices connected to the other sockets. And, of course, shutting off the computer results in shutting off the connected peripherals. No more costly power-wasting monitors left on over the weekend.



This is one of the most useful accessories I have found. It uses extend well past computers. I use a @Power strip with my favorite communications receiver to control connected tape recording and decoder equipment. Another connected to my stereo amplifier allows it to turn on and off the DVD player, VCR, tape deck and satellite (DSS) receiver. The energy savings and convenience justifies the $23 cost of the @Power.

One Line – Many Uses

No one can deny the great importance that the Internet now plays in everyday life. It's like having access to all the great libraries of the world at our fingertips. And equally important is the Internet's ability to provide us instant communications. Radio frequency lists, once updated monthly, are now updated in real time. However, occasionally, the family does need to make phone calls, thereby disrupting our real-time Internet communications.

One answer is a dedicated Internet phone line. But with the annual cost approaching $500 I am always looking for alternatives.

About a year ago we looked at one alternative, **Catch-A-Call**. This small box connects between your modem and the phone line. It then allows the use of the Internet while still being able to detect incoming calls. Although requiring the user to have the "call-waiting" feature on their phone line, it required no computer software or computer connection (other than the modem line). Economically it made good sense since its cost was less than two months of phone line charges.

Hold the Phone!

Now another product, **NetCallerID** is available for under $30! See Figure 4 below. However, unlike Catch-A-Call, NetCallerID is not totally standalone. It requires software to be loaded on your computer, a connection to a serial port , Plus the call waiting and caller ID phone line features.

As you can see in the Figure, NetCallerID has a large LCD that displays caller ID information. The CD ROM supplied software is Windows 95 and 98 compatible and produces a pop-up window on your computer when you are connected to the Internet and an incoming phone call is detected. The pop-up window displays caller ID information and allows you to answer, log or ignore the call.

Setup and Operation

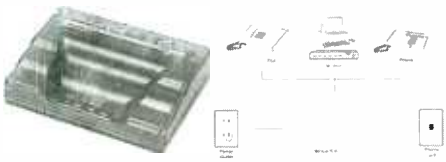
Software installation was quick with no problems on a basic Pentium 233 MHz system running Windows 98. One tip: *carefully* insure that the serial port to which you connect the NetCallerID computer is activated via your computer's BIOS setup screen. You can access the BIOS setup screen on most computers immediately upon tuning on the computer, before Windows loads. Be careful not to change any other settings except enabling of the serial port.

The NetCallerID operated exactly as advertised. Incoming calls caused the pop-up screen to appear on the computer display. However, the time it took from first ring to pop-up screen seemed to be very dependent on the types and number of programs open and running.

NetCallerID can also be used without a computer as a caller ID box. With a price under $30 it's worth checking out if you are looking for an alternative to a dedicated Internet phone line.

❖ Son of Catch-A-Call

Not standing on their past laurels, International Electronics, Inc (**http://www.internationalelect.com**) has added a new top of the line model to their product offering. As the publicity blurb says, "**Catch-A-Call Gold** allows Internet, phone and FAX sharing on one line." Well, almost.



As with the previously reviewed Catch-A-Call, "sharing" is not quite the word I would use. Instead, I would describe their very useful function as allowing "holding" of Internet, phone or FAX while one mode is being used.

How Does It Work?

Catch-A-Call Gold is still a standalone unit requiring no software to be loaded on your computer and only the line connections to your modem, phone, answering machine and/or FAX. It is powered via a supplied power supply and that's all it takes to get it up and running. See Figure 5 above.

While you are on line and Catch-A-Call Gold detects a call-waiting signal, it will sound a ring and the Call light will flash. Picking up the attached phone will automatically flash the Internet line on to hold while you take the call. When the phone is hung up Catch-A-Call automatically reflashes the Internet back on line.

Added Gold Features

What makes it Gold? If a FAX is received while on line it will automatically transfer it to the FAX machine with no "user intervention." Also, when you are not on line the unit will automatically route incoming calls to the appropriate appliance: phone, answering machine or FAX.

My clarification of the term "sharing" in no way is meant to demean the usefulness of Catch-A-Call. However, the term "sharing" now carries the connotation of simultaneous use, which is not really the case. In any case, there is no question to the usefulness and potential cost savings that the Catch-A-Call products can provide Internet users.

❖ Simple Can Be Very Useful

This time we pretty well proved this axiom with these products. I hope you found at least one gizmo that you think is worthy of purchase. All are available from a number of sources, including Cyberguys at **http://www.cyberguys.com**. Tell them you saw it in Catalano's *Monitoring Times* column. If you purchase any of these products please let me know how useful you find them. Also, tell us if you have any computer Gizmos and Gadgets that you consider indispensable in your monitoring shack.

Next time we will return to the world of radio software. Till then, stay warm.

Receiving Frequency Modulation

By Ian Poole G3YWX

Above 30 MHz, frequency modulation (FM) is the most widely used mode outside of the aircraft bands where amplitude modulation (AM) is still the standard. FM offers many advantages, particularly in mobile radio applications where its resistance to fading and interference is a great advantage, and in broadcasting where its high quality audio is desirable.

What is FM?

As the name suggests, the information (music, speech, data) to be transmitted is used to modulate (vary) the frequency of the carrier wave (signal) as shown in Figure 1. This type of modulation offers several advantages, including interference reduction.

Much interference appears in the form of amplitude variations (noise spikes). Since FM is not based on amplitude, it is quite easy to make FM receivers insensitive to such variations, which brings about a subsequent reduction in the level of interference. Similarly, fading and other strength variations of the signal have little effect on recovered quality. This can be particularly useful for mobile applications in which signal strength can vary significantly with constantly changing location.

A further advantage of FM is that the RF amplifiers in transmitters do not need to be linear. When using amplitude modulation or its derivatives, any amplifier after the modulator must be linear – otherwise distortion is introduced. For FM, more efficient class C amplifiers may be used, as the level of the signal remains constant and only the frequency varies.

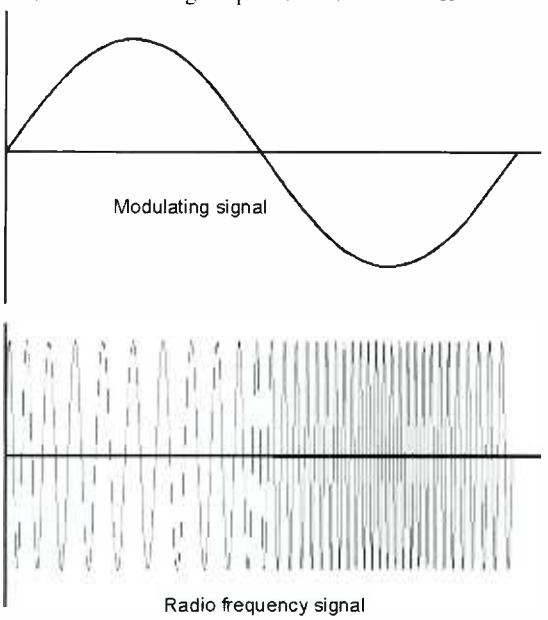


Figure 1: Frequency modulating a signal

Wide Band and Narrow Band

When a signal is frequency modulated, the carrier shifts in frequency proportionately with the modulation; this is called the deviation. The level of modulation (deviation) is governed by a number of factors, including available bandwidth. Signals with a large deviation are able to support higher quality transmissions as in music broadcasting, although they naturally occupy a greater bandwidth. As a result of these conflicting requirements, different levels of deviation are used according to the application that is used.

Those with low levels of deviation are called narrow band frequency modulation (NBFM), typically deviating +/- 3 kHz either side of the center carrier frequency. NBFM is generally used for point-to-point communications.

Much higher levels of deviation are used for broadcasting. Such wide band FM (WBFM) usually has a deviation of +/- 75 kHz, resulting in a 150 kHz bandwidth and requiring, as in FM broadcasting, a safe separation between channels of 200 kHz.

To receive wide and narrow FM a scanner may have both modes; if you attempt to receive WBFM (often labeled WFM) in the NBFM mode (often labeled FM), considerable distortion will result; and if you attempt to listen to NBFM signals in the WBFM mode, recovered audio will sound very weak, competing with background noise and other adjacent signals.

Receiving FM

All receivers are variants of the same basic design, the superheterodyne. In order to be able to receive FM, the detector stage must be sensitive to the frequency variations of the incoming signals, while insensitive to the amplitude variations. This is achieved by having a high gain, intermediate frequency (IF) amplifier that amplifies the signals to such a degree that the amplifier runs into limiting (no further amplification can occur); this way, any amplitude variations are removed.

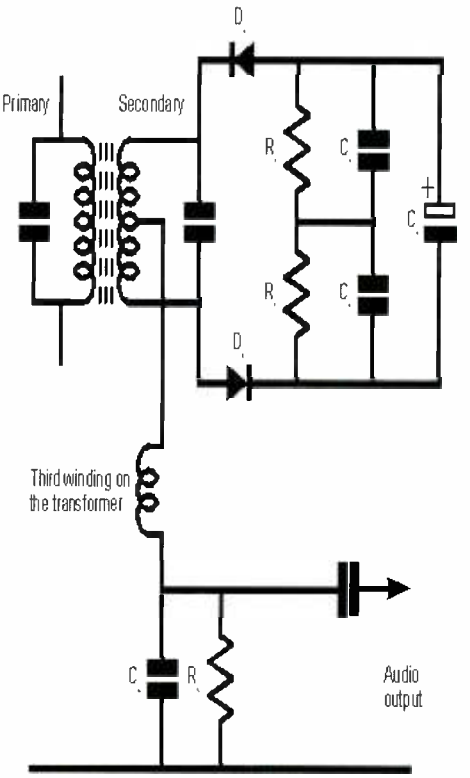


Figure 2: A ratio detector

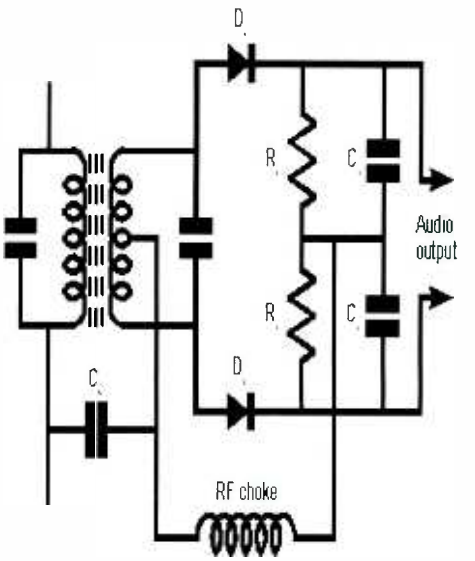


Figure 3: A Foster Seeley detector

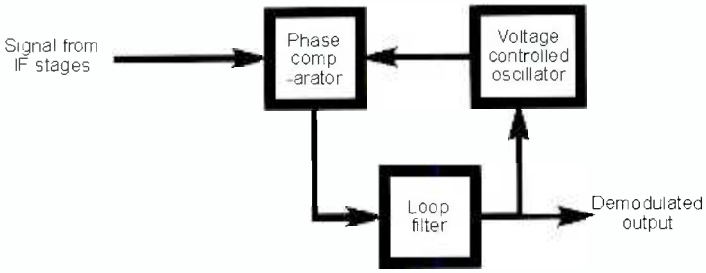


Figure 4: A phase locked loop FM demodulator

To convert the radio frequency (RF) signals into audio voltage variations to be amplified by the audio stage, an FM demodulator must be used. This is a tuned circuit called the discriminator which produces an output voltage proportionate to the frequency variations it detects. It must be very linear to avoid distortion.

Two popular circuits for such discrimination are the ratio detector and the Foster-Seeley detector shown in Figure 2 and Figure 3. Modern FM demodulators are self-contained within integrated circuits (ICs), requiring only an external coil and capacitor to provide the frequency-dependent circuit.

Another method is to use a phase-locked loop (PLL). The way in which this circuit demodulates FM is shown in Figure 4. The FM signal from the IF stages of the set is connected to one of the phase detector inputs as shown, and the output from the VCO is connected to the other.

With no modulation applied and the carrier in the center position of the pass band, the voltage on the tune line to the VCO is set to the mid position. However, if the carrier deviates in frequency, the loop will try to keep the loop in lock. For this to happen the VCO frequency must follow (synchronize with) the incoming signal, and for this to occur the tune line voltage must vary.

Monitoring the tune line shows that the variations in voltage correspond to the modulation applied to the signal. By amplifying the variations in voltage on the tune line it is possible to generate the demodulated signal.

❖ Squelch

Because of the high gain of an FM receiver, under no-signal conditions the background noise is quite high. To overcome this unpleasant effect, a squelch circuit is often included to cut off the audio when no signal is present. Scanners and hand-held transceivers all have such circuits. On stereo FM radios, such a circuit is called "mute."

❖ Quieting specification

One of the advantages of FM is its resilience to noise in the presence of a signal. If a weak signal is introduced and its level slowly increased, the noise level gradually reduces. From this, the "quieting" level can be deduced – the reduction in noise level expressed in decibels when a signal of a given strength is introduced to the input of the set. Typically, a broadcast tuner should give a quieting level of 30 dB for an input level of around a microvolt (1 uV).

❖ Capture effect

Another characteristic often associated with FM is called the capture effect. When two signals are present on or nearly on the same frequency, only the stronger will heard. In the AM mode, the same situation would produce a mixture of the two signals, often accompanied by a heterodyne ("beat" tone produced by any difference between the two carrier waves).

A capture ratio is often defined in receiver specifications; this is the ratio between the relative strengths of the wanted and the unwanted signals required to quiet the unwanted signal. Normally, a reduction of the unwanted signal of 30 dB is used. For example, if the capture ratio is specified as 2:30 dB reduction, a desired signal only 2 dB stronger than the undesired signal will suppress the unwanted interference by 30 dB.

For more information about radio, radio receivers, propagation, radio history, new technology, and much more visit **http://www.radio-electronics.com**

Jock Elliott
lightkpr@nycap.rr.com

Alinco's Superb DJ-596 Dual Band HT

A considerable chunk of my life is occupied with amateur radio. Everyday by 6am I switch on my two-meter radio, and for the next two hours and fifteen minutes or so, I run an assistance network for commuters. The purposes of the net are to detect problems on the roadways of the Capital District of New York State, to report any problems to the proper authorities, and to share that information with net participants.

The information gathered by the net is given to the Traffic Command Center in Albany and to Metro Networks, which does 98 percent of the traffic reporting in the area. The net operates on 145.33, with a Very Large tip of the hat to the Niagara Mohawk Amateur Radio Club for allowing the use of the repeater.

Over the years in running the net, I have put in literally thousands of hours behind the microphone operating on two meters, and I have used a bunch of different rigs in the process. While I don't want to make too much of myself, I figure that makes me somewhat of a connoisseur of two-meter rigs.

It's been my experience that most two-meter rigs, whether they are mobile, base or handi-talkies, typically work pretty well, and that the chief differences among them (with the exception of power source and power output) relate to features. Every once in a while, though, a surprise pops up.

In the case of the Alinco DJ-596, it is a very pleasant surprise: this dual-band handi-talkie has the best audio of any handheld rig that I have ever tested.

More than Competent Performance

The DJ-596 has 100 memory channels, full coverage of the 2 meter and 70 cm USA Amateur bands, extended receive capabilities, CTCSS and DCS encode+decode, three scan modes, the ability to work and save in memory any number of "odd split" transmit/receive offsets, and it can transmit and receive in both the wide and narrow FM modes. A nickel metal hydride battery is standard and the unit will accept and operate on a wide range of input voltages, from 6 ~ 16 VDC. Illuminated keys and display provide easier operation in low-light conditions.

The large display can also show alphanumeric designations for each memory channel. A theft alarm and experimental "mosquito repelling sound" are among the unique features, along with more traditional items such as nine autodial memories. A new feature is External Terminal Control, which can output 5 VDC at 5 mA from the mic jack, which can be used by experimenters to control external devices. The DJ-596 can transmit up to 5 watts output on the 2 meter and 70 cm bands in analog wide or narrow FM and with the optional EJ-43U digital board, digital voice communications are possible.

The Alinco DJ-596 delivers excellent performance with absolutely outstanding audio.

The DJ-596 measures 2-1/4 inches wide, 5-3/8 inches tall (excluding antenna), and 1-5/8 inches deep (including the belt clip). On the front of the radio, there is a speaker grill, the liquid crystal display a tiny hole for the microphone, and 18 soft buttons. On the left side of the case, there is a push-to-talk button and a button that turns off the squelch and can be used to turn on the lamp that illuminates the display. On the right side of the case, there is a jack for plugging in DC power or the wall-transformer/charger that comes standard with the DJ-596.

The back half of the DJ-596 is a nickel metal hydride rechargeable battery. The belt clip attaches to the battery pack, and there are two metal tabs at the bottom of the pack for use with an optional drop-in charger. On top of the radio is a sturdy flexible antenna (total length of the radio including the antenna is 9-5/8 inches), jacks for plugging in an optional speaker-microphone, and a knob which does many things.

Knobs and Buttons

If you're from the Old School (in which the knob on top of the radio controls the volume and little else), the operating schema for the DJ-596 seems foreign at first, but it works very well. The general idea is that the knob on top of the radio is used in concert with one or two of the buttons to change operating parameters. For example, if you want to change the receive volume, press the VOL/BELL key and turn the knob up or down. To adjust the squelch, press the SQL/DIGI button and turn the knob.

To enter the memory mode, press the V/M/MW key and twirl the knob to select a memory channel. Memory channels can store frequency, offset frequency, shift direction, tone encoder frequency, tone encoder/decoder setting, tone decoder frequency, and a bunch of other parameters as well. To store an operating setup in a memory channel, select a memory channel, press the FUNC/SET key and the V/M/MW key at the same time.

Like most of the modern two-meter handi-talkies, the DJ-596 bristles with features and functions. As a result, you'll want to keep the manual – which I found to be well-written and easy to understand – handy for ready reference.

Features, though, mean little if the basic performance of the radio isn't up to par. When I fired up the DJ-596 on a local two-meter repeater, a ham that I have spoken with frequently responded. "How's the audio on this rig?" I asked. "Superb," he said. And the audio coming out of the speaker sounded as if he were in the same room with me!

I give the DJ-596 my highest personal recommendation. And at a manufacturer's suggested retail price of $301.95, what's not to like?

Big Savings on Radio Scanners

Uniden® SCANNERS

Bearcat® 780XLT Trunk Tracker III with free deluxe scanner headset

Manufacturers suggested list price $529.95

Less -$205 Instant Rebate / Special $324.95

500 Channels • 10 banks • CTCSS/DCS • S Meter

Size: 7$^{5/8}$" Wide x 6$^{15/16}$" Deep x 2$^{13/16}$" High

Frequency Coverage: 25 0000-512.0000 MHz , 806.000-823.9875MHz., 849.0125-868.9875 MHz., 894.0125-1300.000 MHz.

When you buy your Bearcat 780XLTGV Trunktracker package deal from Communications Electronics, you get more. The GV means "Great Value." With your BC780XLT scanner purchase, you also get a **free deluxe scanner headphone** designed for home or race track use. Headset features independent volume controls and 3.5 mm gold right angle plug. The Bearcat 780XLT has 500 channels and the widest frequency coverage of any Bearcat scanner ever. Packed with features such as Trunktracker III to cover EDACS, Motorola and EF Johnson systems, control channel only mode to allow you to automatically trunk many systems by simply programming the control channel, S.A.M.E. weather alert, full-frequency display and backlit controls, built-in CTCSS/DCS to assign analog and digital subaudible tone codes to a specific frequency in memory, PC Control with RS232 port, Beep Alert, Record function, VFO control, menu-driven design, total channel control and much more. Our CEI package deal includes telescop c antenna, AC adapter, cigarette lighter cord, DC cord, mobile mounting bracket with screws, owner's manual, trunking frequency guide and one-year limited Uniden factory warranty. For maximum scanning enjoyment, operate your scanner from your computer running Windows. Order Scancat Gold for Windows, part number **SGFW** for $99.95 and magnetic mount antenna part number **ANTMMBNC** for $29.95. Not compatible with AGEIS, ASTRO or ESAS systems. For fastest delivery, order on-line at www.usascan.com.

Bearcat® 895XLT Trunk Tracker

Manufacturer suggested list price $499.95

Less -$320 Instant Rebate / Special $179.95

300 Channels • 10 banks • Built-in CTCSS • S Meter

Size: 10$^{1/2}$" Wide x 7$^{1/2}$" Deep x 3$^{3/8}$" High

Frequency Coverage: 29.000-54.000 MHz., 108.000-174 MHz., 2°6.000-512.000 MHz., 806.000-823.995 MHz , 849.0125-868.995 MHz., 894.0125-956.000 MHz.

The Bearcat 895XLT is superb for intercepting trunked analog communications transmissions with features like TurboScan™ to search VHF channels at 100 steps per second. This base and mobile scanner is also ideal for intelligence professionals because it has a Signal Strength Meter, RS232C Port to allow computer-control of your scanner via optional hardware and 30 trunking channel indicator annunciators to show you real-time trunking activity for an entire trunking system. Other features include Auto Store - Automatically stores all active frequencies within the specified bank(s). Auto Recording - Lets you record channel activity from the scanner onto a tape recorder. CTCSS Tone Board (Continuous Tone Control Squelch System) allows the squelch to be broken during scanning only when a correct CTCSS tone is received. For maximum scanning pleasure, order the following optional accessories: **PS001** Cigarette lighter power cord for temporary operation from your vehicle's cigarette lighter $14.95; **PS002** DC power cord - enables permanent operation from your vehicle fuse box $14.95; **MB001** Mobile mounting bracket $14.95; **EX711** External speaker with mounting bracket & 10 feet of cable with plug attached $19.95. **CAT895** Computer serial cable $29.95 The BC895XLT comes with AC adapter, telescopic antenna, owner's manual and one year limited Uniden warranty. Not compatible with AGEIS, ASTRO, EDACS, ESAS or LTR systems.

Bearcat® 245XLT Trunk Tracker II

Mfg. suggested list price $429.95/**CEI price $189.95**

300 Channels • 10 banks • Trunk Scan and Scan Lists
Trunk Lockout • Trunk Delay • Cloning Capability
10 Priority Channels • Programmed Service Search

Size: 2$^{1/2}$" Wide x 1$^{3/4}$" Deep x 6" High

Frequency Coverage:

29.000-54.000 MHz., 108-174 MHz., 406-512 MHz., 806-823.995 MHz., 849.0125-868.995 MHz., 894.0125-956.000 MHz

Our Bearcat TrunkTracker BC245XLT, is the world's first scanner designed to track Motorola Type I, Type II, Hybrid, SMARTNET, PRIVACY PLUS and EDACS™ analog trunking systems on any band. Now, follow UHF High Band, UHF 800/900 MHz trunked public safety and public service systems just as if conventional two-way communications were used. Our scanner offers many new benefits such as Multi-Track - Track more than one trunking system at a time and scan conventional and trunked systems at the same time. 300 Channels - Program one frequency into each channel. 12 Bands, 10 Banks - Includes 12 bands, with aircraft and 800 MHz. 10 banks with 30 channels each are useful for storing similar frequencies to maintain faster scanning cycles or for storing all the frequencies of a trunked system. Smart Scanner - Automatically program your BC245XLT with all the frequencies and trunking talk groups for your local area by accessing the Bearcat national database with your PC. If you do not have a PC simply use an external modem. Turbo Search - Increases the search speed to 300 steps per second when monitoring frequency bands with 5 KHz steps. 10 Priority Channels - You can assign one priority channel in each bank. Assigning a priority channel allows you to keep track of activity on your most important channels while monitoring other channels for transmissions. Preprogrammed Service (SVC) Search - Allows you to toggle through preprogrammed police, fire/emergency, railroad, aircraft, marine, and weather frequencies. Unique Data Skip - Allows your scanner to skip unwanted data transmissions and reduces unwanted birdies. Memory Backup - If the battery completely discharges or if power is disconnected, the frequencies programmed in your scanner are retained in memory. Manual Channel Access - Go directly to any channel. LCD Back Light - An LCD light remains on for 15 seconds when the back light key is pressed. Autolight - Automatically turns the backlight on when your scanner stops on a transmission. Battery Save - In manual mode, the BC245XLT automatically reduces its power requirements to extend the battery's charge. Attenuator - Reduces the signal strength to help prevent signal overload. The BC245XLT also works as a conventional scanner. Now it's easy to continuously monitor many radio conversations even though the message is switching frequencies. The BC245XLT comes with AC adapter, one rechargeable long life ni-cad battery pack, belt clip, flexible rubber antenna, earphone, RS232C cable, Trunk Tracker frequency guide, owner's manual and one year limited Uniden warranty. Not compatible with AGEIS, ASTRO, ESAS or LTR systems. Hear more action on your radio scanner today. Order on-line at www.usascan.com for quick delivery. For maximum scanning satisfaction, operate the Bearact 245XLT from your computer running Windows. Order Scancat Gold for Windows, part number **SGFW** for $99.95 or the surveillance enhanced version with audio recording part number **SGFWSE** for $159.95.

More Radio Products

Save even more on radio scanners when purchased directly from CEI. Your CEI price after instant rebate is listed below:

Bearcat 895XLT 300 ch. Trunktracker I base/mobile scanner	$179.95
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Bearcat 278CLT 100 ch. AM/FM/SAME WX alert scanner	$159.95
Bearcat 245XLT 300 ch. Trunktracker II handheld scanner	$189.95
Bearcat 248CLT 50 ch. base AM/FM/weather alert scanner	$89.95
Bearcal Sportcat 200 alpha handheld sports scanner	$169.95
Bearcat Sportcat 180B handheld sports scanner	$149.95
Bearcat 80XLT 50 channel handheld scanner	$99.95
Bearcat 60XLT 30 channel handheld scanner	$74.95
Bearcat BCT7 information mobile scanner	$139.95
AOR AR8200 Mark II Wide Band handheld scanner	$539.95
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ICOM R3 handheld wideband receiver with video display	$379.95
Uniden WX100 Weather Alert with S.A.M.E. feature	$49.95

AOR

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1,000 Channels • 20 banks • 50 Select Scan Channels
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Frequency step programmable in multiples of 50 Hz.

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Frequency Coverage:

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The AOR AR8200 Mark IIB is the ideal handheld radio scanner for communications professionals. It features all mode receive: WFM, NFM, SFM (Super Narrow FM), WAM, AM, NAM (wide, standard, narrow AM), USB, LSB & CW. Super narrow FM plus Wide and Narrow AM in addition to the standard modes. The AR8200 also has a versatile multi-function band scope with save trace facility, twin frequency readout with bar signal meter, battery save feature with battery low legend, separate controls for volume and squelch, arrow four way side rocker with separate main tuning dial, configuarable keypad beep/illumination and LCD contrast, write protect and keypad lock, programmable scan and search including LINK, FREE, DELAY, AUDIO, LEVEL, MODE, computer socket fitted for control, clone and record, Flash-ROM no battery required memory, true carrier re-insertion in SSB modes. RF preselection of mid VHF bands. Detachable MW bar aerial. Tuning steps are programmable in multiples of 50 Hz in all modes. 8.33 KHz airband step correctly supported, Step-adjust, frequency offset, AFC. Noise limited & attenuator, Wide and Narrow AM in addition to the standard modes. For maximum scanning pleasure, you can add one of the following optional slot cards to this scanner. CT8200 CTCSS squelch & search decoder $89.95, EM8200 External 4.000 channel backup memory, 160 search banks. $69.95; RU8200 about 20 seconds chip based recording and playback $69.95; TE8200 256 step tone eliminator $59.95. In addition, two leads are available for use with the option socket. CC8200 personal computer control lead $109.95; CR8200 tape recording lead $59.95. Includes 4 1,000 mAh AA ni-cad batteries, charger, cigarette lighter adapter, whip aerial, MW bar antenna, belt hook, strap and one year limited AOR warranty. Enter your order now at http://www.usascan.com.

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What's NEW

Tell them you saw it in Monitoring Times

2-Way Radio from Kenwood

Kenwood Communications has introduced a compact, rugged, 2-way radio designed expressly for the job-site communications needs of workers operating in office complexes, restaurants, retail stores and small warehouses. The new ProTalk XLS, a palm-sized radio with four-mile range, operates on the UHF business bands, providing a penetrating, reliable communication link even in challenging RF environments.

The ProTalk XLS radios come preprogrammed with the eight standard Business Radio Service UHF "star" frequencies. Users can easily select any two of these frequencies for their own use. ProTalk is user-programmable to provide two channels of voice communication from a choice of 242 channel combinations.

The two-channel ProTalk XLS offers 38 user programmable analog sub-channels and an additional 83 user programmable digital sub-channels, for a total of 242 channel combinations (2x38 plus 2x83). The digital talk groups provide more than 160 channels of exceptionally clear communications.

A backlit LCD display with numeric and icon read-outs indicates programmed settings and radio performance. Channel scan ensures users can always find a clear channel to talk, and six call tones and a vibration alert means calls won't go undetected, even in noisy surroundings. Users can take advantage of a voice scrambler unique to XLS model radios to increase privacy. Built-in voice activation (VOX) circuitry, with three sensitivity levels, allows users to utilize headsets to bypass push-to-talk (PTT) methods.

The XLS is small (about 4.5 inches tall) and lightweight (about 7 oz.) A tough polycarbonate case helps protect the unit, and a top-mounted rotary volume control makes for easy operation even when wearing gloves.

The ProTalk XLS comes with a rechargeable NiMH battery that provides around 10 hours of talk time at 1-watt output, or users can select a lower power setting to further increase battery life and talk time. A time-out timer also conserves battery life. Standard equipment includes the NiMH batteries and rapid charger, but the XLS also accepts three conventional double-A alkaline or rechargeable batteries.

For more information, contact Kenwood Communications Corp., Technology Park at Johns Creek, 3975 Johns Creek Rd., Suwanee, GA 30024 (Phone: 800-950-5005; **http://www.kenwood.net**.

KVH Satellite TV Antenna

Travelers parked for the evening in their RVs and campers have a new option for acquiring satellite TV or high-speed Internet access. KVH Industries' TracVision S3 satellite TV antenna introduces integrated Digital Video Broadcast (DVB) technology and automatic satellite acquisition to make "pop-up" style satellite antennas obsolete.

Ideal for use aboard parked RVs, trucks, and motorcoaches, the system automatically identifies and acquires satellite signals from a range of DIRECTV and DVB-compatible satellites, including the multi-satellite DISH 500 service. In addition, the TracVision S3 is fully compatible with KVH's TracNet Mobile Internet Server and exclusive mobile DirecPC high-speed Internet service.

"With a growing number of satellite TV options as well as the launch of KVH's exclusive high-speed mobile Internet service, vehicle-mounted satellite antennas need to have the ability to seek out, identify, and lock onto the correct satellite from potentially hundreds of targets in orbit," explained Ian Palmer, vice president of satellite sales.

"KVH pioneered the solution to this challenge when we introduced our DVB-compatible TracVision L3 in-motion antenna. Now, we've applied that same technology to our newest automatic domed system, the TracVision S3. Simply park the vehicle and turn on the antenna –TracVision S3 will do the rest without requiring you to crank up the antenna or laboriously tune in the satellite signal. And with its pre-programmed satellite library, switching from one satellite to another is a simple matter, an invaluable convenience if you subscribe to a satellite TV service that uses multiple satellites to broadcast its programming, such as the popular DISH 500."

For pricing and availability, check with your nearest KVH dealer.

OCEA Would Approve

Do you ever wonder if your son's rock music, your wife's food processor, or your lawn mower could be damaging your hearing? Edmund Scientifics has just announced a meter to put a value on the audio in question. The two-

scale, direct-reading decibel meter is suitable for use in home, school or industry. Low scale indicates 40 to 80dB; high scale indicates 80 to 120 dB – the loudest noise level allowed even with ear protection.

The sound level meter includes battery check and calibration settings. The unit is powered by one 9V battery, provided. Window size 1" x 2". Unit measures 6.3"L x 2.6"W x 1.5"T; the window size is 1"x2".

The sound level meter is $160 from Edmund Scientifics, 60 Pearce Avenue, Tonawanda, NY 14150-6711; 800-728-6999; **http://www.scientificsonline.com** or email *cons_order@edsci.com*

Monitoring Times Anthology 2001

Compact, convenient, and *searchable* – those are some of the good reasons for acquiring the entire volume of last year's *Monitoring Times* issues on one compact disk. Frequency lists, shortwave program guides, equipment reviews, construction tips, antenna projects, scanner and shortwave topics, even ads –

What's NEW

Tell them you saw it in Monitoring Times

all are available on one CD! Adobe Acrobat Reader 4.0 is included at no extra charge.

MT Anthology 2001 is $19.95 plus $2.50 US shipping USPS from Grove Enterprises (7540 Hwy 64 West, Brasstown, NC 28902; 800-438-8155; order@grove-ent.com).

ARRL Handbook for Radio Amateurs

This year's bible of radio and electronics for the amateur radio enthusiast has grown yet larger, offering more than 1200 pages, and as a 79th annual edition, you can be sure that what you read is right!

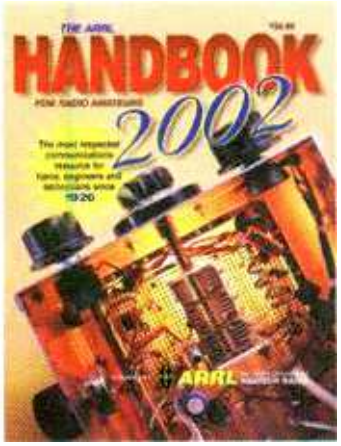
The *ARRL Handbook* has earned the respect of engineers, experimenters, and hams worldwide, and with good reason – the answer to virtually any question that might come to mind regarding amateur radio and related equipment is likely to be found within this volume.

In addition to time-honored topics like antennas, propagation, radio direction finding (RDF), transmitters, receivers, basic electronics theory, satellites, interference, test equipment, power supplies, filters, and operational procedures, this year's edition includes an expanded chapter on digital signal processing (DSP), wireless technology (cell phones, pagers, etc.), solar charge controller, universal power supply, easy-to-buld VHF receiver, and a wide-range RF voltmeter project.

Free companion software for many of the projects is available from the ARRL web site (**http://www.arrl.org/**) including meter faces, data and base diagrams for power tubes, exhaustive tables for the 1988 *Handbook*, and more.

As always, the material is easy to read, and photos and diagrams are crisp and abundant. A great look-up chapter gives tables of specifications and descriptions for capacitors, resistors, inductors and transformers, wire gauges and characteristics, coax cable and connectors, miniature lamps, semiconductors, and even plastics.

A copy of the ARRL *Handbook* should proudly adorn every radio enthusiast's bookshelf – and he should read it, too! $34.95 plus $7 U.S. postage from the American Radio Relay League, 225 Main St., Newington, CT 06111, or phone your order to (888) 277-5289.



Flashlights

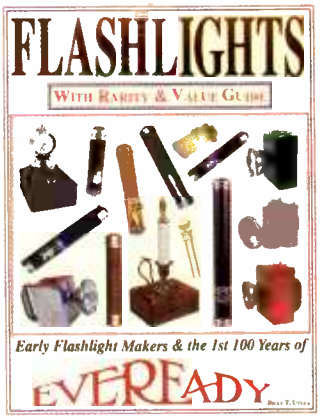
by Billy T. Utley

How many of us have seen an old flashlight at an auction, estate sale, yard sale, or antique shop, and wondered about its age and value? A comprehensive guide to these lanterns of yore has been long awaited, and it's here now!

Eveready invented the flashlight a century ago, and has been the dominant force ever since. Utley's comprehensive 340-page guide includes virtually every Eveready flashlight ever made, with hundreds of superb color and B/W photos, along with exhaustive historical documents showing patents and original drawings and designs. An additional section covers the lesser-known 1928-1930 radios and vacuum tubes, and even earlier, clocks from the respected company.

The new reference includes early scarf lights, electric candles, lanterns, dental and photographers' lights, bicycle and travel lights, test meters, novelties, extensive advertising prints, and a value guide as well. A delightful, colorful, informative read.

$49.95 plus $3.05 U.S. shipping from Bill Utley, PO Box 4095, Tustin, CA 92781; or email flashlight1@home.com, or phone (714) 505-4067.



Here and There

- LLC Technology Publishing (Hightext Publications), founded by Carol Lewis and Harry Helms, has been acquired by Butterworth-Heinemann, which will add their titles to the Newnes list of communications and engineering books. Visit **http://www.newnespress.com** for information on new releases.
- Dan Veeneman reports that hobbyists can track Orbcomm's 30 satellites just the way the company does it: Internally they use a program called "Orbcomm View" from Northern Lights Software (**http://www.nlsa.com**) to visualize the locations of each of their satellites. Since there is a demo version of the software and Orbcomm publishes the Keplerian elements on their webpage, anyone can do the same thing (the elements are derived not from NORAD but from $300 Rockwell GPS receivers that are onboard each spacecraft.)
- Maps can sometimes be very revealing. Clary Meuser has an online environmental research network, and among data he is tracking is the growth of wireless communications towers. You can see the website and participate in his study by going to **http://www.mapcruzin.com**, where you can also learn how to make your own maps. Hmm-m, how about inserting frequencies into pop-up boxes...?

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 mteditor@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
Keaau, 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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What's New	Rachel Baughn	mteditor@grove-ent.com

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Ads for **Stock Exchange** must be received 45 days prior to publication date. All ads must be paid in advance to *Monitoring Times*.
Ad copy must be typed for legibility.

1-3/4" SQUARE DISPLAY AD: $50 per issue if camera-ready copy or, $85 if copy to be typeset. Photo-reduction $5 additional charge. For more information on commercial ads, contact Beth Leinbach, 828-389-4007.

Monitoring Times assumes no responsibility for misrepresented merchandise.

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NON-COMMERCIAL SUBSCRIBER RATES: $.25 per word — *Subscribers only!* All merchandise must be personal and radio-related.

COMMERCIAL, NON-SUBSCRIBER, AND MULTIPLE SALES RATES: $1.00 per word. Commercial line ads printed in bold type.

NOTICE: It is unlawful to buy cellular-capable scanners in the United States made after 1993, or modified for cellular coverage, unless you are an authorized government agency, cellular service provider, or engineering/service company engaged in cellular technology.

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Join the Club!

Open to hobbyists worldwide, the **CANADIAN INTERNATIONAL DX CLUB** is Canada's national, general coverage radio club serving members since 1962. The **Messenger** features columns on AM/FM, shortwave, utilities, scanning, QSLing, pirates, ham radio and more. Send $2 for a sample copy to:

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Closing Comments

By Bob Grove, Publisher

The Internet: Soup to Nuts

The Internet has become, and will remain, the largest repository of information – and misinformation – in history. Burgeoning with fact and fancy, the 'net is an inexhaustible wonderland of knowledge, experiences, biographies, accounts, catalogs, assertions and rebuttals, resources, ravings, hopes and dreams. It is a panorama of contributions from scientists and pseudo-scientists, thinkers and crackpots, conformists and dissenters, intellectuals and lunatics.

The Internet is perceived differently by different users and abusers. To legitimate merchandisers, it is a mercantile mart to hawk their wares; to the fraudulent exploiter, it provides insulation from identity, a means to creep about in the darkness of anonymity, preying on the trust of the innocents.

But the truly benevolent – and there are many more of those – contribute help, insight, counseling, and hope to anyone in need of religious, spiritual, or philosophical healing.

And for those of us that just can't seem to get enough information, the 'net is a cornucopia of knowledge.

The Internet is a giant leveler; whoever or whatever, appearance seems to be all that counts. But not all that glitters is gold. Even in our hobby, we see widely-disparate claims and counterclaims for products as well as conflicting misstatements of fact.

Obsolete and erroneous call signs are perpetuated by self-annointed "experts" who simply copy other Internet lists, ignorant of the subject. A recent list we saw propagated call signs of military bases long closed, or of aircraft no longer flying. Originally copied from the early editions from my *Shortwave Directory*, some included ringers (non-existent calls) I injected to detect plagiarism. Here are a few samples:

AARDVARK (F-111 generic call sign; aircraft no longer flying)
ABNORMAL 20, Wheeler Air Force Base, HI (It's an Army installation)
ABSOLUTION (Used only once by the USAF Air Mobility Command in Somalia!)
ALMIGHTY (Guantanamo Bay Navy Base; hasn't been reported in years)
BARBARIC (Same as above)
BATTER UP (Any NAVCOMSTA this frequency; another obsolete USN call sign relic)
BRASS HAT (Fictitious; used in the Hollywood movie *War Games*!)
CAPSULE (General call sign for all MAC aircraft, but MAC no longer exists and neither does the call sign)
COURAGE (*USS America* – decommissioned)
CRISCO (This Tennessee ANG radar unit is no longer in existence)
FIRESIDE (USAF TAC ground station call sign series hasn't been heard in several years, and neither has TAC)
GIANT TALK (SAC net; discontinued and combined with another HF net years ago)
GRAY EAGLE (*USS Ranger* – now a museum)
GUN TRAIN (*USS Independence* – decommissioned)
IVANHOE (NTCC Norfolk, VA – this is over a decade old!)
JITTERBUG (Canal Zone – someone hasn't been following current events)
LOBO (Howard AFB, Panama – base closed)
MASTADON (NASA Merritt Island – gone for at least 10 years)
MISSIONARY (NAS Norfolk, VA – another ancient US Navy relic)
OVERWORK (Navy HICOM general call sign; HICOM disappeared with Giant Talk)
RASPBERRY (USN call sign; disappeared many years ago along with its 6723 kHz frequency that still circulates)
RAYMOND 6 (George AFB, CA – base closed)
RAYMOND 9 (Howard AFB, Panama – base closed)
RAYMOND 12 (England AFB, LA – base closed)
RAYMOND 28 (Bergstrom AFB, TX – base closed)
RINGMASTER (Obsolete NORAD Headquarters)
SHARK (Howard AFB, Panama – base closed)
TOPHAND (Atlantic Submarine Command, Norfolk, VA – Callsign disappeared with Overwork)
TOREADOR (NAVCOM San Francisco, CA – Ditto)
WIMPY (*USS Hornet* – now a museum)

And then there are the erroneous frequencies, many long abandoned, changed by the military's switch to 3 kHz channelization in the early '90s, or relegated to non-existent agencies. Take a look at these erroneous examples populating some web sites:

Raspberry Net: 6723
SAC A (Alfa): 11243
SAC B (Bravo): 11220
SAC Q (Quebec): 6761
SAC YQ: 11408
GCCS 6750, 6753
NORAD 9723, 11141, 11441, 14894
SAMTEC 10780, 13218, 17248, 20390

...all gone from the airwaves, but still prominently copied by numerous 'net hounds.

But this is just the edge of the abyss of misinformation available on the Internet. In a previous editorial I noted the nonsense behind the contrail ("chemtrail"..sic.) phobia; this elicited a number of swift, dissonant responses, most of them pointing me toward Internet sites "proving" the existence of these malevolent effluents.

Fortunately, an equal number of informed pilots and engineers were quick to rally on my behalf, explaining the science behind the mystery: Altitude, temperature, winds aloft, fuel concentrations, water vapor, aerodynamic experiments – all play a part in the appearance of vapor trails tailing aircraft.

And let's not forget the zealots, those who are totally obsessed with precepts and notions, many of which have little basis in reality. To them, the Internet is a fresh, new vista for propagandizing and proselytizing. Let's take a brief look at a quote from one site:

"It is well known that microwave mind control using the TETRA system, based on CIA mind control research, is in the process of turning the UK into a matrix-land. The 30,000 plus transmitters will zombify the population and police, and dissidents can be terminated by implanting them with Digital Angel and using computer controlled microwave weapons targeted on their home, street, shopping mall, car, trains – to covertly kill all subversives."

Hmmmm... Well-known by whom? TETRA (Trans European Trunked Radio) is simply an extensive radio system used to integrate multiple public safety organizations, and even business and private communications if desired by the licensees. Prominent manufacturers like Motorola and Nokia are instrumental in its successful implementation throughout Europe. Nothing sinister here – unless you don't like big business.

Allegations of CIA mind control experiments have been played to the hilt by the perpetually nervous for years, so it's not surprising to see it resurrected again, especially when it's on a site promoting magnetic and natural healing products.

So far as the "Digital Angel," a product of Advanced Digital Systems (ADS), we reported on that prospective device some years ago. It is a microchip implant which could be used to satellite-track animals, in-transit products, high-risk diplomats or medical patients, or anything or anyone else – voluntarily. It was scheduled to begin marketing last December in south Florida, but at this writing we have no further information.

The Internet is a wondrous place to visit, but keep a skeptical eye on its contents, and your hand on your wallet pocket!

Not everyone is as charitable toward the copycats. Let's read what one of the world's most well-known publishers of requency directories, Joerg Klingenfuss, says about them in his 2002 Shortwave Frequency Guide: "The Internet...is not only a just too convenient source for copying and plagiarizing information, but...consititutes a worldwide promotion platform for incompetent and stupid people, idiots, and outright maniacs."

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